

TECHNICAL REPORT



**for the
2013 Pennsylvania
System of School Assessment**

**Provided by
Data Recognition Corporation**

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Glossary of Common Terms

The following table contains some terms used in this technical report and their meanings. Some of these terms are used universally in the assessment community, and some of these terms are used commonly by psychometric professionals. A glossary of accommodation terms as applied to the PSSA is provided in Chapter Ten.

Table G–1. Glossary of Terms

Term	Common Definition
Ability	In Rasch scaling, ability is a generic term indicating the level of an individual on the construct measured by an exam. As an example for the PSSA, a student’s reading ability is measured by how the student performed on the PSSA Reading test. A student who answered more items correctly has a higher ability than a student who answered fewer items correctly.
Adjacent Agreement	A score/rating difference of one (1) point in value usually assigned by two different raters under the same conditions (e.g., two independent raters give the same paper scores that differ by one point).
Alternate Forms	Two or more versions of a test that are considered exchangeable, i.e., they measure the same constructs in the same ways, are intended for the same purposes, and are administered using the same directions. More specific terminology applies depending on the degree of statistical similarity between the test forms (e.g., parallel forms, equivalent forms, and comparable forms) where parallel forms refers to the situation in which the test forms have the highest degree of similarity to each other.
Average	A measure of central tendency in a score distribution that usually refers to the arithmetic mean of a set of scores. In this case, it is determined by adding all the scores in a distribution and then dividing the obtained value by the total number of scores. Sometimes people use the word average to refer to other measures of central tendency such as the median (the score in the middle of a distribution) or mode (the score value with the greatest frequency).
Bias	In a statistical context, bias refers to any source of systematic error in the measurement of a test score. In discussing test fairness, bias may refer to construct-irrelevant components of test scores that differentially affect the performance of different groups of test takers (e.g., gender, ethnicity, etc.). Attempts are made to reduce bias by conducting item fairness reviews and various differential item functioning (DIF) analyses, detecting potential areas of concern, and either removing or revising the flagged test items prior to the development of the final operational form of the test (see also Differential Item Functioning).
Constructed-Response Item	See Open-Ended Item.
Content Validity Evidence	Evidence regarding the extent to which a test provides an appropriate sampling of a content domain of interest (e.g., assessable portions of a state’s Grade 6 mathematics curriculum in terms of the knowledge, skills, objectives, and processes sampled.)

Table G–1 (continued). Glossary of Terms

Term	Common Definition
Core-Linking Item	Items that are utilized during the linking process (see also Linking). They are a subset of the PSSA operational items and so they 1) are the same on all test forms for any grade/subject area test and 2) contribute to student total raw scores and scaled scores.
Criterion-Referenced Interpretation	When a score is interpreted as a measure of a student’s performance with respect to an expected level of mastery, educational objective, or standard. The types of resulting score interpretations provide information about what a student knows or can do with respect to a given content area.
Cut Score	A specified point on a score scale such that scores at or above that point are interpreted or acted upon differently from scores below that point (e.g., a score designated as the minimum level of performance needed to pass a competency test). One or more cut scores can be set for a test that results in dividing the score range into various proficiency level ranges. Methods for establishing cut scores vary. For the PSSA, three cut scores are used to place students into one of four performance levels (see also Performance Level Setting).
Decision Consistency	The extent to which classifications based on test scores would match the decisions based on scores from a second, parallel form of the same test. It is often expressed as the proportion of examinees who are classified the same way from the two test administrations.
Differential Item Functioning (DIF)	A statistical property of a test item in which different groups of test takers (who have the same total test score) have different average item scores. In other words, students with the same ability level but different group memberships do not have the same probability of answering the item correctly (see also Bias).
Distractor	An incorrect option in a multiple-choice item (also called a foil).
Equating	The strongest of several linking methods used to establish comparability between scores from multiple tests. Equated test scores should be considered exchangeable. Consequently, the criteria needed to refer to a linkage as equating are strong and somewhat complex (equal construct and precision, equity, and invariance). In practical terms, it is often stated that it should be a matter of indifference to a student if he/she takes any of the equated tests (see also Linking).
Equating Block (EB) Items	The PSSA uses multiple test forms for each grade/subject area test. Each form is composed of operational (OP) items, equating block (EB) items, and field test (FT) items. EB items are utilized during the linking process (see also Linking). Each test form includes a set of EB items. EB items are not part of any student scores.
Error of Measurement	The amount by which the score actually received (an observed score) differs from a hypothetical true score (see also Standard Error of Measurement).
Exact Agreement	When identical scores/ratings are assigned by two different raters under the same conditions (e.g., two independent raters give a paper the same score).

Table G–1 (continued). Glossary of Terms

Term	Common Definition
Field Test (FT) Items	The PSSA uses multiple test forms for each grade/subject area test. Each form is composed of operational (OP) items, equating block (EB) items, and field test (FT) items. An FT item is a newly-developed item that is ready to be tried out to determine its statistical properties (see also <i>P</i> -value and Point-Biserial Correlation). Each test form includes a set of FT items. FT items are not part of any student scores.
Frequency	The number of times that a certain value or range of values (score interval) occurs in a distribution of scores.
Frequency Distribution	A tabulation of scores from low to high or high to low showing the number and/or percent of individuals who obtain each score or who fall within each score interval or category.
Infit/Outfit	Statistical indicators of the agreement of the data and the measurement model (see also Outfit/Infit).
Item Difficulty	For the Rasch model, the dichotomous item difficulty represents the point along the latent trait continuum where an examinee has a 0.50 probability of making a correct response. For a polytomous item, the difficulty is the average of the item’s step difficulties (see also Step Difficulty).
Key	The correct response option or answer to a test item.
Linking	A generic term referring to one of a number of processes by which scores from one or more tests are made comparable to some degree. Linking includes several classes of transformations (equating, scale alignment, prediction, etc.). Equating is associated with the strongest degree of comparability (exchangeable scores). Other linkages may be very strong but fail to meet one or more of the strict criteria required of equating (see also Equating).
Logit	In Rasch scaling, logits are units used to express both examinee ability and item difficulty. When expressing examinee ability, a student who answers more items correctly has a higher logit than a student who answers fewer items correctly. Logits are transformed into Scaled Scores through a linear transformation. When expressing item difficulty, logits are transformed <i>p</i> -value (see also <i>P</i> -value). The logit difficulty scale is inversely related to <i>p</i> -values. A higher logit value would represent a relatively harder item, while a lower logit value would represent a relatively easier item.
Mean	Also referred to as the arithmetic mean of a set of scores, is found by adding all the score values in a distribution and dividing by the total number of scores. For example, the mean of the set {66, 76, 85, 97} is 81. The value of a mean can be influenced by extreme values in a score distribution.

Table G–1 (continued). Glossary of Terms

Term	Common Definition
Measure	In Rasch scaling, measure generally refers to a specific estimate of an examinee’s ability (often expressed as logits) or an item’s difficulty (again, often expressed as logits). As an example for the PSSA, a student’s reading measure might be equal to 0.525 logits. Or, a PSSA Reading test item might have logit equal to -0.905.
Median	The middle point or score in a set of rank-ordered observations that divides the distribution into two equal parts such that each part contains 50 percent of the total data set. More simply put, half of the scores are below the median value and half of the scores are above the median value. As an example, the median for the following ranked set of scores {2, 3, 6, 8, 9} is 6.
Multiple-Choice Item	A type of item format that requires the test taker to select a response from a group of possible choices, one of which is the correct answer (or key) to the question posed (see also Open-Ended Item).
<i>N</i> -count	Sometimes designated as <i>N</i> or <i>n</i> , it is the number of observations (usually individuals or students) in a particular group. Some examples include the number of students tested, the number of students tested from a specific subpopulation (e.g., females), the number of students who attained a specific score, etc. In the follow set {23, 32, 56, 65, 78, 87}, <i>n</i> = 6.
Open-Ended Item	An open-ended (OE) item—referred to by some as a constructed-response (CR) item—is an item format that requires examinees to create their own responses, which can be expressed in various forms (e.g., written paragraph, created table/graph, formulated calculation, etc.). Such items are frequently scored using more than two score categories, that is, polytomously (e.g., 0, 1, 2, and 3). This format is in contrast to when students make a choice from a supplied set of answers options (e.g., multiple-choice (MC) items which are typically dichotomously scored as right = 1 or wrong = 0.) When interpreting item difficulty and discrimination indices it is important to consider whether an item is polytomously or dichotomously scored.
Operational Item	The PSSA uses multiple test forms for each grade/subject area test. Each form is composed of operational (OP) items, equating block (EB) items, and field test (FT) items. OP items are the same on all forms for any grade/subject area test. Student total raw scores and scaled scores are based exclusively on the OP items.
Outfit/Infit	Statistical indicators of the agreement of the data and the measurement model. Infit and Outfit are highly correlated, and both are highly correlated with the point-biserial correlation. Underfit can be caused when low-ability students correctly answer difficult items (perhaps by guessing or atypical experience) or high-ability students incorrectly answer easy items (perhaps because of carelessness or gaps in instruction). Any model expects some level of variability, so overfit can occur when nearly all low-ability students miss an item while nearly all high-ability students get the item correct.

Table G–1 (continued). Glossary of Terms

Term	Common Definition
Percent Correct	When referring to an individual item, the percent correct is the item’s <i>p</i> -value expressed as a percent (instead of a proportion). When referring to a total test score, it is the percentage of the total number of points that a student received. The percent correct score is obtained by dividing the student’s raw score by the total number of possible points and multiplying the result by 100. Percent Correct scores are often used in criterion-referenced interpretations and are generally more helpful if the overall difficulty of a test is known. Sometimes Percent Correct scores are incorrectly interpreted as Percentile Ranks.
Percentile	The score or point in a score distribution at or below which a given percentage of scores fall. It should be emphasized that it is a value on the score scale, not the associated percentage (although sometimes in casual usage this misinterpretation is made). For example, if 72 percent of the students score at or below a Scaled Score of 1500 on a given test, then the Scaled Score of 1500 would be considered the 72nd percentile. As another example, the median is the 50th percentile.
Percentile Rank	The percentage of scores in a specified distribution falling at/below a certain point on a score distribution. Percentile Ranks range in value from 1 to 99, and indicate the status or relative standing of an individual within a specified group, by indicating the percent of individuals in that group who obtained equal or lower scores. An individual’s percentile rank can vary depending on which group is used to determine the ranking. As suggested above, Percentiles and Percentile Rank are sometimes used interchangeably; however strictly speaking, a percentile is a value on the score scale.
Performance Level Descriptors	Descriptions of an individual’s competency in a particular content area, usually defined as ordered categories on a continuum, often labeled from Below Basic to Advanced, that constitute broad ranges for classifying performance. The exact labeling of these categories, and narrative descriptions, may vary from one assessment or testing program to another.
Performance Level Setting	Also referred to as standard setting, a procedure used in the determination of the cut scores for a given assessment that is used to measure students’ progress towards certain performance standards. Standard setting methods vary (e.g., modified Angoff, Bookmark Method, etc.), but most use a panel of educators and expert judgments to operationalize the level of achievement students must demonstrate in order to be categorized within each performance level.
Point-Biserial Correlation	In classical test theory this is an item discrimination index. It is the correlation between a dichotomously scored item and a continuous criterion, usually represented by the total test score (or the corrected total test score with the reference item removed). It reflects the extent to which an item differentiates between high-scoring and low-scoring examinees. This discrimination index ranges from –1.00 to +1.00. The higher the discrimination index (the closer to +1.00), the better the item is considered to be performing. For multiple-choice items scored as 0 or 1, it is rare for the value of this index to exceed 0.5.

Table G–1 (continued). Glossary of Terms

Term	Common Definition
<i>P</i> -value	An index indicating an item’s difficulty for some specified group (perhaps grade). It is calculated as the proportion (sometimes percent) of students in the group who answer an item correctly. <i>P</i> -values range from 0.0 to 1.0 on the proportion scale. Lower values correspond to more difficult items and higher values correspond to easier items. <i>P</i> -values are usually provided for multiple-choice items or other items worth one point. For open-ended items or items worth more than one point, difficulty on a <i>p</i> -value-like scale can be estimated by dividing the item mean score by the maximum number of points possible for the item (see also Logit).
Raw Score	Sometimes abbreviated by RS—it is an unadjusted score usually determined by tallying the number of questions answered correctly, or by the sum of item scores (i.e., points). (Some rarer situations might include formula-scoring, the amount of time required to perform a task, the number of errors, application of basal/ceiling rules, etc.). Raw scores typically have little or no meaning by themselves and require additional information—like the number of items on the test, the difficulty of the test items, norm-referenced information, or criterion-referenced information.
Reliability	The expected degree to which test scores for a group of examinees are consistent over exchangeable replications of an assessment procedure, and therefore, are considered dependable and repeatable for an individual examinee. A test that produces highly consistent, stable results (i.e., relatively free from random error) is said to be highly reliable. The reliability of a test is typically expressed as a reliability coefficient or by the standard error of measurement derived by that coefficient.
Reliability Coefficient	A statistical index that reflects the degree to which scores are free from random measurement error. Theoretically, it expresses the consistency of test scores as the ratio of true score variance to total score variance (true score variance plus error variance). This statistic is often expressed as correlation coefficient (e.g., correlation between two forms of a test) or with an index that resembles a correlation coefficient (e.g., calculation of a test’s internal consistency using Coefficient Alpha). Expressed this way, the reliability coefficient is a unitless index. The higher the value of the index (closer to 1.0), the greater the reliability of the test (see also Standard Error of Measurement).
Scaled Score	A mathematical transformation of a raw score developed through a process called scaling. Scaled scores are most useful when comparing test results over time. Several different methods of scaling exist, but each is intended to provide a continuous and meaningful score scale across different forms of a test.
Selected-Response Item	See Multiple-Choice Item.

Table G–1 (continued). Glossary of Terms

Term	Common Definition
Spiraling	A packaging process used when multiple forms of a test exist and it is desired that each form be tested in all classrooms (or other grouping unit (e.g., schools)) participating in the testing process. This process allows for the random distribution of test booklets to students. For example, if a package has four test forms labeled A, B, C, and D, the order of the test booklets in the package would be A, B, C, D, A, B, C, D, A, B, C, D, etc.
Standard Deviation (SD)	A statistic that measures the degree of spread or dispersion of a set of scores. The value of this statistic is always greater than or equal to zero. If all of the scores in a distribution are identical, the standard deviation is equal to zero. The further the scores are away from each other in value, the greater the standard deviation. This statistic is calculated using the information about the deviations (distances) between each score and the distribution’s mean. It is equivalent to the square root of the variance statistic. The standard deviation is a commonly used method of examining a distribution’s variability since the standard deviation is expressed in the same units as the data.
Standard Error of Measurement (SEM)	It is the amount an observed score is expected to fluctuate around the true score. As an example, across replications of a measurement procedure, the true score will not differ by more than plus or minus one standard error from the observed score about 68 percent of the time (assuming normally distributed errors). The SEM is frequently used to obtain an idea of the consistency of a person’s score in actual score units, or to set a confidence band around a score in terms of the error of measurement. Often a single SEM value is calculated for all test scores. On other occasions, however, the value of the SEM can vary along a score scale. Conditional standard errors of measurement (CSEMs) provide an SEM for each possible scaled score.
Step Difficulty	Step difficulty is a parameter estimate in Master’s partial credit model (PCM) that represents the relative difficulty of each score step (e.g., going from a score of 1 to a score of 2). The higher the value of a particular step difficulty, the more difficult a particular step is relative to other score steps (e.g., is it harder to go from a 1 to a 2, or to go from a 2 to a 3).
Strand	On score reports, a strand often refers to a set of items on a test measuring the same contextual area (e.g., Number Sense in Mathematics). Items developed to measure the same reporting category would be used to determine the strand score (sometimes called “subscale” score).
Technical Advisory Committee (TAC)	A group of individuals, most often professionals in the field of testing, who are either appointed or selected to make recommendations for and to guide the technical development of a given testing program.
Validity	The degree to which accumulated evidence and theory support specific interpretations of test scores entailed by the purposed uses of a test. There are various ways of gathering validity evidence.

Preface: An Overview of Assessments from 2003 to the Present

The period from 2003 through 2006 brought significant structural changes to the test blueprint for the Pennsylvania System of School Assessment (PSSA). These changes necessitated extensive test development and field testing activity along with phased-in implementation of the operational assessment. Included in this process was the development and implementation of assessments at additional grade levels.

For mathematics and reading, content changes for Grades 5, 8, and 11 were developed in 2003, field tested in spring 2004, and implemented in spring 2005. The *2005 PSSA Technical Report for Reading and Mathematics* provides a description of test development activities including a review of open-ended tasks and multiple-choice items, field testing, selection of items, statistical analysis of assessment data, reliability, validity, standard setting, and other technical characteristics of the operational 2005 PSSA. Test development for the new grade levels of 4, 6, and 7 began in 2004, with field testing in 2005, and full implementation in 2006. Similarly, the *2006 PSSA Technical Report for Reading and Mathematics: Grades 4, 6, and 7* provides a complete description of test development activities, item review, field testing, statistical analysis, item selection, and technical characteristics of the operational 2006 PSSA for these grade levels. In 2007, the Grade 3 reading and mathematics assessment became DRC's responsibility and is covered in the *2007 PSSA Technical Report for Reading and Mathematics*, along with the remaining grades.

Changes implemented in the writing assessment of spring 2006 were designed to sharpen the focus on what is assessed with respect to Academic Standards 1.4 and 1.5. To support this effort, a shift in grade levels assessed was made, moving from Grades 6 and 9 to Grades 5 and 8, thereby aligning assessment to the end of elementary and middle school years. The writing testing window was changed from fall to February 2006 for Grades 5 and 8, making it consistent with Grade 11. Mode-specific scoring guidelines replaced domain scoring, and the introduction of stimulus-based passages and associated multiple-choice items measuring revising and editing expanded the basis of the conventions score. An account of the development of writing prompts and stimulus-based, multiple-choice items, review processes, field testing and item analysis, standard setting, and other technical characteristics of the operational 2006 PSSA may be found in the *2006 PSSA Technical Report for Writing*.

The introduction of an operational science assessment in 2008 moved closer to reality with a major standalone field test at Grades 4, 8, and 11 in April–May of 2007. A description of the development of science scenarios and related multiple-choice, short answer open-ended, and extended open-ended questions, item review processes, statistical analysis of field test data, and selection of items for the 2008 operational science test may be found in the *2008 PSSA Preliminary Technical Report for Science*. Subsequently, the first operational science assessment took place in the spring of 2008, along with standard setting and reporting of results.

With the exception of some shifting of test windows, the spring assessments of 2009, 2010, 2011, 2012, and 2013 were conducted without change in content structure of the PSSA test instruments.

The following pages provide an overview of the year-to-year changes to the PSSA. Tables and descriptions show the subject areas assessed, time of year the testing activity took place, and the type of testing that occurred (e.g., operational, field testing, Grade 12 retest) for each year.

To access any of the PSSA technical reports referenced in the Preface, please go to the Pennsylvania Department of Education website, www.education.state.pa.us. Click on “Programs” from the menu in the left-hand column, then select “Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” then select “PSSA Technical Analysis” from the “Most Requested Content...” box.

ASSESSMENT ACTIVITIES OCCURRING IN THE 2003–04 SCHOOL YEAR

Table P–1 outlines the operational assessments and field tests administered during the 2003–04 school year. (A spring operational assessment in mathematics and reading took place at Grades 3, 5, 8, and 11.)

As a result of new Assessment Anchor Content Standards (Assessment Anchors) developed by the Pennsylvania Department of Education (PDE) during 2003, new test items were developed (see Chapter Two of the *2005 PSSA Technical Report for Reading and Mathematics*). Following the spring operational assessment, a separate, standalone field test of new items for Grades 5, 8, and 11 was conducted. Note that Grade 11 students also took an operational writing assessment in February, and Grades 6 and 9 students participated in a fall writing assessment. Lastly, Grade 12 students who as 11th graders in the preceding spring failed to attain at least the Proficient level in any subject area were offered an opportunity to retest.

**Table P–1. Operational Assessment and Field Testing
During the 2003–04 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test (conducted by CTB/McGraw-Hill)	April 2004
5	Operational mathematics and reading	April 2004
	Standalone field test in mathematics and reading	April/May 2004
6	Operational writing	October 2004
8	Operational mathematics and reading	April 2004
	Standalone field test in mathematics and reading	April/May 2004
9	Operational writing	October 2004
11	Operational mathematics and reading	April 2004
	Standalone field test in mathematics and reading	April/May 2004
	Operational writing	February 2004
12	Retest opportunity for students who as Grade 11 students in the spring of 2003 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2004

ASSESSMENT ACTIVITIES OCCURRING IN THE 2004–05 SCHOOL YEAR

Table P–2 displays the operational assessments and field tests that took place during the 2004–05 school year. The operational assessment at Grades 5, 8, and 11 used items chosen from the spring 2004 field test. This was the first operational assessment that reflected the Pennsylvania Assessment Anchors and Eligible Content. Fulfilling the No Child Left Behind Act of 2001 (NCLB) requirement that states must implement a test at Grades 3–8, a major field test in mathematics and reading was administered at Grades 4, 6, and 7. Item development for these new grade levels took place during 2004.

The Grades 6 and 9 writing assessment was reevaluated in favor of moving the writing assessment to Grades 5 and 8. This accounts for the separate (standalone) field test at these grade levels. There was also a test administration change from October to February. In addition, the writing assessment underwent changes to align the test to the Academic Standards for writing. New writing prompts and stimulus-based multiple-choice items were also field tested at Grade 11 as part of the operational assessment, hence the reference to an embedded field test. No assessment activity of any kind occurred at Grade 9. As in fall 2003, the retest opportunity at Grade 12 continued.

**Table P–2. Operational Assessment and Field Testing
During the 2004–05 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test (conducted by CTB/McGraw-Hill)	April 2005
4	Standalone field test for mathematics and reading	April 2005
5	Operational mathematics and reading with embedded field test	April 2005
	Standalone field test in writing	February 2005
6	Standalone field test for mathematics and reading	April 2005
7	Standalone field test for mathematics and reading	April 2005
8	Operational mathematics and reading with embedded field test	April 2005
	Standalone field test in writing	February 2005
11	Operational mathematics and reading with embedded field test	April 2005
	Operational writing with embedded field test	February 2005
12	Retest opportunity for students who as Grade 11 students in the spring of 2004 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2004

ASSESSMENT ACTIVITIES OCCURRING IN THE 2005–06 SCHOOL YEAR

Table P–3 shows the assessment activities that occurred during the 2005–06 school year. Note that the reading and mathematics operational assessments ran consecutively in Grades 3–8 and Grade 11. For Grades 4, 6, and 7, it was the first year for operational assessments. Field testing for mathematics and reading was embedded as part of the operational assessment at each grade level. At Grade 3, the reference to field testing with items developed by DRC reflects the transition of shifting the assessment from CTB/McGraw-Hill to DRC in 2007. As in previous years, the retest opportunity at Grade 12 continued.

The first operational assessments for writing at Grades 5 and 8 took place in the 2005–06 school year, while the Grade 11 writing assessment continued in the same February testing window. For all three grade levels, the operational writing assessments featured mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis shift in writing modes assessed. See the *2006 PSSA Technical Report for Writing: Grades 5, 8, and 11* for further information about the new writing assessments. Since extensive field testing in February 2005 produced a pool of prompts for use over several years, no additional writing prompts were field tested in 2006. However, new multiple-choice items were field tested in the 2006 writing assessment.

**Table P–3. Operational Assessment and Field Testing
During the 2005–06 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test of DRC-written items (conducted by CTB/McGraw-Hill)	April 2006
4	Operational mathematics and reading with embedded field test	March 2006
5	Operational mathematics and reading with embedded field test	March 2006
	Operational writing with embedded field test	February 2006
6	Operational mathematics and reading with embedded field test	March 2006
7	Operational mathematics and reading with embedded field test	March 2006
8	Operational mathematics and reading with embedded field test	March 2006
	Operational writing with embedded field test	February 2006
11	Operational mathematics and reading with embedded field test	March 2006
	Operational writing with embedded field test	February 2006
12	Retest opportunity for students who as Grade 11 students in the spring of 2005 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2005

ASSESSMENT ACTIVITIES OCCURRING IN THE 2006–07 SCHOOL YEAR

Table P–4 shows the assessment plan for the 2006–07 school year. Note that the mathematics and reading assessments ran consecutively in Grades 3–8 and Grade 11. For Grades 4, 6, and 7, it was the second year for operational assessments and the first year in which these grade levels were included in the adequate yearly progress (AYP) calculations. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. This was the first year in which DRC was responsible for the Grade 3 assessment, as the transition from CTB/McGraw-Hill was complete. As in previous years, the retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued in the same February testing window featuring the mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed, which were introduced in 2006. Since extensive field testing in February 2005 produced a pool of prompts for use over several years, no additional writing prompts needed to be field tested in 2007. However, new multiple-choice items were field tested in the 2007 writing assessment.

Following the spring operational assessments in writing, reading, and mathematics, a separate, standalone field test in science was administered for Grades 4, 8, and 11 with full implementation scheduled for 2008.

**Table P–4. Operational Assessment and Field Testing
During the 2006–07 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	March 2007
4	Operational mathematics and reading with embedded field test	March 2007
	Standalone field test in science	April/May 2007
5	Operational mathematics and reading with embedded field test	March 2007
	Operational writing with embedded field test	February 2007
6	Operational mathematics and reading with embedded field test	March 2007
7	Operational mathematics and reading with embedded field test	March 2007
8	Operational mathematics and reading with embedded field test	March 2007
	Operational writing with embedded field test	February 2007
	Standalone field test in science	April/May 2007
11	Operational mathematics and reading with embedded field test	March 2007
	Operational writing with embedded field test	February 2007
	Standalone field test in science	April/May 2007
12	Retest opportunity for students who as Grade 11 students in the spring of 2006 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2006

ASSESSMENT ACTIVITIES OCCURRING IN THE 2007–08 SCHOOL YEAR

Table P–5 shows the assessment plan for the 2007–08 school year. Note that the mathematics and reading assessments ran consecutively in Grades 3–8 and Grade 11. For Grades 4, 6, and 7, it was the third year for operational assessments and the second year in which these grade levels were included in the AYP calculations. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. This was the second year in which DRC was responsible for the Grade 3 assessment. As in previous years, the retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued in the same February testing window featuring the mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed, which was introduced in 2006. Since extensive field testing in February 2005 produced a pool of prompts for use over several years, no additional writing prompts needed to be field tested in 2007. However, new multiple-choice items were field tested in the 2008 writing assessment.

Joining the spring operational assessments in writing, reading, and mathematics was science at Grades 4, 8, and 11. See the *2008 PSSA Technical Report for Science: Grades 4, 8, and 11* for further information about the new science assessments.

**Table P–5. Operational Assessment and Field Testing
During the 2007–08 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	March/April 2008
4	Operational mathematics and reading with embedded field test	March/April 2008
	Operational science with embedded field test	April/May 2008
5	Operational mathematics and reading with embedded field test	March/April 2008
	Operational writing with embedded field test	February 2008
6	Operational mathematics and reading with embedded field test	March/April 2008
7	Operational mathematics and reading with embedded field test	March/April 2008
8	Operational mathematics and reading with embedded field test	March/April 2008
	Operational writing with embedded field test	February 2008
	Operational science with embedded field test	April/May 2008
11	Operational mathematics and reading with embedded field test	March/April 2008
	Operational writing with embedded field test	February 2008
	Operational science with embedded field test	April/May 2008
12	Retest opportunity for students who as Grade 11 students in the spring of 2007 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2007

ASSESSMENT ACTIVITIES OCCURRING IN THE 2008–09 SCHOOL YEAR

Table P–6 shows the assessment plan for the 2008–09 school year. The mathematics and reading assessments continued to be operational for Grades 3–8 and Grade 11. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. As in previous years, the fall retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued with a February testing window featuring mode-specific scoring guidelines; stimulus-based, multiple-choice items; and a grade-specific emphasis in writing modes assessed. An embedded field test of writing prompts was incorporated in the 2009 assessment along with a set of embedded field test multiple-choice items.

The second operational assessment in science took place in April/May. Similar to the other operational assessments, field testing for science was embedded as part of the operational assessments at each grade level.

**Table P–6. Operational Assessment and Field Testing
During the 2008–09 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	March 2009
4	Operational mathematics and reading with embedded field test	March 2009
	Operational science with embedded field test	April/May 2009
5	Operational mathematics and reading with embedded field test	March 2009
	Operational writing with embedded field test	February 2009
6	Operational mathematics and reading with embedded field test	March 2009
7	Operational mathematics and reading with embedded field test	March 2009
8	Operational mathematics and reading with embedded field test	March 2009
	Operational writing with embedded field test	February 2009
	Operational science with embedded field test	April/May 2009
11	Operational mathematics and reading with embedded field test	March 2009
	Operational writing with embedded field test	February 2009
	Operational science with embedded field test	April/May 2009
12	Retest opportunity for students who as Grade 11 students in the spring of 2008 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2008

ASSESSMENT ACTIVITIES OCCURRING IN THE 2009–10 SCHOOL YEAR

Table P–7 shows the assessment plan for the 2009–10 school year. A notable change from previous years was that all assessments and make-ups were completed during the testing window from April through the first week of May.

The mathematics and reading assessments continued to be operational for Grades 3–8 and Grade 11. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. As in previous years, the fall retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued to feature mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed. An embedded field test of writing prompts was included in the 2010 assessment along with a set of embedded field test multiple-choice items.

The operational assessment for science at Grades 4, 8, and 11 included multiple-choice and open-ended questions. Students responded to standalone multiple-choice and open-ended questions (all grades) as well as scenario-based multiple-choice (Grades 8 and 11) and open-ended (Grade 11 only) questions. Field testing was embedded as part of the operational assessments at each grade level.

**Table P–7. Operational Assessment and Field Testing
During the 2009–10 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	April/May 2010
4	Operational mathematics and reading with embedded field test	April/May 2010
	Operational science with embedded field test	April/May 2010
5	Operational mathematics and reading with embedded field test	April/May 2010
	Operational writing with embedded field test	April/May 2010
6	Operational mathematics and reading with embedded field test	April/May 2010
7	Operational mathematics and reading with embedded field test	April/May 2010
8	Operational mathematics and reading with embedded field test	April/May 2010
	Operational writing with embedded field test	April/May 2010
	Operational science with embedded field test	April/May 2010
11	Operational mathematics and reading with embedded field test	April/May 2010
	Operational writing with embedded field test	April/May 2010
	Operational science with embedded field test	April/May 2010
12	Retest opportunity for students who as Grade 11 students in the spring of 2009 failed to reach at least the Proficient level in mathematics, reading, science, or writing	October/ November 2009

ASSESSMENT ACTIVITIES OCCURRING IN THE 2010–11 SCHOOL YEAR

Table P–8 shows the assessment plan for the 2010–11 school year. A change from the previous year is an earlier testing window, beginning in mid-March for mathematics and reading, late-March to April for writing, and early April for science. A make-up period extended into mid-April for all assessments.

The mathematics and reading assessments continued to be operational for Grades 3–8 and Grade 11. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. As in previous years, the fall retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued to feature mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed. An embedded field test of writing prompts was included in the 2011 assessment along with a set of embedded field test multiple-choice items.

The operational assessment for science at Grades 4, 8, and 11 included multiple-choice and open-ended questions. Students responded to standalone multiple-choice and open-ended questions (all grades) as well as scenario-based multiple-choice (Grades 8 and 11) and open-ended (Grade 11 only) questions. Field testing was embedded as part of the operational assessments at each grade level.

**Table P–8. Operational Assessment and Field Testing
During the 2010–11 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	March/April 2011
4	Operational mathematics and reading with embedded field test	March/April 2011
	Operational science with embedded field test	March/April 2011
5	Operational mathematics and reading with embedded field test	March/April 2011
	Operational writing with embedded field test	March/April 2011
6	Operational mathematics and reading with embedded field test	March/April 2011
7	Operational mathematics and reading with embedded field test	March/April 2011
8	Operational mathematics and reading with embedded field test	March/April 2011
	Operational writing with embedded field test	March/April 2011
	Operational science with embedded field test	March/April 2011
11	Operational mathematics and reading with embedded field test	March/April 2011
	Operational writing with embedded field test	March/April 2011
	Operational science with embedded field test	March/April 2011
12	Retest opportunity for students who as Grade 11 students in the spring of 2010 failed to reach at least the Proficient level in mathematics, reading, science, or writing	October/ November 2010

ASSESSMENT ACTIVITIES OCCURRING IN THE 2011–12 SCHOOL YEAR

Table P–9 shows the assessment plan for the 2011–12 school year. The testing window for mathematics and reading began in mid-March, while writing and science began in mid to late April. The make-up period for mathematics and reading extended into late March, while writing and science extended into early May.

The mathematics and reading assessments continued to be operational for Grades 3–8 and Grade 11. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. As in previous years, the fall retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued to feature mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed. An embedded field test of writing prompts was included in the 2012 assessment along with a set of embedded field test multiple-choice items.

The operational assessment for science at Grades 4, 8, and 11 included multiple-choice and open-ended questions. Students responded to standalone multiple-choice and open-ended questions (all grades) as well as scenario-based multiple-choice (Grades 8 and 11) and open-ended (Grade 11 only) questions. Field testing was embedded as part of the operational assessments at each grade level.

**Table P–9. Operational Assessment and Field Testing
During the 2011–12 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	March 2012
4	Operational mathematics and reading with embedded field test	March 2012
	Operational science with embedded field test	April 2012
5	Operational mathematics and reading with embedded field test	March 2012
	Operational writing with embedded field test	April 2012
6	Operational mathematics and reading with embedded field test	March 2012
7	Operational mathematics and reading with embedded field test	March 2012
8	Operational mathematics and reading with embedded field test	March 2012
	Operational writing with embedded field test	April 2012
	Operational science with embedded field test	April 2012
11	Operational mathematics and reading with embedded field test	March 2012
	Operational writing with embedded field test	April 2012
	Operational science with embedded field test	April 2012
12	Retest opportunity for students who as Grade 11 students in the spring of 2011 failed to reach at least the Proficient level in mathematics, reading, science, or writing	October/ November 2011

ASSESSMENT ACTIVITIES PLANNED FOR THE 2012–13 SCHOOL YEAR

Table P–10 shows the assessment plan for the 2012–13 school year. The 2012-13 school year begins the initial transition for the PSSA Mathematics, Reading, and Writing tests to align to the newly-developed Pennsylvania Assessment Anchors and Eligible Content aligned to the Pennsylvania Common Core Standards (PACC). The transition from the Legacy PSSA Mathematics, Reading, and Writing tests to the new PACC-based PSSA tests will occur during the operational 2013-14 and 2014-15 administrations, with grades 3, 4, and 5 part of the first phase, and grades 6, 7, and 8 part of the second phase.

As a part of the PACC transition, the Legacy PSSA Reading test and the Legacy PSSA Writing test will be phased out and will be replaced with an English Language Arts test aligned to the PACC. As part of this transition, there will be a standalone field test at Grades 3, 4, and 5 for the Writing component of the English Language Arts test. This standalone field test will include standalone multiple-choice items (as opposed to stimulus-based multiple-choice items on the Legacy Writing test) and writing prompts at Grades 3, 4, and 5. In addition, at Grade 3 there will be open-ended items on the standalone ELA Writing test. This standalone field test will take place during a two-week testing window in early to mid February. The Reading component of the new PACC ELA test will be embedded in the 2013 Reading field test.

Additionally, PDE modified the order of the testing windows for writing, reading and mathematics, and science. Writing will now take place earlier than reading and mathematics instead of at the same time as science. The testing window for writing will begin mid March; mathematics and reading will begin early to mid April, while science will begin mid to late April. The make-up period for writing extends into mid to late March, while mathematics, reading, and science extends into early May. These operational assessments will all be offered in an online format in addition to the paper/pencil format used in previous assessments.

An additional change from previous years is the removal of Grade 11 from the Mathematics, Reading, Science, and Writing. As Grade 11 will no longer be a part of the assessments, the fall retest opportunity at Grade 12 will no longer be available. Operational tests will continue to be available for Mathematics and Reading at Grades 3–8, Science at grades 4 and 8, and Writing at grades 5 and 8.

Field testing for mathematics and reading will continue to be embedded as part of the operational assessments at each grade level. The embedded field test items for Grades 3, 4, and 5 will be aligned to the Pennsylvania Assessment Anchors and Eligible Content aligned to the Pennsylvania Common Core Standards, while the embedded field test items for Grades 6, 7, and 8 will continue to be aligned to the previous Assessment Anchor Content Standards.

The operational assessment for science at Grades 4 and 8 will include multiple-choice and open-ended questions. Students will respond to standalone multiple-choice and open-ended questions (all grades) as well as scenario-based multiple-choice questions (Grades 8 only). Field testing will be embedded as part of the operational assessments at each grade level.

The operational assessment for writing at Grades 5 and 8 will continue to feature mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed. An embedded field test of writing prompts will be included in the 2012 assessment along with a set of embedded field test multiple-choice items at Grade 8. The operational assessment at Grade 5 will include placeholder multiple-choice items for consistency in the length of the multiple-choice section of the assessment; however, students will respond to only two writing prompts at Grade 5, as a field-test writing prompt is not needed due to the standalone field test at that grade.

**Table P–10. Operational Assessment and Field Testing
During the 2012–13 School Year**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	April 2013
	Standalone field test in ELA: writing	February 2013
4	Operational mathematics and reading with embedded field test	April 2013
	Operational science with embedded field test	April 2013
	Standalone field test in ELA: writing	February 2013
5	Operational mathematics and reading with embedded field test	April 2013
	Operational writing	March 2013
	Standalone field test in ELA: writing	February 2013
6	Operational mathematics and reading with embedded field test	April 2013
7	Operational mathematics and reading with embedded field test	April 2013
8	Operational mathematics and reading with embedded field test	April 2013
	Operational writing with embedded field test	March 2013
	Operational science with embedded field test	April 2013

ASSESSMENT ACTIVITIES PLANNED FOR THE 2013–14 SCHOOL YEAR

Table P–11 shows the assessment plan for the 2013–14 school year. The 2013–14 school year continues the transition for the PSSA Mathematics, Reading, and Writing tests to align to the newly-developed Pennsylvania Assessment Anchors and Eligible Content aligned to the Pennsylvania Core Standards (PCS), as field-test items will be aligned to the PCS-aligned Assessment Anchors and Eligible Content. The operational assessments in Mathematics, Reading, and Writing are comprised of items that align to both the PCS and the existing Assessment Anchors and Eligible Content. Reporting in 2013–14 will continue to use the previous content structure. The transition from the Legacy PSSA Mathematics, Reading, and Writing tests to the new PCS-based PSSA tests will occur during the operational 2014–15 administration.

As a part of the PACC transition, the Legacy PSSA Reading test and the Legacy PSSA Writing test will be phased out and will be replaced with an English Language Arts test aligned to the PACC. As part of this transition, there will be a standalone field test at Grades 6, 7, and 8 for the Writing component of the English Language Arts test. This standalone field test will include standalone multiple-choice items (as opposed to stimulus-based multiple-choice items on the Legacy Writing test) and writing prompts at Grades 6, 7, and 8. This standalone field test will take place during a two-week testing window in early to mid-February. The Reading component of the new PCS ELA test will be embedded in the 2014 Reading field test.

Writing will now take place after reading and mathematics but before science. The testing window for mathematics and reading will begin mid-March; writing will begin late March to early April; and science will begin late April. The make-up period for mathematics and reading extends into early April, while the make-up period for writing extends into early to mid-April and science extends into early May. These operational assessments will continue to be offered in an online format in addition to the paper/pencil format used in previous assessments.

Field testing for mathematics and reading will continue to be embedded as part of the operational assessments at each grade level. The embedded field test items will be aligned to the Pennsylvania Assessment Anchors and Eligible Content aligned to the Pennsylvania Common Core Standards.

The operational assessment for science at Grades 4 and 8 will include multiple-choice and open-ended questions. Students will respond to standalone multiple-choice and open-ended questions (all grades) as well as scenario-based multiple-choice questions (Grades 8 only). Field testing will be embedded as part of the operational assessments at each grade level.

The operational assessment for writing at Grades 5 and 8 will continue to feature mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed. Students will respond to only two writing prompts, as a field-test writing prompt is not needed due to the upcoming transition to the ELA assessments.

**Table P–11. Operational Assessment and Field Testing
During the 2013–14 School Year (Planned)**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	March 2014
4	Operational mathematics and reading with embedded field test	March 2014
	Operational science with embedded field test	April-May 2014
5	Operational mathematics and reading with embedded field test	March 2014
	Operational writing	March-April 2014
6	Operational mathematics and reading with embedded field test	March 2014
	Standalone field test in ELA: writing	February 2014
7	Operational mathematics and reading with embedded field test	March 2014
	Standalone field test in ELA: writing	February 2014
8	Operational mathematics and reading with embedded field test	March 2014
	Operational writing with embedded field test	March-April 2014
	Operational science with embedded field test	April-May 2014
	Standalone field test in ELA: writing	February 2014

Chapter One: Background of the Pennsylvania System of School Assessment (PSSA)

This brief overview of the Pennsylvania System of School Assessment (PSSA) summarizes the history of the current program's development process, the program's intent and purpose, recent changes to the program, and the student population that participates in the assessments. Pennsylvania's involvement in state-wide assessment actually began in the 1969–70 school year with a purely school-based assessment known as *Educational Quality Assessment* (EQA), which continued through the 1987–88 school year. A state mandated student competency testing program called *Testing for Essential Learning and Literacy Skills* (TELLS) also operated from the school years of 1984–85 through 1990–91.

THE PENNSYLVANIA SYSTEM OF SCHOOL ASSESSMENT

The Pennsylvania System of School Assessment program was instituted in 1992 as a school evaluation model with reporting at the school level only. Test administration took place in February/March, and school district participation was every third year based on the strategic planning cycle. Mathematics and reading were assessed at Grades 5, 8, and 11; districts could choose to participate in the writing assessment at Grades 6 and 9. The State Board of Education's revisions to Chapter 5 in November 1994 brought major changes to the PSSA, beginning with the spring 1995 assessment. These changes included the following:

- All districts were required to participate in the mathematics and reading assessment each year.
- Student-level reports were generated in addition to school reports.
- The Grades 6 and 9 writing assessments became mandatory on a three-year cycle corresponding with the district's strategic planning cycle.

Yearly administration of the PSSA in 1996, 1997, and 1998 continued at the assessed grades for mathematics and reading, utilizing essentially the same test structure, reporting practices, and testing window. Writing assessment continued on the established mandatory cycle; however, an increasing number of districts chose to participate every year on a voluntary basis.

Pennsylvania Academic Standards and the PSSA

A major structural change took place in test content with the State Board of Education's adoption of the Pennsylvania Academic Standards for Reading, Writing, Speaking and Listening, and Mathematics in January 1999 (Pennsylvania State Board of Education, 1999). The Academic Standards, which are part of *Chapter 4 Regulations on Academic Standards and Assessment*, detailed what students should know (knowledge) and be able to do (skills) at various grade levels. Subsequently, the State Board approved a set of criteria defining Advanced, Proficient, Basic, and Below Basic levels of performance. Mathematics and reading performance level results were reported at both the student and school levels for the 2000 PSSA. At that point, the PSSA became a standards-based, criterion-referenced assessment measuring student attainment of the Academic Standards while simultaneously determining the extent to which school programs enabled students to achieve proficiency of the Academic Standards. The regulations also stipulated that appropriate results be broadly disseminated to an array of audiences including students, parents, educators, citizens, and state policymakers, including the State Senate, the General Assembly, and the State Board. School reporting was to include the aggregate

performance of all students and for relevant subgroups, such as those students with an Individualized Education Plan (IEP). Finally, the data was intended to inform educators regarding school program strengths and weaknesses in order to guide the improvement of curricula and instructional strategies. The data was also intended to be used in the development of strategic plans.

The mathematics and reading assessments from 2001 through 2004 underwent various content enhancements to improve alignment to the Academic Standards. For example, the reading assessment transitioned to utilizing more passages of shorter length and fewer items to improve the range of topics to which students responded. Various reporting modifications were introduced to more effectively communicate results.

ASSESSMENT ANCHOR CONTENT STANDARDS, CONTENT STRUCTURE, AND NEW GRADE LEVELS FOR MATHEMATICS AND READING

Assessment in 2005 was marked by major structural changes to the PSSA. Assessment Anchor Content Standards (Assessment Anchors) developed during the previous school year to clarify content structure and improve articulation between assessment and instruction were implemented in terms of test design and reporting. At the same time, field testing of mathematics and reading occurred at Grades 4, 6, and 7. As specified by PL 107–110, the *No Child Left Behind Act of 2001* (NCLB), states, school districts, and schools must achieve a minimum level of improvement each year, known as adequate yearly progress, or AYP. Accordingly, the third year of calculations for AYP were conducted and reported for Grades 5, 8, and 11.

The 2006 operational mathematics and reading assessment incorporated Grades 4, 6, and 7 for the first time. The assessed grade levels for 2006 included Grades 3–8 and 11. The fourth year of calculations for AYP were conducted and reported for Grades 5, 8, and 11 and, for the first time, Grade 3.

In 2007 the operational mathematics and reading assessment continued in Grades 3–8 and 11. AYP calculations for Grades 4, 6, and 7 took place in 2007 when they were assessed for the second time.

The operational mathematics and reading assessments of 2008, 2009, 2010, 2011, and 2012 continued in Grades 3–8 and 11, utilizing the same content structure. AYP calculations continued for all grades.

The validation of performance levels for mathematics and reading, utilizing the Bookmark method, took place during the summer of the following years: 2005 (Grades 5, 8, and 11), 2006 (Grades 4, 6, and 7), and 2007 (Grade 3). See Chapter Thirteen for a brief summary.

More information regarding the 2012 mathematics and reading tests may be found in Chapter Two and in the following Pennsylvania Department of Education publications available on the PDE website: *2011–2012 PSSA Assessment Handbook*, *2009–2010 PSSA Reading Item and Scoring Sampler Supplement* (one per assessed grade level), and *2009–2010 PSSA Mathematics Item and Scoring Sampler Supplement* (one per assessed grade level). These handbooks can be accessed by going to www.education.state.pa.us. On the left, first click on “Programs,” then “Programs O–R,” next “Pennsylvania System of School Assessment (PSSA)” and then “Resource Materials.”

Core Recycling for Mathematics and Reading

In 2009, PDE made a temporary change to the PSSA test plan for reading and mathematics in order to create required cost savings due to state-level budget concerns. A recycling plan was proposed and accepted that significantly decreased the volume of new item development over a two-year period in 2011 and 2012, and required that a portion of the core from the 2012 administration would be composed of items recycled from prior core administrations. Under this plan, the reduced number of new items in 2011 and 2012 resulted in a reduced number of field test forms in 2011 and 2012 from 9 down to 5. These changes impacted the test design for 2012.

The mathematics core for 2013 was built with the standard core-to-core links from the 2012 core. The remainder of the core was built from items appearing in the embedded field test positions from the 2012 embedded field test or from the existing item bank.

The reading core for 2012 was built with the standard core-to-core links from the 2011 core. The remainder of the core was built from items appearing in the embedded field test positions from the 2011 embedded field test, from the existing item bank, or from items recycled from the 2010 or 2011 cores.

The 2012 PSSA has five field test forms per grade, each with a normal core, normal core-to-core link, and normal equating block (per form). Equating block positions for mathematics were reduced due to fewer forms; however due to the reduction in equating block items for mathematics, core items from 2010 were added as a special set of core-to-core linking so that the total linking points remained unchanged.

More information regarding the 2012 operational layout and core recycling for mathematics and reading can be found in Chapter Three.

THE PENNSYLVANIA SCIENCE ASSESSMENT

In accordance with the NCLB requirement to implement an operational science assessment in 2008, a major test development effort in science took place during 2006, followed by a large-scale, standalone field test in April/May of 2007. A full implementation of an operational science assessment at Grades 4, 8, and 11 first occurred in April–May 2008. The 2009 PSSA operational science assessment continued with the same content structure and testing window as in 2008.

Several historical milestones were significant to the development of a science test in Pennsylvania. These include the following:

- The adoption of Act 16 or Pennsylvania Senate Bill 652 in 2000, which redefined the PSSA “as a test developed and implemented by the Department of Education to determine only academic achievement relating directly to objective Academic Standards in the areas of reading, mathematics, and science.” (See the *Science Assessment Handbook*, PDE, November 2006).
- Pennsylvania State Board of Education adoption of the *Science and Technology Standards* on July 12, 2001, and the *Environment and Ecology Standards* on January 5, 2002.

Aligned to the *Pennsylvania Science Assessment Anchor Content Standards* and Eligible Content, the science test is designed to measure and report results in four major categories:

- The Nature of Science
- Biological Sciences
- Physical Sciences
- Earth and Space Sciences

Students use their content knowledge and science process skills to answer a set of multiple-choice items and open-ended questions that are standalone or related to a scenario. A science scenario consists of a description of a class project, an experiment, or other research and typically contains text, graphs, charts, and/or tables. Science test questions at Grade 4 consist of standalone multiple-choice and 0–2-point short answer open-ended items. At Grades 8 and 11, multiple-choice questions consist of both standalone and scenario-based items. All open-ended items at Grade 8 are standalone 0–2-point questions. Grade 11 is more complex, as it has standalone 0–2-point questions and scenario-based 0–4-point questions formed by combining two 0–2-point questions. More information may be found in Chapter Two and in the following Pennsylvania Department of Education publications available on the PDE website: *2011–2012 PSSA Assessment Handbook* and *2009–2010 PSSA Science Item and Scoring Sampler Supplement* (one per assessed grade level). These handbooks can be accessed by going to www.education.state.pa.us. On the left, click on “Programs,” then “Programs O–R,” then “Pennsylvania System of School Assessment (PSSA)” and then “Resource Materials.” The establishment of performance levels for science, utilizing the Bookmark method, took place during the summer of 2008. See Chapter Thirteen of this technical report for a brief summary.

THE PENNSYLVANIA WRITING ASSESSMENT

In 1990, the state initiated an on-demand writing assessment in which students wrote an essay in response to a particular topic or prompt. With the advent of the Pennsylvania Academic Standards in 1999, major changes took place in the writing assessment, including alignment to the Academic Standards, as well as changes in scoring method, prompts, testing date, and reporting. These changes, which are summarized below, were implemented in the 2000–01 school year and were followed by performance level reporting in the 2001–02 school year.

- The writing assessment became mandatory for all districts every year.
- Administration of the Grades 6 and 9 writing assessment was changed from February to October.
- Scoring changed to a four-point scale for each of five domains (focus, content, organization, style, and conventions).
- Prompts were different for Grade 6 and Grade 9 rather than being identical at the two grade levels.
- Within a grade level all students responded to two common prompts.
- The reporting model was greatly revised, and individual student reports were issued for the first time.

- A writing assessment for Grade 11 was administered for the first time in February 2001.
- In 2002, performance levels were adopted for writing and implemented in the reporting of total writing results for the February Grade 11 and fall 2002 Grades 6 and 9 writing assessment.

In 2003 and 2004 writing continued to be assessed with a February window for Grade 11 and a fall window for Grades 6 and 9.

In 2005 Grade 11 continued to be assessed in February; however, major field testing took place at Grades 5 and 8 in anticipation of implementation of an operational writing assessment in 2006. Consequently, a fall 2005 operational writing assessment did not take place.

The 2006 PSSA operational writing assessment featured additional revisions that included the following enhancements:

- Testing previously done in Grades 6 and 9 shifted to Grades 5 and 8 to provide better alignment to the end of elementary school and middle school.
- Grades 5 and 8 joined Grade 11 in a February test window rather than the October window used previously for Grades 6 and 9.
- Students responded to two writing prompts, which were evaluated in terms of (1) a mode-specific scoring guideline and (2) a conventions scoring guideline, instead of the former domain scoring.
- Stimulus-based revising/editing multiple-choice items were incorporated to provide a more reliable and valid measure of the Conventions Academic Standard.

The 2007 and 2008 PSSA operational writing assessments continued with the same structure and February testing window as in 2006.

Although the 2009, 2010, 2011, and 2012 PSSA operational writing assessments continued with the same structure as in previous years, students also responded to an embedded field test prompt. In addition, adjustments were made to the testing window in 2010 as it was shifted from February to April/May.

The validation of performance levels for writing, utilizing the Body of Work method, took place during the summer of 2006. See Chapter Thirteen for a brief summary.

More information may be found in Chapter Two and in the following two Pennsylvania Department of Education publications available on the PDE website: *2011–2012 PSSA Assessment Handbook* and *2009–2010 PSSA Writing Item and Scoring Sampler Supplement* (one per assessed grade level). These handbooks can be accessed by going to www.education.state.pa.us. On the left, first click on “Programs,” then “Programs O–R,” next “Pennsylvania System of School Assessment (PSSA)” and then “Resource Materials.”

Chapter Two: Overview of the PSSA Framework

ACADEMIC STANDARDS, ASSESSMENT ANCHOR CONTENT STANDARDS, AND ELIGIBLE CONTENT

PSSA Mathematics, Reading, and Science

The PSSA Assessment Anchor Content Standards and Eligible Content are based on the Pennsylvania Academic Standards. Although the Academic Standards indicate what students should know and be able to do, educator concerns regarding the number and breadth of Academic Standards led to an initiative by the Pennsylvania Department of Education (PDE) to develop Assessment Anchor Content Standards (Assessment Anchors) to indicate which parts of the Academic Standards (Instructional Standards) would be assessed on the PSSA. Based on recommendations from Pennsylvania educators, the Assessment Anchors were designed as a tool to improve the articulation of curricular, instructional, and assessment practices. The Assessment Anchors clarify what is expected across each grade span and focus the content of the standards into what is assessable on a large-scale test. The Assessment Anchor documents also serve to communicate Eligible Content, also called assessment limits, or the range of knowledge and skills from which the PSSA would be designed.

The Assessment Anchor's coding is read like an outline. The coding includes the content, grade level, Reporting Category, Assessment Anchor, descriptor (Sub-Assessment Anchor), and Eligible Content. Thus, S.4.A.1.3.1 would be Science, Grade 4, Reporting Category A, Assessment Anchor 1, descriptor (Sub-Assessment Anchor) 3, and Eligible Content 1.

Each of the Assessment Anchors has one or more descriptors (Sub-Assessment Anchors) and Eligible Content varying to reflect grade-level appropriateness. The Assessment Anchors form the basis of the test design for the grades undergoing new test development. In turn, this hierarchy is the basis for organizing the total content scores (based on the core [common] sections).

A draft version of the Assessment Anchors and Eligible Content for mathematics and reading was submitted to Achieve, Inc., Washington, D.C., for a special analysis to evaluate the degree of alignment with the Academic Standards. Preliminary feedback enabled PDE to make adjustments to improve the alignment as the Assessment Anchors took final form. These adjustments were reflected operationally starting with the 2007 PSSA. Achieve, Inc., also conducted a preliminary review of the science anchors in 2003 and produced a follow-up report on the anchors in 2005.

The complete set of Assessment Anchors and Eligible Content can be referenced at PDE's website: www.education.state.pa.us. Click on the green check mark icon labeled "State Assessment System," then select "Pennsylvania System of School Assessment (PSSA)," then select "Assessment Anchors and Anchor Toolkit" under "Other Materials" in the yellow box on the right. In addition, see Appendix A for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

PSSA Writing

Assessment Anchors and Eligible Content have not been developed for the writing content area. Instead, the PSSA writing program is aligned directly to the Academic Standards at 1.4 (Types of Writing [Mode]) and at 1.5 (Quality of Writing). In 1999, Pennsylvania adopted academic standards for writing (*Academic Standards for Reading, Writing, Speaking, and Listening*) that describe what students should know and be able to do with the English language at a grade level. Within the framework of the assessment, the writing prompts are measured under Academic Standards 1.4.A Narrative, 1.4.B Informational, and 1.4.C Persuasive, thus providing the responses to the eligible modes the prompts are designed to elicit. The writing prompts are also measured under Academic Standards 1.5.A–F Quality of Writing. The stimulus-based multiple-choice items are measured under the Academic Standards 1.5.E Revising and 1.5.F Editing.

OVERVIEW OF THE 2013 PSSA

Mathematics Assessment Measures

The PSSA mathematics assessment has five major reporting categories: Numbers and Operations, Algebraic Concepts, Geometry, Measurement, and Data Analysis and Probability. By organizing the Assessment Anchors into a five-category reporting structure, there is a similarity to the categories used by the National Council of Teachers of Mathematics (NCTM) and the National Assessment of Educational Progress (NAEP). See Appendix A for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

The PSSA mathematics assessment employs two types of test items: multiple-choice and open-ended. These item types assess different levels of knowledge and provide different kinds of information about mathematics achievement. Psychometrically, multiple-choice items are very useful and efficient tools for collecting information about a student's academic achievement. Open-ended performance tasks generally generate fewer scoreable points than multiple-choice items in the same amount of testing time; however, they provide tasks that are more realistic and better sample higher-level thinking skills. Furthermore, well-constructed scoring guides have made it possible to include open-ended tasks in large-scale assessments such as the PSSA. Trained scorers can apply the scoring guides to efficiently score large numbers of student papers in a highly reliable way. The design of the PSSA attempts to achieve a reasonable balance between the two item types.

MATHEMATICS MULTIPLE-CHOICE ITEMS

The majority of the mathematics items included on the PSSA are multiple-choice (selected-response) items. This item type is especially efficient for measuring a broad range of content. In the PSSA mathematics assessment, each multiple-choice item has four response options, only one of which is correct. The student is awarded one point for choosing the correct response. Distractors typically represent incorrect concepts, incorrect logic, incorrect application of an algorithm, or computational errors.

Multiple-choice items are used to assess a variety of skill levels, from short-term recall of facts to problem solving. PSSA items involving application emphasize the requirement to carry out some mathematical process to find an answer, rather than simply recalling information from memory.

OPEN-ENDED TASKS FOR MATHEMATICS

Open-ended, or constructed-response, tasks require students to read a problem description and to develop an appropriate solution. The open-ended items are designed to take about ten minutes per item. Most of the open-ended items have several components to the overall task that may enable students to enter or begin the problem at different places. In some items, each successive component is designed to assess progressively more difficult skills or higher knowledge levels. Certain components ask students to explain their reasoning for engaging in particular mathematical operations or for arriving at certain conclusions. The types of tasks utilized do not necessarily require computations. Students may also be asked to perform such tasks as constructing a graph, shading some portion of a figure, or listing object combinations that meet specified criteria.

Open-ended tasks are especially useful for measuring students' problem-solving skills in mathematics. They offer the opportunity to present real-life situations that require students to solve problems using mathematics abilities learned in the classroom. Students must read the task carefully, identify the necessary information, devise a method of solution, perform the calculations, enter the solution directly in the answer document, and when required, offer an explanation. This provides insight into the students' mathematical knowledge, abilities, and reasoning processes.

The open-ended mathematics items are scored on a 0–4 point scale using an item-specific scoring guideline. The item-specific scoring guideline outlines the requirements for each score point. Item-specific scoring guidelines are based on the *General Description of Mathematics Scoring Guidelines for Open-ended Items*. The general guidelines describe a hierarchy of responses, which represent the five score levels. See Appendix B or the *Mathematics Item and Scoring Samplers* available on the PDE website.

Reading Assessment Measures

The PSSA reading assessment has two major reporting categories: Comprehension and Reading Skills, and Interpretation and Analysis of Fictional and Nonfictional Text. These two reporting categories are derived from the Reading Academic Standards 1.1, 1.2, and 1.3. Standards 1.6, 1.7, and 1.8 are not addressed on the PSSA because they are not specific to reading comprehension and can be more accurately evaluated at the school level. Standards 1.4 and 1.5 are addressed on the PSSA writing assessment. See Appendix A for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

The reading assessment employs two types of test items: multiple-choice and short-answer or open-ended.¹ The items are designed to measure students' comprehension of the content contained in the reading passages.

¹ Additionally, the 2013 reading assessment in grades 3-5 included two additional item types in field-test positions only: evidence-based selected response items (two-part items that require a student to select an answer to a comprehension question in part one and to select one or more pieces of evidence to support their answer in part two) and text-dependent analysis questions (which require students to write an essay analyzing a passage or passage set to be scored using a holistic scoring guideline). Field-test data for these item types are displayed in Chapter 5 and Appendix S. The item types will be discussed in more detail in a future technical report after such items are included in an operational assessment.

READING MULTIPLE-CHOICE ITEMS

Multiple-choice (selected-response) items measure how well students comprehend the overall meaning of a passage or make basic inferences about it. At times, asking students to choose a preferred answer is the best way to determine whether they have gleaned certain information from a story. Such information may include setting, central idea, or main events and their sequence.

Each reading multiple-choice item has four response options, only one of which is correct. The student is awarded one point for choosing the correct response. Incorrect response choices, or distractors, typically represent some kind of misinterpretation, predisposition, unsound reasoning, or casual reading.

SHORT-ANSWER OR OPEN-ENDED TASKS FOR READING

Constructed response tasks require written responses and are designed to address comprehension of text in ways that multiple-choice items cannot. These short written responses require about ten minutes per item, and allow a student to prepare an answer using supporting details or examples derived from the text. Prior to 2012, these test questions were called "open ended" items due to the many possible responses students could construct compared to the four static options available in a multiple-choice item. In Grades 3–5, these items began to be labeled as short-answer items during the 2012 administration. In Grades 6–8, these reading items continued to be called open-ended items for the 2012 administration. All grades will transition to the short-answer label beginning with the 2013 administration. The shift in labeling, from "open-ended" to "short-answer", was implemented to draw a greater contrast to the new "Text-Dependent Analysis" prompts which require substantial student writing. By comparison, responses to the short-answer items are simpler and require less explication and almost no analysis.

The reading short-answer and open-ended items are scored on a 0–3 point scale using an item-specific scoring guideline. This scale is consistent with the scale used on the National Assessment of Educational Progress (NAEP). The change from the former 0–4 point scale improves the alignment with the types of tasks required. Each task is text-dependent and is carefully constructed with the scoring guideline reflecting the task requirements. All item-specific scoring guidelines are based on the *General Scoring Guidelines for Short-answer Reading Items* or the *General Scoring Guidelines for Open-ended Reading Items*. The general guidelines describe a hierarchy of responses, which represent the four score levels. See Appendix B or the *Reading Item and Scoring Samplers* available on the PDE website.

Science Assessment Measures

The PSSA science assessment has four major reporting categories: The Nature of Science, Biological Sciences, Physical Sciences, and Earth and Space Sciences. These categories are similar to those used by the National Assessment of Educational Progress (NAEP) and The Third International Mathematics and Science Study (TIMSS). However, the PSSA organizes the categories differently. The science assessment anchors cover seventeen major categories from two sets of standards: Science and Technology Standards (3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, and 3.8) and Environment and Ecology Standards (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, and 4.9). See Appendix A for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

The science assessment employs two types of test items: multiple-choice and open-ended. These item types assess different levels of knowledge and provide different kinds of information about science achievement. The design of the operational 2013 PSSA for science achieves a reasonable balance between the two item types.

SCIENCE MULTIPLE-CHOICE ITEMS

The majority of the science items included on the PSSA are multiple-choice (selected-response) items, either as standalone multiple-choice items or as scenario-based multiple-choice items. (Scenario-based multiple-choice items are found in Grade 8 only.) Multiple-choice items are especially efficient for measuring a broad range of content. In the PSSA science assessment, each multiple-choice item has four response options, only one of which is correct. The student is awarded one point for choosing the correct response. Distractors typically represent incorrect concepts, incorrect logic, or incorrect application of a scientific principle.

Multiple-choice items are used to assess a variety of skill levels, from short-term recall of facts to the application of science content. PSSA items involving application emphasize the requirement to utilize science content to find an answer rather than simply recalling information from memory.

OPEN-ENDED ITEMS FOR SCIENCE

At all grades, standalone open-ended science items require students to read a description of a scientific problem and to develop an appropriate solution. Standalone open-ended items require about five minutes per task.

Open-ended tasks are especially useful for measuring students' skills in science. These tasks may present real-life situations that require students to solve problems using science abilities learned in the classroom. Students must read a task carefully, identify the necessary information, devise a method of solution, enter the solution directly into the answer document, and when required, offer an explanation. This provides insight into students' science knowledge, abilities, and reasoning processes.

The open-ended science items are scored on a 0–2-point scale with an item-specific scoring guideline, and each task is carefully constructed with a scoring guideline reflecting the task requirements. The general guidelines describe a hierarchy of responses, which represent the three score levels. Each item-specific scoring guideline outlines the requirements at each score point, and each item-specific scoring guideline is based on the *Science Scoring Guidelines for Open-ended Items*. See Appendix B or the *Science Item and Scoring Samplers* available on the PDE website.

SCIENCE SCENARIOS FOR GRADE 8

In addition to standalone multiple-choice and open-ended items, the science assessment includes scenarios at Grade 8. In consideration of the multidisciplinary and interdisciplinary nature of science content, science scenarios create stronger connections between The Nature of Science/Science Content and the multiple-choice items associated with a scenario. As a result, science scenarios allow the assessment to efficiently address and utilize the connections among the science content domains. A science scenario contains text, graphics, charts, and/or tables, and uses these elements to describe the results of a class project, an experiment, or other similar research. Students use the information found in a science scenario as a platform from which to answer multiple-choice questions. Scenarios and questions reach beyond simple fact recollection; they are designed to challenge students to think and to apply the knowledge and skills learned in their classrooms. Scenarios are designed to reflect multi-dimensional classroom activities that incorporate higher cognitive levels of understanding. Science scenarios challenge students to interpret stimulus content and to apply existing knowledge to new data while using science knowledge and process skills to arrive at their answers.

Writing Assessment Measures

WRITING MULTIPLE-CHOICE ITEMS

Each multiple-choice item on the writing test is associated with a passage containing embedded errors. Starting with the 2006 operational assessment and continuing through the 2013 assessment, four multiple-choice items are associated with each passage. Multiple revising and editing instances are incorporated within each passage and require that a student demonstrate both passive (recognizing and identifying grammatical and mechanical errors in text, such as misspellings, errors in word choice, errors in verb tense, or pronoun usage) and active (choosing the appropriate correction of an embedded error, such as deleting an irrelevant detail, changing the sequence of details, or placing correct marks of punctuation) revising and editing skills.

All multiple-choice items have four response options that include only one correct answer. The student is awarded one raw score point for choosing the correct response. Incorrect response choices, or distractors, typically represent some kind of misinterpretation or predisposition, unsound reasoning, or casual reading of the item and/or stimuli.

WRITING PROMPTS

At each assessed grade level, students respond to writing prompts developed to measure composition of writing as specified in the Academic Standards 1.4.A–C and further clarified in Academic Standards 1.5 A–F. A student response to a prompt requires approximately 60 minutes per prompt, though students are allowed more time to finish their responses if necessary. The writing prompts were field tested in a standalone field test in 2005 and in embedded field test positions in 2009, 2010, 2011, 2012, and 2013 with only one field test prompt being administered per student in the embedded field test. (No embedded field test prompts were included in the 2013 administration for Grade 5.) Prompt modes and prompts were spiraled across the total number of available forms. Spiraling is accomplished by administering each student one of many available field test prompts in a sequential manner. For example, the first student received Prompt 1, the second student Prompt 2, and so on until every prompt was administered. If there were more students than prompts, the sequence was repeated starting with the first prompt until every student was assigned a prompt. This process ensured that each prompt was administered to approximately equal and representative student populations in regard to demographics like gender, ethnicity, school size, and location in the state.

See Chapter Five for more information about the writing prompt field tests.

Table 2–1. Writing Prompt Field Test Implementation

Administration	Activity		
	Grade 5	Grade 8	Grade 11
2005	Standalone FT	Standalone FT	Embedded FT
2006	None	None	None
2007	None	None	None
2008	None	None	None
2009	Embedded FT	Embedded FT	Embedded FT
2010	Embedded FT	Embedded FT	Embedded FT
2011	Embedded FT	Embedded FT	Embedded FT
2012	Embedded FT	Embedded FT	Embedded FT
2013	None	Embedded FT	No Assessment

Beginning with the operational assessment in 2006 and continuing through 2013, students in Grade 5 responded to two pre-selected operational prompts chosen from across the three modes: narrative, informational, and persuasive. (See Table 2–2 for more information about the modes selected for operational use during a given administration.) The narrative prompt can be story/fiction or personal narrative/recount, which aligns with Academic Standard 1.4.A. The informational prompt can be sequence (process analysis) or simple definition, which aligns with Academic Standard 1.4.B. The persuasive prompt can be problem/solution or evaluation, which aligns with Academic Standard 1.4.C. The 2005 field test yielded enough Grade 5 prompts that no additional writing prompts were field tested in 2006, 2007, or 2008.

Beginning with the operational assessment in 2006 and continuing through 2013, students in Grade 8 responded to two operational prompts: informational and persuasive. The informational prompt can be sequence (process analysis), illustration, conceptual definition, cause/effect, classification, or compare/contrast, which aligns with Academic Standard 1.4.B. The persuasive prompt can be problem/solution or evaluation, which aligns with Academic Standard 1.4.C. The 2005 field test yielded enough Grade 8 prompts that no additional writing prompts were field tested in 2006, 2007, or 2008.

Beginning with the field test in 2005 and continuing through 2013, the responses to writing prompts were scored twice using two different scoring guidelines developed especially for the PSSA. The first score is based on the application of a mode-specific scoring guideline, and the second score is based on the application of a conventions scoring guideline. The mode-specific scoring guideline is designed to evaluate first-draft, on-demand responses. It identifies the essential criteria for successfully responding to a particular mode of writing relating to the core areas of writing: focus, development of content, organization, and style. In contrast, the conventions scoring guideline measures the demonstrated level of control of sentence formation, grammar, usage, spelling, and punctuation. For more information on the application of the new scoring guidelines, see Appendix B or the current *Writing Item and Scoring Sampler*, available on the PDE website.

Table 2–2. Writing Prompt Operational Mode Summary

Administration	Operational Modes		
	Grade 5	Grade 8	Grade 11
2006	Narrative, Informational	Informational, Persuasive	Informational, Persuasive
2007	Informational, Persuasive	Informational, Persuasive	Informational, Persuasive
2008	Narrative, Persuasive	Informational, Persuasive	Informational, Persuasive
2009	Informational, Persuasive	Informational, Persuasive	Informational, Persuasive
2010	Narrative, Informational	Informational, Persuasive	Informational, Persuasive
2011	Informational, Persuasive	Informational, Persuasive	Informational, Persuasive
2012	Narrative, Persuasive	Informational, Persuasive	Informational, Persuasive
2013	Narrative, Informational	Informational, Persuasive	No Assessment

Chapter Three: Item Development Process

The core portion of the 2013 PSSA operational administration is made up of items that were field tested primarily in the 2012 PSSA administration. Therefore, the activities that led to the 2013 PSSA operational administration began with the development of the test items that appeared in the field test portion of the 2012 operational administration. In turn, items that appeared on the field test portion of the 2012 operational administration were developed during and prior to 2011. (See Table 3–1 for a graphic representation of the basic process flow and overlap of the development cycles.)

Table 3–1. General Development Timeline Pattern of the PSSA

Operational Admin Year	Events Occurring in Calendar Year						
	2008	2009	2010	2011	2012	2013	2014
2008	Operational Core Admin with embedded matrix items →	Core-to-Core Link					
2009	Field Test →	Operational Core Admin with embedded equating block items →	Core-to-Core Link				
2010	Initial Item Development* →	Field Test →	Operational Core Admin with embedded equating block items →	Core-to-Core Link			
2011		Initial Item Development →	Field Test →	Operational Core Admin with embedded equating block items →	Core-to-Core Link		
2012			Initial Item Development →	Field Test →	Operational Core Admin with embedded equating block items →	Core-to-Core Link	
2013				Initial Item Development →	Field Test →	Operational Core Admin with embedded equating block items →	Core-to-Core Link

*The initial item development for 2009 field test forms that occurred in 2008 was only for writing prompts, science scenarios, and science multiple-choice and open-ended items. All 2009 mathematics and reading field test items were selected from an existing item bank of previously developed passages and items. All 2009 writing passages and multiple-choice items were also selected from the existing item bank. In addition, some 2009 science scenarios and science multiple-choice and open-ended field test items were selected from the existing item bank as needed for the field test. All passages and items selected from the item bank had been previously reviewed and approved by past bias and content review committees according to the processes described later in this chapter.

Table 3–2. General Timeline Associated with 2012 Field Test and 2013 Operational Assessment of Mathematics and Reading at Grades 3, 4, 5, 6, 7, 8, and 11

Time Frame	Assessment	Activity
January 2011– July 2011	'12 FT for '13 OP	Item development for items to embed in 2012 operational test
March 2011– May 2011	'11 FT for '12 OP	2011 embedded field test in 2011 operational test
July 2011	'12 FT for '13 OP	Item review for the embedded field test in 2012 operational assessment
July 2011	'11 FT for '12 OP	Statistical review of 2011 field tested items
September 2011– January 2012	'12 OP & '12 FT for '13 OP	Forms construction for 2012 operational assessment with embedded field test
January 2012– June 2012	'13 FT for '14 or '15 OP	Item development for items to embed on 2013 operational assessment ²
March 2012– May 2012	'12 FT for '13 OP	2012 embedded field test in 2012 operational test
June 2012	'13 FT for '14 or '15 OP	Item review for the embedded field test in 2013 operational assessment
July 2012	'12 FT for '13 OP	Statistical review of 2012 field tested items
September 2012– January 2013	'13 OP & '13 FT for '14 or '15 OP	Forms construction for 2013 operational assessment
March 2013– May 2013	'13 OP & '13 FT for '14 or '15 OP	2013 operational assessment

MATHEMATICS AND READING

A series of major activities took place in 2003 and 2004, which culminated in the implementation of changes to the structure of the operational PSSA in the 2005 assessment that continued through the 2013 administration. These key activities included the development of the Pennsylvania Assessment Anchor Content Standards (Assessment Anchors); test item development; content review; bias, fairness, and sensitivity review; field testing of items in spring 2012; item review with data; and final selection of items to compose the 2013 PSSA. These activities are described in some detail in this chapter as well as in Chapters Four and Five. It should also be noted that test items for the 2012 field test were developed by Data Recognition Corporation (DRC) and WestEd.

² Items embedded as field-test items on the Reading/Mathematics forms for Grades 3–5 are aligned to the Pennsylvania Core Standards; the first operational assessment aligned to only Pennsylvania Core Standards in ELA and Mathematics will take place in 2015.

Test Content Blueprint for 2012 Mathematics and Reading Assessment

The 2013 PSSA is based on the Pennsylvania Academic Standards. The 2013 PSSA reflects the Assessment Anchors (PDE 2004), which were designed as a means of improving the articulation of curricular, instructional, and assessment practices. The Assessment Anchors serve to clarify the Academic Standards assessed on the PSSA and to communicate assessment limits, or the range of knowledge and skills from which the PSSA was designed. Relevant to item development are the refinement and clarification embodied in the Assessment Anchors. Since the Assessment Anchors encompass Grades 3–8 and Grade 11, the document informs test design for the grades undergoing new test development as well as the grades currently assessed.

The PSSA for Grades 3, 5, 8, and 11 in 2005 through 2012 followed a revised blueprint and testing plan to reflect the Assessment Anchors and item distribution. The first operational administration of the PSSA for Grades 4, 6, and 7 took place in 2006. It followed the revised blueprint and testing plan, and it reflected the Assessment Anchors and item distribution revised plan first applied to the PSSA for Grades 3, 5, 8, and 11 in 2005 and continued through 2012. This plan continued to be applied to the PSSA for Grades 3–8 in 2013.

Operational Layout and Core Recycling for 2013 Mathematics and Reading

The mathematics and reading PSSA plan was developed through the collaborative efforts of Data Recognition Corporation (DRC) and the National Center for Improvement of Educational Assessment (NCIEA). The plan was subsequently evaluated and approved by PDE. At Grades 4–8, the mathematics and reading assessments are combined in one test booklet and one separate answer booklet. The test booklet contains mathematics multiple-choice items and reading passages with multiple-choice items. The answer booklet contains scannable pages for multiple-choice (MC) responses, open-ended (OE) mathematics items with response spaces, short-answer (SA) reading items with response spaces, and demographic data collection areas. At Grade 3, the mathematics and reading assessments are combined into one integrated test/answer booklet. Each MC item is worth 1 point. Mathematics OE items receive a maximum of 4 points (on a scale of 0–4) and reading SA items receive a maximum of 3 points (on a scale of 0–3). Each test form contains common items (identical on all forms) along with equating block (containing equating items) and embedded field test items. The common items consist of a set of core items taken by all students. These core items also include core-to-core linking items, which are items that also appeared on the previous year’s core form. The equating block items and the embedded field test items are unique, in most instances, to a form. That is, there can be instances in which an equating block or embedded field test item appears on more than one form.

The 2013 PSSA has twenty field test forms per grade in Grades 3–5 and nine field test forms per grade in Grades 6–8 with a normal core, normal core-to-core link, and normal equating block (per form). All of the forms contain the common items identical for all students and sets of generally unique items that fulfill two purposes:

1. Field testing new items (FT items)
2. Using items from the previous years’ assessments for the purpose of linking equating block (EB) items

Tables 3–3 through 3–6 display the test design for mathematics and reading for each form. The column entries for these tables denote the following:

- Grade level
- Number of unique common, or core, MC items
- Number of core-to-core linking MC items
- Number of equating block MC items
- Number of embedded MC field test items
- Number of unique common, or core, OE items
- Number of core-to-core linking OE items
- Number of equating block OE items
- Number of embedded OE field test items
- Total number of MC and OE items in the form
- Total number of operational points (derived from Core MC, Core-to-Core MC, Core OE, and Core-to-Core OE only) for producing a student score

Table 3–3. Mathematics Test Plan 2013

Grade	Total Core MC (all forms)	Total Equating Block MC (all forms)*	Total Embedded Field Test MC (all forms)	Total MC (Core, EB, & Field Test) positions (all forms)	Total Core 4 point OE (all forms)	Total Equating Block OE (all forms)*	Total Embedded Field Test OE (all forms)	Total OE (Core, EB, & Field Test) (all forms)	Total No. of Items per Op. Form MC/OE	Total No. of Core Points per Op. Test
3, 4, 5	60	40	200	300	3	0	20	23	72/4	72
6, 7, 8	60	18	90	168	3	0	9	12	72/4	72

* Some of the equating block items may not be unique.

Table 3–4. Mathematics Operational Core Test Plan 2013

Grade	Unique Core MC per Form	Core-to-Core Equating (from 2012) MC per Form	Unique Core 4 point OE per Form	Core-to-Core (from 2012) Equating OE per Form	Total Number of Core Items (MC/OE)	Total Core Points per Test
3, 4, 5, 6, 7, and 8	44	16	1	2	60/3	72

The mathematics core for 2013 was built with the standard core-to-core links from the 2012 core. The remainder of the core was built from items appearing in the embedded field test positions from the 2012 embedded field test or from the existing item bank. Sixteen MC items and two OE items were moved from the previous core to the current year core to serve as linking items. All core linking items appeared in the same relative position as they appeared in the most recent administration. Eighteen MC items from 2012 (field test) were pulled forward into 2012 to form an Equating Block (EB). Two EB MC items appeared on each form. The equating block items in Grades 3–5 were not unique. EB items did not contribute to student or school/district scores as the goal for the equating block is to increase the total available equating points.

Table 3–5. Reading Test Plan 2013 per Operational Form

Grade	No. of Unique Core MC per Op. Form	No. of Core-to-Core MC per Op. Form	No. of Equating Block MC per Op. Form	No. of Embedded FT MC per Op. Form	No. of Unique Core 3-pt. OE per Op. Form	No. of Core-to-Core 3-pt. OE per Op. Form	No. of Equating Block OE per Op. Form	No. of Embedded FT OE per Op. Form	Total No. of Items per Op. Form MC/OE	Estimated No. of Passages per Op. Form	Total No. of Core Points per Op. Test
3	22–29 (3 passages)	11–18 (2 passages)	8* (1 passage)	10* (1 passage)	1	1	0	1	58/3	7	46
4 and 5	22–29 (3 passages)	11–18 (2 passages)	8* (1 passage)	10* (1 passage)	2	2	0	1	58/5	7	52
6, 7, and 8	22–29 (4 passages)	11–18 (2 passages)	8* (1 passage)	10* (1 passage)	2	2	0	1	58/5	8	52

* Average

The reading core for 2013 was built with the standard core-to-core links from the 2012 core. The remainder of the core was built from items appearing in the embedded field test positions from the 2012 embedded field test, from the existing item bank, or from items recycled from the 2010 and 2011 cores that were not designated as core-to-core links. The core-to-core link consists of two reading passages with eleven to eighteen MC items and two OE items (one OE item at grade 3) moved from the previous core to the current year core to serve as linking items. Approximately sixteen MC items from the 2012 (field test) were pulled forward into 2013 to form an Equating Block (EB). One passage equal to approximately eight equating block MC items appeared on each form. Up to two equating block passages were alternated across the forms. EB items did not contribute to student or school/district scores as the goal for the equating block is to increase the total available equating points.

Table 3–6. 2013 Mathematics and Reading Core Points

Content Area	MC Items	Grade	OE Items	Total Score
Mathematics	60	3, 4, 5, 6, 7, and 8	3 items × 4-points=12 points	72
Reading	40	3	2 items × 3-points=6 points	46
		4, 5, 6, 7, and 8	4 items × 3-points=12 points	52

For more information concerning the process used to convert the operational layout into forms (i.e., form construction), see Chapter Six. For more information about operational layout across forms and across years (i.e., form equivalency) see Chapter Ten.

Linking for 2013 Mathematics and Reading Assessment

Linking provides a statistical bridge between assessment administrations. The 2013 administration is linked back to the 2012 administration through the use of linking items in the core (core-to-core linking items) and the equating block (equating items).

MULTIPLE-CHOICE ITEMS

For Grades 3–8, mathematics used 16 core-to-core linking MC items, and 18 equating block MC items per grade, and reading used 11 to 18 core-to-core linking MC items and 16 equating block MC items per grade.

OPEN-ENDED ITEMS

For Grades 3–8, mathematics used two 4-point core-to-core linking OE items and no [zero] equating block OE items per grade. For Grade 3, reading used one 3-point core-to-core linking OE item and no [zero] equating block OE items. For Grades 4–8, reading used two 3-point core-to-core linking OE item and no [zero] equating block OE items. Table 3–7 shows the 2013 linking points plan for mathematics and reading.

Table 3–7. 2013 Mathematics and Reading Linking Points Plan

Content	Grade	No. of Core-to-Core MC	No. of Equating Block MC	No. of Core-to-Core OE	No. of Equating Block OE	Max. No. of Linking Points per Op. Test*
Mathematics	3, 4, 5, 6, 7, and 8	16	2*	2 (4 pt)	0	34*
Reading	3	11–18	8*	1 (3 pt)	0	29*
	4, 5, 6, 7, and 8	11–18	8*	2 (3 pt)	0	32*

The topic of *linking* will be detailed thoroughly in Chapter Fifteen.

Test Sessions and Timing for 2013 Mathematics and Reading Assessment

The testing window for the 2013 operational assessment, including make-up sessions, extended from April 8 through May 3, 2013. The mathematics and reading assessments consisted of six sections. Test administration recommendations called for each section to be scheduled as one assessment session, although schools were permitted to combine multiple sections in a single session. Administration guidelines stipulated that the sections be administered in the sequence in which they were printed in the test booklets. Table 3–8 outlines the assessment schedule and estimated times for each section, as well as the number and types of items tested for each grade level. The estimated Student Testing Times shown on the next page do not include time for administrative tasks that occur during the pre- and post-administration activities. These times are estimated separately. Times are approximate and are supplied to test administrators for scheduling purposes only.

Table 3–8. Mathematics and Reading—2013 Administration and Testing Times

Test Section & Content	Suggested Times (In Minutes)			Grade Level					
	Administration (Total)	Administrative (Pre & Post)	Student Testing	Number of Items and Item Type					
				3	4	5	6	7	8
1 Mathematics	70 to 85	15 to 20	55 to 65	24 MC 2 CR	24 MC 2 CR	24 MC 2 CR	24 MC 2 OE	24 MC 2 OE	24 MC 2 OE
2 Reading	80 to 105	15 to 20	65 to 85	23 MC/SR 1 CR	24 MC/SR 2 CR	24 MC/SR 2 CR	21 MC 2 OE	20 MC 2 OE	21 MC 2 OE
3 Mathematics	65 to 80	15 to 20	50 to 60	24 MC 1 CR	24 MC 1 CR	24 MC 1 CR	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE
4 Reading	65 to 115	15 to 20	50 to 95	18 MC/SR 1 CR	18 MC/SR 1 CR	18 MC/SR 1 CR	18 MC 1 OE	18 MC 1 OE	18 MC 1 OE
5 Mathematics	65 to 80	15 to 20	50 to 60	24 MC 1 CR	24 MC 1 CR	24 MC 1 CR	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE
6 Reading	60 to 95	15 to 20	45 to 75	17 MC/SR 1 CR	16 MC/SR 2 CR	16 MC/SR 2 CR	19 MC 2 OE	20 MC 2 OE	19 MC 2 OE

During the assessment, students may request an extended assessment period if they indicate that they have not completed the task. Such requests are granted if the test administrator finds the request to be educationally valid. See Chapter Seven for more information about testing sessions.

Reporting Categories and Points Distributions for 2013 Mathematics and Reading Assessments

The mathematics assessment results will be reported in five categories that approximately correspond to those advocated by the National Council of Teachers of Mathematics (NCTM). The code letters for these Assessment Anchor categories are A–E and correspond to the following:

- A. Numbers and Operations
- B. Measurement
- C. Geometry
- D. Algebraic Concepts
- E. Data Analysis and Probability

The distribution of mathematics items into these five categories is shown in Table 3–9.

Table 3–9. Mathematics Reporting Categories

Grade	Reporting Categories				
	A: Numbers and Operations	B: Measurement	C: Geometry	D: Algebraic Concepts	E: Data Analysis & Probability
3	40%–50%	12%–15%	12%–15%	12%–15%	12%–15%
4	43%–47%	12%–15%	12%–15%	12%–15%	12%–15%
5	41%–45%	12%–15%	12%–15%	13%–17%	12%–15%
6	28%–32%	12%–15%	15%–20%	15%–20%	15%–20%
7	20%–24%	12%–15%	15%–20%	20%–27%	15%–20%
8	18%–22%	12%–15%	15%–20%	25%–30%	15%–20%

The reading assessment results will be reported in two broad categories:

- A. Comprehension and Reading Skills
- B. Interpretation and Analysis of Fictional and Nonfictional Text

Assessment Anchors associated with Comprehension and Reading Skills are coded with an initial letter A, and those related to Interpretation and Analysis of Fictional and Nonfictional Text are coded with an initial letter B. The distribution of items into these two categories across genres is shown in Table 3–10.

Table 3–10. Reading Reporting Categories and Genre

Grade	Reporting Categories			
	A: Comprehension and Reading Skills % Range	B: Interpretation and Analysis of Fictional and Nonfictional Text % Range	% of Passages (Genre) Fiction	% Passages (Genre) Nonfiction
3	60%–80%	20%–40%	50%–70%	30%–50%
4	60%–80%	20%–40%	50%–70%	30%–50%
5	60%–80%	20%–40%	50%–70%	30%–50%
6	50%–70%	30%–50%	40%–60%	40%–60%
7	50%–70%	30%–50%	40%–60%	40%–60%
8	40%–60%	40%–60%	40%–60%	40%–60%

Both the mathematics and reading content area reporting categories are further subdivided for specificity and Eligible Content or limits. Each subdivision is coded by adding an additional numeral, such as A.1. These subdivisions are called Assessment Anchors and Eligible Content.

Assessment Anchor Content Standards Subsumed within Reporting Categories for 2013 Mathematics and Reading Assessment

For mathematics, there are 16 Assessment Anchor Content Standards (Assessment Anchors) that occur at all grade levels (Grades 3–8), although they are not all assessed at each grade level. More specifically, the number targeted for assessment by grade level are 10 at Grade 3; 12 at Grade 4; 13 at Grade 5; 12 at Grade 6; 14 at Grade 7; and 13 at Grade 8.

For reading, there are five Assessment Anchors that vary to reflect grade-level appropriateness. Within the Comprehension and Reading Skills Reporting Category, two Assessment Anchors pertain to understanding fiction text and understanding nonfiction text. Within the Interpretation and Analysis of Fiction and Nonfiction Text Reporting Category, three Assessment Anchors pertain to Components of Text, Literary Devices and Concepts, and Organization of Nonfiction Text.

Mathematics and reading scores are based on the core (common) sections. Also reported are the student’s mathematics and reading performance levels. See Appendix C for a summary by grade level and content.

SCIENCE

In 2003, the existing Science, Technology, Environment, and Ecology (STEE) test was deferred, and PDE began efforts to develop a new science assessment. In the winter of 2006, a series of cognitive labs or item pilots were conducted across Pennsylvania with the primary focus of ascertaining language and contextual issues within the draft open-ended test items (Grade 4), scenario-based multiple-choice items (Grades 8 and 11), and scenario-based open-ended items (Grade 11), as well as determining the relative difficulty of the test items, the time required to complete the individual tasks, and the opportunity to know factors related to the implementation of the new science Assessment Anchors and Eligible Content by the participating schools. (See the section on the science cognitive labs discussed later in this chapter.)

Following the series of successful cognitive labs or item pilots, DRC developed another set of test items for the proposed voluntary, standalone field test. During the development phase, PDE made the determination to change the designation of the field test from a voluntary assessment to a census-based assessment. Leading up to the administration of the standalone field test, both content review and bias, fairness, and sensitivity review were conducted in Pennsylvania with Pennsylvania educators. In the spring of 2007, the initial standalone field test was administered to the census populations at Grades 4, 8, and 11, followed by a rangefinding for the open-ended items. After the scoring was completed, an item review with data was conducted for the field test items administered in 2007. Table 3–11 shows a timeline for development of the science assessment.

Table 3–11. Science Development Implementation Timeline

Year	Event
2003	STEE test put on hold
2004– 2005	New assessment plan developed by PDE
2006	Item Pilot (Cognitive Labs) to try out scenario-based science items
2007	Initial Standalone Field Test for Grades 4, 8, and 11
2008	Initial Operational Administration with core, matrix, and embedded field test positions
2009	Second Operational Administration with core, equating block, and embedded field test positions
2010– 2013	Continuation of Operational Administration with core, equating block, and embedded field test positions

Test Content Blueprint for the 2013 Operational Science Test

The PSSA is based on the Pennsylvania Academic Standards as defined by the Eligible Content. The PSSA science assessment for 2013 reflects the Assessment Anchor Content Standards, which were designed as a means of improving the articulation of curricular, instructional, and assessment practices. The Assessment Anchors serve to clarify the Academic Standards assessed on the PSSA and to communicate assessment limits, or the range of knowledge and skills from which the PSSA would be designed. Relevant to item development are the refinement and clarification embodied in the Assessment Anchors (PDE, 2004).

The Assessment Anchors are rooted in the Academic Standards adopted by the State Board of Education in January of 2002, and the standards—under two documents: *Science and Technology Standards* and the *Environment and Ecology Standards*—cover seventeen major categories describing what students need to know. Rather than attempting to report results for all seventeen standards, the categories are organized into only four. These categories are similar to those used by the National Assessment of Educational Progress (NEAP) and The Third International Mathematics and Science Study (TIMSS). However, the PSSA organizes the categories differently.

Achieve, Inc. conducted a preliminary review of the anchors in 2003 and produced a follow-up report on the anchors in 2005. More information about the Assessment Anchors and the Eligible Content can be found by referencing the Pennsylvania Science Assessment Anchors located on PDE’s website at www.education.state.pa.us.

More information on the Assessment Anchors can be found in Chapter Two.

Operational Layout for 2013 Science

The sixth operational administration of the PSSA science test took place in 2013. Critical to the preparation for this operational assessment, the design of the operational assessment had to be configured to meet NCLB requirements as well as other test development and psychometric requirements. The preliminary science PSSA plan was developed in 2004 through the collaborative efforts of DRC and PDE based on the recommendations of the Pennsylvania Technical Advisory Committee (TAC). At Grades 4 and 8, the science assessment consists of one test booklet and one separate answer booklet. The test booklet contains multiple-choice items and at Grade 8 contains stimulus scenario text. The answer booklet contains scannable pages for multiple-choice (MC) responses (answer grids), open-ended (OE) items with response spaces, and demographic data collection areas.

All MC items are worth 1 point. Standalone OE items receive a maximum of 2 points (on a scale of 0–2). Each test form contains common items (that are identical on all forms) along with equating block (equating items) and embedded field test items. The common items consist of a set of core items taken by all students. The equating block items and the embedded field test items are unique, in most instances, to a form. That is, there can be instances in which an equating block or embedded field test item appears on more than one form.

At Grades 4 and 8, the 2013 PSSA science assessment is composed of 12 forms per grade. All of the forms contain common items identical for all students and sets of generally unique items that fulfill two purposes:

1. Field testing new items
2. Using items from the previous years' assessments for the purpose of linking

Tables 3–12 through 3–14 display the 2013 operational test design for science.

Table 3–12. 2013 Science Test Plan per Operational Form

Grade	No. of Unique Core MC per Op. Form	No. of Core-to-Core MC per Op. Form	No. of Equating Block MC per Op. Form	No. of Embedded FT MC per Op. Form	No. of Unique Core OE per Op. Form	No. of Core-to-Core OE per Op. Form	No. of Equating Block OE per Op. Form	No. of Embedded FT OE per Op. Form	Total No. of Items per Op. Form MC/OE	Total No. of Core Points per Op Test*
4	42	16	2	8	3 (2 pt)	2 (2 pt)	0	1 (2 pt)	68 MC 6 OE	68
8	38 + 4 scenario-based	16	2	6 + 4 scenario-based	3 (2 pt)	2 (2 pt)	0	1 (2 pt)	70 MC 6 OE	68

*Some equating block items may not be unique to each form.

Since an individual student's score is based solely on the common (or core) items, the total number of operational points is 68 for both grades. The total score is obtained by combining the points from the core MC and OE portions of the test as follows:

Table 3–13. 2013 Science Core Plan per Grade

Grade	Standalone MC Items	Scenario-based MC Items	Standalone OE Items	Scenario-based OE Items	Total Points
4	58	0	5 (2 pt)	0 (4 pt)	68
8	54	4	5 (2 pt)	0 (4 pt)	68

For more information concerning the process used to convert the operational layout into forms (i.e., form construction), see Chapter Six. For more information about operational layout across forms and across years (i.e., form equivalency), see Chapter Ten.

Linking for 2013 Science Assessment

Linking provides a statistical bridge between assessment administrations. The 2013 administration is linked back to the 2012 administration through the use of linking items in the core (core-to-core linking items) and the equating block (equating items).

MULTIPLE-CHOICE ITEMS

For Grades 4 and 8, science used 16 core-to-core linking MC items and 24 equating block MC items per grade.

OPEN-ENDED ITEMS

For both grades, science used two 2-point core-to-core linking OE items and no [zero] equating block OE items per grade.

Table 3–14. 2013 Science Linking Points Plan

Grade	No. of Core-to-Core MC	No. of Equating Block MC	No. of Core-to-Core OE	No. of Equating Block OE	Max. No. of Linking Points per Op. Test*
4	16	24*	2 (2 pt)	0	44*
8	16	24*	2 (2 pt)	0	44*

*Not all equating block items will be unique; some may appear on more than one form.

The topic of *linking* is discussed thoroughly in Chapter Fifteen.

Test Sessions and Timing for 2013 Science Assessment

The testing window for the 2013 operational assessment extended from April 22 through May 3, 2013, including make-up session. The science assessments consisted of two sections in each grade. Test administration recommendations call for each section to be scheduled as one assessment session, although schools are permitted to combine both sections in a single session. Administration guidelines stipulate that the sections be administered in the sequence in which they are printed in the booklets. Table 3–15 and Table 3–16 outline the assessment schedule and estimated times for each section and the number and types of items tested for each grade level. The estimated student testing times did not include time for administrative tasks that occur during the pre- and post-administration activities.

Table 3–15. Science – 2013 Administration and Testing Times

Test Section	Suggested Times (In Minutes)			Grade Level Number of Items and Item Type	
	Administration (Total)	Administrative (Pre & Post)	Student Testing	4	8
1	60 to 80	15 to 20	45 to 60	34 MC 3 OE	35 MC 3 OE
2	60 to 80	15 to 20	45 to 60	34 MC 3 OE	35 MC 3 OE

During the assessment, students were allowed to request an extended assessment period if they indicated that they had not completed the task. Such requests were granted if the assessment administrator found them to be educationally valid. See Chapter Seven for more information about testing sessions.

Reporting Categories and Points Distributions

The science assessment results will be reported in four categories, coded as A through D:

- A. The Nature of Science
- B. Biological Sciences
- C. Physical Sciences
- D. Earth and Space Sciences

The distribution of science items into these four categories is shown in Table 3–16.

Table 3–16. Science Reporting Categories

Grade	Reporting Categories			
	A: Nature of Science	B: Biological Sciences	C: Physical Sciences	D: Earth & Space Sciences
4	~50%	~17%	~17%	~17%
8	~50%	~17%	~17%	~17%

The Reporting Categories are further subdivided for specificity and Eligible Content limits. Each subdivision is coded by adding an additional numeral, such as A.1. These subdivisions are called Assessment Anchors, Descriptors (Sub-Assessment Anchors), and Eligible Content.

Assessment Anchor Content Standards Subsumed within Reporting Categories for 2013 Science Assessment

Distributed across the four Reporting Categories are a dozen Sub-Reporting Categories. Each of the 12 Assessment Anchors exists at each grade level, with the Assessment Anchors and Eligible Content varying to reflect grade-level appropriateness. The numbers of Assessment Anchors targeted by grade level are 21 at Grade 4 and 23 at Grade 8.

Total science scores reported at the student level are based on the core (common) sections. School and district-level scores are reported at the Eligible Content level under the Assessment Anchors and are based on the core (common) positions. See Appendix C for a summary by grade level and subject.

2006 Science Item Pilot

Prior to the initial field test in 2007, DRC, in collaboration with PDE, conducted a science cognitive lab/item pilot in selected schools throughout the Commonwealth from February 27 through March 17, 2006. A sample of 507 students from urban, suburban, and rural school districts from across the Commonwealth participated in the PSSA Science Item Tryout Project. The impetus for this study was Pennsylvania's response to the mandatory science assessment component of the No Child Left Behind legislation to create a rigorous science test for Grades 4, 8, and 11 by 2008. The primary purpose of the cognitive lab or item tryout was to pilot the use of the new science scenarios at Grade 8 and Grade 11, and to pilot the multiple-choice items at Grade 4.

The project involved development of science scenarios, refinement of science test items, creation of survey questions, and design of interview protocols to be administered using a cognitive laboratory technique. The cognitive laboratory technique was developed in the early 1980s through an interdisciplinary effort by survey methodologists and psychologists (Willis, 1999; Erickson and Simon, 1993). Different models of the cognitive process to solve a test item have evolved over the years, but all have four major processes in common: 1) comprehension of the question, 2) retrieval of relevant information, 3) decision process, and 4) response process (Tourangeau, 1984).

In the development and execution of the cognitive laboratory project, DRC customized the techniques employed specifically to meet PDE's goal and expectations. The goal of the project was to gather relevant information about the thinking processes of students enrolled in science in Grades 4, 8, and 11 in order to create a better science assessment for Pennsylvania students.

Logistics and Demographics

PDE provided DRC with a list of the Science, Technology, Environment, and Ecology Assessment Advisory Committee (STEEAAC) members who agreed to participate and to facilitate the PSSA Science Item Tryout Project in their respective districts. Disbursed throughout Pennsylvania, participating districts provided a representative sample of students enrolled in science in Grades 4, 8, and 11 in urban, suburban, and rural schools. Participating districts are listed in Table 3–17.

Table 3–17. Participating Districts by Region

Region of Commonwealth	School District
Western	Athens Area Grove City Area Penn Hills Pittsburgh Public Schools
Central	Manheim Township Newport State College Area West Shore Wilkes-Barre Area
Eastern	Haverford Township Lower Merion Mid-Valley Philadelphia City SD Upper Merion

Process and Procedures for the 2006 Item Pilot

Two parallel forms of the science assessment were designed for each grade level, with a designated administration time of thirty minutes. No attempt was made to replicate the design of a PSSA science operational test for the cognitive lab or pilot test because of testing-time limitations and the objectives of this study. The items were representative of items from each of the proposed PSSA’s four reporting strands (i.e., The Nature of Science, Biological Sciences, Physical Sciences, and Earth and Space Sciences). All test items were approved by PDE before inclusion in the PSSA Science Item Tryout Project.

In Grade 4, each form of the test consisted of ten multiple-choice items, 70 percent of which included graphs, graphics, charts, or tables with relevant information associated with the item. All four reporting strands were assessed in each Grade 4 test form. In Grades 8 and 11, age/grade-appropriate science scenarios were developed. The scenarios included graphics, charts, tables, graphs, and diagrams to support the scenario text. A set of test items associated with each science scenario was developed. In Grade 8, each test form included items from all four reporting strands. In Grade 11, scenarios in test Form A assessed the biological, earth and space, and nature of science reporting strands, while test Form B assessed the physical, earth and space, and nature of science reporting strands.

Scenarios and questions reached beyond simple fact recollection; they were designed to challenge students to think and to apply knowledge and skills learned in their classrooms. The science scenarios were based on Pennsylvania Assessment Anchors and Eligible Content. Scenarios were designed to reflect multi-dimensional classroom activities that incorporate higher cognitive levels of understanding. Each scenario was stimulus-based and included passages with graphics, charts, graphs, or a combination of all three media. Science scenarios challenged students to interpret passage content while using science knowledge and process skills to determine their answers.

Implementation and Test Administration for 2006 Item Pilot

Two classrooms within one geographic region participated in the project each day. At least two test development specialists were present at all but one school district during the pilot study project sessions; in addition, representatives from PDE attended most sessions. The PSSA Science Item Tryout Project field work occurred during a three-week window, beginning on February 27 and concluding on March 16.

WRITING

Test Content Blueprint for 2013 Writing Assessment

As indicated in Chapter One and Chapter Two, the PSSA is based on the Pennsylvania Academic Standards for Reading, Writing, Speaking, and Listening. The writing test specifically measures Academic Standards 1.4 (Types of Writing) and 1.5 (Quality of Writing). The Reading, Writing, Speaking, and Listening Standards were designed to show what students should know and be able to do with the English language at each grade level. The Standards establish an outline for what can be assessed on the PSSA writing test and help to communicate the range of knowledge and skills from which the PSSA items would be designed.

The PSSA writing test for Grades 5, 8, and 11 in 2006 through 2012 followed this content blueprint and testing plan in order to reflect the Academic Standards. The PSSA writing test in 2013 continued to follow this blueprint and testing plan for Grades 5 and 8.

Operational Layout for 2013 Writing

The PSSA operational layout was developed through the collaborative efforts of Data Recognition Corporation (DRC), the National Center for Improvement of Educational Assessment (NCIEA), and the Pennsylvania Department of Education. The layout was subsequently evaluated and approved by PDE. The writing test book is scannable and includes fields for student demographic data, stimuli (i.e., embedded error passages) linked to multiple-choice (MC) items, and writing prompts (WP). Each MC item is worth 1 point. Responses to WP items receive a maximum of 4 points (on a scale of 1–4) for demonstrating control in a given mode and also receive a maximum of 4 points (on a scale of 1–4) for demonstrating control of conventions. The writing scoring guidelines have a 1, 2, 3, and 4 score point, but there is no zero score point. Blanks and other non-scoreable responses are the only situations in which a student's raw score is zero.

MULTIPLE-CHOICE ITEMS

Each test form contains a common set of operational items (i.e., each student is tested on an identical set of core items) along with embedded field test items. The embedded field test items are unique across each form. In Grade 5, placeholder items were used in the embedded field test positions, as no embedded field test development took place during 2012 for Grade 5 Writing.

WRITING PROMPTS

Each test form contains two common operational writing prompts along with one embedded field test item in Grade 8 only. The core prompts are taken by all students at a grade level, and the embedded field test items are unique across each form. The 2006 through 2008 operational forms did not contain matrix or embedded field test writing prompts; however, in order to begin building a bank of usable prompts for use in future operational administrations, writing prompts began to appear in field test positions starting again in 2009. Grade 5 did not require embedded

field testing in 2013, so the embedded field test writing prompt section was omitted in 2013. For more information on the field test process that occurred for the development of the writing prompts used operationally in 2013, see Chapter Five.

Forms

The 2013 writing PSSA is comprised of one form at Grade 5 and six forms at Grade 8. All of the forms in Grade 8 contain common items identical for all students and sets of unique embedded field test items that expand the total pool of available items.

Table 3–18 and Table 3–19 display the design for the writing test forms. The column entries for these tables denote the following:

- Number of core Revising and Editing (R&E) stimulus-based MC items
- Number of embedded field test R&E stimulus-based MC items
- Total number of R&E stimulus-based MC items
- Number of pre-equated core 4-point writing prompts (WP)
- Number of field test WP
- Total number of MC and OE items in the form (Total Items MC/WP)

Table 3–18. 2013 Writing Test Plan per Operational Form per Grade

Grade	No. of Core R&E Stimulus-based MC Items per Form	No. of FT R&E Stimulus-based MC Items per Form	Total No. of R&E MC Items per Form	No. of Pre-equated Core 4-point WP per Form	No. of FT WP per Form	Total No. of Items per Op. Form (MC/WP)
5	12	8*	20	2	0	20/2
8	12	8	20	2	1	20/3

* Instead of FT R&E Stimulus-based MC items, Grade 5 used placeholder items.

Since an individual student’s score is based solely on the common, or core items, the total number of operational points is 100. The total score is obtained by combining the points from the core MC and WP portions of the test as displayed in Table 3–19.

Table 3–19. Maximum Eligible Core Points for Writing Prompts

Multiple-choice	Writing Prompts		Totals
	Conventions	Mode	
12	8	80	100
12 items × 1 point each (12×1)	2 items, each worth a maximum of 4 points each (2×4)	2 items, each worth a maximum of 4 points each The raw score is then multiplied by 10. (2×4)×10	(12 + 8 + 80)

Linking for 2013 Writing Assessment

The matter of linking for the PSSA writing assessment is covered in Chapter Fifteen.

Test Sessions and Timing

The testing window for the 2013 operational assessment was from March 11 through March 22, 2013, including make-up sessions. The writing assessment consisted of three sections in Grade 5 four sections in Grade 8. Test administration required each complete section to be scheduled as one assessment session, although schools were permitted to combine multiple sections as a single session. Administration guidelines stipulated that the sections be administered in the sequence in which they were printed in the test book. Table 3–20 outlines the assessment schedule and estimated times for each section.

Table 3–20. Writing

Section	Contents	Administration (Total in minutes)	Administrative (Pre & Post in minutes)	Student Testing in minutes
1	20 Multiple-choice	60 to 75	15 to 20	45 to 55
2	1 Writing Prompt	70 to 85	15 to 20	55 to 65
3	1 Writing Prompt	70 to 85	15 to 20	55 to 65
4*	1 Writing Prompt	70 to 85	15 to 20	55 to 65

* Section 4 was included in Grade 8 only.

During the assessment, students may request an extended assessment period if they indicate that they have not completed the task. Such requests are granted if the test administrator finds them to be educationally valid. See Chapter Seven for more information about testing sessions.

Reporting Categories and Point Distribution for 2013 Writing Assessment

The writing assessment results will be reported in two categories:

- 1.** Composition – Academic Standard 1.4, Types of Writing
- 2.** Revising and Editing – Academic Standard 1.5, Quality of Writing

Academic Standards A, B, and C are associated with Composition. Academic Standards E and F are associated with Revising and Editing. The distribution of core items into these two categories is shown in Table 3–21. See also Appendix C for a summary by grade level and subject.

Table 3–21. Core Points Distribution

Reporting Category	Composition	Revising and Editing	Total
Academic Standards	1.4.A, 1.4.B, 1.4.C	1.5.E and 1.5.F	
Multiple-choice Items	N/A	12	12
Writing Prompt 1	4 (Mode)	4 (Conventions)	8
Writing Prompt 2	4 (Mode)	4 (Conventions)	8
Raw Sub-total	8	20	28
Weighting Factor applied to Raw Score	x10	x1	
Total Possible Points	80	20	100

For more information concerning the process used to convert the operational layout into forms (i.e., form construction), see Chapter Six. For more information about operational layout across forms and across years (i.e., form equivalency), see Chapter Ten.

TEST DEVELOPMENT CONSIDERATIONS: ALL ASSESSMENTS

Alignment to the PSSA Assessment Anchors and Eligible Content (or, in the case of writing, strong alignment with the PSSA Academic Standards), grade-level appropriateness (reading/interest level, etc.), depth of knowledge, cognitive level, item/task level of complexity, estimated difficulty level, relevancy of context, rationale for distractors, style, accuracy, and correct terminology were major considerations in the item development process. The *Standards for Educational and Psychological Testing* (AERA, APA, NCME, 1999) and the *Principles of Universal Design* (Thompson, Johnstone, & Thurlow, 2002) guided the development process. In addition, DRC’s manual, *Fairness in Testing: Guidelines for Training on Bias, Fairness, and Sensitivity Issues* was used for developing items. All items were reviewed for fairness by bias and sensitivity committees and for content by Pennsylvania educators and field-specialists. Items were also reviewed for adherence to the Principles of Universal Design by representatives from the National Center for Educational Outcomes (NCEO). In addition, the items were reviewed for adherence to the guidelines outlined in the Pennsylvania publication *Principles, Guidelines and Procedures for Developing Fair Assessment Systems: Pennsylvania Assessment Through Themes* (PATT).

Bias, Fairness, and Sensitivity: All Assessments

At every stage of the item and test development process, DRC employs procedures that are designed to ensure that items and tests meet Standard 7.4 of the Standards for Educational and Psychological Testing (AERA, APA, NCME, 1999).

Standard 7.4: Test developers should strive to identify and eliminate language, symbols, words, phrases, and content that are generally regarded as offensive by members of racial, ethnic, gender, or other groups, except when judged to be necessary for adequate representation of the domain.

To meet Standard 7.4, DRC employs a series of internal quality steps. DRC provides specific training for test developers, item writers, and reviewers on how to write, review, revise, and edit items for issues of bias, fairness, and sensitivity (as well as for technical quality). Training also includes an awareness of and sensitivity to issues of cultural diversity. In addition to providing *internal* training in reviewing items in order to eliminate potential bias, DRC also provides *external* training to the review panels of minority experts, teachers, and other stakeholders.

DRC's guidelines for bias, fairness, and sensitivity include instruction concerning how to eliminate language, symbols, words, phrases, and content that might be considered offensive by members of racial, ethnic, gender, or other groups. Areas of bias that are specifically targeted include, but are not limited to, stereotyping, gender, regional/geographic, ethnic/cultural, socioeconomic/class, religious, and biases against a particular age group (ageism) or persons with disabilities. DRC catalogues topics that should be avoided and maintains balance in gender and ethnic emphasis within the pool of available items and passages.

Universal Design: All Assessments

As stated above, the Principles of Universal Design were incorporated throughout the item development process to allow participation of the widest possible range of students in the PSSA. The following checklist was used as a guideline:

- Items measure what they are intended to measure.
- Items respect the diversity of the assessment population.
- Items have a clear format for text.
- Stimuli and items have clear pictures and graphics.
- Items have concise and readable text.
- Items allow changes to other formats, such as Braille, without changing meaning or difficulty.
- The arrangement of the items on the test has an overall appearance that is clean and well organized.

A more extensive description of the application of the Principles of Universal Design is described in Chapter Four.

Depth of Knowledge: All Assessments

An important element in statewide assessment is the alignment between the overall assessment system and the state's standards. A methodology developed by Norman Webb (1999) offers a comprehensive model that can be applied to a wide variety of contexts. With regard to the alignment between standards statements and the assessment instruments, Webb's criteria include five categories, one of which deals with content. Within the content category is a useful set of levels for evaluating depth of knowledge (DOK). According to Webb (1999), "depth-of-knowledge consistency between standards and assessments indicates alignment if what is elicited from students on the assessment is as demanding cognitively as what students are expected to know and do as stated in the standards" (p. 7–8). The four levels of cognitive complexity (i.e., depths of knowledge) are as follows:

- Level 1: Recall
- Level 2: Application of Skill/Concept
- Level 3: Strategic Thinking
- Level 4: Extended Thinking

Depth-of-knowledge levels were incorporated in the item writing and review process, and items were coded with respect to the level they represented. Generally, multiple-choice items are written to DOK levels 1 and 2, and open-ended items are written to DOK level 3.

Passage Readability

Evaluating the readability of a passage is essentially a judgmental process by individuals familiar with the classroom context and what is linguistically appropriate at a given grade level as described in the section on reading passage selection later in this chapter. Although various readability indices were computed and reviewed, it is recognized that such methods measure different aspects of readability and are often fraught with particular interpretive liabilities. Thus, the commonly available readability formulas were not used in a rigid way, but more informally to provide for several snapshots of a passage that senior test development staff considered along with experience-based judgments in guiding the passage selection process. In addition, passages were reviewed by committees of Pennsylvania educators who evaluated each passage for readability and grade-level appropriateness.

Test Item Readability: All Assessments

Careful attention was given to the readability of the items to make certain that the assessment focus of the item did not shift based on the difficulty of reading the item. Subject areas such as mathematics or science contain many content-specific vocabulary terms. As a result, readability formulas were not used. However, wherever it was practicable and reasonable, every effort was made to keep the vocabulary one grade level below the tested grade level for non-reading tests. There was a conscious consideration made to ensure that each test question was evaluating a student's ability to build toward mastery of the mathematics standards or the science standards versus the student's reading ability. Resources used to verify the vocabulary level were the *EDL Core Vocabularies* and the *Children's Writer's Word Book*.

In addition, every test question is brought before several different committees comprised of grade-level experts in the field of mathematics education and science education. They review each question from the perspective of the students they teach, and they determine the validity of the vocabulary used and work to minimize the level of reading required.

Vocabulary was also addressed at the Bias, Fairness, and Sensitivity Review, although the focus was on how certain words or phrases may represent a possible source of bias or issues of fairness or sensitivity.

TEST DEVELOPMENT PROCESS: ALL ASSESSMENTS

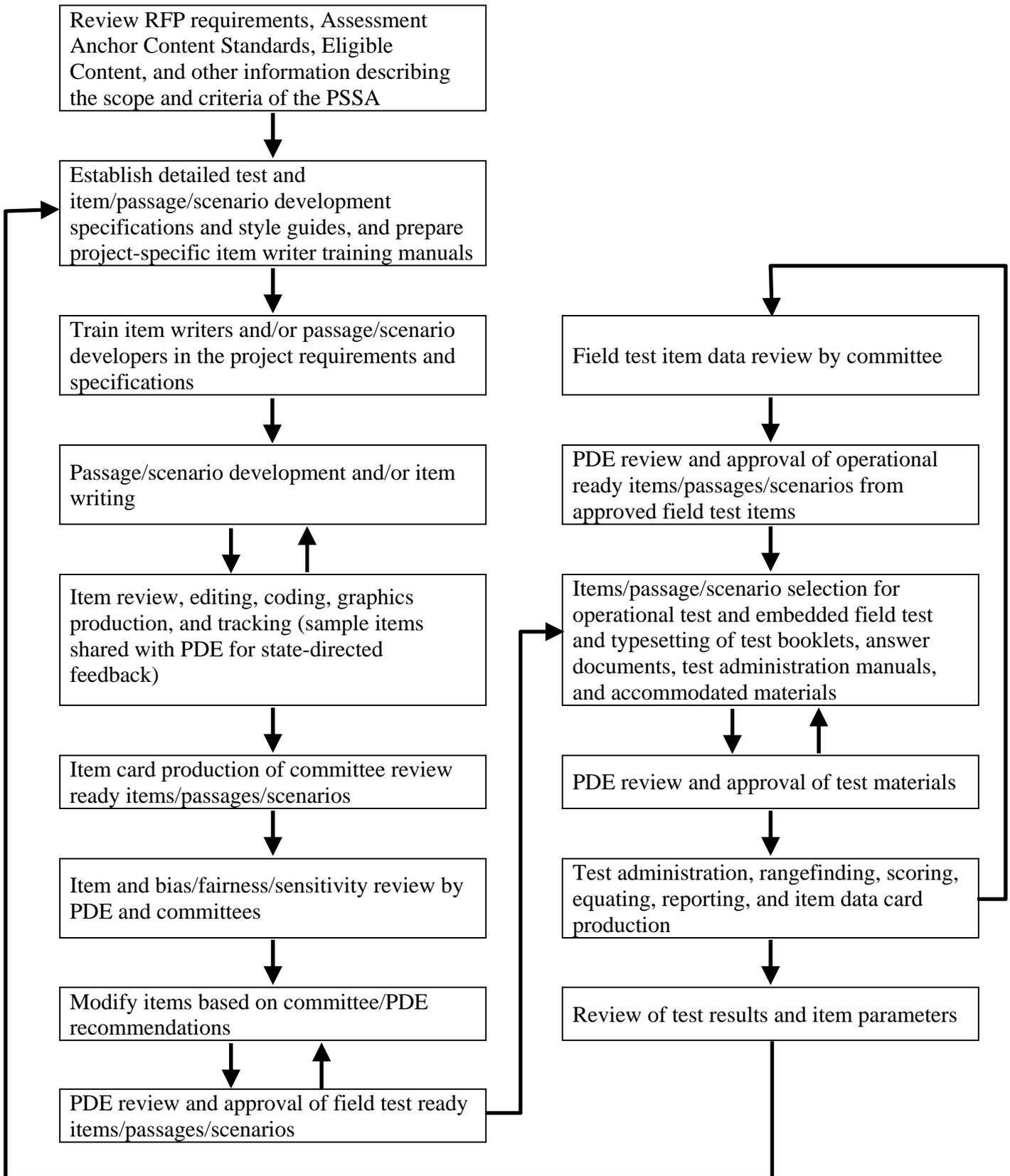
The test development process for passages, scenarios, and items followed a logical timeline, which is outlined below in Figure 3–1. On the front end of the schedule, tasks were generally completed with the goal of presenting field test candidate items to committees of Pennsylvania educators. On the back-end of the schedule, all tasks lead to the field test data review.

Figure 3–1. Item and Test Development Cycle and Timeline

Steps in Development Cycle	Timeline Before/After New Item Review		
Development planning	Fall	↓	-12 to -9 months
Reading passage selection	Fall	↓	-12 to -9 months
Item writer training	Fall/Winter	↓	-9 months
Initial item authoring	Winter/Spring	↓	-9 to -4 months
Internal reviews and PDE reviews	Spring/Summer	↕	-8 to -1 month
Bias, Fairness, and Sensitivity Review	Summer/Fall	↓	+/- 0 months
New Item Content Review	Summer/Fall	⇒	+/- 0 months
Post-review resolution and clean-up	Summer/Fall	↓	+1 to +2 months
Build test forms	Fall	↓	+2 to +4 months
Internal form reviews and PDE reviews	Fall/Winter	↕	+3 to +4 months
Form printing, packaging, and shipping	Winter/Spring	↓	+4 to +8 months
Test administration	Spring	↓	+9 months
Material/data processing, rangefinding, and scoring	Spring/Summer	↓	+10 to +12 months
Field Test Item Data Review	Summer	⇒	+12 months
Select operational items	Summer/Fall	↓	+13 to +15 months

The process flowchart in Figure 3–2 illustrates the interrelationship among the steps in the process that occur in a normal year of development (i.e., when the items for field testing are primarily from new development, as opposed to being selected from an existing item bank). In addition, a detailed process table describing the item and test development processes also appears in Appendix D.

Figure 3–2. DRC Item and Test Development Process



The following paragraphs describe the processes which lead up to the operational test in a normal round of development. These processes were used to develop all the 2012 field test items used as operational items in the 2013 administration.

Item Development Planning Meeting: All Assessments

Prior to the start of any item development work, DRC’s test development staff meets with PDE’s assessment office to discuss the test development plans for the next PSSA administration, including the test blueprint, the field test plan (including development counts), procedures, timelines, etc. With a complete development cycle lasting several years (from item authoring through field test, data review, and operational usage), the initial planning begins well in advance of the anticipated administration. For the 2013 operational administration, the initial planning meeting for the item authoring process for the 2012 field test occurred in fall 2010. Item authoring began early in 2011, with the item review meetings occurring in July 2011. See Table 3–2.

Item Writer Training: All Assessments

Item writers were selected and trained for the content areas of mathematics, reading, science, and writing. Qualified writers were college graduates with teaching experience and a demonstrated base of knowledge in the content area. Many of these writers were content assessment specialists and curriculum specialists. The writers were trained individually and had previous experience in writing multiple-choice and open-ended items. Prior to developing items for the PSSA, the cadre of item writers was trained with regard to the following:

- Pennsylvania Academic Standards, Assessment Anchors, and Eligible Content
- Webb’s Four Levels of Cognitive Complexity: Recall, Basic Application of Skill/Concept, Strategic Thinking, and Extended Thinking
- General Scoring Guidelines for Each Content Area
- Specific and General Guidelines for Item Writing
- Bias, Fairness, and Sensitivity Guidelines
- Principles of Universal Design
- Item Quality Technical Style Guidelines
- Reference Information
- Sample Items

Reading Passage Selection

The task of searching for passages was conducted by DRC professionals with classroom experience in reading/language arts. These professionals also underwent specialized training (provided by DRC) in the characteristics of acceptable passages. Guidelines for passage selection included appropriate length, text structure, density, and vocabulary for the grade level. A judgment was also made about whether the reading level required by a particular passage was at the independent level, that is, where the average student should be able to read 90 percent of words in the text independently. Passage finders were given the charge to search for a specified number of passages for each genre. Generally, at least twice as many passages as needed were sought. Most passages acquired for the 2012 field test were authentic in that they were culled from published materials. Approval to reprint was secured from the publishers. Passages underwent an internal review by several test development content editors to judge their merit with regard to the following criteria:

- Passages have interest value for students.
- Passages are grade-appropriate in terms of vocabulary and language characteristics.
- Passages are free of bias, fairness, and sensitivity issues.
- Passages represent different cultures.
- Passages are from a variety of sources.
- Passages are able to stand the test of time.
- Passages are sufficiently rich to generate a variety of MC and OE items.
- Passages are complete with all necessary permissions documentation.
- Passages avoid dated subject matter unless a relevant historical context is provided.
- Passages should not require students to have extensive background knowledge in a certain discipline or area to understand a text.

Once through the internal review process, those passages deemed potentially acceptable were reviewed by the Reading Content Committee and Bias, Fairness, and Sensitivity Committee for final approval.

Item Authoring and Tracking: All Assessments

Initially, items are generated with software-prepared PSSA Item Cards, which allows for preliminary sorting and reviewing. Although very similar, the PSSA Item Card for Multiple-Choice Items differs from the PSSA Item Card for Open-Ended Items in that the former has a location at the bottom of the card for comments regarding the distractors. Examples of these two cards are shown in Appendix E. In both instances a column against the right margin includes codes to identify the subject area, grade level, content categories, passage information (in the case of reading), item type, depth of knowledge (cognitive complexity), estimated difficulty, answer key (for MC items), and calculator use (for mathematics items).

All items undergoing field testing in 2012 were entered into the DRC Item Development and Educational Assessment System (IDEAS), which is a comprehensive, secure, online item banking system. It accommodates item writing, item viewing and reviewing, and item tracking and versioning. IDEAS manages the transition of an item from its developmental stage to its approval for use within a test form. The system supports an extensive item history that includes item usage within a form, item-level notes, content categories and subcategories, item statistics from both classical and Rasch item analyses, and classifications derived from analyses of differential item functioning (DIF). A sample IDEAS Item Card is presented in Appendix E.

Internal Reviews and PDE Reviews: All Assessments

To ensure that the items produced were sufficient in number and adequately distributed across subcategories and levels of difficulty, item writers were informed of the required quantities of items. As items were written, an item authoring card was completed. It contained information about the item, such as grade level, content category, and subcategories. Based on the item writer's classroom teaching experience, knowledge of the content area curriculum, and cognitive demands required by the item, estimates were recorded for level of cognitive complexity and difficulty level. Items were written to provide for a range of difficulty.

As part of the item construction process, each item was reviewed by content specialists and editors at DRC, at WestEd, or at both companies (depending on the grade level and content). Content specialists and editors evaluated each item to make sure that it measured the intended Eligible Content and/or Assessment Anchor Content Standard. They also assessed each item to make certain that it was appropriate for the intended grade and that it provided and cued only one correct answer (MC items only). In addition, the difficulty level, depth of knowledge, graphics, language demand, and distractors were also evaluated. Other elements considered in this process include, but are not limited to Universal Design, bias, source of challenge, grammar/punctuation, and PSSA style.

Following this internal process, items were reviewed by content specialists at the Pennsylvania Department of Education. PDE staff then consulted with DRC and WestEd about any general issues or concerns (e.g., style, format, interpretation of Assessment Anchors and Eligible Content) and about edits to specific items. Following PDE's review, the items were prepared for the content review meetings conducted with Pennsylvania educators.

Item Content Review in Summer 2011: All Assessments

Prior to the 2012 field testing, all newly-developed test items were submitted to content committees for review. The content committees consisted of Pennsylvania educators from school districts throughout the Commonwealth of Pennsylvania, some with postsecondary university affiliations. The primary responsibility of the content committee was to evaluate items with regard to quality and content classification, including grade-level appropriateness, estimated difficulty, depth of knowledge, and source of challenge. With source of challenge, items are identified where the cognitive demand is focused on an unintended content, concept, or skill (Webb, 2002). In addition, source of challenge may be attributed if the reason that an answer could be given results from a cultural bias, an inappropriate reading level, or a flawed graphic in an item, or if an item requires specialized, non-content related knowledge to answer. Source of challenge could result in a student who has mastered the intended content or skill answering the item incorrectly or a student who has not mastered the intended content or skill answering the item correctly. Committee members were asked to note any items with a source of challenge and to suggest revisions to remove the source of challenge. They also suggested revisions and made

recommendations for reclassification of items. In some cases when an item was deleted, the committee suggested a replacement item and/or reviewed a suggested replacement item provided by the facilitators. The committee also reviewed the items for adherence to the Principles of Universal Design, including language demand and issues of bias, fairness, and sensitivity.

The content review was held June 29–30, 2011 for writing, June 27, 2011 for reading and mathematics, and June 27–29, 2011 for science. Committee members were approved by PDE, and PDE-approved invitations were sent to them by DRC. PDE also selected internal staff members for attendance. The meeting commenced with a welcome by PDE and DRC. This was followed by an overview of the test development process by DRC. PDE, along with DRC, also provided training on the procedures and forms to be used for item content review.

DRC content assessment specialists facilitated the reviews and were assisted by representatives of PDE and WestEd. Committee members, grouped by grade level and content area, worked through and reviewed the items for quality and content, as well as for the following categories:

- Assessment Anchor Alignment (classified as Full, Partial, or No)
- Content Limits (classified as Yes or No)
- Grade-Level Appropriateness (classified as At Grade Level, Below Grade Level, or Above Grade Level)
- Difficulty Level (classified as Easy, Medium, or Hard)
- Depth of Knowledge (classified as Recall, Application, Strategic Thinking)
- Appropriate Source of Challenge (classified as Yes or No)
- Correct Answer (classified as Yes or No)
- Quality of Distractors (classified as Yes or No)
- Graphics (classified as Yes or No) in regards to appropriateness
- Appropriate Language Demand (classified as Yes or No)
- Freedom from Bias (classified as Yes or No)

The members then came to consensus and assigned a status to each item as a group: Approved, Accepted with Revision, Move to Another Assessment Anchor or Grade, or Rejected. All comments were recorded, and a master rating sheet was completed. Committee facilitators recorded the committee consensus on the Item Review Rating Sheet. A sample form and rating criteria may be found in Appendix F.

Security was addressed by adhering to a strict set of procedures. Items in binders were distributed for committee review by number and signed for by each member on a daily basis. All attendees, with the exception of PDE staff, were required to sign a confidentiality agreement. All materials not in use at any time were stored in a locked room. Secure materials that did not need to be retained after the meetings were deposited in secure barrels and the contents of which were shredded.

Bias, Fairness, and Sensitivity Reviews in July 2011: All Assessments

Prior to 2012 field testing, all newly-developed test items for science and writing were also submitted to a Bias, Fairness, and Sensitivity Committee for review. This took place from June 14–16, 2011 for reading, mathematics, science, and writing. The committee’s primary responsibility was to evaluate items with regard to bias, fairness, and sensitivity issues. They also made recommendations for changes or deletion of items in order to remove the potential for issues of bias, fairness, and/or sensitivity. Included in the review were proposed reading passages. An expert, multi-ethnic committee composed of men and women was trained by a DRC test development lead to review items for bias, fairness, and sensitivity issues. Training materials included a manual developed by DRC (DRC, 2003–2011). Members of the committee also had expertise with special needs students and English Language Learners. PDE staff members were also trained and participated in the review. All reading, mathematics, science, and writing items were read by a cross-section of committee members. Each member noted bias, fairness, and/or sensitivity comments on tracking sheets and on the item, if needed, for clarification. Committee members individually categorized any concerns as related to ageism, disability, ethnicity/culture, gender, regional, religious, socioeconomic, or stereotyping. These categories were then the framework through which recommendations for modification or rejection of items occurred during the subsequent committee consensus process. The committee then discussed each of the issues as a group and came to consensus as to which issues should represent the view of the committee. All consensus comments were then compiled, and the suggested actions on these items were recorded and submitted to PDE. This review followed the same security procedures as outlined above, except that the materials were locked up and stored at the DRC offices in Harrisburg. Table 3–22 shows the gender and race/ethnicity composition for the members of the bias committee who reviewed the PSSA items and passages for bias, fairness, and sensitivity.

**Table 3–22. Demographic Composition of the 2011
Bias, Fairness, and Sensitivity Committee**

Member #	Gender	Race/Ethnicity	Background
1.	Female	Caucasian	Educator
2.	Female	Asian	National Consultant
3.	Female	Caucasian	Educator
4.	Female	African American	Education Specialist
5.	Female	African American	Education Specialist
6.	Female	Hispanic	Migrant Education Community Leader
7.	Male	African American	National Consultant
8.	Male	Asian	National Consultant
9.	Male	Caucasian	University Professor
10.	Male	Hispanic	PATTAN ELL Background
Totals	6 Females 4 Males	2 Hispanics 2 Asians 3 Caucasians 3 African Americans	

The results from the Bias, Fairness, and Sensitivity Committee review of mathematics are summarized in Table 3–23.

**Table 3–23. Number of Items—2011
Bias, Fairness, and Sensitivity Committee Review for Mathematics**

Grade	Writing Prompts			
	Total items reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
3	11	11	0	0
4	11	9	2	0
5	11	11	0	0
6	11	11	0	0
7	11	10	1	0
8	11	11	0	0
Total	66	63	3	0

The results from the Bias, Fairness, and Sensitivity Committee review of reading are summarized in Table 3–24.

**Table 3–24. Number of Items—2011
Bias, Fairness, and Sensitivity Committee Review for Reading**

Grade	Reading Passages and Items			
	Total items reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
3	36	35	1	0
4	22	22	0	0
5	33	33	0	0
6	24	24	0	0
7	34	34	0	0
8	34	34	0	0
Total	183	182	1	0

The results from the Bias, Fairness, and Sensitivity Committee review of science are summarized in Table 3–25.

**Table 3–25. Number of Items—2011
Bias, Fairness, and Sensitivity Committee Review for Science**

Grade	Science Items			
	Total items reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
4	134	128	6	0
8	184	182	2	0
Total	318	310	8	0

The results from the Bias, Fairness, and Sensitivity Committee review of writing are summarized in Table 3–26.

**Table 3–26. Number of Items—2011
Bias, Fairness, and Sensitivity Committee Review for Writing**

Grade	Writing Items, Passages, and Prompts			
	Total items or prompts reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
5	93	90	3	0
8	87	80	7	0
Total	180	170	10	0

Chapter Four: Universal Design Procedures Applied in the PSSA Test Development Process

Universally designed assessments allow participation of the widest possible range of students and contribute to valid inferences about participating students. Principles of Universal Design are based on the premise that each child in school is a part of the population to be tested and that testing results should not be affected by disability, gender, race, or English language ability (Thompson, Johnstone & Thurlow, 2002). At every stage of the item and test development process, including the 2012 field test, procedures were employed to ensure that items and subsequent tests were designed and developed using the elements of universally designed assessments developed by the National Center for Educational Outcomes (NCEO).

Federal legislation addresses the need for universally designed assessments. The No Child Left Behind Act (Elementary and Secondary Education Act) requires that each state must “provide for the participation in [statewide] assessments of all students” [Section 1111(b)(3)(C)(ix)(I)]. Both Title 1 and IDEA regulations call for universally designed assessments that are accessible and valid for all students, including students with disabilities and English Language Learners. The benefits of universally designed assessments not only apply to these groups of students, but to all individuals with wide-ranging characteristics.

DRC’s test development team was trained in the elements of Universal Design as it relates to developing large-scale statewide assessments. Team leaders were trained directly by NCEO, and other team members were subsequently trained by team leaders. Committees involved in content review included some members who were familiar with the unique needs of students with disabilities and English Language Learners. Likewise some members of the Bias, Fairness, and Sensitivity Committee were conversant with these issues. What follows are the Universal Design guidelines followed during all stages of the item development process for the PSSA.

ELEMENTS OF UNIVERSALLY DESIGNED ASSESSMENTS

After a review of research relevant to the assessment development process and the Principles of Universal Design (Center for Universal Design, 1997), NCEO has produced seven elements of Universal Design as they apply to assessments (Thompson, Johnstone & Thurlow, 2002). These elements served to guide PSSA item development.

- **Inclusive Assessment Population**

The PSSA target population includes all students at the assessed grades attending Commonwealth schools. For state, district, and school accountability purposes, the target population includes all students except those who will participate in accountability through an alternate assessment.

- **Precisely Defined Constructs**

An important function of well-designed assessments is that they actually measure what they are intended to measure. The Pennsylvania Assessment Anchor Content Standards (Assessment Anchors) provided clear descriptions of the constructs to be measured by the PSSA at the assessed grade levels. Universally designed assessments must remove all non-construct-oriented cognitive, sensory, emotional, and physical barriers.

- **Accessible, Non-biased Items**

DRC conducted both internal and external reviews of items and test specifications to ensure that they did not create barriers because of lack of sensitivity to disability, culture, or other subgroups. Items and test specifications were developed by a team of individuals who understand the varied characteristics of items that might create difficulties for any group of students. Accessibility is incorporated as a primary dimension of test specifications, so accessibility was woven into the fabric of the test rather than being added after the fact.

- **Amenable to Accommodations**

Even though items on universally designed assessments are accessible for most students, there are some students who continue to need accommodations. This essential element of a universally designed assessment requires that the test is compatible with accommodations and a variety of widely used adaptive equipment and assistive technology. (See the section on Assessment Accommodations later in Chapter Four.)

- **Simple, Clear, and Intuitive Instructions and Procedures**

Assessment instructions should be easy to understand, regardless of a student's experience, knowledge, language skills, or current concentration level. Questions that are posed using complex language can invalidate the test if students cannot understand how they are expected to respond to a question. To meet this guideline, directions and questions were prepared in simple, clear, and understandable language that underwent multiple reviews.

- **Maximum Readability and Comprehensibility**

A variety of guidelines exist to ensure the maximum readability and comprehensibility of a test. These features go beyond what is measured by readability formulas. Readability and comprehensibility are affected by many factors, including student background, sentence difficulty, text organization, and others. All of these features were considered as item text was developed.

Plain language is a concept now being highlighted in research on assessments. Plain language has been defined as language that is straightforward and concise. The following strategies for editing text to produce plain language were used during the editing process of the new PSSA items:

- Reduction of excessive length
- Use of common words
- Avoidance of ambiguous words
- Avoidance of irregularly spelled words
- Avoidance of proper names
- Avoidance of inconsistent naming and graphic conventions
- Avoidance of unclear signals about how to direct attention

- **Maximum Legibility**

Legibility is the physical appearance of text, the way that the shapes of letters and numbers enable people to read text easily. Bias can result when tests contain physical features that interfere with a student's focus on or understanding of the constructs that test items are intended to assess. A style guide developed and updated annually (DRC, 2004–2010) was utilized, with PDE approval, which included dimensions of style consistent with universal design.

GUIDELINES FOR UNIVERSALLY DESIGNED ITEMS

All test items written and reviewed adhered closely to the following guidelines for Universal Design. Item writers and reviewers used a checklist during the item development process to ensure that each aspect was attended to. For more information on the checklist, see the Universal Design section in Chapter Three of this report.

- 1. Items measure what they are intended to measure.** Item writing training included ensuring that writers and reviewers had a clear understanding of Pennsylvania's Academic Standards and the Assessment Anchors. During all phases of test development, items were presented with content-standard information to ensure that each item reflected the intended Assessment Anchor. Careful consideration of the content standards was important in determining which skills involved in responding to an item were extraneous and which were relevant to what was being tested. In certain types of items an additional skill is necessary, such as the mathematics test, which requires the student to read.
- 2. Items respect the diversity of the assessment population.** To develop items that avoid content that might unfairly advantage or disadvantage any student subgroup, item writers, test developers, and reviewers were trained to write and review items for issues of bias, fairness, and sensitivity. Training also included an awareness of, and sensitivity to, issues of cultural and regional diversity.
- 3. Items have a clear format for text.** Decisions about how items are presented to students must allow for maximum readability for all students. Appropriate fonts and point sizes were employed with minimal use of italics, which is far less legible and is read considerably more slowly than standard typeface. Captions, footnotes, keys, and legends were at least a 12-point size.³ Legibility was enhanced by sufficient spacing between letters, words, and lines. Blank space around paragraphs and between columns and staggered right margins were used.
- 4. Stimuli and items have clear pictures and graphics.** When pictures and graphics were used, they were designed to provide essential information in a clear and uncluttered manner. Illustrations were placed directly next to the information to which they referred, and labels were used where possible. Sufficient contrast between background and text, with minimal use of shading, increased readability for students with visual impairments. Color was not used to convey important information.

³ While font size follows specific requirements during online setup of an assessment, the screen resolution used at the local level can impact whether the effective font size is visible to the student.

- 5. Items have concise and readable text.** Linguistic demands of stimuli and items can interfere with a student's ability to demonstrate knowledge of the construct being assessed. During item writing and review, the following guidelines were used.
- Simple, clear, commonly-used words were used whenever possible.
 - Extraneous text was omitted.
 - Vocabulary and sentence complexity were appropriate for the grade level being assessed.
 - Technical terms and abbreviations were used only if they were related to the content being measured.
 - Definitions and examples were clear and understandable.
 - Idioms were avoided unless idiomatic speech was being assessed.
 - The questions to be answered were clearly identifiable.
- 6. Items allow changes to format without changing meaning or difficulty.** A Braille version of the PSSA was available at each assessed grade. Attention was given to using items that allow for Braille. Specific accommodations were permitted, such as signing to a student, the use of oral presentation under specified conditions, and the use of various assistive technologies. A Spanish version of the PSSA mathematics and PSSA science test was available for use by English Language Learners who would benefit from this accommodation.
- 7. The test has an overall appearance that is clean and organized.** Images, pictures, and text that may not be necessary (e.g., sidebars, overlays, callout boxes, visual crowding, shading) and that could be potentially distracting to students were avoided. Also avoided were purely decorative features that did not serve a purpose. Information was organized in a left-right, top-bottom format.

ITEM DEVELOPMENT

DRC and WestEd work closely with the Pennsylvania Department of Education to help ensure that PSSA tests comply with nationally recognized Principles of Universal Design. The implementation of accommodations on large-scale statewide assessments for students with disabilities is supported in the development of the PSSA. In addition to the Principles of Universal Design as described in the Pennsylvania Technical Report, DRC and WestEd apply to each content area assessment the standards for test accessibility as described in *Tests Access: Making Tests Accessible for Students with Visual Impairments—A Guide for Test Publishers, Test Developers, and State Assessment Personnel* (Allman, 2004). To this end, DRC and WestEd embrace the following precepts:

- Test directions are carefully worded to allow for alternate responses to open-ended questions.
- During item and bias reviews, test committee members are made aware of the Principles of Universal Design and of issues that may adversely affect students with disabilities with the goal of ensuring that PSSA tests are bias free for all students.

- With the goal of ensuring that the PSSA tests are accessible to the widest range of diverse student populations, PDE instructs DRC and WestEd to limit item types that are difficult to format in Braille and that may become distorted when published in large print. DRC and WestEd are instructed to limit the following on the PSSA.
 - Mathematics: Complicated tessellations; charts or graphs that extend beyond one page
 - Reading: Graphics and illustrations that are not germane to the content presented
 - All content areas: Unnecessary boxes and framing of text, unless enclosing the text provides necessary context for the student; use of italics (limited to only when it is absolutely necessary, such as with variables)

ITEM FORMATTING

For all content areas, DRC formats PSSA tests to maximize accessibility for all students by using text that is in a size and font style that is easily readable. DRC limits shading, graphics, charts, and the number of items per page so that there is sufficient white space on each page. Whenever possible, DRC ensures that graphics, pictures, diagrams, charts, and tables are positioned on the page with the associated test items. DRC uses high contrast for text and background where possible to convey pertinent information. Tests are published on dull-finish paper to avoid the glare encountered on glossy paper. DRC pays close attention to the binding of the PSSA test booklets to ensure that they lie flat for two-page viewing and ease of reading and handling.

DRC ensures consistency across PSSA assessments by following these Principles of Universal Design:

- High contrast and clarity is used to convey detailed information.
- Typically, shading is avoided; when necessary for content purposes, 10 percent screens are used as the standard.
- Overlaid print on diagrams, charts, and graphs is avoided.
- Charts, graphs, diagrams, and tables are clearly labeled with titles and with short descriptions where applicable.
- Only relevant information is included in diagrams, pictures, and graphics.
- Symbols used in keys and legends are meaningful and provide reasonable representations of the topics they depict.
- Pictures that require physical measurement are true to size.

ASSESSMENT ACCOMMODATIONS

While universally designed assessments provide for participation of the widest range of students, many students require accommodations in order to participate in the regular assessment. Clearly, the intent of providing accommodations for students is to ensure that students are not unfairly disadvantaged during testing and that the accommodations used during instruction, if appropriate, are made available as students take the test. The literature related to assessment accommodations is still evolving and often focuses on state policies regulating accommodations rather than on providing empirical data that supports the reliability and validity of the use of accommodations. On a yearly basis, the Pennsylvania Department of Education examines accommodations policies and current research to ensure that valid, acceptable accommodations are available for students. Accommodations manuals for the PSSA titled *2013 Accommodations Guidelines* and *Accommodations Guidelines for English Language Learners* were developed for use with the 2013 PSSA.

The manuals can be accessed by going to www.education.state.pa.us. Click on the green checkmark icon, then select “Pennsylvania System of School Assessment (PSSA).”

In addition, Spanish-language versions, translated from the original English versions, were made available for both the mathematics and science PSSA. The Spanish-translation versions are discussed in Chapter Six.

Chapter Five: Field Test Leading to the 2013 Core

Generally, all non-linking core items appearing on the 2012 assessment came from the 2011 embedded field test positions. Prior to 2009, PSSA test forms contained common items that were identical on all forms along with matrix/embedded field test items. On the 2009 administration, equating block positions (equating items) replaced matrix positions. The common items consisted of a set of core items taken by all students. The matrix and field test items were embedded and were unique, in most instances, to a form; however, there were instances in which a matrix or embedded field test item appeared on more than one form. The purpose of administering field test items is to obtain statistics so they can be reviewed before becoming operational. Based on this statistical review, many of the field test items embedded in the 2011 PSSA were selected for use as common or equating block items (equating items) in the 2012 PSSA.

More information on the field test designs for all contents can be found in the content-specific portions of Chapter Three.

STATISTICAL ANALYSIS OF ITEM DATA

All field tested items were analyzed using conventional item analysis methods. For MC items, traditional or classical item statistics included the corrected point-biserial correlation (Pt. Bis.) for the correct and incorrect responses (distractors), percent correct (p -value), and the percent responding to incorrect responses. For OE items, the statistical indices included the item-test correlation, the point-biserial correlation for each score level, percent in each score category or level, and the percent of non-scoreable responses.

In general, more capable students are expected to respond correctly to easy items and less capable students are expected to respond incorrectly to difficult items. If either of these situations does not occur, the item will be reviewed by DRC test development staff and committees of Pennsylvania educators to determine the nature of the problem and the characteristics of the students affected. The primary way of detecting such conditions is through the point-biserial correlation coefficient for dichotomous (MC) items and the item-total correlation for polytomous (OE) items. In each case the statistic will be positive if the total test mean score is higher for the students who respond correctly to MC items (or attain a higher OE item score) and negative when the reverse is true.

Item statistics are used as a means of detecting items that deserve closer scrutiny, rather than being a mechanism for automatic retention or rejection. Toward this end, a set of criteria was used as a screening tool to identify items that needed a closer review by committees of Pennsylvania educators. For an MC item to be flagged, the criteria included any of the following:

- Point-biserial correlation for the correct response of less than 0.25
- Point-biserial correlation for any incorrect response greater than 0.0
- Percent correct less than 0.3 or greater than 0.9
- Percent responding to any incorrect responses greater than the percent correct
- Gender DIF code of either C- or C+
- Any ethnic DIF code of C-

For an OE item to be flagged, the criteria included any of the following:

- Score Proportion < .05
- Gender DIF code of B-, B+, C- or C+
- Any ethnic DIF code of B- or C-

Item analysis results for MC and OE field test items are presented in Appendix G.

REVIEW OF ITEMS WITH DATA

In the preceding section on Statistical Analysis of Item Data, it was stated that content-area test development specialists used certain statistics from item and DIF analyses of the 2011 field test to identify items for further review. Specific flagging criteria for this purpose were specified in the previous section. Items not identified for the review had good statistical characteristics and, consequently, were regarded as statistically acceptable. Likewise, items of extremely poor statistical quality were regarded as unacceptable and needed no further review. However, there were some items—relatively few in number—that DRC content-area test development specialists and DRC psychometric specialists regarded as needing further review by a committee of Pennsylvania educators. The intent was to capture all items that needed a closer look; thus, the criteria employed tended to over-identify rather than under-identify items.

Data review (review of items with data) was conducted with more than 50 Pennsylvania educators (including PDE staff) broken out into subject-area content committees. The review for reading, mathematics, and science took place on July 19, 2011; Writing took place on July 20, 2011. In these sessions, committee members were first trained by a representative from DRC's psychometrics staff with regard to the statistical indices used in item evaluation. This was followed by a discussion with examples concerning reasons that an item might be retained regardless of the statistics. The committee review process involved a brief exploration of possible reasons for the statistical profile of an item (e.g., potential bias, grade appropriateness, instructional issues) and a decision regarding acceptance. DRC content-area test development specialists facilitated the review of the items. Each committee reviewed the pool of field tested items and made recommendations on each item and/or scenario/passage. Further discussion on how this information was used is detailed in Chapter Six. Additional information regarding the data review committee, including gender, ethnicity (when available), and Instructional Unit (geographic location within Pennsylvania), is provided in Tables 5-1 through 5-4.

Table 5–1. Demographic Composition of the 2011 Mathematics Data Review Committee

Member #	Gender	Race/Ethnicity	Instructional Unit Represented
1.	Female	Caucasian	15
2.	Female	Caucasian	01
3.	Female	Caucasian	18
4.	Male	Caucasian	23
5.	Female	Caucasian	07
6.	Male	Caucasian	06
7.	Female	Hispanic	07
8.	Female	Caucasian	25
9.	Female	Caucasian	18
10.	Female	Caucasian	28
11.	Female	Caucasian	17
Totals	9 Females 2 Males	10 Caucasians 1 Hispanic	

Table 5–2. Demographic Composition of the 2011 Reading Data Review Committee

Member #	Gender	Race/Ethnicity	Instructional Unit Represented
1.	Female	Caucasian	05
2.	Female	Caucasian	17
3.	Female	Caucasian	06
4.	Female	Caucasian	25
5.	Female	Caucasian	05
6.	Female	Caucasian	03
7.	Female	Caucasian	11
8.	Female	Caucasian	13
9.	Female	Caucasian	10
10.	Female	Caucasian	23
11.	Female	Caucasian	07
Totals	11 Females	11 Caucasians	

Table 5–3. Demographic Composition of the 2011 Science Data Review Committee

Member #	Gender	Race/Ethnicity	Instructional Unit Represented
1.	Female	Caucasian	03
2.	Male	Caucasian	04
3.	Female	Caucasian	05
4.	Female	Caucasian	01
5.	Female	Caucasian	06
6.	Female	Caucasian	10
7.	Male	Caucasian	24
8.	Male	Caucasian	20
9.	Female	Caucasian	20
10.	Female	Caucasian	23
11.	Female	Multi-racial	24
12.	Male	Caucasian	12
Totals	8 Females 4 Males	11 Caucasians 1 Multi-racial	

Table 5–4. Demographic Composition of the 2011 Writing Data Review Committee

Member #	Gender	Race/Ethnicity	Instructional Unit Represented
1.	Female	Caucasian	05
2.	Female	Caucasian	17
3.	Female	Caucasian	06
4.	Female	Caucasian	07
5.	Female	Caucasian	25
6.	Female	Caucasian	03
7.	Female	Caucasian	13
8.	Female	Caucasian	02
9.	Female	Caucasian	03
10.	Female	Caucasian	08
11.	Female	Caucasian	07
Totals	11 Females	11 Caucasians	

Table 5–5. 2011 Data Review Committee Results

Assessment	Grade	No. of Items in 2011 Field Test	Flagged Items in 2011 Field Test Examined at 2011 Data Review Committee					Flagged Items in 2011 Field Test Rejected by 2011 Data Review Committee		Items Classified as “Rejected” from 2011 Field Test (all sources: Data Review Committee, PDE, and DRC)	
			MC	OE	Items flagged for DIF only	Total	Total (% of FT)	No. of	% of FT	No. of	% of FT
Mathematics	3	55	26	5	3	31	56.4%	5	9.1%	5	9.1%
	4	55	11	4	3	15	27.3%	1	1.8%	1	1.8%
	5	55	12	3	4	15	27.3%	3	5.5%	3	5.5%
	6	55	14	3	4	17	30.9%	1	1.8%	1	1.8%
	7	55	9	3	1	12	21.8%	3	5.5%	4	7.3%
	8	55	8	3	2	11	20.0%	1	1.8%	1	1.8%
	11	55	8	3	0	11	20.0%	1	1.8%	1	1.8%
Reading	3	55	8	3	4	11	20.0%	1	1.8%	1	1.8%
	4	55	13	3	1	16	29.1%	3	5.5%	3	5.5%
	5	55	12	3	7	15	27.3%	1	1.8%	1	1.8%
	6	55	9	4	1	13	23.6%	1	1.8%	1	1.8%
	7	55	9	3	5	12	21.8%	0	0.0%	0	0.0%
	8	55	11	5	1	16	29.1%	2	3.6%	2	3.6%
	11	55	21	4	5	25	45.5%	2	3.6%	2	3.6%
Science	4	108	38	4	3	42	38.9%	11	10.2%	13	12.0%
	8	132	44	6	5	50	37.9%	13	9.8%	13	9.8%
	11	96	19	10	3	29	30.2%	10	10.4%	10	10.4%
Writing	5	54	9	5	2	14	25.9%	1	1.9%	1	1.9%
	8	54	16	6	3	22	40.7%	1	1.9%	3	5.6%
	11	54	10	6	0	16	29.6%	3	5.6%	3	5.6%
Totals		1,268	307	86	57	393	31.0%	64	5.0%	69	5.4%

DIFFERENTIAL ITEM FUNCTIONING

Differential item functioning (DIF) occurs when examinees with the same ability level but different group memberships do not have the same probability of answering an item correctly. This pattern of results may suggest the presence of *item bias*. As a statistical concept, however, DIF can be differentiated from item bias, which is a content issue that can arise when an item presents negative group stereotypes, uses language that is more familiar to one subpopulation than to another, or is presented in a format that disadvantages certain learning styles. While the source of item bias is often plain to trained judges, DIF may have no clear cause. However, studying how DIF arises and how it presents itself can provide information about how to detect and correct for it.

Limitations of Statistical Detection

No statistical procedure should be used as a substitute for rigorous, hands-on reviews by content and bias specialists. The statistical results can help organize the review so the effort is concentrated on the most problematic cases. Further, no items should be automatically rejected simply because a statistical method flagged them or accepted because they were not flagged.

Statistical detection of DIF is not an exact science. There have been a variety of methods proposed for detecting DIF, but no single statistic can be considered either necessary or sufficient. Different methods are more or less successful depending on the situation. No analysis can guarantee that a test is free of bias, but almost any thoughtful analysis will uncover the most flagrant problems.

A fundamental shortcoming of all statistical methods used in DIF evaluation is that all are intrinsic to the test being evaluated. If a test is unbiased overall but contains one or two DIF items, any method will locate the problems. If, however, all items on the test show consistent DIF to the disadvantage of a given subpopulation, a statistical analysis of the items will not be able to separate DIF effects from true differences in achievement.

Mantel-Haenszel Procedure for Differential Item Functioning

For multiple-choice (MC) items, the *Mantel-Haenszel* procedure (Mantel & Haenszel, 1959) for detecting differential item functioning is a commonly used technique in educational testing. It does not depend on the application or the fit of any specific measurement model. However, it does have significant philosophical overlap with the Rasch model since it uses a test's total score to organize the analysis.

The procedure as implemented by DRC contrasts a focal group with a reference group. While it makes no practical difference in the analysis which group is defined as the focal group, the group most apt to be disadvantaged by a biased measurement is typically defined as the focal group. In these analyses, the focal group was female for gender-based DIF and black for ethnicity-based DIF; reference groups were male and white, respectively. The Mantel-Haenszel (MH) statistic for each item is computed from a contingency table. It has two groups (focal and reference) and two outcomes (right or wrong). The ability groups are defined by the test's score distribution for the total examinee populations.

The basic MH statistic is a single degree of freedom chi-square that compares the observed number in each cell to the expected number. The expected counts are computed to ensure that the analysis is not confounded with differences in the achievement level of the two groups.

For OE items, a comparable statistic is computed based on the standardized mean difference (SMD) (Dorans, Schmitt, & Bleistein, 1992), which is computed as the differences in mean scores for the focal and reference groups if both groups had the same score distribution.

To assist the review committees in interpreting the analyses, the items are assigned a severity code based on the magnitude of the MH statistic. Items classified as A+ or A- have little or no statistical indication of DIF. Items classified as B+ or B- have some indication of DIF but may be judged to be acceptable for future use. Items classified as C+ or C- have strong evidence of DIF and should be reviewed and possibly rejected from the eligible item pool. The plus sign indicates that the item favors the focal group and a minus sign indicates that the item favors the reference group.

Results and Observations

Counts of the number of items from each grade and subject area that were assigned to each severity code are shown below in Table 5–2A (MC items) and 5–2B (OE items). DIF analyses were conducted on the 2013 PSSA field test items and may be compared to the 2012 results.

The number of field test items in each DIF category across the two years was quite similar. Overall, relatively few items had B or C DIF for the Male/Female or White/Black reference and focal groups. Generally speaking, there were more items showing White/Black DIF than Male/Female DIF. However, it was the Male/Female DIF for OE items in Reading and Writing that exhibited the highest proportion of B or C classifications, with Reading having relatively more C DIF codes. While this matches historical trends, additional monitoring and study of DIF in these areas may be warranted.⁴

⁴ As suggested earlier, only a subset of items showing DIF will actually be biased. For example, any given B or C DIF code might be a false positive. It may also be the result of one of a number of systematic factors not actually attributable to bias. Of course, only items approved by teacher review committees will actually appear on operational PSSA tests.

Table 5–6A. DIF Summary—MC Items

	Grade	Male/Female														White/Black													
		2012							2013							2012						2013							
		A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot
Mathematics	3	25	23	1	1	0	0	50	79	115	1	5	0	0	200	2	35	0	11	0	2	50	43	139	0	18	0	0	200
	4	33	17	0	0	0	0	50	89	108	1	1	1	0	200	3	38	0	9	0	0	50	60	137	0	3	0	0	200
	5	18	29	1	2	0	0	50	84	114	0	2	0	0	200	9	33	0	7	0	1	50	53	143	0	4	0	0	200
	6	28	20	1	1	0	0	50	49	36	2	3	0	0	90	11	38	0	1	0	0	50	25	61	0	4	0	0	90
	7	25	24	0	1	0	0	50	43	43	1	2	0	1	90	8	39	0	3	0	0	50	15	71	0	4	0	0	90
	8	24	24	1	1	0	0	50	48	37	2	3	0	0	90	8	35	0	7	0	0	50	19	64	0	4	0	3	90
11	20	29	0	1	0	0	50	-	-	-	-	-	-	-	16	30	0	4	0	0	50	-	-	-	-	-	-	-	
Reading	3	38	12	0	0	0	0	50	81	77	0	1	0	1	160	4	36	0	9	0	1	50	33	123	0	4	0	0	160
	4	32	17	1	0	0	0	50	57	102	0	1	0	0	160	6	36	0	7	0	1	50	15	136	0	9	0	0	160
	5	22	26	0	2	0	0	50	71	80	0	6	0	3	160	6	36	0	6	0	2	50	33	113	0	10	1	3	160
	6	17	28	2	2	0	1	50	34	53	0	2	0	1	90	7	38	0	4	0	1	50	2	81	0	7	0	0	90
	7	26	23	0	1	0	0	50	43	43	1	3	0	0	90	9	36	0	3	0	2	50	22	62	0	4	0	2	90
	8	16	34	0	0	0	0	50	48	40	0	2	0	0	90	7	37	0	4	0	2	50	25	57	0	8	0	0	90
11	22	24	1	2	0	1	50	-	-	-	-	-	-	-	5	35	0	8	0	2	50	-	-	-	-	-	-	-	
Science	4	45	46	4	0	0	1	96	44	52	0	0	0	0	96	15	73	0	8	0	0	96	18	73	0	3	0	2	96
	8	65	50	2	2	0	1	120	60	54	5	1	0	0	120	23	94	0	1	0	2	120	35	83	0	2	0	0	120
	11	32	47	1	0	0	0	80	-	-	-	-	-	-	-	21	57	0	2	0	0	80	-	-	-	-	-	-	-
Writing	5	23	25	0	0	0	0	48	3	5	0	0	0	0	8	2	35	0	11	0	0	48	0	8	0	0	0	0	8
	8	27	21	0	0	0	0	48	24	23	0	1	0	0	48	4	32	0	11	0	1	48	5	36	0	7	0	0	48
	11	21	27	0	0	0	0	48	-	-	-	-	-	-	-	4	39	0	5	0	0	48	-	-	-	-	-	-	-

Table 5–6B. DIF Summary—OE Items

	Grade	Male/Female														White/Black													
		2012							2013							2012					2013								
		A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot
Mathematics	3	3	2	0	0	0	0	5	14	4	0	1	0	0	19	0	3	0	1	0	1	5	0	13	0	5	0	1	19
	4	2	2	0	0	0	0	4	11	8	1	0	0	0	20	0	1	0	2	0	1	4	2	14	0	3	0	1	20
	5	3	2	0	0	0	0	5	14	5	1	0	0	0	20	0	4	0	0	0	1	5	4	13	0	2	0	1	20
	6	2	3	0	0	0	0	5	3	6	0	0	0	0	9	0	4	0	0	0	1	5	0	7	0	1	0	1	9
	7	2	2	1	0	0	0	5	8	1	0	0	0	0	9	0	3	0	1	0	1	5	0	6	0	3	0	0	9
	8	4	1	0	0	0	0	5	5	1	1	0	0	0	7	2	1	0	1	0	1	5	1	5	0	0	0	1	7
	11	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-	-	-	-	-	-	-	
Reading	3	3	0	1	0	1	0	5	16	1	2	0	1	0	20	2	3	0	0	0	0	5	2	15	0	1	0	0	18
	4	2	0	2	0	1	0	5	21	0	14	0	5	0	40	3	1	0	1	0	0	5	2	27	0	7	0	4	40
	5	2	1	2	0	0	0	5	18	1	10	0	10	0	39	3	2	0	0	0	0	5	8	23	0	5	0	3	39
	6	4	0	1	0	0	0	5	1	0	5	0	3	0	9	2	3	0	0	0	0	5	4	5	0	0	0	0	9
	7	1	0	2	0	2	0	5	1	0	1	0	7	0	9	3	2	0	0	0	0	5	6	3	0	0	0	0	9
	8	0	0	4	0	1	0	5	2	0	2	0	5	0	9	2	3	0	0	0	0	5	7	2	0	0	0	0	9
	11	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-	-	-	-	-	-	-	
Science	4	7	4	1	0	0	0	12	9	3	0	0	0	0	12	1	6	0	2	0	3	12	1	6	0	2	0	3	12
	8	8	3	0	1	0	0	12	3	5	2	1	1	0	12	3	6	0	3	0	0	12	1	6	0	1	0	4	12
	11	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-	-	-	-	-	-	-	
Writing	5	3	0	8	0	1	0	12	0	0	0	0	0	0	0	11	0	1	0	0	12	0	0	0	0	0	0	0	
	8	9	0	3	0	0	0	12	4	0	5	0	3	0	12	0	2	0	2	0	8	12	0	10	0	1	0	1	12
	11	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-	-	-	-	-	-	-	

Chapter Six: Operational Forms Construction for 2013

FINAL SELECTION OF ITEMS AND 2013 PSSA FORMS CONSTRUCTION

When the final selection of items for the operational 2013 test was ready to begin, the candidate items that emerged from the spring 2011 field test had undergone multiple reviews, including:

- Reviews by DRC and WestEd content-area test development specialists and curriculum specialists to ensure that all items were properly aligned with content standards
- Formal bias, fairness, and sensitivity review by the Bias, Fairness, and Sensitivity Committee consisting of a multi-ethnic group of men and women having expertise with special needs students and English Language Learners
- Formal review by the content committees consisting of Pennsylvania educators, including teachers as well as district personnel
- PDE review
- Item data review by members of the PDE subject-area teacher committees

The item and bias reviews are detailed in Chapter Three. The results of the data review are summarized in Chapter Five.

The end product of the above process was an item status designation for each field tested item. All items having an item status code of Acceptable/Active were candidates to be selected for the 2012 PSSA. To have an item status code of Acceptable/Active meant that the item met the following criteria:

- Appropriately aligned with its designated Assessment Anchor Content Standard (Assessment Anchor) and sub-classifications
- Acceptable in terms of bias/fairness/sensitivity issues, including differential item functioning (for gender and ethnicity)
- Acceptable in terms of psychometric standards, including a special review of flagged items

Next, all relevant information regarding the acceptable items, including associated graphics, was entered into the item banking system known as IDEAS (Item Development and Education Assessment System). From IDEAS and other database sources, Microsoft Excel files were created for each content area at each grade. These files contained all relevant content codes and statistical characteristics. IDEAS also created an item card displaying each acceptable item, any associated graphic, and all relevant content codes and item statistics for use by the content-area test development specialists and psychometric services staff.

DRC test development specialists reviewed the test design blueprint, including the number of items per strand for each content-area test. Special considerations, such as calculator use and manipulatives, were noted.

Psychometricians provided content-area test development specialists with an overview of the psychometric guidelines for forms construction, including guidelines for selecting linking items to link to previous test forms.

Senior DRC content-area test development specialists reviewed all items in the operational pool to make an initial selection for common (core) and equating block (equating items) positions according to test blueprint requirements and psychometric guidelines. Changes to items were not encouraged since alterations could affect how an item performs on subsequent testing.

For the common items, this meant that the combination of MC and OE items would yield the appropriate range of points while tapping an appropriate variety of the Assessment Anchors and related Eligible Content within each Reporting Category. Items selected in the first round were examined with regard to how well they went together as a set. Of particular concern were the following:

- One item providing cues as to the correct answer to another item
- Context redundancy (e.g., mathematics items with a sports context)
- Presence of clang (distractors not unique from one another)
- Diversity of names and artwork for gender and ethnicity

The first round of items was then evaluated for statistical features such as an acceptable point-biserial correlation and whether correct answers were distributed equally—that is, whether approximately 25 percent of correct answers appeared in each of the four possible positions (A, B, C, or D). Selected items that were deemed psychometrically less advantageous in contrast to the overall psychometric characteristics of the core resulted in a search by the senior reviewer for suitable replacements. At this point, the second round of items was analyzed. If necessary, this iterative process between content-based selections and statistical properties continued in an effort to reach the best possible balance.

In the case of the core-to-core linking items (part of the overall core pull), content considerations remained relevant, together with statistical features, such as an acceptable point-biserial correlation and whether the items, as a collection, had an average logit value and a test characteristic curve approximating that of the previous year.

The process for selecting equating block items was slightly different. The chief consideration was that items in equating block positions of the various forms mirrored the psychometric considerations of the core. In some cases, the selection of equating block items also required multiple rounds of selection and evaluation until the best possible balance of content and statistical properties was obtained. The content-area test development specialist's task was to distribute these items in equating block positions across the five forms so that the MC items assigned to a particular form would go well with one another and reflect the same content and statistical considerations as previously outlined. Additionally, the forms needed to display similar difficulty levels.

Once the recommendations were finalized for the core items, core-to-core linking items, and equating block items, they were submitted to PDE for review. Department staff provided feedback, which could be in the form of approval or recommendations for replacing certain items. Any item replacement was accomplished by the collective effort of the test development specialists, psychometricians, and PDE staff until final PDE approval was given.

SPECIAL FORMS USED IN THE 2013 PSSA

Braille and Large Print

Students with visual impairments were able to respond to test materials that were available in either Braille or large print. At each grade level assessed, one form was selected for the creation of a Braille and a large print edition. School district personnel ordered Braille or large print assessment materials directly from DRC. They could also contact PaTTAN for technical assistance regarding students with visual impairments.

School personnel were directed to transcribe all student answers (MC and OE) into scannable answer documents exactly as the student responded. No alterations or corrections of student work were permitted, and the transcribed answer document had to have the same form designation as the Braille and large print version.

Spanish Translation of the Mathematics and Science Assessments

Starting with the 2005 assessment, school personnel had the option of allowing Spanish-speaking students who had been enrolled in schools in the United States for less than three years to respond to a Spanish version of the PSSA for mathematics. In 2009, a Spanish version was also added for the science component of the PSSA. The original translation of the items and the *Directions for Administration Manual* was completed by Second Language Testing, Incorporated. Second Language Testing, Incorporated uses translators with varying cultural and regional backgrounds to create the Spanish versions of the mathematics and science assessments. The translations were then reviewed and verified by DRC's internal Spanish group. As part of the internal review, a Spanish style guide is maintained to document Spanish word choice from administration to administration and across grades within an administration. After discussions with PDE and Second Language Testing, Incorporated, the mathematics sections of the mathematics and reading test booklets for Grades 4–8 and 11 and the entire science assessment for Grades 4 and 8 were designed with a side-by-side format with the English text and Spanish translated text on facing pages. The Spanish translated text was on the left-hand side followed by the original English text on the right-hand (facing) side.

The mathematics sections of the answer booklets for Grades 4–8 and 11 and the science answer booklets for Grades 4 and 8 were also presented in Spanish and English. In the case of mathematics, each open-ended item covered a total of four pages in the answer booklet. In the case of science, each open-ended item covered either two or four pages in the answer booklet, depending on the length of the original English-language item. In the case of four-page open-ended items, the first set of facing pages of an item was presented in Spanish. The second set of facing pages of an item was presented in the original English. Those students using this accommodated version of the mathematics assessment could write their answers on either the English language pages or on the translated Spanish language pages. Their answers could be written in English, Spanish, or a combination of both Spanish and English as all pages were evaluated and scored, and the highest possible scores from those combinations recorded for the students.

The mathematics sections of the scannable booklets for Grade 3 and the Grade 11 science assessment scannable booklets were also presented in Spanish and English using a modified over/under format, with the Spanish presented directly above or to the left of the English. To assist the presentation of the two languages on the same page, the English portion was presented in italics and in a smaller font. Those students using this accommodated version of the

mathematics assessment could write their answers in English, Spanish, or a combination of both Spanish and English, with the highest possible scores from those combinations recorded for the students.

Spanish-translated versions of the mathematics assessment were used by a total of 2,587 students at Grades 3–8 and 11 in 2012. Spanish-translated versions of the science assessment were used by a total of 1,045 students at Grades 4, 8, and 11 in 2012.

Instructions for the appropriate use of these special forms are detailed in accommodation manuals titled *Accommodations Guidelines for Students with IEPs and Students with 504 Plans*, *Accommodations Guidelines for Students without IEPs and 504 Plans*, and *Accommodations Guidelines for English Language Learners*.

Summary of the Translation Verification Study by SLTI of the 2009 PSSA Science Assessments

From November 2009 through January 2010, Second Language Testing, Incorporated conducted a translation verification study of the 2009 PSSA science assessments titled “Translation Verification Study of the 2009 Pennsylvania System of School Assessment (PSSA) of Science for Grades 4, 8, and 11.” In this study, the appropriateness of the transadaptation of the PSSA Science Assessments into Spanish was investigated. Three independent reviewers, specialists in bilingual science education and science translation, were used to determine the appropriateness of each translated or adapted item. The purpose of the report was to conduct qualitative research on the comparability of the Spanish and English versions of the PSSA Science assessments.

The report of this study by Second Language Testing, Incorporated described the assessments, the purpose of the translation verification study, the reviewers, the translation verification process, and the translation verification results. A total of 185 items covering tests at Grades 4 (63 items), 8 (63 items), and 11 (59 items) were reviewed. The study shows that none of the 185 reviewed items were judged by the reviewers to be inappropriately translated or adapted into Spanish. The study did provide suggestions for nine items that were judged as appropriate but the translation could still be improved in the event the items were used again.

Overall, the report concluded that the transadaptation of the 2009 PSSA Science Assessments was clearly appropriate. Since both the English and Spanish versions are comparable in the sense that both versions assess the same content, use the same format, have equal numbers of items, follow the same test administration and scoring procedures, and are used and interpreted in the same way, the study concluded that the English and Spanish versions of the science assessments measured the same content in two different languages. Thus, the study indicated that both language versions showed the same degree of alignment and the same depth-of-knowledge described in the Assessment Anchors alignment study. As a result, the report concluded that there is no need to conduct a separate alignment study of the Spanish version of the PSSA Science Assessments.

Beyond the findings presented in the study, the report recommended that appropriate quantitative analyses be carried out on construct equivalence. Unless such analyses clearly demonstrate a lack of equivalence, it is appropriate to assume that there is no need to conduct a separate linking study or a separate standard setting study for the Spanish versions of the tests. Both versions can be scored on the same scale, and scores on each version have the same meaning in terms of student mastery of the Science Assessment Anchors as defined by the Eligible Content.

The full report can be obtained by request from the Pennsylvania Department of Education.

Summary of Comparability Report from Sireci Psychometric Services

In addition to the study conducted by Second Language Testing, Incorporated, a second comparability study of the 2009 PSSA Spanish translations for science was completed in February 2010 by Sireci Psychometric Services. The report of the study is titled “Evaluating the Comparability of English and English-Spanish Science Tests from the Pennsylvania System of School Assessment.”

In this study, the data from the English-language and English-Spanish dual-language Pennsylvania science tests for Grades 4, 8, and 11 were analyzed. These analyses were designed to evaluate the consistency of the structure of the data and the consistency of item functioning across the English and Spanish versions of these assessments using various psychometrics methods.

The full report can be obtained by request from the Pennsylvania Department of Education.

Chapter Seven: Test Administration Procedures

TEST SESSIONS, TEST SECTIONS, TEST TIMING, AND TEST LAYOUT

Some assessments utilized separate test booklets and answer booklets. An answer booklet was used to respond to the multiple-choice and open-ended items and to collect demographic information. The multiple-choice items and all stimulus-text were placed within the test booklet. Other assessments used a single consumable booklet. When a single scannable answer booklet was utilized, the contents of the answer booklet and the test booklet were combined into one integrated booklet. Each assessment’s booklet type by grade level is shown in Table 7–1.

Table 7–1. Booklet Type by Administration

Assessment	Grade	Test Booklet	Answer Booklet	Single Consumable Booklet
Mathematics & Reading	3			✓
	4	✓	✓	
	5	✓	✓	
	6	✓	✓	
	7	✓	✓	
	8	✓	✓	
Science	4	✓	✓	
	8	✓	✓	
Writing	5			✓
	8			✓

Generally, a separate test booklet and answer booklet were used to separate the multiple-choice items and the open-ended items. For the Grade 3 mathematics and reading assessment, a single booklet was used to accommodate the younger age of the students. The writing assessments utilized one booklet, since sections 2, 3, and 4 all required student writing only.

The number of sections for the 2013 operational assessment varied based on the content area of the assessment. The reading and mathematics assessments consisted of six sections. The science assessments consisted of two sections. The writing assessments consisted of three sections for Grade 5 and four sections for Grade 8. Table 7–2 shows test section information for each PSSA assessment. See also Appendix H.

Table 7–2. PSSA Test Section Information

	Assessment	No. of Sections per Content	No. of Sections per Form
1.	Mathematics	3	6
	Reading	3	
2.	Writing	4	4
3.	Science, Grade 4 and 8	2	2

In general, the estimated testing times allowed 1–3 minutes per multiple-choice item, depending on the content area. The open-ended items were estimated to take approximately 5–10 minutes per item, also depending on the content area. Writing prompts were estimated to take approximately 55–65 minutes per prompt.

Test administrators were instructed that each section in a form should be scheduled as one assessment session. However, they were allowed to combine multiple sections into a single session, as long as the sections were administered in the sequence in which they are printed in the test booklets. In all cases, individual assessment sections had to be completed within one school day.

Table 7–3. PSSA Testing Load and Duration by Subject by Grade

Assessment	Grade	Total No. of MC Items per Form per Administration	Total No. of OE Items per Form per Administration	Total Estimated Administration Time per Form (in Minutes)
Mathematics	3	72	4	200 to 245
	4	72	4	200 to 245
	5	72	4	200 to 245
	6	72	4	200 to 245
	7	72	4	200 to 245
	8	72	4	200 to 245
Reading	3	58	3	210 to 255
	4	58	5	220 to 265
	5	58	5	220 to 265
	6	58	5	230 to 275
	7	58	5	225 to 270
	8	58	5	230 to 275
Science	4	68	6	120 to 150
	8	70	6	130 to 160
Writing	5	20	3	270 to 330
	8	20	3	270 to 330

Table 7–4. PSSA Testing Load and Duration by Grade by Subject

Grade	Content	Total No. of Items per Form per Administration	Total Estimated Administration Time per Form (in Minutes)	Total No. of Items per Student	Total Estimated Administration Time per Student (in Minutes)
3	Mathematics	76	200 to 245	137	410 to 500
	Reading	61	210 to 255		
4	Mathematics	76	200 to 245	213	540 to 660
	Reading	63	220 to 265		
	Science	74	120 to 150		
5	Mathematics	76	200 to 245	162	690 to 840
	Reading	63	220 to 265		
	Writing	23	270 to 330		
6	Mathematics	76	200 to 245	139	430 to 520
	Reading	63	230 to 275		
7	Mathematics	76	200 to 245	139	425 to 515
	Reading	63	225 to 270		
8	Mathematics	76	200 to 245	238	830 to 1010
	Reading	63	230 to 275		
	Science	76	130 to 160		
	Writing	23	270 to 330		

Since not all students finished the assessment sections at the same time, test administrators were advised to use the flexibility of the time limits to the students' advantage. For example, test administrators managed the testing time so that students did not feel rushed while they were taking any assessment section, and no student was penalized because he or she worked slowly. It was equally stressed to test administrators that a student should not be given an opportunity to waste time. Students were told to close their booklets when they had finished the section of the assessment in which they had been working. Students who finished early were allowed to sit quietly or read for pleasure until all students had finished. Students with special requirements and/or abilities (i.e., physical, visual, auditory, or learning disabilities as defined by their IEP or service contracts) and students who just worked slowly may have required extended time. Special assessment situations were arranged for these students. When all students in a testing session indicated that they had finished an assessment section, test administrators ended the section and began the next section or allowed the students to return to regular activities.

Scheduled extended time was provided by a test administrator, and students were allowed to request extended time if they indicated that they had not completed the task. Such requests were granted if the test administrator found the request to be educationally valid. Test administrators

were advised that not permitting ample time for students to complete the assessment might impact the students' and school's performance.

As a general guideline, however, when all students indicated that they had finished a section, that section was closed. Students requiring time beyond the majority of the student population were allowed to continue immediately following the regularly scheduled session in another setting. When such accommodations were made, school personnel ensured that students were monitored at all times to prevent sharing of information. Students were not permitted to continue a section of the assessment after a significant lapse of time from the original session.

Additional information concerning testing time and test layouts can be found in Chapter Three.

TESTING WINDOW

The testing windows for the 2013 operational assessments were as follows:

- Writing – March 11 through March 15, 2013
- Writing Make-up – March 18 through March 22, 2013
- Mathematics and Reading – April 8 through April 19, 2013
- Science – April 22 through April 26, 2013
- Mathematics, Reading, and Science Make-up – April 29 through May 3, 2013

Additional information concerning testing time and test layouts can be found in Chapter Three.

SHIPPING, PACKAGING, AND DELIVERY OF MATERIALS

DRC sent two shipments for the 2013 PSSA operational assessment:

- Shipment one contained the *Handbook for Assessment Coordinators* and the *Directions for Administration Manuals* for each grade tested at a school participating in the mathematics, reading, science, and writing assessments. Shipment one was delivered by February 11, 2013.
- Shipment two contained the administrative materials (e.g., Return Shipping labels, District/School labels, Do Not Score labels, and Student Precode labels) and secure materials (e.g., consumable test/answer booklets) for each grade tested at a school participating in the mathematics, reading, science, and writing assessments. Shipment two was delivered by February 25, 2013.

DRC ensured that all assessment materials were assembled correctly prior to shipping. DRC operations staff used the automated Operations Materials Management System (Ops MMS) to assign secure materials to a school at the time of ship out. This system used barcode technology to provide an automated quality check between items requested for a site and items shipped to a site. A shipment box manifest was produced for and placed in each box shipped. DRC operations staff double-checked all box contents with the box manifest prior to sealing the box for shipping to ensure accurate delivery of materials. DRC operations staff performed lot acceptance sampling on both shipments. Districts and schools were selected at random and examined for correct and complete packaging and labeling. This sampling represented a minimum of 10 percent of all shipping sites.

DRC's materials management system, along with the systems of shippers, allowed DRC to track materials from DRC's warehouse facility to receipt at the district, school, or testing site. All DRC shipping facilities, materials processing facilities, and storage facilities are secure. Access is restricted by security code. Non-DRC personnel are escorted by a DRC employee at all times. Only DRC inventory control personnel have access to stored secure materials. DRC employees are trained in and made aware of the high level of security that is required.

DRC packed 2,841,326 assessment booklets and 131,782 *Directions for Administration Manuals* for 2,747 testing sites. DRC used United Parcel Service (UPS) and Advanced Shipping Technologies to deliver the secure materials to the testing sites.

MATERIALS RETURNED

DRC used UPS for all returns. The return windows for the PSSA materials were as follows:

- Writing primary return window – March 13 through March 22, 2013
- Writing make-up return window – March 18 through March 22, 2013
- Mathematics and Reading primary return window – April 10 through April 19, 2013
- Science primary return window – April 24 through May 4, 2013
- Mathematics, Reading, and Science make-up return window – April 29 through May 4, 2013

TEST SECURITY MEASURES

Test security is essential to obtaining reliable and valid scores for accountability purposes. Test Security Certifications were required to be signed by each building Principal, School Assessment Coordinator, District Assessment Coordinator, Test Administrator, and Proctor prior to the assessment being administered. All signed Certifications were returned to the Chief School Administrator who must retain the Certifications for three years. The purpose of the Certifications was to serve as a tool to document that the individuals responsible for administering the assessments both understood and acknowledged the importance of test security and accountability. The Certifications attested that all security measures were followed concerning the handling of secure materials.

SAMPLE MANUALS

Copies of the *Handbook for Assessment Coordinators* and the *Directions for Administration Manuals* can be found on the PDE website at www.education.state.pa.us.

TESTING WINDOW ASSESSMENT ACCOMMODATIONS

Two accommodations manuals, *Accommodations Guidelines* and *Accommodations Guidelines for English Language Learners*, were developed for use with the 2013 PSSA. These manuals can be found on the PDE website at www.education.state.pa.us. Additional information regarding assessment accommodations can be found in Chapter Four of this report.

Chapter Eight: Processing and Scoring

RECEIPT OF MATERIALS

Receipt of PSSA test materials began on March 20, 2013, and concluded with all make-up tests on May 9, 2013. DRC's Operations Materials Management System (Ops MMS) was utilized to receive assessment materials securely, accurately, and efficiently. This system features innovative automation and advanced barcode scanners. Captured data were organized into reports, which provided timely information with respect to suspected missing material.

The first step in the Ops MMS was the Box Receipt System. When a shipment arrived at DRC, the boxes were removed from the carrier's truck and passed under a barcode reader, which read the barcode printed on the return label and identified the district and school. The number of boxes was immediately compared to what was picked up at the district. The data collected in this process were stored in the Ops MMS database. After the barcode data were captured, the boxes were placed on a pallet and assigned a corresponding pallet number.

Once the box receipt process was completed, the materials separation phase began. Warehouse personnel opened the boxes and sorted materials by grade, subject, and status (used or unused booklets) into scanning boxes. Every booklets' security barcode and precode barcode were hand-scanned to link each document to the original box. As the booklets were sorted, the Ops MMS system guided the floor operator to which box to place the document. The Ops MMS system kept count and record of the materials placed in each box. This count remained correlated to the box as an essential quality-control step throughout the secure booklet processing and provided a target number for all steps of the check-in process. Once a box was closed, an MMS Processing Label was placed on that box.

Once labeled, the sorted and counted boxes proceeded to the Quality Assurance process, where a secure booklet check-in operator used a hand scanner to scan the MMS Processing Label. This procedure identified the material type and quantity parameters for what the Ops MMS should expect within a box. The box contents were then loaded into the streamfeeder.

The documents were fed past oscillating scanners that captured both the security code and precode from the booklets. A human operator monitored an Ops MMS screen that displayed scan errors, an ordered accounting of what was successfully scanned, and the document count for each box. The system ensured that each material within the box matched the information obtained from the original hand-scanning process.

When all materials were scanned and the correct document count was confirmed, the box was sealed and placed on a pallet. If the correct document count was not confirmed, or if the operator encountered difficulties with material scanning, the box and its contents were delivered to an exception handling station for resolution.

This check-in process occurred immediately upon receipt of materials; therefore, DRC provided feedback to districts and schools regarding any missing materials based on actual receipt versus expected receipt. Sites that had 100 percent of their materials missing after the date they were due to DRC were contacted, and any issues were resolved.

Throughout the process of secure booklet check-in, DRC project management ran a daily missing materials report. Every site that was missing any number of booklets was contacted by DRC. Results of these correspondences were recorded for inclusion in the final Missing Materials Report if the missing booklets were not returned by the testing site. DRC produced the Missing Materials Report for PDE upon completion of secure booklet check-in. The report listed all schools in each participating district along with security barcodes for any booklets not returned to DRC.

After scannable materials (used answer booklets) were processed through booklet check-in, the materials became available to the DRC Document Processing log-in staff for document log-in. The booklets were logged-in using the following process:

- A DRC scannable barcode batch header was scanned, and a batch number was assigned to each box of booklets.
- The DRC box label barcode was scanned into the system to link the box and booklets to the newly created batch and to create a Batch Control Sheet.
- The DRC box label barcode number, along with the number of booklets in the box, was printed on the Batch Control Sheet for document tracking purposes. All booklets that were linked to the box barcode were assigned to the batch number and tracked through all processing steps. As booklets were processed, DRC staff dated and initialed the Batch Control Sheet to indicate that proper processing and controls were observed.

Before the booklets were scanned, all batches went through a quality inspection to ensure batch integrity and correct document placement.

After a quality check-in at the DRC Document Processing log-in area, the spines were cut off the scannable documents, and the pages were sent to DRC's Imaging and Scoring System.

SCANNING OF MATERIALS

Customized scanning programs for all scannable documents were prepared to read the booklets and to format the scanned information electronically. Before materials arrived, all image scanning programs went through a quality review process that included scanning of mock data from production booklets to ensure proper data collection.

DRC's image scanners were calibrated using a standard deck of scannable pages with 16 known levels of gray. On a predefined page location, the average pixel darkness was compared to the standard calibration to determine the level of gray. Marks with an average darkness level of 4 or above on a scale of 16 (0 through F) were determined to be valid responses, per industry standards. If multiple marks were read for a single item and the difference of the grayscale reads was greater than four levels, the lighter mark was discarded. If the multiple marks had fewer than four levels of grayscale difference, the response was flagged systematically and forwarded to an editor for resolution.

DRC's image scanners read selected-response, demographic, and identification information. The image scanners also used barcode readers to read pre-printed barcodes from a label on the booklets.

The scannable documents were automatically fed into the image scanners where predefined processing criteria determined which fields were to be captured electronically. Open-ended response images were separated out for image-based scoring.

During scanning, a unique serial number was printed on each sheet of paper. This serial number was used for document integrity and to maintain sequencing within a batch of booklets.

A monitor randomly displayed images, and the human operator adjusted or cleaned the scanner when the scanned image did not meet DRC's strict quality standards for image clarity.

All images passed through a software clean-up program that despeckled, deskewed, and desmeared the images. A random sample of images was reviewed for image quality approval. If any document failed to meet image quality standards, the document was returned for rescanning.

Page-scan verification was performed to ensure that all predefined portions of the booklets were represented in their entirety in the image files. If a page was missing, the entire booklet was flagged for resolution.

After each batch was scanned, booklets were processed through a computer-based editing program to detect potential errors as a result of smudges, multiple marks, and omissions in predetermined fields. Marks that did not meet the predefined editing standards were routed to editors for resolution.

Experienced DRC Document Processing editing staff reviewed all potential errors detected during scanning and made necessary corrections to the data files. The imaging system displayed each suspected error. The editing staff then inspected the image and made any needed corrections using the unique serial number printed on the document during scanning.

Upon completion of editing, quality control reports were run to ensure that all detected potential errors were reviewed again and a final disposition was determined.

Before batches of booklets were extracted for scoring, a final edit was performed to ensure that all requirements for final processing were met. If a batch contained errors, it was flagged for further review before being extracted for scoring and reporting.

During this processing step, the actual number of documents scanned was compared to the number of booklets assigned to the box during book receipt. Count discrepancies between book receipt and booklets scanned were resolved at this time.

Once all requirements for final processing were met, the batch was released for scoring and student level processing.

Table 8–1 shows the number of answer booklets received through booklet check-in, the number of booklets that contained student responses that were scanned and scored, the number of test booklets received, and the total number of booklets received for the writing assessment (W), the mathematics and reading assessment (MR), and the science assessment (S).

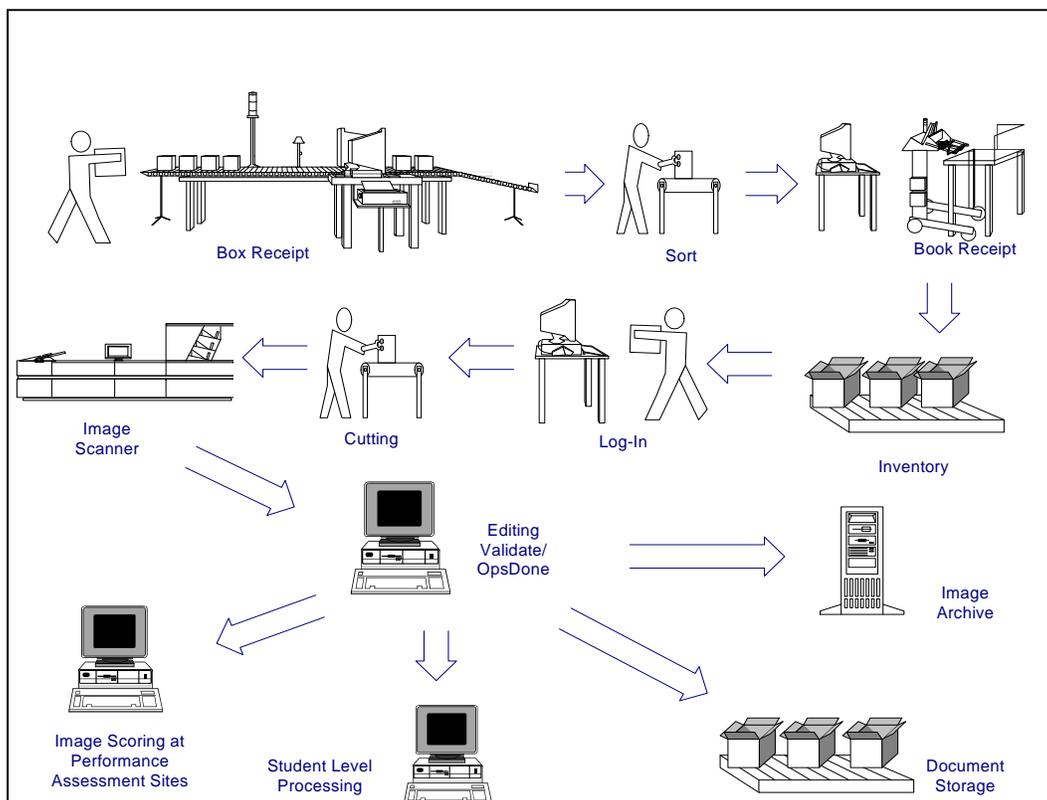
Table 8–1. Counts of 2013 PSSA Materials Received: Grades 3–8

	Answer Booklets Received	Used Answer Booklets Received	Test Booklets Received	Total Booklets Received	Total Booklets Shipped
Grade 3 MR	162,632	121,421	n/a*	162,632	162,669
Grade 4 MR	168,602	114,312	168,600	337,202	337,270
Grade 4 S	166,082	103,032	166,073	332,155	332,188
Grade 5 MR	168,026	111,996	168,025	336,051	336,084
Grade 5 W	164,983	127,204	n/a*	164,983	164,994
Grade 6 MR	167,522	114,087	167,520	335,042	335,078
Grade 7 MR	168,874	122,793	168,879	337,753	337,830
Grade 8 MR	168,303	116,620	168,301	336,604	336,632
Grade 8 S	166,401	102,141	166,399	332,800	332,834
Grade 8 W	165,729	131,110	n/a*	165,729	165,747

* Grades 5 and 8 writing and Grade 3 mathematics and reading were presented in a single, integrated test/answer booklet.

Figure 8–1 illustrates the production workflow for DRC’s Ops MMS and Image Scanning and Scoring System from receipt of materials through all processing of materials and the presentation of scanned images for scoring.

Figure 8–1. Workflow System



MATERIALS STORAGE

Upon completion of processing, student response documents were boxed for security purposes and final storage:

- Project-specific box labels were created containing unique customer and project information, material type, batch number, pallet/box number, and the number of boxes for a given batch.
- Boxes were stacked on pallets that were labeled with the project information and a list of the pallet’s contents before delivery to the Materials Distribution Center for final secure storage.
- Materials will be destroyed one year after contract year ends, with PDE written approval.

SCORING MULTIPLE-CHOICE ITEMS

The scoring process included the scoring of multiple-choice items against the answer key and the aggregation of raw scores from the open-ended responses. A student's raw score is the actual number of points achieved by the student for tested elements of an assessment. From the raw scores, the scale scores were calculated.

The student file was scored against the final and approved multiple-choice answer key. Items were scored as right, wrong, omitted, or double-gridded (more than one answer was bubbled for an item). Sections of the test were evaluated as a whole and an attempt status was determined for each student for each subject. The score program defined all data elements at the student level for reporting.

RANGEFINDING

After student answer documents were received and processed, DRC's Performance Assessment Services (PAS) staff assembled groups of responses that exemplified the different score points for each subject. The score point ranges were represented by the following scoring guidelines:

- 0–4 item-specific scoring guidelines for math
- 0–3 item-specific scoring guidelines for reading and ELA: reading (short answer)
- 1–4 mode-specific composing and 1–4 revising and editing scoring guidelines for writing
- 1–4 holistic scoring guideline for ELA: reading (text-dependent analysis)
- 0–2 item-specific scoring guidelines for science

Note: For grades 3–5 math, grades 3–5 ELA: reading (short answer), and grades 4 and 5 ELA: reading (text-dependent analysis), the new transition to common core item-types were range-found and field tested this year. For grades 6–8 reading, writing, and math, traditional PSSA items were range-found and field tested. All the above items were embedded in the 2013 operational PSSA. The grades 3–5 transition to common core writing prompts and the grade 3 writing open-ended items were range-found and field tested as part of a separate standalone field test not addressed in this technical report.

Responses were pulled from the embedded field test portion of the PSSA for each subject. Once examples of all score points were selected for each item, sets were assembled for range-finding. Copies were made for each range-finding participant. Range-finding committees consisted of Pennsylvania educators, PDE staff members, DRC Test Development staff, and DRC Performance Assessment Services staff. The range-finding meetings were as follows:

- ELA: Reading (text-dependent analysis) Field Test Range-finding (grades 4 and 5), May 20–24, The Sheraton Harrisburg-Hershey, Harrisburg
- Reading Field Test Range-finding (grades 6–8), May 21–23, The Sheraton Harrisburg-Hershey, Harrisburg
- Writing Field Test Range-finding (grade 8), May 21–23, The Sheraton Harrisburg-Hershey, Harrisburg
- ELA: Reading (short answer) Field Test Range-finding (grades 3–5), May 29–31 and June 10–12, The Hilton, Harrisburg

- Math Field Test Rangefinding (grades 6–8), May 29–31, The Hilton, Harrisburg
- Science Field Test Rangefinding (grades 4 and 8), May 29–30, The Hilton, Harrisburg
- Math Field Test Rangefinding (grades 3–5), June 10–13, The Hilton, Harrisburg

Each rangefinding meeting began in a joint session with a review of the history of the assessment and a discussion of the transition towards common core, and then broke into subject/grade-specific groups. Sets of student responses were presented to the committees, one item at a time. Each committee initially reviewed and scored student responses as a group to ensure that everyone was interpreting the scoring guidelines consistently. Committee members then went on to score responses independently. For each student response, committee members' scores were discussed until a consensus was reached. Only those responses for which there was strong agreement among committee members were chosen for inclusion in training materials for DRC raters.

Discussions of student responses included the mandatory use of scoring guideline language. This ensured that committee members remained focused on the specific requirements of each score level. DRC PAS staff took notes addressing how and why the committees arrived at score point decisions, and this information was used by the scoring directors in rater training.

DRC and PDE discussed scoring guideline edits suggested by the rangefinding committees. Changes approved by PDE were then incorporated into the scoring guidelines by DRC Test Development staff. The edited scoring guidelines were used in the preparation of materials and the training of raters.

RATER RECRUITMENT/QUALIFICATIONS

DRC retains a number of raters from year to year. This pool of experienced raters was drawn from to staff the scoring of the 2013 PSSA. To complete the rater staffing for this project, DRC placed advertisements in local newspapers and utilized a variety of web sites. Open houses were held and applications for rater positions were screened by DRC's recruiting staff. Candidates were personally interviewed by DRC staff. In addition, each candidate was required to provide an on-demand writing sample, an on-demand math sample, references, and proof of a four-year college degree. In this screening process, preference was given to candidates with previous experience scoring large-scale assessments and degrees emphasizing expertise in mathematics, English language arts, or science. Thus, the rater pool consisted of educators and other professionals with content-specific backgrounds. These individuals were valued for their content-specific knowledge, but they were required to set aside their own biases about student performance and accept the scoring standards outlined in the PSSA.

LEADERSHIP RECRUITMENT/QUALIFICATIONS

Scoring directors and team leaders were selected by content specialists from a pool of employees who displayed expertise as raters and leaders on previous DRC projects. These individuals had strong backgrounds in mathematics, English language arts, or science and demonstrated organizational, leadership, and management skills. A majority of scoring directors and team leaders had at least five years of leadership experience working on large-scale assessments, including the PSSA. All scoring directors, team leaders, and raters were required to sign confidentiality agreements before handling secure materials.

Each room of raters was assigned a scoring director. This individual led all handscoring activities for the duration of the project. Scoring directors assisted in rangefinding, worked with supervisors to create training materials, conducted team leader training, and were responsible for training the raters. The scoring director made sure that reports were available and interpreted those reports for the raters. The scoring director also supervised the team leaders. All scoring directors were monitored by the project director, the project manager and the content specialists.

Team leaders assisted the scoring director with rater training by leading their teams in small group discussions and answering individual questions that raters may not have felt comfortable asking in a large group. Once raters were qualified, team leaders were responsible for maintaining the accuracy and workload of each team member. Ongoing monitoring identified those individuals having difficulty scoring accurately. These raters received one-on-one retraining from the team leader. Any rater who could not be successfully retrained had his/her scores purged and was released from the project.

TRAINING

As part of preparation for the 2013 mathematics, reading, science, and writing assessments, DRC's PAS staff assembled the PDE-approved scoring guidelines and scored student responses approved by rangefinding committees into sets used for training raters. The item-specific scoring guidelines (and the revising and editing, and composing writing guidelines) served as the raters' constant reference. Responses that were relevant in terms of the scoring concepts they illustrated were annotated and included in an anchor set. The full range of each score point was clearly represented and annotated in the anchor set, which was used for reference by raters throughout the project.

Training sets and qualifying sets contained student responses reviewed by rangefinding committee members. Raters were instructed on how to apply the scoring guidelines and were required to demonstrate a clear comprehension of each anchor set by performing well on the associated training materials. Responses were selected for training to show raters the range of each score point (e.g., high, mid, and low 2s). Examples of 0s were also included for all mathematics, reading, and science items. This process helped raters recognize the various ways that a student could respond in order to earn each score point outlined and defined in the item-specific scoring guidelines.

The scoring director conducted a team leader training session before training the raters. This session followed the same procedures as rater training, but qualifying standards were more stringent due to the extra responsibilities required of team leaders. During team leader training, all PSSA materials were reviewed and discussed. Team leaders were required to annotate all of their training materials with committee justifications from the rangefinding meetings. To facilitate scoring consistency, it was imperative that all team leaders imparted the same rationale

for each response. Once the team leaders were qualified, leadership responsibilities were reviewed and team assignments were given. A ratio of one team leader per each 8–10 raters ensured sufficient monitoring rates for team members.

The 2013 assessment included the opportunity for students to respond in Spanish to mathematics and science items. The scoring director responsible for overseeing this is a Spanish language speaker who has a strong mathematics and science background and has worked closely with the PSSA for four years. All Spanish raters were bilingual and hired specifically to score the Spanish portion of the assessment. They were required to meet the same training and scoring standards set for the raters of the English version of the assessment.

Rater training began with the scoring director providing an intensive review of the scoring guidelines and anchor papers. Next, raters practiced by independently scoring the responses in the training sets. After each training set, the scoring director or team leaders led a thorough discussion of the responses, either in a large-group or small-group setting.

Once the scoring guidelines, anchor sets, and training sets were thoroughly discussed, each rater was required to demonstrate understanding of the scoring criteria by qualifying (i.e., scoring with acceptable agreement to the true scores) on at least one of the qualifying sets. Raters who failed to achieve 70 percent exact agreement on the first qualifying set were given additional, individual training. Raters who did not perform at the required level of agreement by the end of the qualifying process were not allowed to score any student responses. These individuals were removed from the pool of potential raters in DRC's imaging system and released from the project.

HANDSCORING PROCESS

Student responses were scored independently. All responses were scored once, and ten percent of the responses were scored a second time. The data collected from the ten percent double read portion was used to calculate the exact and adjacent agreement rates in the Scoring Summary Reports. The responses that were used for the ten percent read behind were randomly chosen by the imaging system at the item level. Additional read behinds by the team leaders and scoring directors were done to further ensure reliability.

Raters scored the imaged student responses on PC monitors at DRC Scoring Centers in Sharonville and Columbus, Ohio; Plymouth and Woodbury, Minnesota; Pittsburgh, Pennsylvania; and Austin, Texas. Raters were seated at tables with two imaging stations at each table. Image distribution was controlled, ensuring that student images were sent only to designated groups of raters qualified to score those items. Imaged student responses were electronically separated for routing to individual raters by item. Raters were only provided with student responses that they were qualified to score. Scores were keyed into DRC's imaging system.

To handle possible alerts (i.e., student responses indicating potential issues related to students' safety and well-being that sometimes require attention at the state or local level), DRC's imaging system allows raters to forward responses needing attention to the scoring director. These alerts are reviewed by the project director, who then notifies the students' schools and PDE of the occurrences. However, PDE does not receive students' responses or any other identifying information about the students. At no time in the alerts process do raters, or other DRC staff, acquire any knowledge concerning a student's personal identity.

HANDSCORING VALIDITY PROCESS

One of the training tools PAS utilized to ensure rater accuracy was the validity process. The goal of the validity process is to ensure that scoring standards are maintained. Specifically, the objective is to make sure that raters score student responses in a manner consistent with statewide standards both within a single administration of the PSSA and across consecutive administrations. In scoring the 2013 PSSA, this scoring consistency was maintained, in part, through the validity process.

The validity process began with the selection of scored responses from the initial field test. The content specialist for each subject selected 40 validity papers for each core open-ended (OE) item. These 40 papers were drawn from a pool of exemplars (responses that are representative of a particular score point and have been verified by the scoring director and the content specialist). The scores on validity papers are considered true scores.

The validity papers were then implemented to test rater accuracy. The responses were scanned into the imaging system and dispersed intermittently to the raters. By the end of the project, raters had scored all 40 validity papers for any items they were qualified to score. Raters were unaware that they were being dealt pre-scored validity responses and assumed that they were scoring live student responses. This helped bolster the internal validity of the process. It is important to note that all raters who received validity papers had already successfully completed the training/qualifying process.

Next, the scores that the raters assigned to the validity papers were compared to the true scores in order to determine the validity of the raters' scores. For each item, the percentage of exact agreement as well as the percentage of high and low scores was computed. This data was accessed through the Validity Item Detail Report. The same sort of data was also computed for each specific rater. This data was accessed through the Validity Reader Detail Report. Both of these may be run as daily or cumulative reports.

The Validity Reader Detail Report was used to identify particular raters for retraining. If a rater on a certain day generated a lower rate of agreement on a group of validity papers, it was immediately apparent in the Validity Reader Detail Report. A lower rate of agreement was defined as anything below 70 percent exact agreement with the true scores. Any time a rater's validity agreement rate fell below 70 percent, the scoring director was cued to examine that rater's scoring. First, the scoring director attempted to ascertain what kind of validity papers the rater was scoring incorrectly. This was done to determine whether there was any sort of a trend (e.g., trending low on the 1–2 line). Once the source of the low agreement was determined, the rater was retrained. If it was determined that the rater had been scoring live papers inaccurately, then his/her scores were purged for that day, and the responses were re-circulated and scored by other raters.

The cumulative Validity Item Detail Report was utilized to identify potential room-wide trends in need of correction. For instance, if a particular validity response with a true score of 3 was given a score of 2 by a significant number of raters within the room, that trend would be revealed in the Validity Item Detail Report. To correct a trend of this sort, the scoring director would look for student responses similar to the validity paper being scored incorrectly. Once located, these responses would be used in room-wide re-training, usually in the form of an annotated handout or a short set of papers without printed scores given to raters as a recalibration test.

Validity was employed on all core mathematics, reading, and science OE items and for all operational writing prompts. Each 40-paper validity set was formulated to mirror the score point distribution that the item generated during its previous administration. Each validity set included at least five examples of each score point. Examples of different types of responses were included to ensure that raters were tested on the full spectrum of response types.

The exact rater agreement rate generated during the validity process was often higher than the inter-rater agreement rate for the same item. The reason for this discrepancy has to do with how validity sets are formulated. The 40 validity papers for each item, chosen by the content specialist, are intended to cover the full breadth of each score point. For example, each validity set contains examples of high, mid, and low 2s. This scope ensures that the validity process is truly valid in terms of addressing the complete spectrum of response types. However, certain types of responses are generally not included in validity sets. These include line papers (i.e., examples of score points that are so close to the adjacent score point that raters are instructed to consult with a supervisor before assigning a score) and responses that, because of poor word choice/writing, are difficult to understand. The reason for these exclusions is that confusing/line/illegible papers often do not impart a teachable lesson. Since these types of papers are usually unique, any potential lesson the response might teach would apply only to that particular paper. Conversely, the papers in validity sets are chosen because they represent common response-types and teach lessons that can be applied to other similar papers. Due to this distinction, validity sets generate a slightly higher agreement rate than is typically generated during operational scoring.

QUALITY CONTROL

Rater accuracy was monitored throughout the scoring session by means of daily and on-demand reports. These reports ensured that an acceptable level of scoring accuracy was maintained throughout the project. Inter-rater reliability was tracked and monitored with multiple quality control reports that were reviewed by quality assurance analysts. These reports and other quality control documents were generated at the scoring centers, where they were reviewed by the scoring directors, team leaders, content specialists, and project directors. The following reports and documents were used during the scoring of the open-ended items:

The Scoring Summary Report (includes two related reports)

1. The Reader Monitor Report monitored how often raters were in exact agreement with one another and ensured that an acceptable agreement rate was maintained. This report provided daily and cumulative exact and adjacent inter-rater agreement on the ten percent that was double read.
2. The Score Point Distribution Report monitored the percentage of responses given each of the score points. For example, the mathematics daily and cumulative reports showed what percentage of 0s, 1s, 2s, 3s, and 4s a rater had given to all the responses scored at the time the report was produced. It also indicated the number of responses read by each rater so that production rates could be monitored.

The Item Status Report monitored the progress of handscoring. This report tracked each response and indicated the status (e.g., not read, complete, awaiting supervisor review, etc.). This report ensured that all responses were scored by the end of the project.

The Read-Behind Report identified all responses scored by an individual rater. This report was useful if any responses needed rescoring because of possible rater drift.

The Validity Reports (addressed in detail on previous page) tracked how raters performed by comparing pre-scored responses to raters' scores for the same responses. If a rater's scoring fell below the 70 percent determined agreement rate, remediation occurred. Raters who did not retrain to the required level of agreement were released from the project.

The Read-Behind Log was used by the team leader/scoring director to monitor individual rater reliability. Team leaders read randomly-selected, scored items from each team member. If the team leader disagreed with a rater's score, remediation occurred. This proved to be a very effective type of feedback because it was done with live items scored by a particular rater.

Recalibration Sets were used throughout the scoring sessions to ensure accuracy by comparing each rater's scores with the true scores on a pre-selected set of responses. Recalibration sets helped to refocus raters on Pennsylvania scoring standards. This check made sure there was no change in the scoring pattern as the project progressed. Raters failing to achieve 70 percent agreement with the recalibration true scores were given additional training to achieve the highest degree of accuracy possible. Raters who were unable to recalibrate were released from the project. The process for creating and administering recalibration sets was similar to the one used for training sets.

Table 8–2 shows exact and adjacent agreement rates of raters on the core open-ended responses for the mathematics items in the 2013 PSSA. All student responses were read once, and ten percent of the responses were read a second time. The data collected from this ten percent double read was used to calculate the exact and adjacent agreement rates.

**Table 8–2. Inter-rater Agreement for 2013 PSSA
Mathematics Grades 3–8
Open-Ended Response Items and Validity**

Mathematics	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
Grade 3	1	89	10	99	94
	2	88	12	100	95
	3	97	3	100	96
Grade 4	1	93	7	100	96
	2	94	6	100	94
	3	94	6	100	91
Grade 5	1	94	6	100	96
	2	94	6	100	93
	3	88	12	100	92
Grade 6	1	92	8	100	97
	2	87	13	100	91
	3	95	5	100	96
Grade 7	1	86	14	100	96
	2	85	14	99	94
	3	88	12	100	95
Grade 8	1	91	9	100	95
	2	84	15	99	91
	3	82	18	100	81

Note. 0–4 possible score points

Table 8–3 shows the distribution of scores for the mathematics items. All mathematics items are scored with a 0–4 score point range.

**Table 8–3. Percentages Awarded for Each Possible Score Point
2013 PSSA Mathematics Grades 3–8**

Mathematics	Common Item	%0	%1	%2	%3	%4	%B/NS*
Grade 3	1	13	20	21	33	13	1
	2	5	20	34	17	24	1
	3	2	9	20	23	45	1
Grade 4	1	8	15	23	43	10	2
	2	28	39	11	12	5	4
	3	4	10	35	26	24	1
Grade 5	1	4	12	54	22	6	1
	2	12	27	25	21	11	5
	3	27	32	17	17	6	1
Grade 6	1	5	12	14	52	14	2
	2	11	32	27	22	2	5
	3	16	20	16	29	18	1
Grade 7	1	17	31	32	16	4	2
	2	24	25	18	12	16	5
	3	15	8	25	40	11	1
Grade 8	1	12	21	13	35	17	2
	2	14	6	25	25	24	5
	3	12	31	22	22	12	1

*B=blank and NS=non-scoreable

Table 8–4 shows exact and adjacent agreement rates of raters on the core open-ended responses for the reading items in the 2013 PSSA. All student responses were read once, and ten percent of responses were read a second time. The data collected from this ten percent double read was used to calculate the exact and adjacent agreement rates.

**Table 8–4. Inter-rater Agreement for 2013 PSSA
Reading Grades 3–8
Open-Ended Response Items and Validity**

Reading	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
Grade 3	1	84	16	100	80
	2	74	26	100	79
Grade 4	1	84	16	100	82
	2	84	16	100	89
	3	86	14	100	87
	4	85	15	100	88
Grade 5	1	79	21	100	87
	2	75	25	100	85
	3	75	25	100	87
	4	76	24	100	84
Grade 6	1	81	19	100	77
	2	75	25	100	74
	3	82	18	100	85
	4	80	20	100	82
Grade 7	1	83	17	100	86
	2	78	22	100	79
	3	77	23	100	76
	4	80	19	99	82
Grade 8	1	72	28	100	72
	2	77	23	100	80
	3	75	25	100	84
	4	77	23	100	86

Note. 0–3 possible score points

Table 8–5 shows the distribution of scores for the reading items. All reading items are scored with a 0–3 score point range.

**Table 8–5. Percentages Awarded for Each Possible Score Point
2013 PSSA Reading Grades 3–8**

Reading	Common Item	%0	%1	%2	%3	%B/NS*
Grade 3	1	9	42	33	13	2
	2	7	41	38	12	2
Grade 4	1	7	14	44	32	1
	2	5	21	39	33	2
	3	7	53	16	22	1
	4	12	31	34	21	2
Grade 5	1	5	26	56	12	1
	2	6	27	52	13	2
	3	8	29	43	19	1
	4	12	46	27	13	1
Grade 6	1	8	42	37	12	1
	2	3	33	49	12	2
	3	4	33	51	11	1
	4	7	28	45	18	1
Grade 7	1	2	44	31	22	1
	2	7	19	54	18	2
	3	8	29	44	17	1
	4	9	39	30	21	2
Grade 8	1	8	36	41	13	2
	2	4	18	35	41	2
	3	6	25	45	21	2
	4	9	39	30	20	2

*B=blank and NS=non-scoreable

Table 8–6 shows exact and adjacent agreement rates of raters on the core open-ended responses for the science items in the 2013 PSSA. All student responses were read once, and ten percent of responses were read a second time. The data collected from this 10 percent double read was used to calculate the exact and adjacent agreement rates.

**Table 8–6. Inter-rater Agreement for 2013 PSSA
Science Grades 4 and 8
Open-Ended Response Items and Validity**

Science	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
Grade 4	1	80	18	98	85
	2	88	12	100	92
	3	88	12	100	95
	4	97	3	100	99
	5	81	18	99	91
Grade 8	1	92	8	100	97
	2	83	17	100	93
	3	86	14	100	96
	4	93	7	100	98
	5	94	6	100	97

Note. 0–2 possible score points

Table 8–7 shows the distribution of scores for the science items. All science items are scored with a 0–2 score point range for reporting purposes.

**Table 8–7. Percentages Awarded for Each Possible Score Point
2013 PSSA Science Grades 4 and 8**

Science	Common Item	%0	%1	%2	%B/NS*
Grade 4	1	34	27	38	1
	2	34	41	23	1
	3	26	27	45	2
	4	24	37	37	1
	5	17	39	43	1
Grade 8	1	25	56	18	2
	2	13	64	19	3
	3	32	36	29	4
	4	14	19	65	2
	5	22	35	40	3

*B=blank and NS=non-scoreable

Table 8–8 shows exact and adjacent agreement rates of raters on the core open-ended responses for the writing items in the 2013 PSSA. All student responses were read once, and ten percent of responses were read a second time. The data collected from this ten percent double read was used to calculate the exact and adjacent agreement rates.

**Table 8–8. Inter-rater Agreement for 2013 PSSA
Writing Grades 5 and 8
Open-Ended Response Items and Validity**

Writing		Composition % Agreement			Revising and Editing % Agreement		
Grade	Prompt	Exact	Adjacent	Exact + Adjacent	Exact	Adjacent	Exact + Adjacent
5	1	86	14	100	82	18	100
	2	84	16	100	84	16	100
	1 Validity	84	16	100	81	19	100
	2 Validity	78	22	100	78	22	100
8	1	80	20	100	78	22	100
	2	82	18	100	80	20	100
	1 Validity	78	21	99	76	23	99
	2 Validity	85	15	100	85	15	100

Note. 1–4 possible score points

Table 8–9 shows the distribution of scores for the writing items. All prompts are scored with a 1–4 score point range for both Composition and for Revising and Editing.

**Table 8–9. Percentages Awarded for Each Possible Score Point
2013 PSSA Writing Grades 5 and 8**

Writing		Composition					Revising and Editing				
Grade	Prompt	%1	%2	%3	%4	%NS/ NT*	%1	%2	%3	%4	%NS/ NT*
5	1	3	34	54	8	1	5	36	52	7	1
	2	5	44	45	4	2	5	44	45	4	1
8	1	4	33	56	7	1	4	34	54	6	1
	2	5	35	51	7	1	6	36	50	7	1

* NS=non-scoreable and NT=not taken

Chapter Nine: Description of Data Sources and Sampling Adequacy

This chapter describes the data sources (e.g., *n*-counts, characteristics of students) used for the various analysis procedures discussed in the remaining chapters of this technical report. Psychometric analyses are conducted at several points for the PSSA: 1) early analyses for quality control purposes; 2) analyses associated with the calibration, scaling, and linking processes; 3) analyses used for item banking; and 4) analyses for the technical report. Detailed information regarding the attributes of students used for Adequate Yearly Progress (AYP) reporting is provided in Chapter Ten.

PRIMARY STUDENT FILTERING CRITERIA

For many data files, the primary means of filtering students for inclusion/exclusion from any data analysis are based on the state reporting criteria which are outlined below. Within the state reporting rules are separate attempt criteria for individual subject areas. The attempt criteria are discussed more fully below.

State Reporting Criteria

The state reporting criteria are as follows:

- The student must be enrolled for the full academic year.
- The student must be attributed to a public district/school (state).
- The student must receive a score (i.e., met the subject attempt logic—see additional information below).
- The student is not a home school student.
- The student is not a foreign exchange student.
- The student is not a first year ELL student (mathematics/reading only).

PSSA Attempt Criteria

For all data sources, only students who meet the attempt criteria are included. For mathematics, reading, and science, the attempt criteria required students to complete a minimum of five items (multiple-choice (MC) or open-ended (OE)) in each respective subject area section of the test booklets. Science counts were based on operational items only, while mathematics and reading counts were based on operational and nonoperational items. For writing, a student must complete at least five MC items and respond to both operational writing prompts.

KEY VALIDATION DATA

These data are only mentioned for the sake of completeness, as no formal results from these data are provided in this technical document. An analysis on all operational MC items is conducted early in the scoring process to ensure that the items are performing as expected. This is an important quality check that is always done for the PSSA. This analysis is usually (but not always) done using all students from early-return schools. The sample does not need to be representative of the entire state for these quality checks. Available student data typically suffices as long as there is reasonable variability in the total test scores of students.

For 2013 this data included all public school students who 1) had their MC items scanned and scored by April 26 (mathematics/reading), April 5 (writing), or May 10 (science) and 2) met preliminary attempt criteria (i.e., attempt was determined based on MC items only). Note that the full state reporting criteria were not in effect for this file (only attribution to a public school based on tested site and preliminary attempt criteria were used to filter students).

CALIBRATION DATA

Calibration data included students who met the preliminary state reporting criteria (including attempt criteria) by May 13. The state reporting criteria were preliminary, meaning that attributions and final PIMS⁵ information were not complete by this time. No sampling was undertaken in this data (i.e., it included all students who met the above criteria with operational test scores up to this point⁶). This data file was used to provide impact results to the Technical Advisory Committee (TAC) during the linking review process.

ITEM BANK DATA

The item bank data included students who met the state reporting criteria by July 9. No sampling was undertaken in this data (i.e., it included all students who met the above criteria with scored field test data up to this point). The data banked for field test items were based on this data file.

FINAL DATA

This file included all students who met state reporting criteria by August 20 for all subject areas. The final data reflects update by schools for correction of certain fields (e.g., student ethnicity). All other files contained preliminary data (item bank data). The majority of the results included in this technical report were derived using the final data file.

⁵ Pennsylvania Information Management System

⁶ Historically, PSSA has retained all students who met the stated criteria in the calibration data set, even those who had testing accommodations.

FINAL N-COUNTS FOR ALL DATA SOURCES

The *n*-counts for all data sources are provided in Table 9–1a. The calibration count includes students who met the preliminary state reporting criteria, while the final count includes students who met the final state reporting criteria.⁷ A computer-based test (CBT) was offered for all subjects for the first time in 2013. Calibration data shows the number of students in both modes. Calibration of item parameters were conducted with paper students only, however, other analyses conducted during calibration period (see chapter 12) used both paper and CBT students. The *n*-counts of item bank data show only the number of students who took paper test, because values for item banking (e.g. CTT statistics) were obtained with paper students. However, the *n*-counts of paper students and total are not very different because the proportions of CBT students were small (see Table 9–1b).

Table 9–1a. Data Source N-Counts

Subject	Grade	Key Validation (Paper/CBT)	Calibration (Paper/CBT)	Item Bank (Paper)	Final (Paper/CBT)
Mathematics	3	62627	126415	126454	126734
	4	51654	126162	126311	126550
	5	44690	125331	125346	125790
	6	46044	128702	128528	129366
	7	47427	130952	130652	131842
	8	52677	129693	129460	131143
Reading	3	62555	126377	126408	126685
	4	51486	126113	126253	126491
	5	44563	125274	125284	125727
	6	45790	128660	128469	129305
	7	47255	130883	130577	131767
	8	52443	129584	129328	131006
Science	4	60750	126352	125724	126729
	8	52533	129217	127878	130637
Writing	5	87891	123637	123608	124041
	8	83251	128560	127854	129823

⁷ For this reason, the final count may be smaller than the calibration count in any given year.

COMPUTER-BASED TEST

Table 9–1b displays the count of students who took the 2013 PSSAs broken out by content, grade, and mode with the final data. In all grades, less than one percent of students were enrolled to take the PSSAs CBT in the spring, except grade 8. Lower grades had fewer students who took CBT and grade 8 had highest CBT proportion of students in all subjects. Slightly over 1 percent of grade 8 students took CBT with mathematics, reading, and writing, and slightly over 2 percent of grade 8 students took science CBT.

Table 9–1b. Final N-Counts and Proportion by Mode

Subject	Grade	N-Counts		Proportion (%)	
		Paper	CBT	Paper	CBT
Mathematics	3	126456	278	99.78	0.22
	4	126311	239	99.81	0.19
	5	125347	443	99.65	0.35
	6	128535	831	99.36	0.64
	7	130658	1184	99.10	0.90
	8	129466	1677	98.72	1.28
Reading	3	126409	276	99.78	0.22
	4	126253	238	99.81	0.19
	5	125285	442	99.65	0.35
	6	128476	829	99.36	0.64
	7	130583	1184	99.10	0.90
	8	129334	1672	98.72	1.28
Science	4	125723	1006	99.21	0.79
	8	127878	2759	97.89	2.11
Writing	5	123610	431	99.65	0.35
	8	127861	1962	98.49	1.51

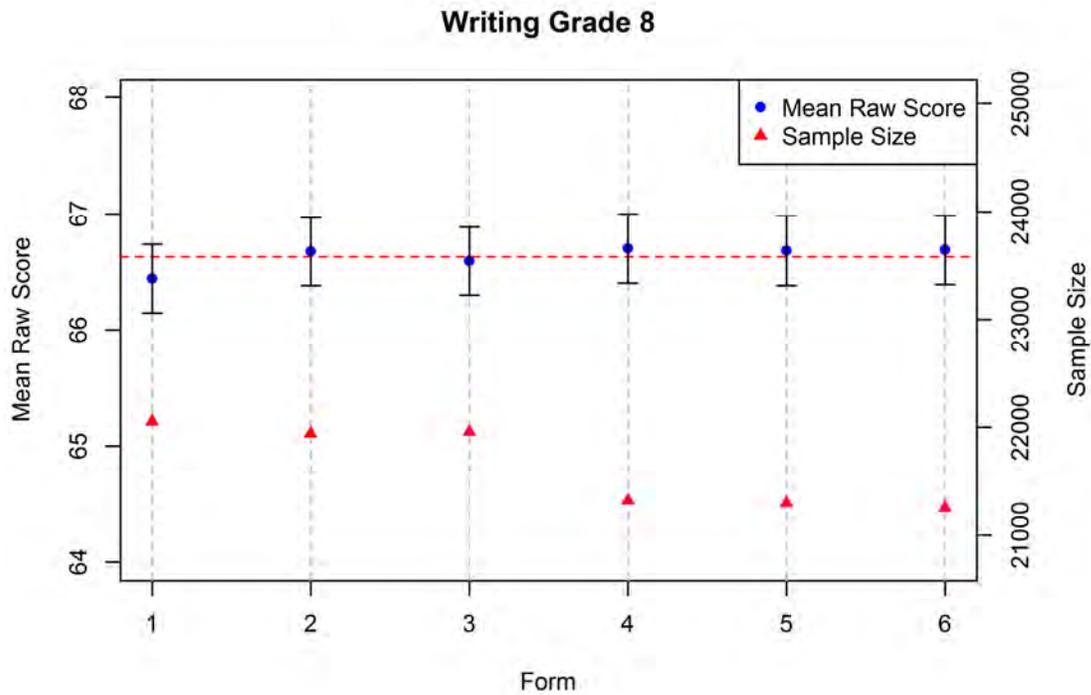
SPIRALING OF FORMS FOR WRITING

PSSA forms were scrambled and spiraled for all grades and subjects, except writing. For writing, no scrambling was done, but during the PSSA administration, test forms were spiraled within classrooms for grade 8. With grade 5 Writing, there was only one form and thus no spiraling was done (see Appendix I for summary statistics). With grade 8 writing, all students were administered the same set of operational items but different field test items. The goal of spiraling is to achieve randomly equivalent samples of students across forms. When spiraling achieves randomly equivalent samples, the forms will have equal standard deviations and means (within sampling error) over the operational items.

Appendix I provides summary statistics for all test forms for each grade and subject area test. The tables provide the form number (Form), the number of students (N), test length in items (L), total points (Pts.), the minimum (Min) score, the maximum (Max) score, the mean (Mean) score, the median score (Med), and the standard deviation (SD). The extent to which the mean raw scores across forms are similar, indicating the extent to which the student populations taking each form are of approximately equal ability and item scrambling are appropriate. This equivalence of ability distributions across forms is the desired outcome of spiraling and allows for optimum analysis of the embedded field test items.

In Figure 9–1, the form means are plotted (blue circle) with three standard error (SE) lines. *N*-counts for each form (including both paper and CBT) are shown with red triangle with the axis on right. Forms 1, 2, 3 have slightly larger sample size than forms 4, 5, and 6 due to CBT offering. For each form, the standard error was computed by taking the standard deviation of each form. The state grand mean score across all forms is indicated by the horizontal line. If a form’s standard error band captures the horizontal line, then that suggests only random differences exist between the form mean and the population mean. This was true in all forms.

Figure 9–1. Form Mean Scores with +/- One Standard Error (SE) Bands



SCRAMBLING OF FORMS

In response to test security issues raised in prior PSSA Administrations, multiple scrambled versions of the 2013 operational form were constructed for each mathematics, reading, and science assessment. The core form was constructed following the past test construction and equating guidelines and will be referred to as the Master Core throughout the remainder of this document. Based on previous TAC recommendation, the Master Core is the pattern of the test that would have been administered to all students in the absence of scrambling. More importantly, the data obtained from administration of Master Core were used for operational MC item calibration for the 2013 PSSA.

Once the Master Core was constructed and approved, DRC and PDE content specialists built seven scrambled patterns of the Master Core for each content and grade. OE items were not scrambled so each OE item appeared in the same position on every form. Some MC items also appear in the same position on multiple forms due to content constraints. In some content areas and grades the number of field-test forms was greater than the number of scrambled patterns. In these instances the Master Core and scrambled patterns were repeated with no specific pattern appearing more than three times. Due to the limited enrollment for the PSSA CBT, only three forms were offered. These forms included the accommodation form, a Master Core form, and one additional scrambled form (or forms 1, 2, and 3, respectively), therefore these forms have slightly higher participation than other forms.

When the Master Core was built, the linking position rules were observed for all core-linking and equating-block items. The Master Core was used at least as often, or more often, than any scrambled version of the core form. Since form 1 was used for all accommodated forms (e.g., Braille, Large Print, Audio, and Spanish) it was never designated as a Master Core. The specific forms presenting the Master Core vary across grades within each content area. For example, the Master Core for mathematics grade 4 is repeated on forms 2, 10, and 12 while the Master Core for grade 5 is repeated on forms 2, 6, and 15. Given that all forms were spiraled at the student level, the distribution of forms is reasonably uniform. The exception is form 1 which had higher participation due to the fact that it is the only form used for accommodations.

Based on TAC recommendations to minimize possible item position effects, each section of the Master Core was divided into blocks of non-overlapping MC items. (Recall that the OE items were not part of the scrambling) The blocks generally contained six to seven MC items (or one passage), but the block sizes varied depending on the content and test session. Within each block, MC items were scrambled following general psychometric and content guidelines to create up to five versions of the block in addition to the Master Core sequencing. The blocks were assembled to create seven scrambled patterns of the Master Core. Table 9–2 shows the mathematics grade 5 scrambled form structure. The core was divided into nine blocks (labeled “1”–“9”) and each block was scrambled in five different permutations (labeled “A”–“E”). So, for example, form **B** was constructed with scrambled version A for all nine blocks. Seven scrambled patterns (labeled “A”–“H” in the “Pattern.” column) of the Master Core were used in addition to the Master Core across the twenty field-test forms. The Master Core was used on forms 2, 6, and 15.

Table 9–2. Mathematics Grade 5 Scrambling

Form	Block									Pattern	
	1	2	3	4	5	6	7	8	9		
1	A	A	A	A	A	A	A	A	A	A	B
2	Master Core	A									
3	C	C	C	C	C	C	C	C	C	C	C
4	A	A	A	A	A	A	A	A	A	A	B
5	E	E	E	E	E	E	E	E	E	E	E
6	Master Core	A									
7	B	B	B	B	B	B	B	B	B	B	F
8	D	D	D	D	D	D	D	D	D	D	D
9	C	C	C	C	C	C	C	C	C	C	C
10	A	A	A	A	A	A	A	A	A	A	B
11	D	D	D	D	D	D	D	D	D	D	D
12	B	B	B	B	B	B	B	B	B	B	F
13	A	B	C	D	A	B	C	D	A	A	G
14	D	C	B	A	D	C	B	A	D	D	H
15	Master Core	A									
16	E	E	E	E	E	E	E	E	E	E	E
17	A	B	C	D	A	B	C	D	A	A	G
18	D	C	B	A	D	C	B	A	D	D	H
19	D	D	D	D	D	D	D	D	D	D	D
20	C	C	C	C	C	C	C	C	C	C	C

Prior to scrambling the Master Core, DRC and PDE content specialists developed the following general psychometric and content guidelines:

- Items cannot move between blocks.
- DRC and PDE content specialists will work to ensure that the scrambling does not result in making content more difficult than the Master Core item sequence. For example, items of similar cognitive complexity will be swapped rather than random scrambling.
- A block scrambled pattern is only valid if it does not contain an invalid key distribution within the block. Additional checks for an invalid key distribution across blocks must be made when combining block scrambled patterns to create forms. For example, scrambling must not create more than three (3) of the same key positions in a row.

- A block scrambled pattern is only valid if it does not contain an invalid standard (AA/EC) distribution within a block. Additional checks for standard distribution across blocks must be made when combining block scrambled patterns to create forms. An exception was made for one mathematics scramble for each grade which ordered items within block by eligible content per PDE request.
- Scrambling should not place a difficult item as the first item in a section. The first item in a block that does NOT begin a section may be a difficult item since blocks are invisible to the student.
- For passage-based items, a block scrambled pattern is only valid if it does not create dissonance between the items and passage(s).
- Scrambling should not place a difficult item as the first item in a passage set.
- Within a set of items connected to a paired set of passages, an item associated with both passages can be swapped only with another item associated with both passages. (These items must remain at the end of the set of items associated with the passage set.)

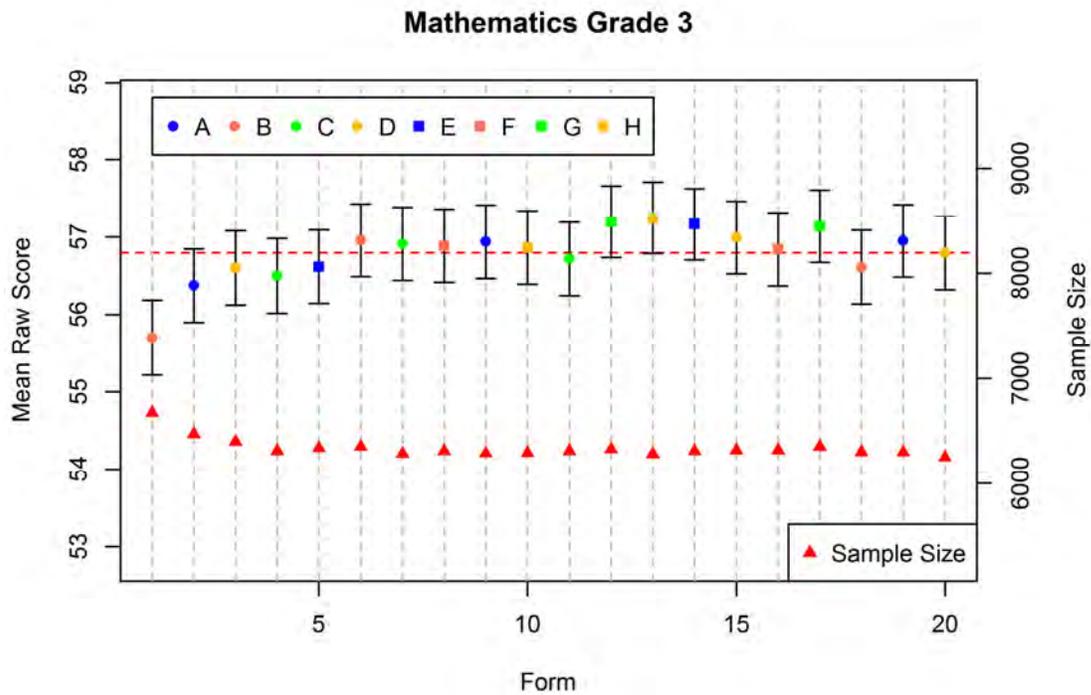
Table 9–3 shows a summary of the scrambling strategy employed for the 2013 PSSAs. Each content and grade used a total of eight different patterns of the core including the Master Core. Recall that mathematics and reading grades 3–5 have started transitioning to the PA Common Core (PACC) and, thus, were required to field test more forms. Also note that no scrambling was implemented for the writing assessment.

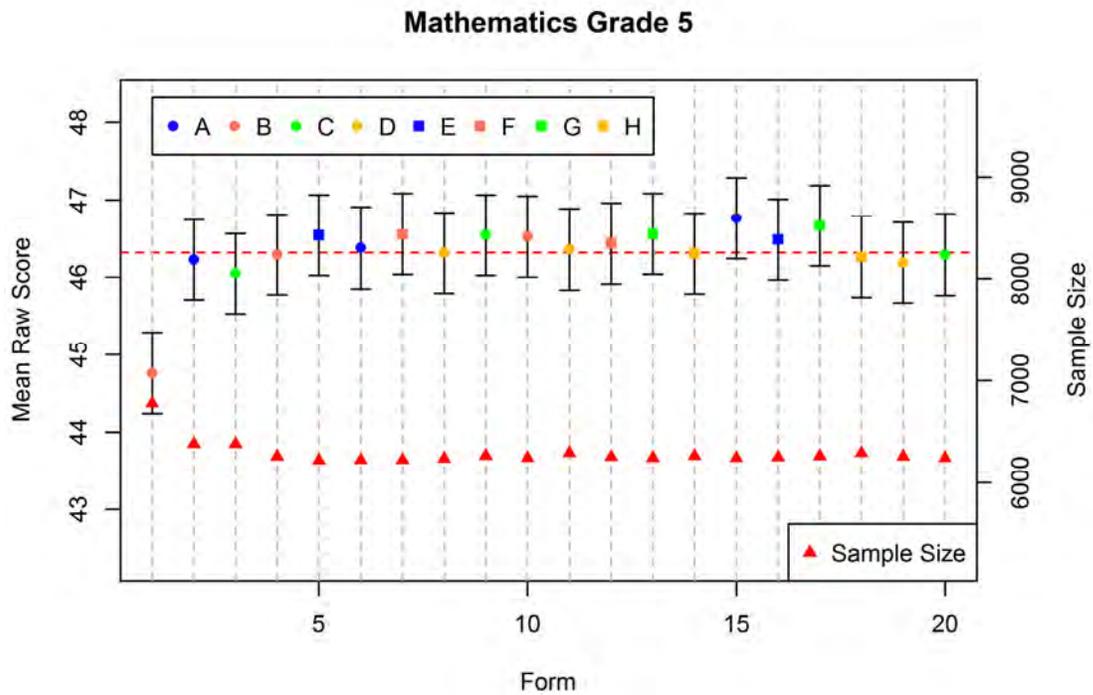
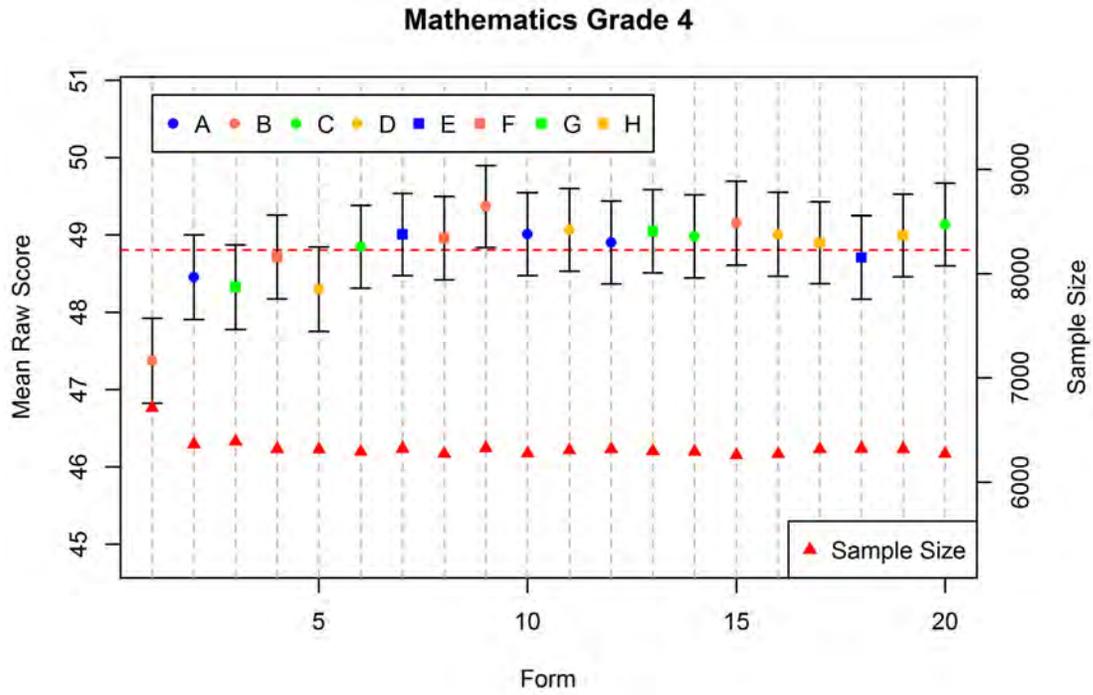
Table 9–3. Form Scrambling

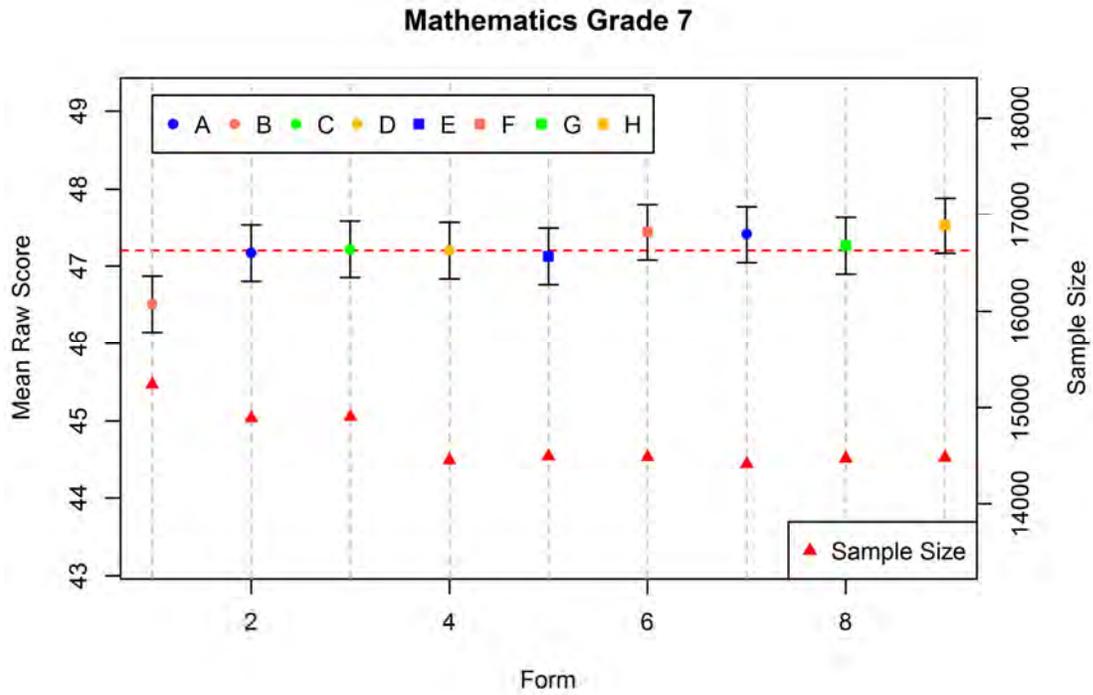
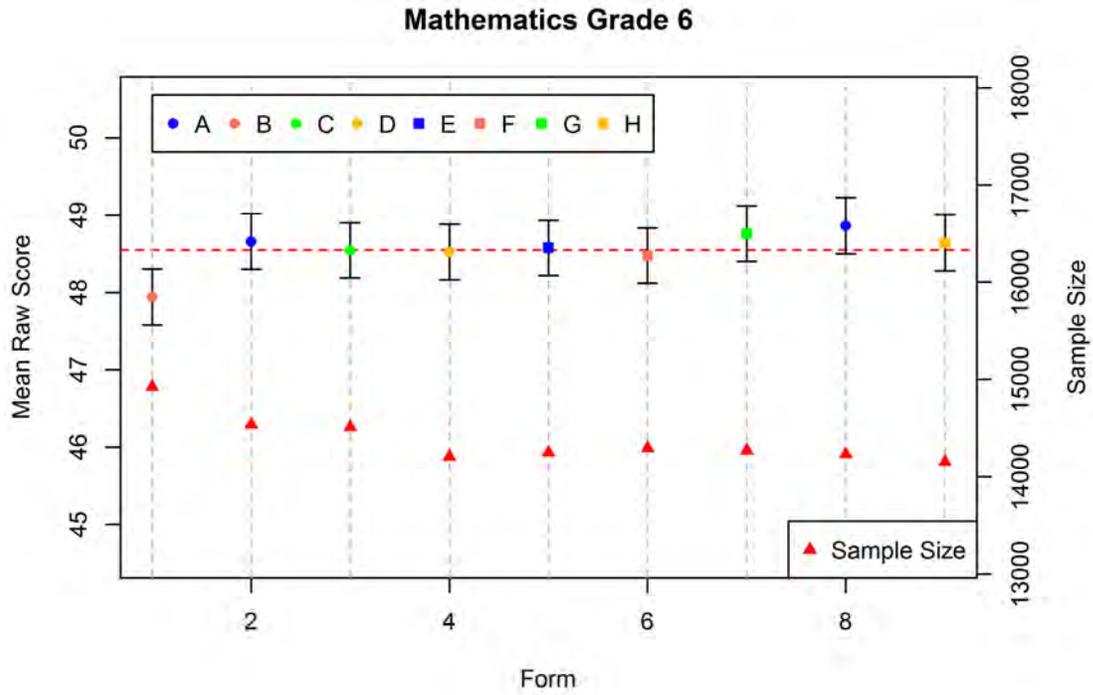
Content	Grade	Forms	Total Patterns	Master Cores
Mathematics	3	20	8	3
	4	20	8	3
	5	20	8	3
	6	9	8	2
	7	9	8	2
	8	9	8	2
Reading	3	20	8	3
	4	20	8	3
	5	20	8	3
	6	9	8	2
	7	9	8	2
	8	9	8	2
Science	4	12	8	2
	8	12	8	2

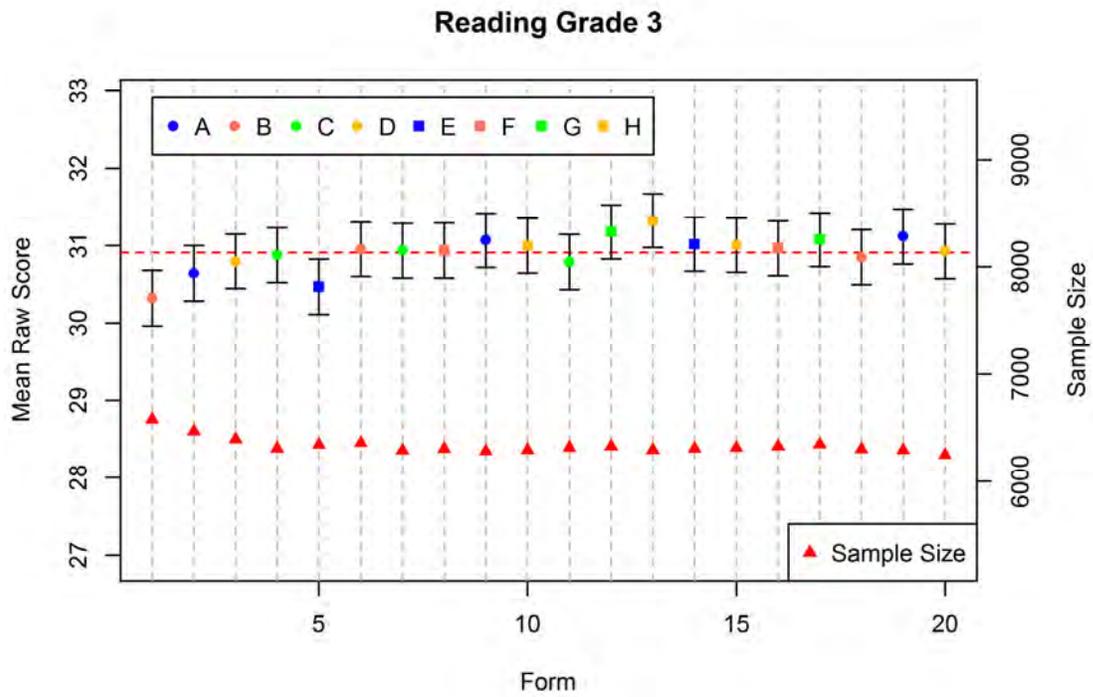
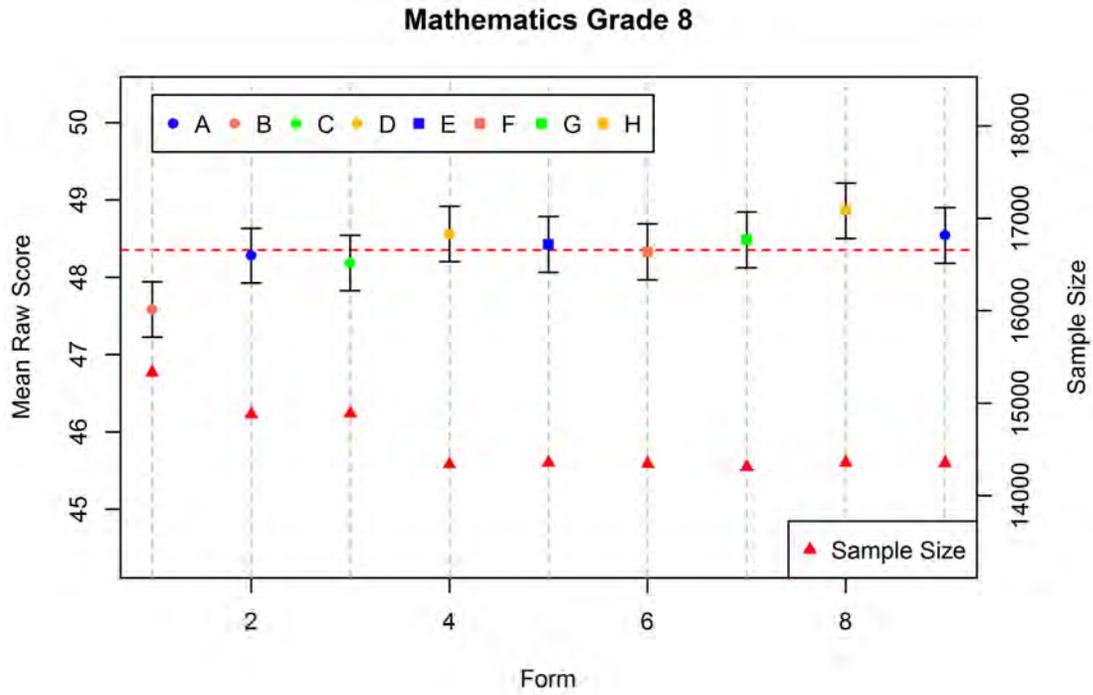
An important assumption for effectively collapsing forms into pattern groups is that the form spiraling yielded randomly equivalent groups. Figure 9–2 displays the raw score mean, a three standard error band, and the scrambled pattern for each form. The standard error bands we have plotted here are equivalent to approximately 99% confidence interval for the form means. Notice that the error bands for all forms overlapped the overall mean (the red line). This tells us that the form means were not statistically different from the overall mean regardless of the type of scrambling. Please note that form 1 is used for all accommodated administrations and as such appears different from the remaining forms in these plots. However, if accommodated administrations are excluded, the mean raw score performance on this form is not statistically different from the overall mean.

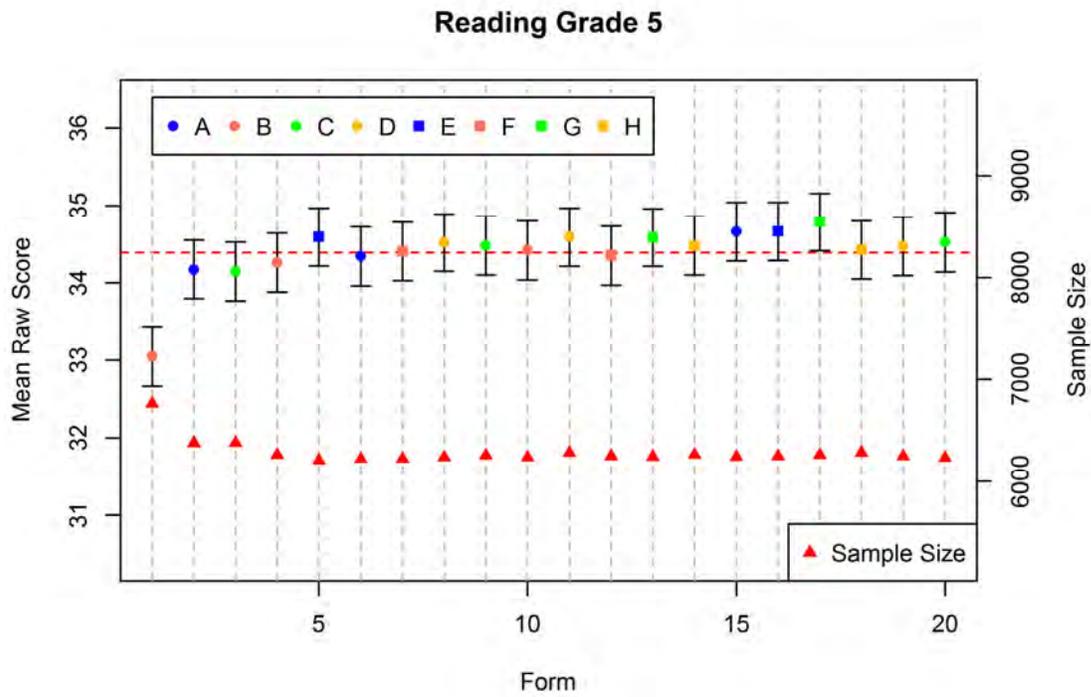
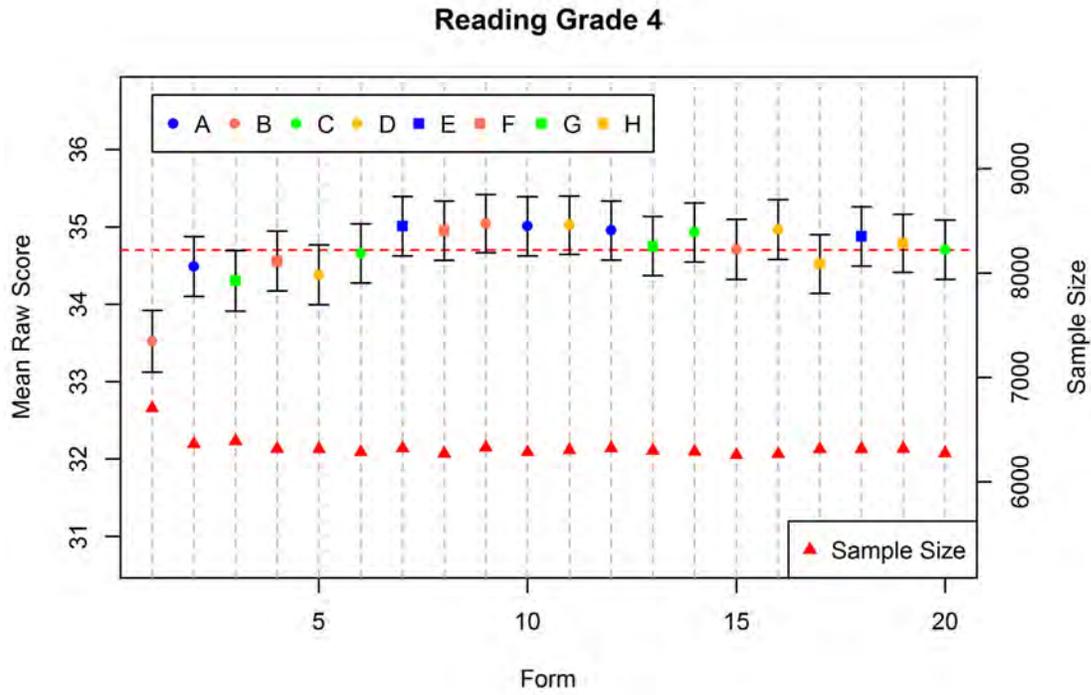
Figure 9–2. Form Mean Scores with +/- Three Standard Error (SE) Bands

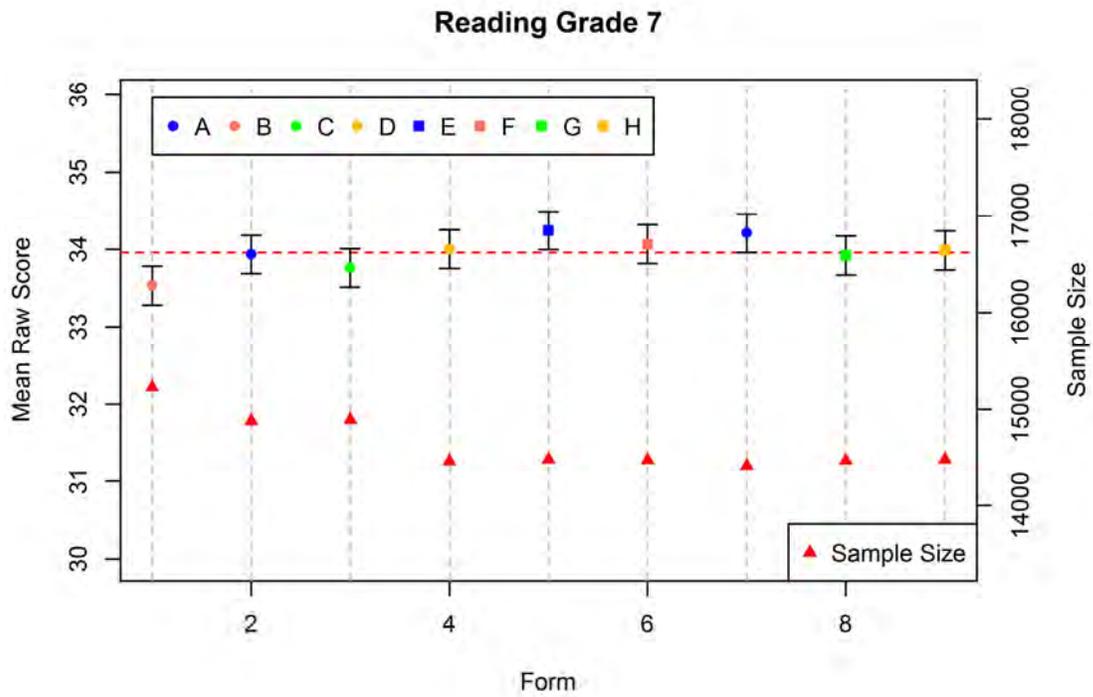
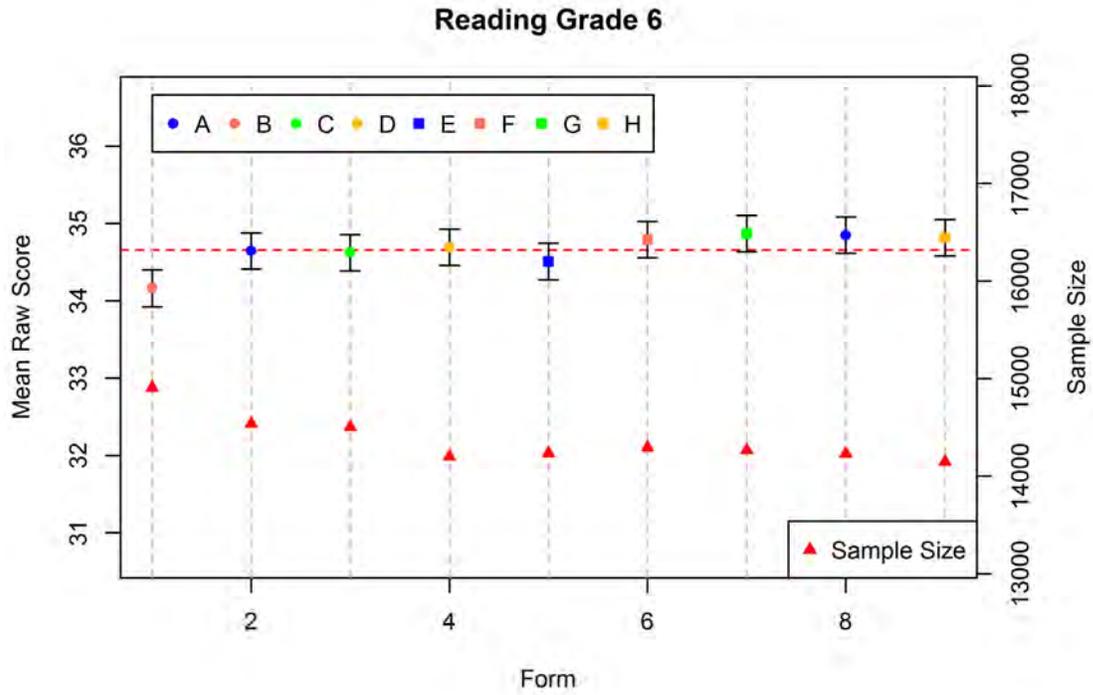


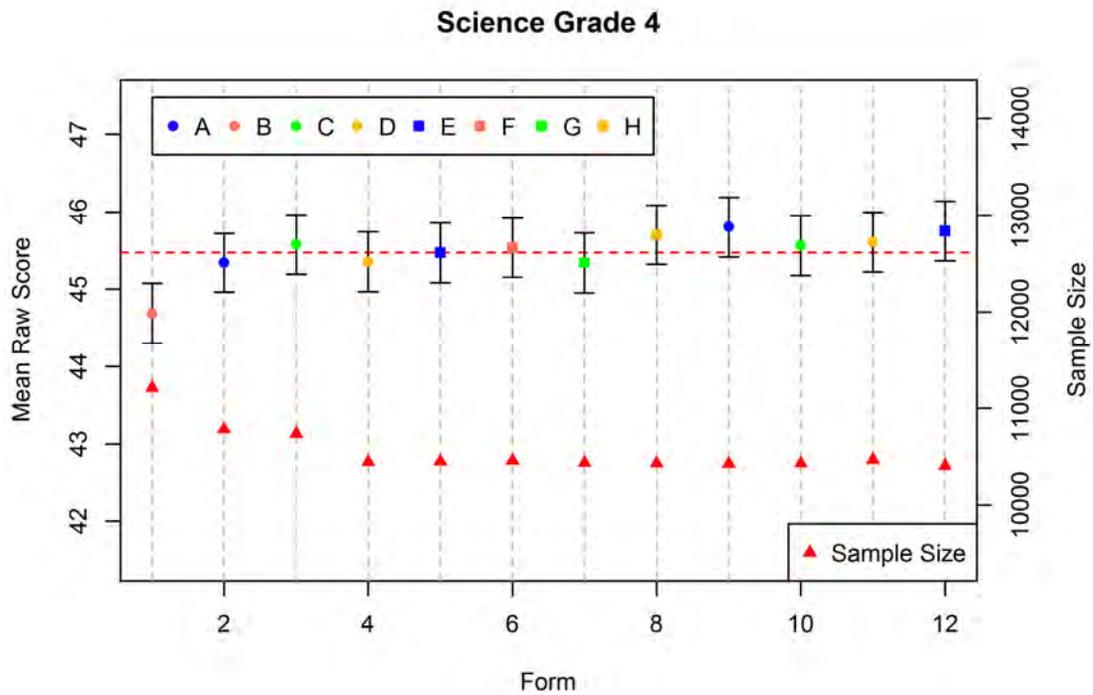
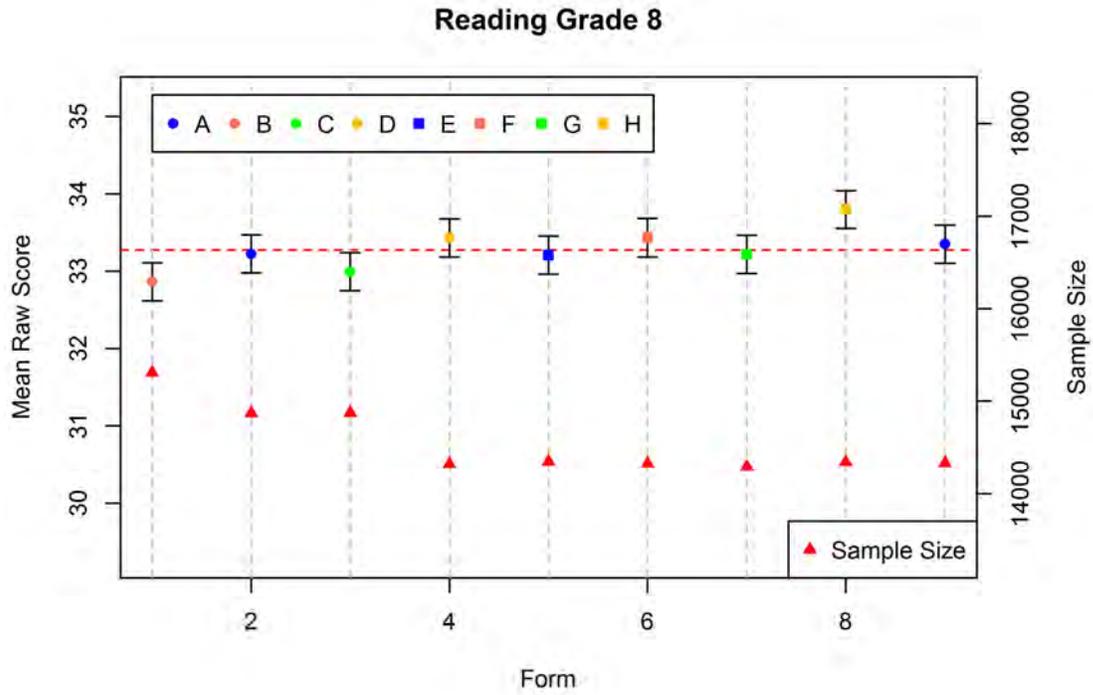












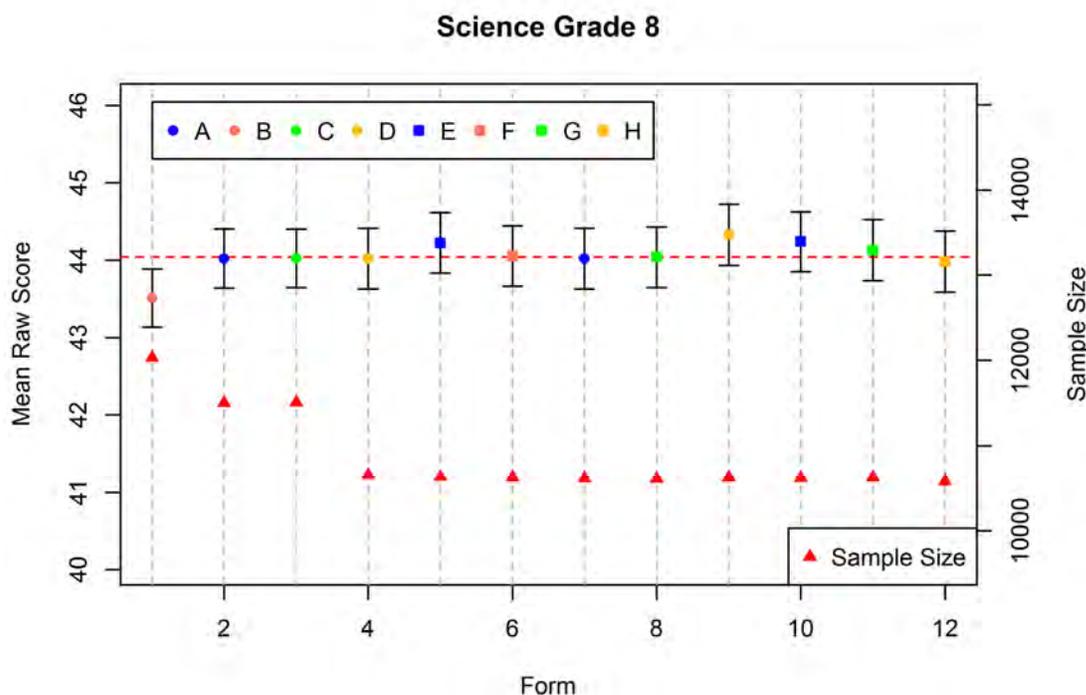


Table 9–4 shows the number of students who took each form pattern and Table 9–5 gives the form to scrambled pattern conversion. (Recall that pattern A is the Master Core version.)

Table 9–4. Form Pattern Counts

Content	Grade	Pattern							
		A	B	C	D	E	F	G	H
Mathematics	3	19048	19320	18899	18957	12641	12622	12676	12571
	4	18953	19298	18856	18887	12643	12590	12688	12635
	5	18842	19277	18886	18785	12470	12474	12504	12552
	6	28765	14924	14509	14206	14248	14293	14270	14151
	7	29303	15235	14904	14459	14496	14488	14474	14483
	8	29226	15333	14887	14337	14352	14342	14310	14356
Reading	3	19040	19237	18913	18953	12651	12631	12672	12588
	4	18960	19284	18843	18877	12631	12583	12686	12627
	5	18843	19261	18869	18768	12458	12473	12506	12549
	6	28762	14906	14502	14200	14234	14292	14263	14146
	7	29291	15221	14888	14463	14480	14475	14469	14480
	8	29200	15308	14874	14320	14348	14324	14291	14341
Science	4	21217	11214	21175	20921	20863	10463	10441	10435
	8	22119	12031	11506	21279	21252	10626	21241	10583

Note: Final data was used

Table 9–5. Form to Pattern Conversion Table

Content	Grade	Form																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Mathematics	3	B	A	D	C	E	B	C	F	A	H	C	G	H	E	D	F	G	B	A	D
	4	B	A	G	F	D	C	E	F	B	A	D	A	G	C	B	D	H	E	H	C
	5	B	A	C	B	E	A	F	D	C	B	D	F	G	H	A	E	G	H	D	C
	6	B	A	C	D	E	F	G	A	H											
	7	B	A	C	D	E	F	A	G	H											
	8	B	A	C	D	E	F	G	H	A											
Reading	3	B	A	D	C	E	B	C	F	A	H	C	G	H	E	D	F	G	B	A	D
	4	B	A	G	F	D	C	E	F	B	A	D	A	G	C	B	D	H	E	H	C
	5	B	A	C	B	E	A	F	D	C	B	D	F	G	H	A	E	G	H	D	C
	6	B	A	C	D	E	F	G	A	H											
	7	B	A	C	D	E	F	A	G	H											
	8	B	A	C	D	E	F	G	H	A											
Science	4	B	A	C	D	E	F	G	H	A	C	D	E								
	8	B	A	C	D	E	F	A	G	D	E	G	H								

SCRAMBLING ANALYSIS

Form Level

The test-level and item-level effects of scrambling are presented in the following section. Table 9–6 shows the mean raw score difference from the Master Core for each scrambled pattern (i.e., the scrambled pattern mean minus the Master Core mean). The Master Core is labeled as scrambled pattern A. The highlighted mean differences are statistically significant at a family-wise Type I error rate (alpha) of 0.01 with a two-sample t-test. For example, with grade 3 math, seven two sample t-tests are conducted (Master Core vs. B, C, D, E, F, G, and H) and each test had Type I error rate (alpha) of 0.001428571 to keep the family-wise Type I error rate equal to 0.01. Form 1 was excluded from these analyses since the accommodations tend to lower average performance. This means that there are no pattern B results for mathematics and reading grades 6–8 and science because pattern B was only used once in these contents and grades and form 1 followed pattern B. Table 9–6 shows that 0 of 39, 1 of 39, and 0 of 12 scrambled pattern raw score means showed a significant difference from the Master Core in mathematics, reading, and science, respectively. Although there are some content grades showing a constant direction of performance differences of the scrambled patterns from the Master Core, there does not appear to be a general pattern by either content or grade.

Table 9–6. Mean Raw Score Differences From the Master Core

Content	Grade	Scrambled Pattern						
		B	C	D	E	F	G	H
Mathematics	3	0.03	-0.04	0.05	0.14	0.11	0.42	0.30
	4	0.47	0.20	0.00	0.07	0.05	-0.10	0.16
	5	-0.05	-0.16	-0.17	0.06	0.04	0.16	-0.17
	6		-0.22	-0.24	-0.18	-0.28	0.00	-0.12
	7		-0.07	-0.09	-0.16	0.16	-0.02	0.24
	8		-0.22	0.15	0.02	-0.08	0.08	0.45
Reading	3	-0.04	-0.07	-0.03	-0.20	0.01	0.19	0.22
	4	0.06	-0.05	-0.03	0.13	-0.06	-0.29	-0.16
	5	-0.05	-0.01	0.14	0.24	-0.01	0.30	0.06
	6		-0.12	-0.05	-0.24	0.04	0.12	0.07
	7		-0.31	-0.07	0.17	-0.01	-0.15	-0.09
	8		-0.29	0.15	-0.08	0.15	-0.07	0.51
Science	4		0.00	-0.09	0.04	-0.03	-0.23	0.13
	8		0.00	0.15	0.21	0.03	0.06	-0.04

Note: Final data is used and the highlighted cell indicates the scrambled pattern is statistically significantly different from the Master Core form at family-wise $\alpha = 0.01$ for each subject and grade combination.

Item Level

The item p -values are tested for independence using the chi-square test. For example, Table 9–7, a chi-square test for the 2 by 2 table is conducted for comparison of the Master Core form and scrambled pattern B for the first item in grade 3 mathematics. The chi-square test was chosen because the item scores are discrete and we are interested in comparing proportions. The null hypothesis here is that students are equally likely to answer the item correct regardless of the form: Master Core or scrambled pattern B. The alternative hypothesis is that students are not equally likely to answer the item correct in the Master Core and form B.

Table 9–7. Example of a Contingency Table for Grade 3 Mathematics for Item 1

		Scrambled pattern	
		Master Core	B
Item score	1	1057	1534
	0	17991	11114

Table 9–8 shows the item p -value difference from the Master Core (Master Core mean minus scrambled pattern mean). The cells where statistically significant differences are observed have been highlighted. As in the t-test for form level, the Type I error rate is controlled by Bonferroni correction to keep family-wise alpha equal to 0.01. That is, for grade 3 mathematics, each comparison has alpha equal to 0.01 divided by 60 items and divided by 7 scrambled patterns.

The results are similar for all grades and subjects. At the item level, many comparisons between the Master Core and the scrambled patterns are statistically significant; however, overall differences are very close to zero. There are item-level differences and some are statistically significant, but overall, the effects of item-level differences cancel out at the form level. At most, the average item p -value differences at form level are 0.01, which is observed with grades 3, 4, and 8 mathematics and grades 4, 5, 6, 7, and 8 reading, where only one form had 0.01 (or -0.01) difference from the Master Core.

Table 9–8. Item P-Value Differences From the Master Core

Mathematics Grade 3								
Session	Item	B	C	D	E	F	G	H
1	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	2	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
1	3	0.01	0.01	0.00	0.01	0.01	0.01	0.01
1	4	-0.02	-0.02	-0.02	-0.02	-0.01	-0.02	-0.02
1	5	0.01	0.00	-0.01	0.01	0.00	0.02	0.02
1	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	7	0.01	0.00	0.01	0.00	0.01	0.01	0.01
1	8	0.00	0.00	0.00	-0.01	0.00	0.00	0.00
1	9	-0.01	-0.01	0.01	-0.01	0.00	0.00	0.00
1	10	0.00	0.00	0.01	-0.01	0.00	0.00	0.01
1	11	0.01	0.00	0.00	0.01	0.01	0.01	0.02
1	12	0.01	0.01	0.01	0.02	0.02	0.03	0.01
1	13	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1	14	0.00	0.00	0.00	0.01	0.01	0.02	0.00
1	15	0.00	0.00	0.00	0.01	0.00	0.01	0.01
1	16	0.00	-0.01	0.00	-0.01	-0.01	0.00	0.00
1	17	0.00	0.00	0.00	-0.01	0.00	0.01	0.00
1	18	-0.01	0.01	0.00	0.00	0.01	0.01	0.00
1	19	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00
1	20	-0.02	-0.01	-0.01	-0.01	-0.01	0.00	-0.02
1	21	0.00	0.01	0.00	0.01	0.00	0.00	0.00
1	22	-0.01	0.00	0.00	0.00	0.00	0.01	0.00
1	23	-0.02	-0.02	0.00	-0.01	0.00	0.01	-0.02
1	24	0.00	0.00	0.00	0.00	0.00	0.00	0.01
3	25	0.00	0.00	0.01	0.01	0.01	0.01	0.01
3	26	-0.01	-0.03	-0.01	-0.02	-0.02	-0.02	-0.01
3	27	0.02	0.02	0.03	0.02	0.02	0.03	0.03
3	28	-0.01	0.00	0.00	-0.02	0.00	0.00	0.00
3	29	-0.02	-0.01	0.00	0.01	0.00	-0.01	0.00
3	30	0.01	0.01	0.00	0.01	0.00	0.01	0.01

Mathematics Grade 3 continued								
Session	Item	B	C	D	E	F	G	H
3	31	0.01	0.01	0.01	0.00	0.01	0.01	0.01
3	32	0.01	0.01	0.01	0.01	0.00	0.01	0.01
3	33	-0.01	-0.03	-0.03	-0.01	-0.03	-0.01	-0.02
3	34	-0.01	-0.01	0.01	-0.01	0.00	0.00	0.00
3	35	0.00	0.01	-0.01	0.00	0.00	0.00	0.00
3	36	0.01	0.00	0.00	0.01	0.01	0.01	0.01
5	37	0.00	0.01	0.01	0.00	0.00	0.01	0.01
5	38	0.01	0.01	0.00	0.00	0.01	0.01	0.01
5	39	0.00	-0.01	0.00	0.00	0.01	0.01	0.00
5	40	-0.01	0.00	-0.01	0.00	-0.01	-0.01	0.02
5	41	0.00	-0.01	0.00	0.00	0.00	0.00	-0.01
5	42	0.00	-0.01	-0.01	0.01	0.01	0.01	0.00
5	43	0.02	0.02	0.01	0.01	0.01	0.02	0.03
5	44	0.00	0.00	0.01	0.00	0.00	0.01	0.00
5	45	0.01	0.00	-0.01	0.00	0.01	0.00	0.02
5	46	0.01	0.00	-0.01	0.00	0.00	0.00	0.00
5	47	0.00	0.01	-0.01	0.00	0.00	0.01	0.00
5	48	0.01	0.01	0.01	0.01	0.01	0.02	0.01
5	49	0.00	0.01	0.01	0.01	-0.01	0.02	0.00
5	50	0.01	0.01	0.00	0.01	0.00	0.00	0.01
5	51	0.00	0.00	0.00	0.00	0.00	0.01	0.00
5	52	0.02	0.02	0.01	0.03	0.02	0.04	0.01
5	53	0.00	0.00	0.00	0.01	0.01	0.01	0.01
5	54	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
5	55	-0.01	-0.01	-0.01	0.00	0.00	0.00	-0.01
5	56	-0.02	-0.01	-0.02	-0.02	-0.02	0.00	-0.01
5	57	0.01	0.01	0.01	0.01	0.00	0.02	0.01
5	58	-0.01	-0.01	0.01	0.00	0.00	-0.01	0.01
5	59	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
5	60	0.00	-0.01	0.00	0.00	0.01	0.01	0.00
Mean		0.00	0.00	0.00	0.00	0.00	0.01	0.00

Note: Final data was used.

Mathematics Grade 4								
Session	Item	B	C	D	E	F	G	H
1	1	0.00	0.00	-0.01	0.00	0.00	0.00	0.00
1	2	0.01	0.02	0.02	0.02	0.03	0.02	0.00
1	3	0.00	0.00	0.01	-0.01	0.00	-0.01	0.01
1	4	0.00	-0.01	0.02	-0.02	-0.02	-0.02	0.04
1	5	0.01	0.00	0.00	0.01	0.00	0.00	0.00
1	6	0.01	0.01	0.00	0.01	0.00	0.01	0.00
1	7	0.01	0.00	0.00	0.01	0.00	-0.01	0.00
1	8	0.01	0.01	0.00	0.01	0.01	0.00	0.01
1	9	0.00	0.01	0.00	0.00	0.02	0.00	0.02
1	10	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1	11	0.01	0.00	0.00	-0.01	0.00	0.00	-0.02
1	12	0.00	-0.01	-0.02	-0.01	-0.01	0.01	-0.01
1	13	0.00	-0.03	-0.01	-0.03	-0.03	0.00	-0.01
1	14	0.02	0.02	0.01	0.01	0.01	0.01	0.00
1	15	0.00	0.01	-0.01	0.00	0.00	-0.01	0.00
1	16	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	0.00
1	17	0.02	0.02	0.03	0.02	0.01	0.01	0.02
1	18	0.01	0.01	0.00	-0.02	-0.01	-0.03	-0.01
1	19	0.00	0.00	-0.01	0.00	0.00	0.00	0.00
1	20	0.02	0.02	0.01	-0.01	0.01	-0.01	-0.01
1	21	0.01	0.00	0.00	0.00	0.00	0.00	-0.01
1	22	-0.01	-0.01	0.00	0.01	0.01	0.00	0.01
1	23	0.01	0.01	0.00	0.00	0.01	0.00	0.01
3	24	0.04	-0.07	-0.04	-0.11	-0.07	-0.10	-0.03
3	25	0.01	0.00	-0.01	0.00	0.00	0.00	-0.01
3	26	-0.02	0.00	0.02	0.01	-0.01	0.00	0.00
3	27	0.00	0.00	-0.01	-0.01	0.01	0.00	0.00
3	28	-0.01	0.02	0.01	0.01	0.01	0.00	0.01
3	29	0.01	-0.01	0.00	0.00	-0.02	0.00	0.00
3	30	0.01	0.02	0.02	-0.01	0.01	0.00	-0.01

Mathematics Grade 4 continued								
Session	Item	B	C	D	E	F	G	H
3	31	0.01	-0.02	0.01	-0.01	0.00	-0.02	0.00
3	32	0.00	0.01	-0.01	0.00	0.00	0.00	0.01
3	33	0.03	0.02	0.01	0.02	0.00	0.02	0.02
3	34	0.02	0.02	0.00	0.02	0.02	0.02	0.01
3	35	0.01	0.01	-0.01	0.01	0.00	0.01	0.01
3	36	0.00	0.01	0.01	0.00	0.01	0.01	0.00
5	37	-0.01	-0.02	-0.01	-0.01	-0.01	0.00	-0.01
5	38	0.00	0.00	0.00	0.00	0.00	0.00	0.01
5	39	-0.02	-0.01	-0.02	0.06	0.01	-0.03	-0.03
5	40	0.00	-0.02	-0.01	-0.01	-0.02	0.00	-0.02
5	41	0.02	0.01	0.01	0.02	0.01	0.00	0.01
5	42	0.00	0.01	0.01	0.00	-0.01	-0.01	0.01
5	43	0.00	0.02	-0.01	-0.02	0.00	-0.02	0.00
5	44	0.02	0.01	0.00	0.01	0.01	0.00	0.01
5	45	0.00	-0.01	-0.01	-0.01	-0.01	0.00	0.00
5	46	0.06	0.02	0.01	0.02	0.01	0.01	0.02
5	47	0.00	0.01	0.01	0.01	0.00	0.00	0.00
5	48	0.01	0.01	0.01	0.00	0.03	0.00	-0.01
5	49	-0.02	-0.01	-0.02	-0.02	-0.02	-0.03	-0.01
5	50	0.02	0.01	0.00	-0.01	0.00	0.00	-0.01
5	51	0.00	0.01	0.00	0.00	-0.01	0.01	0.00
5	52	0.01	0.01	0.00	0.02	0.00	0.00	0.01
5	53	0.02	0.02	0.01	0.02	0.01	0.01	0.01
5	54	0.00	0.01	0.00	0.01	0.00	0.00	0.02
5	55	-0.01	0.00	0.01	0.00	-0.01	-0.01	0.01
5	56	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00
5	57	0.01	0.01	0.01	0.01	0.01	-0.01	0.01
5	58	0.01	0.01	-0.02	0.00	0.00	0.01	0.01
5	59	0.01	0.00	0.00	0.00	0.00	-0.01	0.00
5	60	0.02	0.00	0.00	0.02	0.00	0.01	0.00
Mean		0.01	0.00	0.00	0.00	0.00	0.00	0.00

Note: Final data was used.

Mathematics Grade 5								
Session	Item	B	C	D	E	F	G	H
1	1	-0.03	-0.01	-0.03	-0.01	-0.01	-0.02	-0.03
1	2	-0.02	-0.01	0.01	-0.01	-0.01	-0.01	0.00
1	3	-0.01	0.00	-0.01	0.00	0.00	-0.01	-0.01
1	4	0.00	-0.02	0.03	-0.03	-0.03	0.01	0.02
1	5	0.01	0.00	0.01	0.02	0.01	0.01	0.01
1	6	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
1	7	0.00	0.01	0.00	0.01	-0.01	0.00	0.01
1	8	0.01	-0.01	0.01	0.01	0.01	0.00	0.00
1	9	0.00	0.00	0.00	0.01	0.01	0.02	0.00
1	10	0.00	0.01	0.01	0.01	0.00	0.01	0.01
1	11	0.01	-0.06	-0.03	0.00	-0.03	-0.03	-0.05
1	12	0.00	0.00	0.00	0.01	0.01	0.01	-0.01
1	13	0.00	-0.01	0.00	0.00	-0.01	0.00	-0.02
1	14	-0.01	-0.01	0.00	0.01	0.00	0.00	0.00
1	15	-0.03	0.00	-0.03	0.00	0.01	-0.03	0.01
1	16	0.01	0.00	0.00	0.01	0.00	0.01	0.00
1	17	0.00	0.00	0.01	0.00	0.01	0.01	0.00
1	18	0.00	0.00	0.01	0.00	-0.01	0.00	0.00
1	19	-0.01	-0.01	-0.01	0.01	0.00	0.01	-0.01
1	20	-0.01	0.00	-0.01	-0.01	-0.01	0.00	-0.01
1	21	0.01	0.00	-0.01	0.00	0.01	-0.01	0.01
1	22	0.01	0.00	0.00	0.00	0.01	0.00	-0.01
1	23	0.00	0.01	0.00	0.01	0.01	0.01	0.00
3	24	-0.01	-0.01	-0.01	0.00	0.00	-0.01	-0.01
3	25	0.00	0.00	0.00	0.01	0.01	0.00	0.00
3	26	-0.01	0.00	0.00	-0.02	0.00	-0.01	0.00
3	27	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01
3	28	-0.01	0.00	-0.01	0.00	0.00	-0.01	-0.01
3	29	0.01	0.00	0.01	0.00	0.01	0.01	0.00
3	30	0.00	0.00	0.00	-0.01	0.00	0.00	-0.01

Mathematics Grade 5 continued								
Session	Item	B	C	D	E	F	G	H
3	31	-0.01	-0.01	-0.01	-0.01	0.00	-0.01	0.00
3	32	0.00	-0.01	0.00	0.01	0.00	0.00	-0.02
3	33	-0.01	0.01	0.00	0.00	0.00	0.01	0.01
3	34	-0.01	-0.03	-0.03	-0.01	-0.01	-0.01	-0.03
3	35	0.01	0.00	0.00	0.00	0.00	0.01	0.01
3	36	0.01	0.01	-0.01	-0.01	0.00	0.01	0.00
5	37	0.00	0.01	0.00	-0.01	0.00	0.01	0.02
5	38	0.00	0.01	0.00	-0.01	-0.01	0.02	-0.01
5	39	-0.01	-0.01	-0.02	-0.01	-0.02	-0.01	-0.02
5	40	0.01	0.00	0.01	0.00	0.01	0.01	0.00
5	41	0.01	0.01	0.00	0.00	0.00	0.01	0.00
5	42	-0.01	-0.01	0.01	0.01	0.01	0.00	-0.01
5	43	-0.01	-0.01	-0.01	0.01	0.01	-0.01	0.00
5	44	0.00	0.00	-0.01	0.01	-0.01	0.02	0.00
5	45	0.02	0.01	0.01	0.02	0.01	0.02	0.00
5	46	0.00	0.00	-0.01	0.00	-0.01	-0.01	0.00
5	47	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01
5	48	0.00	0.00	0.00	0.00	0.02	0.01	0.01
5	49	0.00	0.00	0.00	0.00	0.01	0.00	0.00
5	50	-0.01	-0.01	0.00	-0.01	-0.01	0.00	-0.01
5	51	0.00	0.00	0.01	0.00	0.00	0.00	0.00
5	52	-0.01	-0.02	-0.02	0.01	-0.01	-0.01	-0.02
5	53	0.01	0.01	0.01	0.00	0.02	0.01	0.01
5	54	0.01	0.01	0.01	0.01	0.00	0.01	0.02
5	55	-0.02	-0.01	-0.03	-0.01	-0.01	-0.03	-0.02
5	56	0.00	-0.02	0.00	-0.01	0.00	0.00	0.00
5	57	-0.01	0.02	0.00	-0.01	0.00	0.03	0.02
5	58	0.00	0.00	-0.01	-0.01	0.01	0.00	0.00
5	59	0.02	0.01	-0.01	0.01	0.00	0.01	-0.01
5	60	0.00	0.00	0.00	0.00	0.01	0.01	0.01
Mean		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Final data was used.

Mathematics Grade 6								
Session	Item	B	C	D	E	F	G	H
1	1		0.01	-0.02	-0.01	-0.02	-0.01	-0.01
1	2		-0.01	-0.01	0.02	0.00	-0.01	0.00
1	3		0.02	-0.02	-0.01	-0.01	0.02	-0.01
1	4		-0.02	-0.02	-0.01	-0.02	-0.03	-0.01
1	5		0.00	0.00	-0.01	0.00	-0.01	-0.01
1	6		-0.01	-0.01	-0.01	-0.01	-0.01	0.01
1	7		-0.01	0.00	0.01	-0.01	0.01	0.00
1	8		0.00	0.01	0.00	0.00	0.01	0.00
1	9		0.00	0.01	0.01	0.01	0.01	0.00
1	10		0.02	0.00	-0.02	0.02	0.03	-0.01
1	11		0.00	0.00	0.00	0.00	0.01	0.01
1	12		0.00	-0.02	-0.01	-0.01	0.01	-0.03
1	13		0.00	-0.01	-0.01	0.00	0.00	-0.01
1	14		0.00	0.00	0.00	0.00	0.00	-0.01
1	15		0.00	0.01	0.00	0.01	0.00	0.00
1	16		0.00	0.00	-0.01	-0.01	0.00	-0.01
1	17		-0.01	-0.01	-0.01	-0.02	-0.01	-0.01
1	18		0.01	0.01	0.00	0.01	0.00	0.01
1	19		-0.01	0.00	0.00	-0.02	0.01	0.00
1	20		-0.01	0.00	0.00	0.00	-0.01	0.00
1	21		-0.02	0.01	0.01	-0.01	0.00	-0.02
1	22		0.00	0.00	0.00	0.00	-0.01	-0.01
1	23		0.02	0.01	0.02	0.01	0.01	0.02
3	24		-0.02	-0.01	-0.02	-0.02	-0.02	-0.02
3	25		-0.02	-0.01	-0.02	-0.02	-0.02	-0.02
3	26		-0.02	-0.01	0.00	-0.01	0.00	0.00
3	27		0.00	-0.01	0.00	0.00	0.00	0.00
3	28		0.01	0.03	0.02	0.02	0.03	0.02
3	29		0.01	0.00	0.01	0.01	0.01	0.01
3	30		0.01	0.01	0.01	0.00	0.01	-0.02

Mathematics Grade 6 continued								
Session	Item	B	C	D	E	F	G	H
3	31		-0.02	-0.01	-0.01	-0.01	-0.01	-0.02
3	32		0.00	0.00	0.00	0.00	-0.01	0.00
3	33		0.00	-0.02	-0.03	-0.02	0.00	-0.02
3	34		-0.01	0.01	0.00	0.01	-0.01	0.01
3	35		0.00	-0.02	0.00	-0.01	0.01	-0.01
3	36		-0.03	-0.02	-0.02	-0.01	-0.03	-0.01
5	37		0.02	0.00	0.01	0.01	0.01	0.02
5	38		-0.01	0.00	-0.01	-0.01	0.00	-0.01
5	39		-0.01	0.01	0.01	-0.01	-0.01	-0.01
5	40		0.00	0.00	0.00	0.00	0.01	0.01
5	41		0.01	-0.02	0.01	0.02	-0.01	0.00
5	42		0.01	0.02	0.00	-0.01	0.01	0.03
5	43		-0.02	-0.05	-0.01	-0.02	-0.05	-0.03
5	44		0.00	-0.01	-0.02	-0.02	-0.01	0.01
5	45		-0.01	0.00	-0.02	0.00	-0.02	0.00
5	46		0.01	-0.01	0.00	0.00	0.01	0.00
5	47		-0.01	-0.01	0.00	-0.02	-0.02	0.01
5	48		0.00	0.00	-0.01	0.00	0.01	0.00
5	49		0.02	0.00	0.02	0.00	0.01	0.00
5	50		-0.02	-0.02	-0.02	-0.01	-0.01	-0.01
5	51		0.00	0.00	-0.01	0.00	0.01	-0.01
5	52		0.00	0.00	0.01	0.01	0.01	0.00
5	53		0.00	0.00	0.00	0.00	0.02	0.00
5	54		-0.02	-0.03	-0.02	-0.02	-0.01	0.00
5	55		-0.02	-0.01	0.00	0.02	0.02	-0.02
5	56		0.01	-0.01	-0.04	-0.03	-0.03	0.01
5	57		0.00	0.00	0.02	0.02	0.04	0.01
5	58		-0.01	0.02	0.00	0.01	0.00	0.02
5	59		0.02	0.02	0.01	0.00	0.01	0.01
5	60		0.00	-0.01	0.00	0.00	0.02	0.00
Mean			0.00	0.00	0.00	0.00	0.00	0.00

Note: Final data was used.

Mathematics Grade 7								
Session	Item	B	C	D	E	F	G	H
1	1		-0.01	0.02	0.00	0.00	0.01	0.00
1	2		-0.01	-0.01	0.00	-0.02	0.00	-0.01
1	3		-0.02	0.00	-0.01	-0.01	-0.02	-0.01
1	4		0.03	0.03	0.01	0.03	0.02	0.02
1	5		0.01	-0.02	0.01	-0.02	-0.01	0.01
1	6		0.00	-0.01	-0.01	0.00	-0.01	0.01
1	7		0.02	0.01	-0.03	0.01	0.00	0.01
1	8		-0.02	-0.03	0.00	-0.01	0.00	0.00
1	9		0.00	-0.01	-0.02	0.00	-0.02	-0.01
1	10		0.00	0.00	0.01	0.00	0.00	0.01
1	11		-0.02	-0.01	-0.02	-0.02	-0.02	-0.01
1	12		0.00	-0.01	0.00	0.00	0.01	-0.01
1	13		0.00	0.00	-0.01	-0.01	-0.01	0.01
1	14		-0.02	0.00	-0.01	0.00	0.00	0.00
1	15		0.01	0.00	0.00	0.00	0.00	0.01
1	16		0.00	-0.01	0.00	0.01	0.00	0.00
1	17		0.00	0.01	0.00	0.01	0.00	0.00
1	18		-0.01	-0.01	-0.01	-0.01	-0.01	0.00
1	19		0.01	0.02	0.00	0.02	0.02	0.01
1	20		0.00	0.00	0.00	0.00	0.00	0.00
1	21		0.00	0.01	0.01	0.00	0.00	0.00
1	22		0.00	0.00	0.01	0.01	0.00	0.01
1	23		0.00	-0.01	0.00	0.00	0.01	0.02
3	24		0.02	0.01	0.00	0.01	0.02	0.02
3	25		0.00	-0.01	0.00	0.00	-0.02	-0.01
3	26		-0.02	-0.02	-0.01	-0.01	-0.03	-0.01
3	27		0.01	-0.01	0.00	0.00	-0.01	0.01
3	28		-0.01	0.01	-0.01	-0.01	0.01	0.00
3	29		0.01	-0.03	-0.01	-0.01	-0.03	0.00
3	30		0.00	0.01	0.01	0.00	0.01	0.02

Mathematics Grade 7 continued								
Session	Item	B	C	D	E	F	G	H
3	31		-0.07	0.00	-0.07	0.00	-0.07	-0.07
3	32		0.01	0.00	0.00	0.01	0.01	0.00
3	33		0.00	0.00	0.00	0.01	0.00	0.01
3	34		-0.01	-0.01	0.00	0.00	-0.02	-0.01
3	35		-0.01	0.00	-0.01	0.01	-0.01	-0.03
3	36		-0.01	0.02	0.01	0.02	0.00	0.00
5	37		0.01	0.00	0.02	0.00	0.00	0.02
5	38		0.00	0.01	0.02	0.00	0.01	0.01
5	39		0.00	0.00	-0.01	0.00	0.02	-0.01
5	40		0.02	-0.01	-0.01	0.02	0.02	0.00
5	41		0.00	-0.01	0.01	0.00	-0.01	-0.01
5	42		0.01	0.01	0.01	0.01	0.00	0.01
5	43		0.02	-0.01	-0.01	0.05	0.02	0.02
5	44		0.00	-0.02	-0.02	-0.01	-0.01	0.00
5	45		-0.01	0.01	-0.02	0.00	0.02	0.06
5	46		0.01	-0.01	0.00	0.01	0.00	0.01
5	47		0.02	-0.03	0.02	0.01	-0.02	0.02
5	48		0.02	0.01	0.02	0.00	0.01	0.04
5	49		0.00	0.02	0.02	0.03	0.03	0.00
5	50		0.00	0.01	0.00	0.00	0.00	0.01
5	51		-0.04	-0.03	-0.05	-0.04	-0.03	-0.02
5	52		0.03	-0.01	0.00	-0.01	0.04	0.02
5	53		-0.01	0.02	0.01	0.03	-0.01	0.02
5	54		0.00	0.02	0.01	-0.02	0.00	-0.01
5	55		0.00	0.01	-0.01	0.01	0.04	-0.01
5	56		0.01	-0.01	-0.01	0.00	0.00	-0.02
5	57		-0.01	-0.01	0.00	0.00	0.00	0.00
5	58		-0.01	-0.02	0.01	-0.01	0.00	0.03
5	59		0.01	0.04	0.02	0.02	0.00	0.01
5	60		-0.01	0.00	0.02	0.01	0.01	0.02
Mean			0.00	0.00	0.00	0.00	0.00	0.00

Note: Final data was used.

Mathematics Grade 8								
Session	Item	B	C	D	E	F	G	H
1	1		-0.01	0.01	0.01	0.00	0.00	-0.01
1	2		-0.01	0.00	-0.01	-0.01	-0.01	0.00
1	3		-0.03	0.00	-0.02	-0.04	0.00	0.00
1	4		-0.04	-0.01	-0.01	0.00	-0.01	-0.03
1	5		-0.02	-0.01	-0.01	-0.02	0.00	0.00
1	6		0.00	0.01	0.01	0.00	0.01	0.01
1	7		0.01	0.02	0.02	0.00	0.01	0.01
1	8		0.00	-0.02	-0.01	0.00	0.00	0.00
1	9		0.00	0.00	-0.01	0.01	0.00	0.00
1	10		-0.04	-0.01	-0.03	-0.03	-0.01	0.00
1	11		0.00	0.00	0.00	0.00	0.00	0.00
1	12		0.00	0.00	0.00	0.00	0.00	0.01
1	13		0.01	0.00	0.00	0.00	0.00	0.01
1	14		0.00	0.01	-0.01	0.00	0.00	0.00
1	15		0.00	-0.01	-0.01	-0.01	0.00	0.00
1	16		0.00	0.00	0.00	0.00	0.00	0.01
1	17		0.01	0.02	0.01	0.01	0.01	0.02
1	18		-0.01	0.00	-0.01	-0.01	-0.01	-0.01
1	19		0.00	0.01	0.00	0.00	-0.01	0.00
1	20		-0.02	0.00	-0.01	0.00	-0.02	0.00
1	21		-0.02	-0.01	0.00	-0.01	-0.01	-0.01
1	22		0.01	0.02	0.01	0.00	0.01	0.00
1	23		-0.01	0.01	0.04	0.00	-0.01	0.03
3	24		-0.01	0.03	-0.02	0.02	0.00	-0.01
3	25		0.00	0.01	0.02	0.01	0.00	0.03
3	26		-0.01	0.02	0.01	0.02	-0.01	0.02
3	27		0.00	0.00	-0.01	0.00	0.00	0.00
3	28		-0.01	-0.01	-0.02	-0.01	-0.01	-0.01
3	29		0.01	0.00	0.00	0.00	0.02	0.00
3	30		0.00	0.00	0.01	-0.01	0.00	0.01

Mathematics Grade 8 continued								
Session	Item	B	C	D	E	F	G	H
3	31		-0.01	0.00	0.00	0.00	0.00	0.00
3	32		0.02	0.03	0.01	0.01	0.01	0.02
3	33		0.00	0.01	0.01	0.00	0.01	0.01
3	34		0.01	0.00	0.01	0.00	0.00	0.02
3	35		0.00	0.00	0.00	0.01	-0.01	0.04
3	36		-0.01	0.01	0.00	0.00	0.03	0.01
5	37		0.01	0.00	0.00	0.00	0.00	0.00
5	38		0.00	-0.01	0.00	-0.01	0.00	0.00
5	39		-0.01	0.00	-0.02	-0.03	-0.02	0.00
5	40		-0.03	-0.01	-0.01	-0.01	0.01	0.01
5	41		-0.01	-0.01	0.00	-0.02	0.00	0.00
5	42		-0.01	0.00	0.00	0.02	0.01	0.01
5	43		0.01	-0.02	0.00	0.00	0.00	0.00
5	44		0.00	0.00	0.01	0.01	0.01	0.01
5	45		0.00	0.01	0.01	-0.01	0.00	0.00
5	46		-0.02	-0.02	-0.01	-0.04	-0.02	-0.02
5	47		0.00	0.01	0.00	0.00	-0.01	0.00
5	48		-0.02	-0.03	0.01	-0.01	0.00	0.01
5	49		0.00	0.00	0.01	0.02	0.01	0.02
5	50		0.02	0.02	0.00	0.01	0.01	-0.01
5	51		0.00	0.01	0.01	0.00	0.00	0.01
5	52		-0.01	-0.01	0.00	0.00	0.01	0.01
5	53		-0.01	-0.01	0.00	-0.01	-0.01	0.00
5	54		0.00	-0.04	-0.02	-0.01	-0.02	-0.01
5	55		0.03	0.00	0.02	0.01	0.05	0.05
5	56		-0.02	-0.01	-0.01	-0.02	-0.01	0.00
5	57		-0.01	0.03	-0.02	-0.01	-0.01	-0.01
5	58		0.01	0.02	0.01	0.03	0.02	0.03
5	59		0.00	0.01	0.00	0.00	0.01	0.01
5	60		0.00	0.01	0.01	0.01	0.01	0.01
Mean			0.00	0.00	0.00	0.00	0.00	0.01

Note: Final data was used.

Reading Grade 3									
Session	Passage	Item	B	C	D	E	F	G	H
2	1	1	0.02	0.01	0.02	0.00	0.02	0.02	0.03
2	1	2	-0.03	-0.02	-0.02	0.00	-0.02	-0.02	-0.02
2	1	3	-0.01	-0.01	0.00	0.00	0.00	-0.01	0.01
2	1	4	0.00	0.00	0.01	0.00	0.00	0.01	0.01
2	1	5	0.01	-0.02	0.01	0.00	0.00	-0.03	0.02
2	1	6	0.00	0.01	0.01	0.00	0.01	0.02	0.01
2	1	7	0.03	0.06	0.03	-0.01	0.04	0.07	0.04
2	1	8	-0.01	-0.02	-0.02	0.00	0.00	-0.02	-0.01
2	2	9	-0.01	-0.06	-0.05	-0.01	-0.07	-0.04	0.00
2	2	10	0.01	-0.01	0.00	0.01	-0.02	0.00	0.01
2	2	11	-0.01	0.01	0.01	-0.01	0.01	0.01	0.01
2	2	12	-0.01	0.02	0.02	0.00	0.02	0.03	0.00
2	2	13	0.01	0.00	0.00	0.00	0.00	0.00	0.01
2	2	14	0.01	-0.01	-0.01	0.01	-0.02	0.00	0.01
2	2	15	0.00	0.02	0.01	-0.01	0.02	0.01	0.01
2	2	16	0.00	0.00	0.00	0.00	0.00	-0.01	0.01
2	2	17	0.01	0.01	0.04	0.01	0.00	0.04	0.01
2	3	18	-0.01	-0.01	-0.01	-0.02	-0.01	0.01	-0.01
2	3	19	0.01	-0.02	-0.01	-0.03	-0.01	0.00	0.02
2	3	20	-0.02	0.00	0.01	-0.01	0.01	0.01	-0.01
2	3	21	0.01	0.00	0.01	0.00	0.00	0.00	0.00
2	3	22	0.00	-0.02	0.01	-0.04	0.00	0.01	0.00
2	3	23	0.00	0.01	0.00	0.03	0.00	0.01	0.00
6	4	24	-0.03	-0.05	-0.06	-0.06	0.00	-0.03	-0.05
6	4	25	0.00	-0.01	-0.02	-0.02	0.00	0.01	0.00
6	4	26	0.01	0.00	0.02	0.00	0.01	0.02	0.00
6	4	27	0.00	-0.02	-0.02	-0.02	0.00	0.00	-0.01
6	4	28	0.00	0.03	0.02	0.03	0.00	0.01	0.02
6	4	29	-0.01	0.00	0.01	0.01	0.00	-0.01	0.00
6	4	30	0.01	0.01	-0.01	-0.01	0.01	0.01	0.01
6	4	31	0.02	0.01	0.03	0.01	0.02	0.03	0.02
6	4	32	-0.04	0.00	-0.10	-0.11	0.00	-0.03	0.00
6	5	33	-0.01	0.00	0.00	0.00	-0.01	0.00	-0.01
6	5	34	-0.01	-0.01	0.00	0.00	-0.01	0.01	0.01
6	5	35	0.00	0.01	0.01	0.00	-0.01	0.01	0.01
6	5	36	0.00	-0.01	0.00	0.00	0.00	0.01	0.00
6	5	37	-0.02	0.01	0.00	0.01	-0.02	0.00	0.00
6	5	38	0.01	0.00	0.01	0.00	0.00	0.01	0.01
6	5	39	-0.02	0.00	-0.01	0.00	-0.02	-0.02	-0.01
6	5	40	0.01	0.00	0.03	0.00	0.01	0.00	0.03
Mean			0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Final data was used.

Reading Grade 4									
Session	Passage	Item	B	C	D	E	F	G	H
2	1	1	-0.03	0.00	-0.07	0.00	-0.03	-0.01	-0.08
2	1	2	0.00	-0.01	-0.02	0.00	0.00	-0.01	-0.02
2	1	3	0.00	0.02	0.02	0.00	-0.01	0.01	0.01
2	1	4	0.02	-0.02	-0.01	0.00	0.02	-0.04	0.00
2	1	5	-0.01	0.00	0.02	0.01	-0.01	0.00	0.01
2	1	6	-0.02	-0.03	-0.02	0.01	-0.02	-0.02	-0.02
2	1	7	0.02	0.00	0.03	0.00	0.01	0.00	0.02
2	1	8	0.00	-0.01	0.01	0.00	0.00	-0.01	0.00
2	1	9	0.04	0.04	0.01	0.00	0.04	0.04	0.02
2	2	10	0.03	0.00	0.00	0.02	0.01	0.01	0.00
2	2	11	0.02	-0.01	0.00	0.02	-0.01	-0.01	0.00
2	2	12	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
2	2	13	0.01	0.01	0.03	0.00	-0.01	0.02	0.00
2	2	14	0.00	0.01	0.02	0.00	0.01	0.01	0.01
2	2	15	0.01	-0.01	0.00	0.00	-0.01	0.00	0.00
2	2	16	0.01	0.00	0.02	0.01	-0.01	0.01	0.00
2	3	17	0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
2	3	18	0.02	0.01	0.00	0.01	0.00	-0.01	0.02
2	3	19	0.01	0.04	0.03	0.04	0.03	-0.01	0.01
2	3	20	0.00	-0.02	0.00	-0.02	0.00	0.00	-0.01
2	3	21	0.00	0.01	0.00	0.00	0.01	0.00	0.00
2	3	22	0.00	-0.01	-0.02	-0.02	-0.01	0.00	-0.01
2	3	23	0.00	0.02	0.02	0.02	0.02	0.00	-0.01
2	3	24	0.00	0.01	0.01	0.00	0.00	0.01	-0.01
6	4	25 ^K	-0.03	-0.05	0.00	0.00	0.00	-0.03	-0.05
6	4	26	-0.01	-0.01	0.00	0.00	0.00	-0.02	0.00
6	4	27	-0.02	-0.01	-0.01	-0.01	0.00	-0.02	-0.01
6	4	28	0.01	-0.01	0.01	0.02	0.00	0.00	-0.01
6	4	29	-0.02	-0.04	0.00	-0.01	0.00	-0.03	-0.04
6	4	30	-0.02	0.01	0.00	0.01	0.01	-0.03	0.01
6	4	31	0.01	0.03	0.01	0.00	0.00	-0.01	0.03
6	4	32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	5	33	0.00	0.01	-0.03	0.00	0.00	0.01	-0.03
6	5	34	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	-0.01
6	5	35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	5	36	0.01	0.04	-0.01	0.00	0.00	0.04	0.00
6	5	37	-0.05	-0.07	-0.02	0.00	-0.05	-0.06	-0.02
6	5	38	-0.02	-0.04	0.02	0.01	-0.01	-0.05	0.02
6	5	39	0.01	0.01	0.01	0.00	0.01	0.00	0.01
6	5	40	0.00	-0.05	0.01	0.00	-0.01	-0.06	0.00
Mean			0.00	0.00	0.00	0.00	0.00	-0.01	0.00

Note: Final data was used.

Chapter Nine: Description of Data Sources and Sampling Adequacy

Reading Grade 5									
Session	Passage	Item	B	C	D	E	F	G	H
2	1	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1	3	-0.01	-0.01	0.01	0.00	-0.01	0.00	0.01
2	1	4	0.02	0.02	0.02	0.00	0.02	0.03	0.02
2	1	5	0.01	0.00	0.02	0.01	0.01	0.01	0.00
2	1	6	0.00	0.00	0.00	0.01	0.00	0.00	0.00
2	1	7	0.00	0.00	0.00	0.01	0.00	0.01	0.00
2	2	8	0.00	-0.01	-0.02	0.00	-0.01	-0.02	0.00
2	2	9	-0.02	-0.01	-0.04	0.00	-0.02	-0.03	0.00
2	2	10	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00
2	2	11	0.00	0.00	0.00	0.01	0.00	0.00	0.00
2	2	12	-0.01	-0.01	0.00	0.00	-0.01	0.01	0.00
2	2	13	0.02	0.01	0.00	0.02	0.01	0.00	0.00
2	2	14	0.00	0.01	0.03	0.00	0.01	0.03	0.00
2	2	15	0.00	0.00	0.01	0.01	0.00	0.01	0.00
2	2	16	0.01	0.03	0.00	0.02	0.02	0.00	0.00
2	3	17	0.01	0.00	0.01	0.00	0.00	0.00	0.01
2	3	18	-0.02	-0.01	-0.02	-0.02	-0.01	0.00	-0.02
2	3	19	0.00	-0.02	0.01	-0.01	0.01	-0.01	0.01
2	3	20	-0.01	0.01	-0.01	0.02	-0.01	0.00	0.00
2	3	21	-0.01	0.02	0.06	0.03	0.05	0.00	-0.02
2	3	22	0.02	0.01	-0.01	0.02	0.00	0.00	0.02
2	3	23	-0.02	0.00	-0.01	0.01	-0.01	0.00	-0.02
2	3	24	0.00	0.02	0.02	0.03	0.01	0.00	0.00
6	4	25	0.00	-0.03	-0.03	-0.02	0.00	0.01	-0.02
6	4	26	0.03	-0.03	0.00	-0.01	0.00	0.03	-0.01
6	4	27	0.00	-0.03	-0.02	-0.01	0.00	0.01	-0.02
6	4	28	0.02	0.01	-0.02	-0.01	0.00	0.02	0.00
6	4	29	0.01	0.00	0.02	0.03	0.00	0.01	0.00
6	4	30	0.00	-0.01	0.04	0.03	0.00	0.04	0.02
6	4	31	-0.01	0.01	-0.01	-0.01	0.00	-0.01	0.01
6	4	32	0.00	0.01	0.01	0.02	0.00	0.01	0.03
6	5	33	-0.01	0.00	-0.03	0.00	-0.01	0.01	-0.03
6	5	34	-0.02	0.00	0.03	0.02	-0.01	0.02	0.04
6	5	35	-0.01	0.01	-0.01	0.00	-0.02	0.02	-0.02
6	5	36	-0.03	0.00	0.02	0.00	-0.02	0.01	0.01
6	5	37	-0.01	0.00	0.02	-0.01	-0.01	0.00	0.04
6	5	38	-0.01	0.01	-0.01	0.01	-0.01	0.02	0.00
6	5	39	-0.02	0.00	-0.01	0.00	-0.02	0.01	-0.02
6	5	40	0.00	0.00	0.01	0.01	0.00	0.01	0.01
		Mean	0.00	0.00	0.00	0.00	0.00	0.01	0.00

Note: Final data was used.

Reading Grade 6									
Session	Passage	Item	B	C	D	E	F	G	H
2	1	1		-0.03	0.00	0.00	0.00	-0.03	0.00
2	1	2		0.02	0.01	0.01	0.02	0.02	0.00
2	1	3		0.05	0.03	0.00	0.06	0.05	0.03
2	1	4		0.00	-0.01	0.00	-0.02	-0.01	-0.01
2	1	5		-0.02	-0.02	0.00	-0.04	-0.01	-0.03
2	1	6		-0.01	0.01	0.00	0.00	-0.01	0.01
2	1	7		-0.01	-0.01	0.00	0.01	0.00	-0.01
2	1	8		0.00	0.02	0.01	0.01	0.00	0.02
2	2	9		-0.03	0.00	-0.03	-0.03	0.00	0.00
2	2	10		-0.01	0.00	0.02	0.00	-0.01	0.00
2	2	11		0.00	0.03	0.01	0.00	0.02	0.00
2	2	12		-0.02	0.00	-0.02	-0.02	0.00	0.00
2	2	13		-0.01	-0.01	0.00	0.00	0.00	0.00
2	2	14		0.01	0.01	-0.01	0.01	0.01	0.01
2	2	15		0.01	0.02	0.01	0.02	0.02	0.01
2	3	16		-0.08	-0.02	-0.08	-0.02	0.00	-0.01
2	3	17		0.00	0.03	0.00	0.03	0.00	0.03
2	3	18		-0.06	-0.03	-0.06	-0.03	0.00	-0.03
2	3	19		0.01	-0.04	0.02	-0.04	0.00	0.01
2	3	20		0.01	-0.01	0.00	-0.01	0.00	-0.01
2	3	21		0.01	0.01	0.00	0.02	-0.01	0.01
6	4	22		0.01	-0.01	-0.01	0.00	-0.01	0.01
6	4	23		-0.01	-0.01	-0.01	0.00	-0.02	0.00
6	4	24		0.00	0.01	0.01	0.00	0.02	0.00
6	4	25		0.00	-0.06	-0.07	0.00	-0.01	-0.01
6	4	26		-0.02	0.00	-0.01	0.01	-0.01	-0.01
6	4	27		0.00	0.00	-0.01	0.00	0.00	0.00
6	4	28		0.00	0.00	0.00	0.01	0.01	0.01
6	5	29		0.02	0.01	-0.01	0.02	0.02	0.03
6	5	30		-0.02	0.00	0.00	0.01	-0.02	0.01
6	5	31		0.02	0.00	0.00	-0.01	0.00	-0.01
6	5	32		-0.01	-0.02	0.00	0.01	-0.01	-0.02
6	5	33		0.02	0.00	0.00	0.00	0.03	0.01
6	5	34		0.00	0.00	-0.01	0.00	-0.02	-0.01
6	6	35		-0.01	-0.02	0.00	0.00	-0.02	0.00
6	6	36		0.00	0.01	0.00	-0.01	0.01	-0.01
6	6	37		-0.02	-0.01	0.01	-0.02	-0.02	0.00
6	6	38		0.02	0.01	0.00	0.03	0.02	0.00
6	6	39		-0.01	0.00	-0.02	0.00	0.00	0.01
6	6	40		0.01	0.01	-0.03	0.01	0.02	0.01
Mean				0.00	0.00	-0.01	0.00	0.00	0.00

Note: Final data was used.

Reading Grade 7									
Session	Passage	Item	B	C	D	E	F	G	H
2	1	1		-0.03	-0.03	0.00	0.00	-0.03	-0.03
2	1	2		-0.02	-0.01	0.00	0.00	-0.03	-0.02
2	1	3		-0.03	-0.01	0.00	-0.02	-0.04	-0.01
2	1	4		-0.03	-0.04	-0.01	-0.01	-0.03	-0.04
2	1	5		0.02	0.02	-0.01	0.00	0.03	0.02
2	1	6		0.00	0.00	0.00	0.00	0.00	0.01
2	2	7		-0.03	0.01	-0.03	-0.02	0.00	0.00
2	2	8		0.00	-0.01	0.00	0.00	-0.01	0.00
2	2	9		0.00	-0.01	0.00	0.00	-0.01	0.01
2	2	10		-0.01	0.00	-0.02	-0.01	-0.01	0.00
2	2	11		0.00	-0.01	-0.01	0.00	-0.01	0.00
2	2	12		0.03	0.04	0.01	0.03	0.03	0.01
2	2	13		-0.01	0.00	0.00	-0.01	0.00	0.00
2	2	14		-0.01	0.02	0.03	-0.01	0.03	0.00
2	3	15		0.00	-0.01	0.01	0.00	0.00	-0.01
2	3	16		-0.03	-0.01	-0.02	-0.01	0.00	0.00
2	3	17		-0.04	-0.01	-0.04	-0.01	0.00	0.01
2	3	18		0.00	0.02	0.01	0.02	0.00	0.00
2	3	19		0.02	0.02	0.02	0.03	0.00	0.01
2	3	20		0.04	0.02	0.04	0.02	0.00	0.01
6	4	21		-0.03	0.00	0.00	0.00	-0.03	-0.02
6	4	22		-0.03	-0.01	0.00	0.00	0.00	-0.01
6	4	23		-0.02	0.01	0.01	0.00	0.01	-0.01
6	4	24		0.00	0.00	0.00	0.00	0.00	0.00
6	4	25		0.02	0.00	0.00	0.00	-0.01	0.03
6	4	26		-0.02	0.01	0.01	0.01	0.02	0.00
6	5	27		-0.02	-0.03	0.00	-0.04	-0.03	-0.03
6	5	28		-0.01	-0.01	0.00	-0.01	-0.02	-0.01
6	5	29		0.01	0.00	0.00	0.02	0.00	0.01
6	5	30		-0.01	0.00	0.00	-0.01	-0.01	0.00
6	5	31		-0.02	-0.03	0.00	-0.02	-0.02	-0.04
6	5	32		0.00	-0.01	0.00	0.03	0.00	-0.01
6	6	33		-0.04	0.00	-0.02	-0.04	0.02	0.01
6	6	34		0.00	-0.01	-0.01	0.01	-0.01	-0.01
6	6	35		-0.01	0.00	-0.01	-0.01	0.01	0.01
6	6	36		0.03	0.00	0.03	0.02	0.01	-0.01
6	6	37		0.00	0.00	0.00	0.00	-0.01	0.00
6	6	38		0.02	0.00	0.06	0.01	-0.01	0.00
6	6	39		-0.06	-0.02	0.03	-0.06	-0.02	0.01
6	6	40		0.02	0.00	0.02	0.01	-0.02	-0.01
Mean				-0.01	0.00	0.00	0.00	0.00	0.00

Note: Final data was used.

Reading Grade 8									
Session	Passage	Item	B	C	D	E	F	G	H
2	1	1		-0.02	-0.01	0.00	0.00	-0.02	-0.01
2	1	2		0.00	-0.01	0.00	-0.02	0.00	0.00
2	1	3		-0.03	0.01	0.00	0.00	-0.02	0.01
2	1	4		0.04	0.05	0.01	0.04	0.04	0.05
2	1	5		-0.04	0.02	0.01	0.03	-0.04	0.02
2	1	6		-0.01	0.02	0.01	0.00	-0.01	0.02
2	1	7		0.00	0.01	0.00	0.01	0.01	0.01
2	1	8		0.01	0.12	-0.01	0.10	0.00	0.13
2	2	9		-0.01	0.00	0.00	0.00	0.00	0.00
2	2	10		-0.01	0.01	0.01	0.00	0.02	0.00
2	2	11		0.00	-0.03	-0.03	0.00	-0.03	0.00
2	2	12		0.00	0.01	0.01	0.00	0.01	0.01
2	2	13		-0.02	0.01	-0.01	-0.01	0.01	0.01
2	3	14		-0.05	-0.05	-0.05	-0.05	0.01	-0.04
2	3	15		-0.03	-0.01	-0.03	-0.01	0.00	-0.01
2	3	16		-0.01	-0.04	-0.01	-0.03	0.00	0.00
2	3	17		-0.02	-0.03	-0.01	-0.02	0.00	0.03
2	3	18		0.01	0.01	0.02	0.01	0.00	0.01
2	3	19		-0.01	0.00	-0.01	0.00	0.00	0.00
2	3	20		0.02	0.00	0.02	0.01	0.00	0.02
2	3	21		0.00	0.00	0.00	0.00	0.00	0.01
6	4	22		-0.02	-0.01	-0.01	0.00	0.00	0.00
6	4	23		0.00	0.00	-0.01	0.00	-0.01	0.01
6	4	24		0.00	0.00	0.00	0.00	-0.01	0.01
6	4	25		0.00	0.00	-0.01	0.00	0.02	0.00
6	4	26		0.01	0.01	0.01	0.00	0.01	0.02
6	4	27		0.05	0.00	0.00	0.01	0.01	0.07
6	5	28		0.00	0.02	0.00	-0.02	0.00	0.02
6	5	29		0.02	0.00	0.00	0.03	0.01	0.01
6	5	30		-0.02	0.02	0.01	0.02	-0.01	0.03
6	5	31		0.02	-0.01	0.00	0.01	0.01	0.00
6	5	32		-0.02	-0.02	-0.01	-0.03	-0.02	-0.01
6	5	33		0.01	0.01	0.00	0.01	0.01	0.01
6	6	34		-0.01	-0.01	0.00	0.01	-0.01	0.00
6	6	35		-0.01	0.00	-0.01	0.00	0.00	0.01
6	6	36		-0.01	-0.01	0.00	-0.01	-0.01	0.01
6	6	37		-0.02	-0.01	-0.02	-0.01	-0.02	0.00
6	6	38		0.00	0.01	0.01	0.00	0.01	0.00
6	6	39		-0.01	0.02	0.00	-0.01	0.00	0.00
6	6	40		-0.01	0.00	0.01	0.00	0.00	0.00
Mean				0.00	0.00	0.00	0.00	0.00	0.01

Note: Final data was used.

Science Grade 4								
Session	Item	B	C	D	E	F	G	H
1	1		-0.01	0.00	0.00	0.00	0.00	0.00
1	2		-0.01	-0.01	0.00	0.00	-0.01	0.00
1	3		-0.01	-0.01	-0.01	0.00	-0.02	0.00
1	4		-0.02	-0.02	-0.02	0.03	-0.02	0.03
1	5		0.02	0.01	0.01	0.03	0.01	0.03
1	6		0.01	0.03	0.03	0.03	0.03	0.03
1	7		0.00	-0.02	0.00	-0.04	0.01	-0.03
1	8		-0.01	-0.01	0.00	0.00	0.00	-0.01
1	9		-0.03	-0.02	0.01	-0.02	-0.02	-0.02
1	10		0.01	0.01	0.03	0.02	0.02	0.01
1	11		0.02	0.02	0.01	-0.01	0.00	0.01
1	12		-0.04	-0.02	-0.02	-0.03	-0.04	-0.04
1	13		0.02	0.04	0.02	0.04	0.03	0.04
1	14		-0.01	-0.01	0.00	0.00	0.00	-0.01
1	15		0.00	-0.03	-0.03	-0.01	-0.02	-0.01
1	16		0.03	0.04	0.03	0.02	0.01	0.04
1	17		-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
1	18		-0.03	0.00	0.01	-0.01	0.00	-0.01
1	19		-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
1	20		0.00	0.00	-0.01	-0.02	-0.04	0.00
1	21		0.01	0.00	0.00	0.01	0.00	0.01
1	22		0.00	0.00	0.00	-0.01	-0.01	0.00
1	23		0.00	0.00	0.00	0.00	-0.01	0.00
1	24		-0.03	-0.01	-0.03	-0.02	-0.02	-0.03
1	25		0.02	-0.01	0.01	0.01	0.02	0.00
1	26		-0.01	0.00	-0.01	0.01	-0.01	-0.01
1	27		-0.01	0.00	0.00	-0.01	0.00	-0.01
1	28		0.00	-0.02	0.01	-0.03	0.01	0.01
1	29		-0.01	0.00	0.00	0.00	-0.01	0.01
2	30		0.00	0.01	-0.01	0.00	-0.01	0.01

Science Grade 4 continued								
Session	Item	B	C	D	E	F	G	H
2	31		-0.02	-0.03	-0.02	-0.05	-0.02	-0.03
2	32		-0.03	0.00	-0.02	0.00	0.01	0.00
2	33		-0.01	-0.01	-0.02	-0.02	-0.02	-0.01
2	34		0.01	0.01	0.01	0.02	0.00	0.01
2	35		0.02	0.02	0.00	0.02	0.00	0.03
2	36		0.01	0.01	0.01	0.03	0.01	0.01
2	37		-0.01	-0.02	0.00	-0.02	-0.02	0.00
2	38		-0.01	-0.01	0.01	0.03	-0.01	-0.01
2	39		0.02	0.02	0.00	0.01	0.03	0.02
2	40		0.00	-0.01	0.00	-0.01	0.00	-0.01
2	41		0.00	0.01	0.01	0.01	0.00	0.01
2	42		0.02	0.01	0.00	-0.01	-0.01	0.00
2	43		-0.05	-0.03	-0.05	-0.08	-0.04	-0.04
2	44		0.02	0.03	0.00	0.00	0.03	0.01
2	45		0.00	-0.02	-0.01	-0.01	-0.02	0.01
2	46		-0.01	-0.01	0.03	0.01	0.00	0.02
2	47		0.02	0.00	0.03	0.04	0.01	0.05
2	48		-0.01	-0.01	0.00	-0.01	-0.01	0.00
2	49		0.00	0.01	-0.01	0.00	-0.01	0.02
2	50		0.02	0.02	0.01	0.02	0.00	0.01
2	51		0.00	0.01	0.00	0.00	-0.01	0.00
2	52		0.01	0.01	0.00	-0.01	-0.01	0.00
2	53		0.00	0.01	0.00	0.00	-0.01	0.00
2	54		0.00	-0.04	-0.02	-0.01	-0.02	-0.03
2	55		0.01	0.00	0.01	0.01	-0.01	0.01
2	56		-0.01	-0.01	0.00	0.00	0.00	0.01
2	57		-0.01	-0.01	0.00	0.00	0.00	0.00
2	58		0.02	0.04	0.03	0.02	0.01	0.02
Mean			0.00	0.00	0.00	0.00	0.00	0.00

Note: Final data was used.

Science Grade 8								
Session	Item	B	C	D	E	F	G	H
1	1		0.01	-0.01	0.01	-0.01	0.01	-0.01
1	2		0.00	0.00	0.00	-0.01	-0.01	-0.01
1	3		-0.01	0.01	0.00	-0.02	0.01	0.01
1	4		0.00	0.00	0.00	-0.01	-0.01	0.00
1	5		0.00	-0.01	-0.01	-0.02	-0.02	-0.02
1	6		0.03	-0.03	0.03	0.01	-0.02	-0.02
1	7		-0.01	-0.03	0.00	0.02	-0.01	-0.02
1	8		0.00	0.03	0.02	0.00	0.00	0.02
1	9		-0.01	0.00	-0.01	-0.02	-0.01	-0.01
1	10		0.02	0.02	0.02	0.04	0.03	0.04
1	11		-0.01	0.01	0.00	0.00	0.01	0.00
1	12		0.01	0.01	0.02	0.02	0.02	0.01
1	13		0.02	0.03	0.01	0.02	0.03	0.00
1	14		-0.01	-0.02	-0.01	-0.03	0.00	-0.03
1	15		0.01	0.01	0.01	0.02	0.01	0.02
1	16		0.03	0.00	0.02	0.00	0.02	0.02
1	17		-0.01	0.00	0.00	-0.01	-0.01	-0.01
1	18		0.00	0.01	0.01	0.00	0.00	0.01
1	19		-0.02	-0.01	-0.01	-0.01	-0.01	0.00
1	20		0.00	-0.01	0.00	-0.01	0.01	-0.01
1	21		0.01	0.00	0.00	-0.01	0.01	0.01
1	22		0.01	0.01	0.02	0.01	0.01	0.00
1	23		-0.04	0.02	-0.02	0.00	-0.01	0.01
1	24		-0.01	0.01	0.00	-0.01	0.00	0.01
1	25		0.02	0.01	0.02	0.03	0.02	0.02
1	26		0.01	0.02	0.02	0.02	0.01	0.02
1	27		-0.01	-0.04	0.01	0.01	0.01	-0.03
1	28		0.00	0.00	0.01	0.00	0.01	-0.01
1	29		0.00	0.00	0.00	0.01	0.00	0.00
1	30		0.00	0.01	0.01	0.01	0.01	0.01

Science Grade 8 continued								
Session	Item	B	C	D	E	F	G	H
1	31		0.00	0.01	0.00	0.00	0.01	0.01
2	32		-0.01	-0.01	-0.01	-0.02	-0.01	-0.02
2	33		0.01	-0.01	0.01	-0.01	0.01	0.02
2	34		0.02	0.04	0.03	0.02	0.03	0.03
2	35		0.03	0.02	0.02	0.02	0.01	0.03
2	36		0.01	0.02	0.01	0.01	0.00	-0.01
2	37		-0.02	-0.01	0.00	-0.01	-0.01	-0.02
2	38		0.00	0.01	0.00	0.00	0.01	0.00
2	39		-0.03	-0.02	-0.02	-0.02	-0.02	-0.02
2	40		0.02	0.00	0.01	0.00	0.01	0.00
2	41		0.01	0.01	0.03	0.01	-0.01	0.00
2	42		0.01	0.01	0.01	0.01	0.01	0.02
2	43		-0.01	0.01	0.00	-0.01	-0.01	0.00
2	44		-0.01	-0.01	-0.02	0.00	-0.01	-0.01
2	45		-0.01	0.01	0.00	0.01	0.03	0.00
2	46		0.03	0.00	0.03	0.04	0.01	0.02
2	47		-0.02	-0.01	-0.03	-0.04	-0.03	-0.02
2	48		0.01	0.02	0.01	0.02	0.02	0.01
2	49		0.01	0.01	0.02	0.02	0.00	0.00
2	50		-0.02	-0.02	-0.01	0.01	-0.02	-0.01
2	51		-0.03	0.01	-0.02	-0.02	-0.01	-0.05
2	52		-0.01	0.00	-0.01	0.00	-0.02	-0.02
2	53		0.01	-0.04	-0.01	-0.04	-0.01	0.00
2	54		-0.01	-0.02	-0.01	0.00	-0.02	-0.02
2	55		-0.02	0.00	0.00	-0.01	-0.02	-0.02
2	56		-0.01	0.00	0.00	0.01	-0.02	-0.01
2	57		-0.01	0.00	-0.02	-0.01	0.01	0.00
2	58		0.00	0.01	0.00	0.00	0.00	0.00
Mean			0.00	0.00	0.00	0.00	0.00	0.00

Note: Final data was used.

Chapter Ten: Summary Demographic, Program, and Accommodation Data for the 2013 PSSA

ASSESSED STUDENTS

The PSSA assessed students include those from public schools who are required to participate as well as those from a small number of non-public schools (fewer than 500 students per grade level) that elected to participate. Also included were home-schooled students (fewer than 100 per grade) and a small number of foreign exchange students (generally fewer than 30 per grade through Grade 8). An exception was granted for those IEP students with quite significant cognitive impairments who met each of the following criteria, making them eligible to participate in the Pennsylvania Alternate System of Assessment (PASA) for mathematics, reading, and science and a school-administered alternate assessment for writing: 1) was enrolled in the assessed grade level for the subject area, 2) had a very severe cognitive disability, 3) required very intensive instruction, 4) required very extensive adaptation and support to perform or participate meaningfully, 5) required very substantial modification of the general education curriculum, and 6) participated in the general education curriculum that differed markedly in form and substance from that of other students. (See the *2012–2013 Pennsylvania System of School Assessment: Handbook for Assessment Coordinators*, p.7.)

Results for this chapter are presented in sets of tables for the four PSSA subject areas (mathematics, reading, science, and writing). Accompanying each numbered table is a letter (M, R, S, or W) to designate the subject area. Table set 10–1M through 10–1W provides a summary of the assessed students for each subject. Presented on the first line is the total number of non-blank answer documents processed by grade level for the 2013 PSSA. This number pertains to the total number of records on the student file. The second line shows the number and percentage of students with a PSSA score in the subject area, followed by the number and percentage not receiving a score. The final line shows the number of students contributing to state summary statistics, which is especially relevant for all tables in Appendices J, K, L, and M. (See the section of this chapter entitled “Composition of Sample Used in Subsequent Tables” for additional explanation.)

Noteworthy in the 2013 assessment is the slightly higher number of students taking the PSSA mathematics, reading, and science relative to those taking writing. This departure from previous years is due to the elimination of the modified assessment (PSSA-M) in mathematics, reading, and science. Based on 2012 percentages of students assessed, the re-entry of these students into the PSSA likely increased the numbers taking the PSSA in 2013 by approximately 3.0 to 3.4 percent depending on subject area. Since all students taking the modified assessment in prior years had an IEP, the 2013 PSSA demographics are impacted by being approximately 0.2 to 0.3 percent more male and minority.

Another major change in 2013 was the replacement of the Grade 11 PSSA with the Keystone Exams. Please see the *2013 Keystone Exams Technical Report* for details.

Table 10–1M. Students Assessed on the 2013 PSSA: Mathematics

	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Number of PPT non-blank answer documents processed	130,609	130,151	129,228	132,391	134,899	133,970
Number of CBT processed	299	257	462	872	1,222	1,726
Total number of tests processed	130,908	130,408	129,690	133,263	136,121	135,696
Students with a mathematics score	130,420 99.6	129,870 99.6	129,165 99.6	132,647 99.5	135,174 99.3	134,500 99.1
Students not receiving a test score	488 0.4	538 0.4	525 0.4	616 0.5	947 0.7	1,196 0.9
Students with a mathematics score used in state summaries	126,734	126,550	125,790	129,366	131,842	131,143

Table 10–1R. Students Assessed on the 2013 PSSA: Reading

	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Number of PPT non-blank answer documents processed	130,483	130,151	129,228	132,391	134,899	133,970
Number of CBT processed	299	257	462	872	1,220	1,724
Total number of tests processed	130,782	130,408	129,690	133,263	136,119	135,694
Students with a reading score	130,003 99.4	129,496 99.3	128,792 99.3	132,332 99.3	134,821 99.0	134,093 98.8
Students not receiving a test score	779 0.6	912 0.7	898 0.7	931 0.7	1,298 1.0	1,601 1.2
Students with a reading score used in state summaries	126,685	126,491	125,727	129,305	131,767	131,006

Table 10–1S. Students Assessed on the 2013 PSSA: Science

	Gr. 4	Gr. 8
	N/Pct	N/Pct
Number of PPT non-blank answer documents processed	128,402	131,678
Number of CBT processed	1,034	2,813
Total number of tests processed	129,436	134,491
Students with a science score	128,816 99.5	132,838 98.8
Students not receiving a test score	620 0.5	1,653 1.2
Students with a science score used in state summaries	126,729	130,637

Table 10–1W. Students Assessed on the 2013 PSSA: Writing

	Gr. 5	Gr. 8
	N/Pct	N/Pct
Number of PPT non-blank answer documents processed	128,044	132,342
Number of CBT processed	467	2,044
Total number of tests processed	128,511	134,386
Students with a writing score	126,144 98.2	131,993 98.2
Students not receiving a test score	2,367 1.8	2,393 1.8
Students with a writing score used in state summaries	124,041	129,823

NON-ASSESSED STUDENTS

As may be observed from Tables 10–1M through 10–1W, not all students were assessed. Although there are a variety of reasons for this, the major ones pertain to the following:

- Extended absence from school that continued beyond the assessment window
- Absence without make-up for at least one section of a subject-area test
- Failure to meet the attempt criteria on one or more subject-area test sections and no exclusion code was marked by school personnel. For mathematics, reading, and science, the attempt criteria required a minimum of five items to be completed in each subject area section. For writing, the attempt criteria required is at least five multiple-choice items and a response to both operational writing prompts
- ELL students in the first year in U.S. schools (reading and writing only)
- Medical emergency
- Other reasons (includes parental request due to religious reasons, students who are court-agency placed, students with multiple reasons coded, and the category of other)

The numbers of students without test scores for these reasons are presented in Tables 10–2M through 10–2W.

Table 10–2M. Counts of Students without Scores on the 2013 PSSA: Mathematics

Reason for Non-Assessment	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Extended Absence from School	38 7.8	37 6.9	51 9.7	75 12.2	136 14.4	192 16.1
Absent Without Make-up	32 6.6	42 7.8	42 8.0	58 9.4	74 7.8	108 9.0
Non-Attempt	212 43.4	222 41.3	205 39.0	217 35.2	310 32.7	364 30.4
Medical Emergency	66 13.5	100 18.6	104 19.8	142 23.1	252 26.6	313 26.2
Other Reasons	140 28.7	137 25.5	123 23.4	124 20.1	175 18.5	219 18.3
Total Not Assessed	488	538	525	616	947	1,196

Table 10–2R. Counts of Students without Scores on the 2013 PSSA: Reading

Reason for Non-Assessment	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Extended Absence from School	39 5.0	39 4.3	51 5.7	76 8.2	138 10.6	197 12.3
Absent Without Make-up	41 5.3	53 5.8	43 4.8	63 6.8	76 5.9	118 7.4
Non-Attempt	265 34.0	288 31.6	280 31.2	293 31.5	410 31.6	481 30.0
ELL in First Year in U.S. Schools	226 29.0	297 32.6	295 32.9	228 24.5	241 18.6	253 15.8
Medical Emergency	68 8.7	102 11.2	103 11.5	144 15.5	255 19.6	322 20.1
Other Reasons	140 18.0	133 14.6	126 14.0	127 13.6	178 13.7	230 14.4
Total Not Assessed	779	912	898	931	1,298	1,601

Table 10–2S. Counts of Students without Scores on the 2013 PSSA: Science

Reason for Non-Assessment	Gr. 4	Gr. 8
	N/Pct	N/Pct
Extended Absence from School	98 15.8	391 23.7
Absent Without Make-up	34 5.5	84 5.1
Non-Attempt	201 32.4	422 25.5
Medical Emergency	118 19.0	376 22.7
Other Reasons	169 27.3	380 23.0
Total Not Assessed	620	1,653

Table 10–2W. Counts of Students without Scores on the 2013 PSSA: Writing

Reason for Non-Assessment	Gr. 5	Gr. 8
	N/Pct	N/Pct
Extended Absence from School	108 4.6	283 11.8
Absent Without Make-up	76 3.2	144 6.0
Non-Attempt	1,802 76.1	1,288 53.8
ELL in First Year in U.S. Schools	82 3.5	70 2.9
Medical Emergency	126 5.3	258 10.8
Other Reasons	173 7.3	350 14.6
Total Not Assessed	2,367	2,393

COMPOSITION OF SAMPLE USED IN SUBSEQUENT TABLES

Students included in the following demographic analyses were those who contributed to state summary statistics, using the final individual student data file provided to the Pennsylvania Department of Education in late August 2013. Students not included in the present state summary data were those who were 1) enrolled in a Pennsylvania school after October 1, 2012, 2) coded as ELL and enrolled after March 31, 2012, except for science, 3) foreign exchange students, 4) home schooled, 5) enrolled in a non-public school, or 6) without a subject-area test score.

Demographic data for students taking the PSSA is presented separately for each subject area in Appendix J. Results for accommodations received were collected separately by subject area and are presented in separate tables as well.

COLLECTION OF STUDENT DEMOGRAPHIC INFORMATION

Data for analyses involving demographic characteristics were obtained primarily from information supplied by school district personnel through the Pennsylvania Information Management System (PIMS) and subsequently transmitted to DRC. Updates of attribution data were carried out through the DRC Attribution System. Some data such as accommodation information is marked directly on the student answer document at the time the PSSA is administered.

PARTICIPATION BY ADMINISTRATION MODE

This was the first year in which online testing was available for the PSSA. As anticipated the vast majority of students were assessed utilizing paper/pencil tests (PPT). Overall, the percent of students responding by CBT was approximately 0.6 percent for mathematics and reading, 1.5 percent for science and 0.9 percent for writing. There was a slight rise in the percent of students taking a CBT across grade levels. For mathematics and reading the percent of CBT usage went from 0.2 percent at Grades 3 and 4, to 0.4, 0.6, 0.9 and 1.3 percent from Grades 5 through 8. For science, CBT participation rate was 0.8 percent and 2.1 percent for grades 4 and 8, respectively. Writing participation was 0.3 percent and 1.5 percent at Grades 5 and 8. The bottom row of the tables presented in Appendix J presents the number of students involved in the PPT and CBT administrations.

Demographic Characteristics

Frequency data for each category is presented in Appendix J. Percentages are based on students with scores in a subject area, which are shown at the bottom of the appropriate table. Included are students receiving education in a non-traditional setting, such as a court-agency placement.

Demographic Characteristics of Students Taking the 2013 PSSA can be found in Appendix J.

TEST ACCOMMODATIONS PROVIDED

School personnel supplied information regarding accommodations that a student may have received while taking the PSSA. Accommodations are classified in terms of presentation, response, setting, and timing to enable students to better manage disabilities that hinder their ability to learn and respond to assessments. An accommodations manual entitled, *Accommodations Guidelines: Keystone Exams and PSSA* (PDE, revised 10/31/2012), was updated for use with the 2013 PSSA and Keystone Exams. This manual may be found on the PDE website at www.education.state.pa.us. Click on Programs, Programs O–R, Pennsylvania System of School Assessment (PSSA), and Testing Accommodations & Security. A glossary of accommodation terms as applied to the Keystone Exams is provided in Table 10–3 at the end of this chapter.

It should be noted that there are differences in a few of the accommodations available to students for PSSA writing versus the administration of PSSA mathematics, reading, and science, which took place later in the spring. These differences range from very slight word changes to more extensive rewording to several altogether new accommodations.

The frequency with which accommodations were utilized for PPT and CBT formats is summarized separately for each subject area in Appendix K. Tabled values are based on all students whose score contributed to state summary statistics in a given subject area. Because of the very small number of students utilizing CBT, combined with the fact that a number of accommodations are primarily accessed by only one of the two administration modes, meaningful comparisons with PPT are rather limited. In the tables an NA denotes those instances in which a particular accommodation does not apply to one of the testing modes.

PRESENTATION ACCOMMODATIONS RECEIVED

Presentation Accommodations are those that provide alternate ways for students to access and process printed instructional material and assessments. These include auditory, tactile, visual, and combined auditory/visual modes of presentation. The number of presentation accommodations provided in the 2013 PSSA varied by subject and testing mode as follows:

- PPT: mathematics and science, 11; reading, 7; and writing, 11.
- CBT: mathematics and science, 11; reading, 5; and writing, 9.

As depicted in Appendix K, the actual frequencies were quite low, generally representing less than two-tenths of one percent of assessed students statewide. Frequencies of less than one-tenth of one percent were observed in at least half of the instances. The most notable exceptions were “All items/questions read aloud” and “Some items/questions read aloud” (mathematics and science), and “Test directions read aloud” and “Writing prompts read aloud” (writing). Among accommodations specific to CBT the use of audio was the most frequent. Although included in the tabled data, Spanish version (mathematics and science) is not included in the counts listed above. For CBT administration there were also two unique accommodations.

Incidence of Presentation Accommodations Received on the 2013 PSSA can be found in Appendix K.

RESPONSE ACCOMMODATIONS RECEIVED

Response Accommodations permit students to complete assignments, tests, and activities in different ways to solve or organize problems using some type of assistive device or organizer. The number of response accommodations provided on the 2013 PSSA varied by subject as follows:

- PPT: mathematics and science, 12, reading, 9, and writing, 8.
- CBT: mathematics and science, 9, reading, 6, and writing, 5.

Summarized in Appendix K is the frequency with which these accommodations were utilized, most of which are quite low. Frequencies of less than two-tenths of one percent of assessed students occurred in approximately 75 percent of the instances. Frequencies of less than one-tenth of one percent occurred in approximately 60 percent of the instances. Very few response accommodations were coded as being utilized by students responding by CBT.

Incidence of Response Accommodations Received on the 2013 PSSA can be found in Appendix K.

SETTING ACCOMMODATIONS RECEIVED

Setting Accommodations permit a change in location in which a student receives instruction or participates in an assessment. There were three categories of setting accommodations for mathematics, reading, and science, and four for writing on the 2013 PSSA. As depicted in Appendix K, the most common accommodation across subject areas was small group setting. This was true for PPT and CBT modes of administration. In mathematics and reading the percentage of use for this accommodation by students using a PPT was greatest at Grade 4, followed by gradual decreases through Grade 8. Similarly, usage of a small group setting was greatest at the elementary level for science (Grade 4) and writing (Grade 5) with a slightly lower percentage at Grade 8.

Incidence of Setting Accommodations Received on the 2013 PSSA can be found in Appendix K.

TIMING ACCOMMODATIONS RECEIVED

Timing Accommodations involve a change in the allowable length of time to complete assignments or assessments, including the way in which time is organized. There were four categories of timing accommodations for mathematics, reading, and science, and three categories for writing on the 2013 PSSA. As depicted in Appendix K, the most commonly used accommodation was extended time, followed by frequent breaks. One consistent finding for mathematics and reading was that students responding by CBT had a slightly higher usage of frequent breaks across all six grade levels than observed for students taking a PPT. This was also true for the two grade levels assessed for science and writing.

Incidence of Timing Accommodations Received on the 2013 PSSA can be found in Appendix K.

ACCOMMODATION RATE FOR NON-IEP AND IEP STUDENTS

A comparison between students without an IEP (non-IEP students) and those with an IEP (IEP students) with regard to having received an accommodation is provided in Appendix L. In this data, accommodated means that a student received one or more of the total number of accommodations available for a given subject area; however, this also varies with administration mode. The total number of available accommodations for students taking a PPT was as follows: mathematics and science, 30; reading, 23; and writing, 26. The number of available accommodations for students taking a CBT was as follows: mathematics and science, 26; reading, 17; and writing, 21. The category of non-accommodated indicates that a student did not receive any accommodation during testing.

The general pattern of findings reveals a consistent and substantially higher percentage of IEP students receiving an accommodation in contrast to non-IEP students. This same pattern holds true regardless of test administration mode and PSSA test.

Comparisons between administration modes are less clear. IEP students taking a CBT exceeded those taking a PPT in receiving an accommodation by at least five percentage points in four grade levels for math. In reading, the situation was reversed as accommodated IEP students taking a PPT exceeded those taking a CBT by a margin of at least five percent in five grade levels. No clear pattern emerged for science or writing. These results are tentative at best due to the very small sample size for students taking a CBT.

Accommodation Rates for Non-IEP and IEP Students can be found in Appendix L.

THE INCIDENCE OF ACCOMMODATIONS AND IEP AND ELL STATUS

As noted in Appendix L, students with an IEP received an accommodation of some type far more often than non-IEP students. Certain accommodations with very low frequencies are specific to particular disabilities while others are far more common and may also apply to students classified as English Language Learners (ELL). Accommodations having the largest frequencies can potentially supply the most stable data when separated out for subgroup analysis. Listed below are the most commonly used accommodations, which were chosen for display.

- Some test items/questions read aloud (mathematics, science)
- All test items/questions read aloud (mathematics, science)
- Small group setting (mathematics, reading, science); Small group testing (writing)
- Extended time (mathematics, reading, science, writing)
- Frequent breaks (mathematics, reading, science, writing)
- Test directions read aloud (writing)
- Test prompts recorded (writing)
- Tested in separate setting (writing)

Coding for IEP is dichotomous, as students are classified IEP and non-IEP. For purposes of this analysis, an English Language Learner (ELL) is a student classified ELL and enrolled in a U.S. school on or before March 31, 2012. All other assessed students, including those who have exited an ESL/bilingual program and are in the first or second year of monitoring, are regarded as non-ELL. Students coded as ELL and enrolled in a U.S. school after March 31, 2012, are excluded from state summary statistics, with the exception of science, as stated earlier in this chapter.

Customarily, a considerably larger percentage of IEP students receive a given accommodation than non-IEP students. Although less frequent, certain accommodations also have a high frequency rate for ELL students. To separate out the effect of being classified IEP or ELL, four possible combinations are presented in the tables in Appendix M. These include general education students who are neither IEP nor ELL, students who are IEP but non-ELL, students who are ELL but non-IEP, and students who are both IEP and ELL. The bottom row for each grade provides the total number of assessed students in each of the four classifications.

Because the combination of tabled accommodations and grades assessed differs somewhat by subject area, it is useful to reference the number of instances of accommodations for which the tabled results apply. For example, mathematics has 30 possible instances resulting from five accommodations displayed and six assessed grade levels. There are 18 instances for reading, 10 for science, and 12 for writing. The total number of instances across subjects is 70.

For purposes of comparing the four groups in terms of whether a group displayed a larger frequency rate than another group, a choice was made to use a difference of five or more percentage points. In many instances, the percentage difference between groups was of little practical significance (from zero to only several percentage points).

Although the separate presentation of data for PPT and CBT modes provides an impression of overall findings, the much smaller *N*-counts and accommodation rate by students taking a CBT renders an administration mode comparison meaningless for two groups, namely, ELL and Non-IEP and Both IEP and ELL. Nevertheless, it is possible to make some cautious descriptive observations when sufficient *N*-counts and consistency are present. In the summary comments regarding the tables in Appendix M the term “instances” refers to the set of **accommodations for which data is displayed**. The general findings for each of the four classifications of students may be summarized as follows.

Group Comparisons for Students Taking a PPT

The general findings for students receiving a PPT, where the volume of data is quite substantial, showed a great deal of consistency. Among the accommodations presented in Appendix M, frequent breaks displayed the least differentiation among the four comparison groups. Small group testing had the largest frequency for each subject area at all assessed grades. A dominant pattern was in the especially high number of times that the IEP/ELL group had the largest percent of accommodations at the elementary level (grades 3–5), which then shifted as the IEP/Non-ELL group tended to receive larger percentages of particular accommodations at the middle school level (grades 6–8). Major findings for each of the four classifications of students are summarized below:

- General education students (neither IEP nor ELL) had a very low incidence of accommodations in general and less than the other three groups in nearly all instances. The frequency of accommodations was less than one percent in 32 of the 70 total instances and less than five percent in all but two instances.
- The IEP/non-ELL students had the largest percentage of these accommodations in 6 of the 70 instances, all occurring within Grades 6–8 (small group setting), and was within five percentage points of the IEP/ELL group in 44 of 70 instances.
- The ELL/non-IEP students received a larger percentage of these accommodations than the general education students in all 70 instances, 40 of which exceeded the five percent margin. Furthermore, they exhibited lower percentages than IEP/non-ELL students (63 of 70 instances) and IEP/ELL students (63 of 70 instances).
- The IEP/ELL students had the largest percentage of these accommodations in 19 instances, all but two occurring within Grades 3–5. In 44 instances it was within five percentage points of the IEP/non-ELL student group.

CBT Comparisons with PPT

The only groups for which comparisons between PPT and CBT administration modes were deemed reasonable based on sample sizes were within the general education group and the IEP/non-ELL group. The findings are summarized below.

- General education students at grade levels in which at least 300 students responded by CBT included mathematics and reading (Grades 5–8), science (Grades 4 and 8), and writing (Grades 5 and 8). As noted for PPT, CBT also displayed a very low incidence of accommodations. Of 54 possible instances, the difference between PPT and CBT in percent of students receiving an accommodation was within five percentage points and most often within a percentage point or two.

- IEP/non-ELL students at grade levels in which at least 300 students responded by CBT included mathematics and reading (Grades 7 and 8) and science and writing (Grade 8). Results indicated that in 17 of 27 possible instances students tested by CBT had a greater frequency of accommodations than those responding by PPT, 15 of which were by a margin of 10 or more percentage points. In five instances, PPT exceeded CBT by a wide margin (small group setting). Consistent with the PPT findings, the percentage of CBT students receiving an accommodation was far greater for the IEP/non-ELL group than for the general education group.

Incidence of IEP and ELL Students Receiving Selected Accommodations can may be found in Appendix M.

GLOSSARY OF ACCOMMODATION TERMS

Table 10–3 provides a brief description of accommodation terms as used in the PSSA and Keystone Exams. Accommodation data was supplied by school personnel as noted in the left column of the table. The right column contains an explanation derived from the PDE publication, *2013 Accommodations Guidelines: Keystone Exams and PSSA* (PDE, revised 10/31/2012, pages 23–47). This manual may be found on the PDE website at www.education.state.pa.us. Click on Programs, Programs O–R, Pennsylvania System of School Assessment (PSSA), and Testing Accommodations & Security.

Table 10–3. Glossary of Accommodation Terms as Applied in the 2013 PSSA and 2012–2013 Keystone Exams

Type of Testing Accommodation	Explanation
Student used the following Presentation Accommodations	
Braille format	Students may use a Braille format of the test. Answers must then be transcribed into the answer booklet without alteration.
Large print format	Students with visual impairments may use a large print format. Answers must then be transcribed into the answer booklet without alteration.
Magnification device	Devices to magnify print may be used for students with visual impairments and/or print disabilities.
Color overlay	Students with visual impairments may place a color overlay on a printed page of the test document to make text more readable.
Reading windows, reading guides	Students with visual impairments may use reading windows and reading guides. Data was gathered for this accommodation for 2013 PSSA writing and the Winter 2012–2013 Keystone Exams.
Electronic screen reader (PDE approval required)	Students with severe visual disabilities may use electronic screen readers; however, PDE must approve the program and functions prior to the test window.
Test items/questions signed	Deaf/hearing impaired students may receive test directions from a qualified interpreter. Signing is also permitted for essay prompts in PSSA writing and all items in PSSA mathematics and science and for Keystone Algebra and Biology.
Test items/questions interpreted for ELL	A qualified interpreter may translate directions or clarify instructions for the assessments. The interpreter may translate, but not define specific words or test questions on the PSSA mathematics and science tests and Keystone Algebra and Biology exams. On the PSSA reading test, the interpreter may only translate directions and may not translate or define words in the passages or test questions.
Test directions read aloud, signed, or recorded (provided by live reader)	Directions for the 2013 PSSA writing test and the winter 2012–2013 administration of the Keystone Exams may be read aloud, or signed, interpreted for ELL, or recorded.
Some or all test items/questions read aloud	Students unable to decode text visually may have items/questions read aloud for PSSA mathematics and science and Keystone Algebra I and Biology; however, words may not be defined.
Writing prompts recorded, signed, interpreted for ELL, or recorded	PSSA writing essay prompts may be presented by audio recording.
Amplification device	In addition to using hearing aids, an amplification device to enhance clarity may be required.

Table 10–3 (continued). Glossary of Accommodation Terms as Applied in the 2013 PSSA and 2012–2013 Keystone Exams

Type of Testing Accommodation	Explanation
Other (PDE approval required)	Other presentation accommodations indicated in the <i>Accommodation Guidelines</i> may be provided; however, PDE approval is required prior to the test window.
Spanish version for PSSA (Math and Science) and Keystone (Algebra and Biology)	Students whose first language is Spanish and who have been enrolled in U.S. schools for fewer than three years may take this version.
Student used the following Online Presentation Accommodations	
Audio	An audio CD version of PSSA mathematics and science or Keystone Algebra and Biology test items/questions may be taken by students with severe hearing disabilities as documented by their IEPs.
Color chooser	The use of this accommodation enables the student to change the background color or text color to make text more readable.
Student used the following Response Accommodations	
Braille/Note taker (per <i>Accommodations Guidelines</i>)	Students using this device as part of their regular instructional program may use it on the assessments; however, without thesaurus, spelling, or grammar checker.
Test administrator scribed open-ended responses at student’s direction	A test administrator may record word-for-word exactly what a student dictated directly into the test booklet. This includes MC and OE responses Keystone Algebra, Biology, and Literature tests and PSSA mathematics and science.
Test administrator marked multiple-choice responses at student’s direction	A test administrator may mark an answer booklet at the direction of a student (e.g., a student may point to an MC answer with the test administrator marking the response in the answer booklet).
Test administrator transcribed student responses (per <i>Accommodations Guidelines</i>)	A test administrator may transcribe (copy) a student’s written, typed, or keyed response into a standard answer booklet.
Qualified Interpreter translated, transcribed, and/or scribed student’s signed responses	A qualified interpreter may interpret a student’s signed responses into written English for Keystone Algebra and Biology exams, and PSSA mathematics and science assessments. Interpreters are not permitted to make corrections or change the meaning of the response.
Qualified Interpreter translated, transcribed, and/or scribed ELL student responses	A qualified interpreter may interpret a student’s non-English oral responses into written English for Keystone Algebra and Biology exams, and PSSA mathematics and science assessments. Interpreters are not permitted to make corrections or change the meaning of the response.

Table 10–3 (continued). Glossary of Accommodation Terms as Applied in the 2013 PSSA and 2012–2013 Keystone Exams

Type of Testing Accommodation	Explanation
Augmentative communication device	Students with severe communication difficulties may use a special device to convey responses, which must be transcribed into the test booklet by the test administrator.
Keyboard, word processor, or computer (per <i>Accommodations Guidelines</i>)	This is an allowable accommodation as a typing function only for students with the identified need. Supports such as dictionaries, thesauri, spell checkers, and grammar checkers must be turned off. Answers must then be transcribed into the answer booklet without alteration.
Audio recording of student responses (per <i>Accommodations Guidelines</i>)	An electronic recording device may be used to record responses, which must be transcribed into the answer booklet by the test administrator. (Students who are unable to use a pencil or have illegible handwriting may answer MC questions orally. Answers must be recorded in the answer booklet without alteration during the testing period.)
Translation dictionary for ELL student	A word-to-word dictionary that translates native language to English (or vice versa) without word definitions or pictures is allowed on any portion of the Keystone Algebra and Biology exams, and PSSA mathematics and science tests.
Electronic screen reader (PDE approval required)	Students with blindness or extremely low vision may use computer software that converts text to synthesized speech or Braille.
Other (per <i>Accommodations Guidelines</i> or PDE approval)	Other accommodations may be appropriate and available if they do not compromise the integrity of the assessment. Documentation must be provided to PDE.
Student used the following Setting Accommodations	
Hospital/home testing	A student who is confined to a hospital or to home during the testing window may be tested in that environment.
One-on-one setting (Keystone Exams and PSSA Math, Reading, Science) or Tested in a separate setting (Writing)	One-on-one settings are necessitated in certain instances, such as to reduce distraction or in the use of certain devices. A separate room may be used to reduce distraction.
Small group testing	Some students may require a test setting with fewer students or a setting apart from all other students to minimize distraction.
Other (per <i>Accommodations Guidelines</i> or PDE approval)	Other accommodations may be appropriate and available if they do not compromise the integrity of the assessment. Documentation must be provided to PDE.

Table 10–3 (continued). Glossary of Accommodation Terms as Applied in the 2013 PSSA and 2012–2013 Keystone Exams

Type of Testing Accommodation	Explanation
Student used the following Timing Accommodations	
Extended time	Extended time may be allotted for each section of the test as a planned accommodation to enable students to finish.
Frequent breaks	Frequent breaks (breaks within a test section) may be scheduled for the completion of each test section; however, a test section must be completed within one school day.
Changed test schedule	Students whose disabilities prevent them from following a regular, planned test schedule may follow an individual schedule that enables test completion.
Other (per <i>Accommodations Guidelines</i> or PDE approval)	Other accommodations may be appropriate and available if they do not compromise the integrity of the assessment. Documentation must be provided to PDE.

Chapter Eleven: Classical Item Statistics

This chapter provides an overview of the two most familiar item-level statistics obtained from any classical (traditional) item analysis: item difficulty and item discrimination. The following results pertain only to operational PSSA items (i.e., those items that contributed to a student's total test score). Rasch item statistics are discussed in Chapter Twelve, and test-level statistics are found in Chapter Seventeen.

ITEM-LEVEL STATISTICS

Appendix G provides classical item statistics for all PSSA items. Results are organized by subject and grade. These statistics represent the item characteristics most often used to determine whether an item functioned properly and/or how a group of students performed on a particular item. The item statistics in the appendices include p -values for multiple-choice (MC) items and item means for open-ended (OE) items (indicators of item difficulty); point-biserial correlations for MC items and item-test correlations for OE items (indicators of item discrimination); and the proportion of students selecting each MC item option or earning each OE item score point.

ITEM DIFFICULTY

At the most general level, an item's difficulty is indicated by its mean score in some specified group (e.g., grade level).

$$\bar{x} = \frac{1}{n} \cdot \sum_{i=1}^n x_i$$

In the mean score formula above, the individual item scores (x_i) are summed and then divided by the total number of students (n). For multiple-choice items, student scores are represented by 0s and 1s (0 = wrong, 1 = right). With 0–1 scoring, the equation above also represents the number of students correctly answering the item divided by the total number of students. Therefore, this is also the proportion correct for the item, or the p -value. In theory, p -values can range from 0.00⁸ to 1.00 on the proportion-correct scale. For example, if an item has a p -value of 0.89, it means 89 percent of the students answered the item correctly. Additionally, this value might also suggest that the item was relatively easy and/or the students who attempted the item were relatively high achievers. In other words, item difficulty and student ability are somewhat confounded.

For OE items, mean scores can range from the minimum possible score (usually zero) to the maximum possible score (e.g., four points in the case of some mathematics, science, and writing items). Sometimes a pseudo p -value is provided for an OE item. This is done by dividing the mean item score by the maximum possible item score.

The minimum and maximum extremes of the difficulty scale are typically not seen in applied practice. However, understanding the extremes helps illustrate that relatively lower values correspond to more difficult items, and that relatively higher values correspond to easier items. (As a result of this, some assert that this index would be more accurately referred to as the item's easiness.)

⁸ For MC items with four response options, pure random guessing would lead to an expected p -value of 0.25.

Item difficulty is an important consideration for the PSSA tests because of the ranging achievement levels of students in Pennsylvania (Below Basic, Basic, Proficient, and Advanced). Items that are either very hard or very easy provide little information about student differences in achievement. However, an item answered correctly by a high percentage of students would suggest that the knowledge or skill the item taps has been mastered by most students. Conversely, an item answered incorrectly by a low percentage of students would suggest few students have mastered the knowledge or skill the item taps. On a standards-referenced test like the PSSAs, a test development goal is to include a wide range of item difficulties.

ITEM DISCRIMINATION

At the most general level, item discrimination⁹ indicates an item's ability to differentiate between high and low achievers. It is expected that students with high ability (i.e., those who perform well on the PSSA overall) would be more likely to answer any given PSSA item correctly, while students with low ability (i.e., those who perform poorly on the PSSA overall) would be more likely to answer the same item incorrectly. For the PSSA tests, Pearson's product-moment correlation coefficient between item scores and test scores is used to indicate discrimination. (As commonly practiced, DRC removes the item score from the total score such that the resulting correlations will not be spuriously high.) The correlation coefficient can range from -1.0 to +1.0. If the aforementioned expectation is met (high-scoring students tend to get the item right while low-scoring students do not), the correlation between the item score and the total test score will be both positive and noticeably large in its magnitude (i.e., well above zero), meaning the item is a good discriminator between high and low ability students. This should be the case for all PSSA operational test items.

In summary, the correlation will be positive in value when the mean test score of the students answering the item correctly is higher than the mean test score of the students answering the item incorrectly.¹⁰ In other words, this indicates that students who did well on the total test tended to do well on the item as well. However, an interaction can exist between item discrimination and item difficulty. Items answered correctly (or incorrectly) by a large proportion of examinees (i.e., the items have extreme *p*-values) can have reduced power to discriminate, and thus, can have lower correlations.

Discrimination is an important consideration for the PSSA because the use of more discriminating items on a test is associated with more reliable test scores. This in turn means that score estimates will be more precise (i.e., there will be smaller confidence intervals around the scores) and, perhaps more importantly, that more accurate performance level placements will be made. The issues of reliability, confidence intervals, and performance level classifications are further discussed in Chapter Eighteen.

⁹ As noted earlier, the discrimination index for PSSA dichotomous MC items is typically referred to as the point-biserial correlation coefficient. For OE items, the term item-test correlation is sometimes used.

¹⁰ It is legitimate to view the point-biserial correlation as a standardized mean difference. A positive value indicates students who chose that response had a higher mean score than the average student; a negative value indicates students who chose that response had a lower than average mean score.

DISCRIMINATION ON DIFFICULTY SCATTERPLOTS

Figure 11–1 contains a series of scatterplots showing item discrimination values (y -axis) on the item difficulty (x -axis) for each grade and subject area test. Note that pseudo p -values (described above) are used for OE items in these plots. These plots provide maximum information about item discrimination and difficulty in a single visual image for each PSSA test. This is because the x - and y -axes also show histogram with following descriptive statistics:

- Minimum and maximum values
- Mean scores
- Median scores
- First and third quantile (Q1 and Q3).

The bivariate relationship between item discrimination (item-test *correlations*) and difficulty (item *mean* scores) is also presented through scatterplots in these figures. One does not usually expect any type of trend here. However, as noted earlier, it is often the case that items with extreme difficulties can have lower discrimination values, as this can be revealed in such plots.

OBSERVATIONS AND INTERPRETATIONS

To support the visuals, Table 11–1 provides break-out results for the MC and OE items. The mean p -values for the MC items ranged from about 0.65 to 0.82, while the mean proportion-correct values for the OE items ranged from about 0.45 to 0.66. Most means were generally close to their historic values¹¹ and suggest that the PSSA items, overall, were reasonably challenging to most students based on these past trends. A noteworthy outlier was Grade 3 mathematics, which seems to have been easier for students than other PSSA exams. However, this is also consistent with past data for the Grade 3 PSSA mathematics test. From the difficulty distributions illustrated in the plots, a wide range of item difficulties appeared on each exam, which was one test development goal.

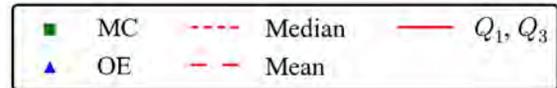
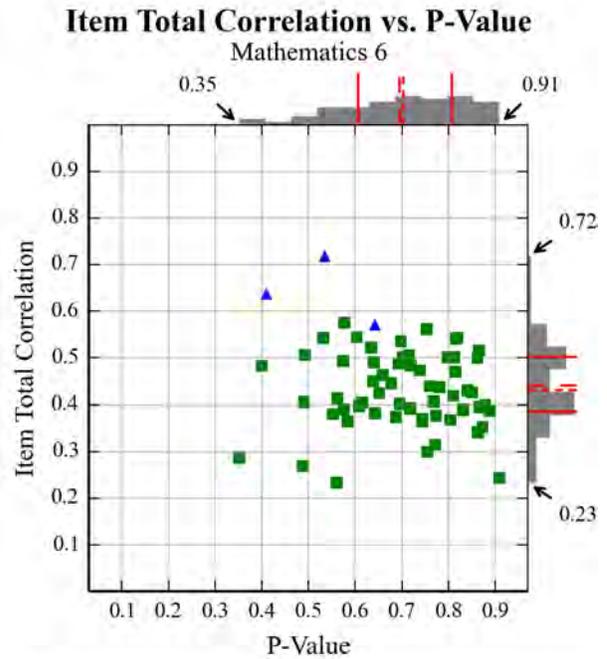
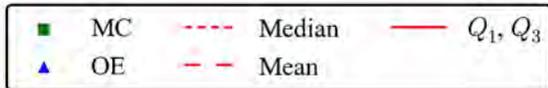
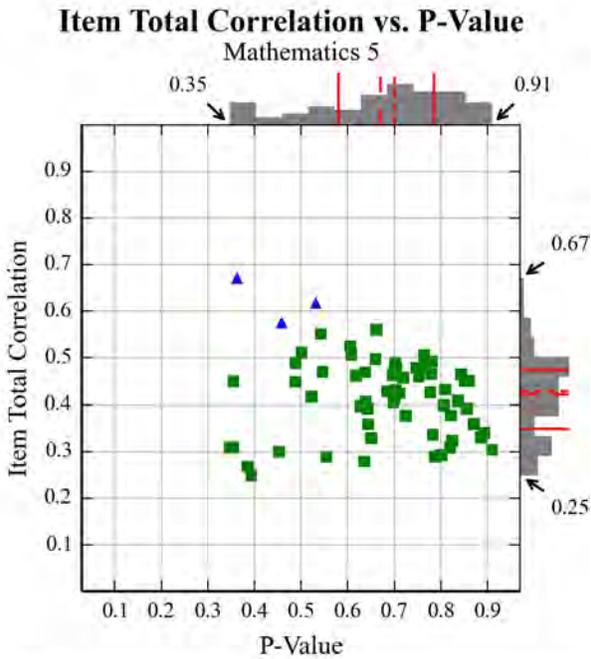
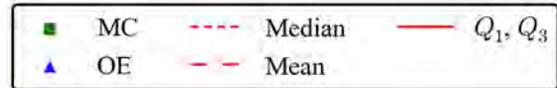
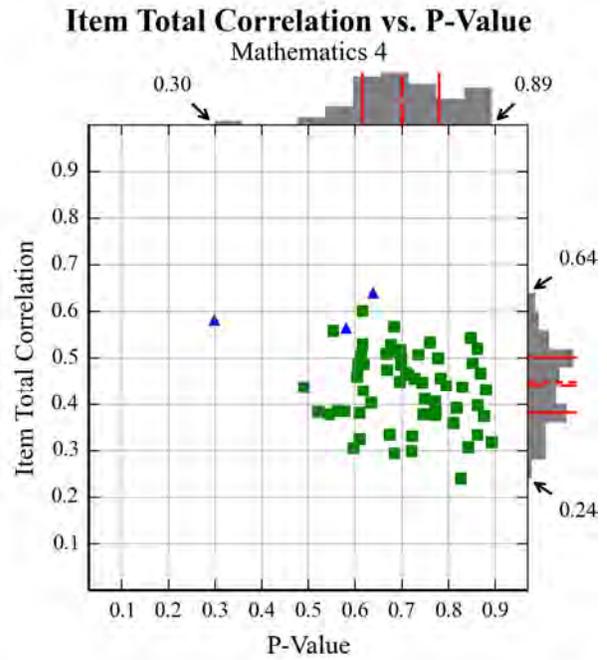
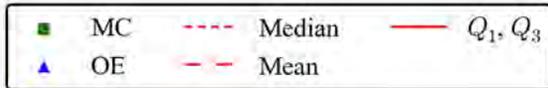
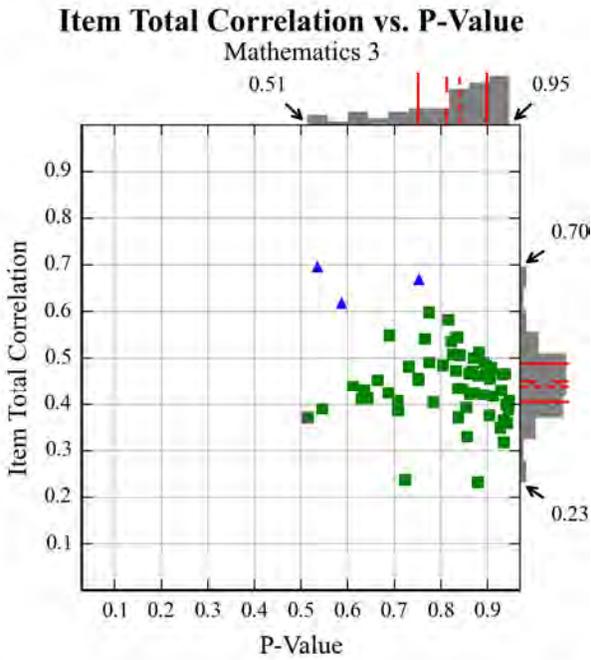
The mean item-test correlations ranged from roughly 0.31 to 0.43 and 0.44 to 0.70 for the MC and OE items, respectively. Again, these were similar to historic trends. The writing MC item-test correlations were generally the lowest, but even here were in the mid 0.30s. The writing MC items were correlated against the unweighted writing total scores, which included the prompt scores. The correlations in writing might be suppressed some because the prompt tasks are so different from the MC tasks. The OE correlations tended to be higher than the MC correlations, which is not surprising because the OE items include more score points. Based on the distribution of the discrimination statistics, the overall item quality was quite good.

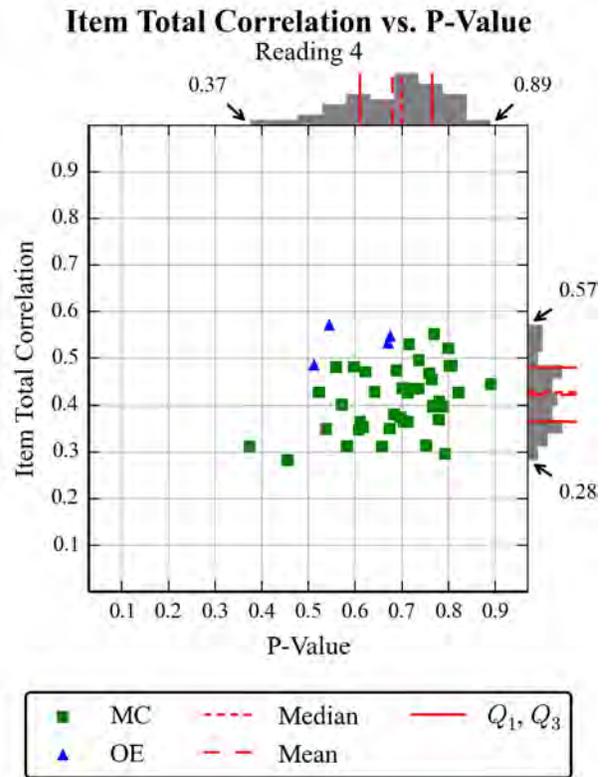
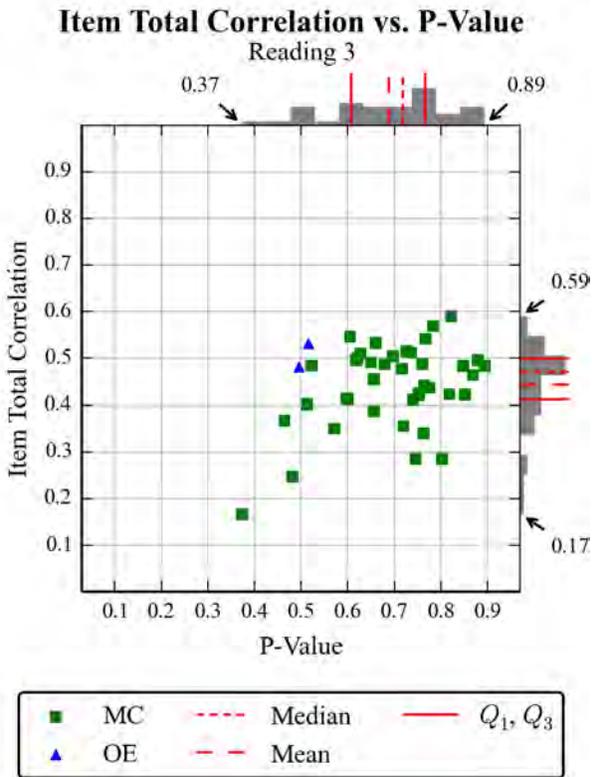
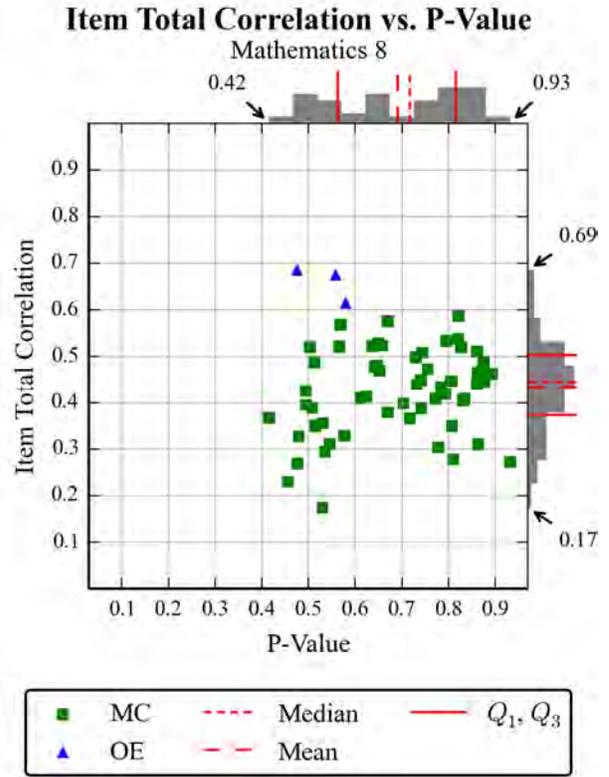
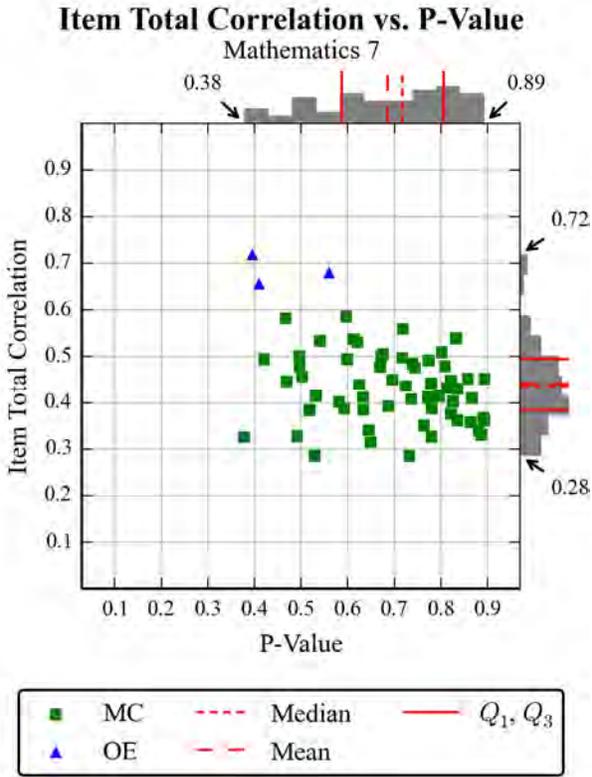
It is difficult to make global conclusions about overall test quality from these item statistics alone. With that caveat in mind, the results presented in this chapter indicate that the PSSA item difficulty and discrimination were in expected and acceptable ranges when using historic trends as a guide.¹²

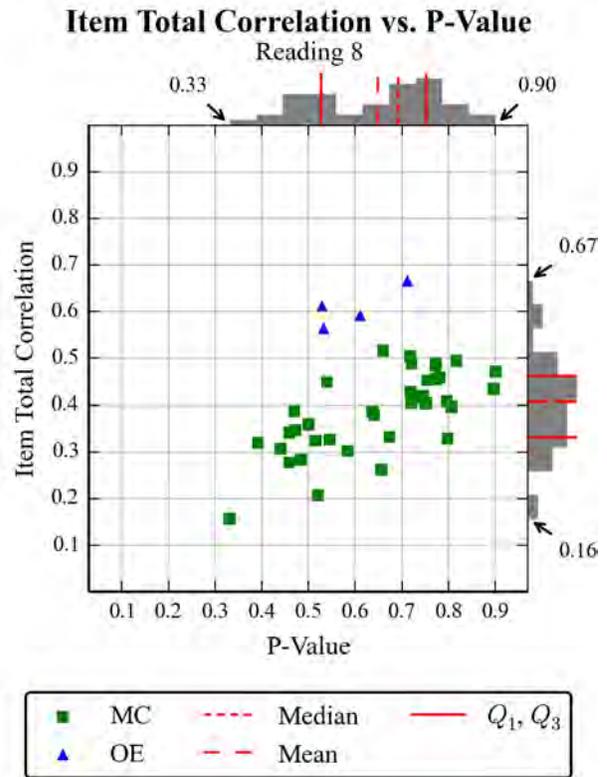
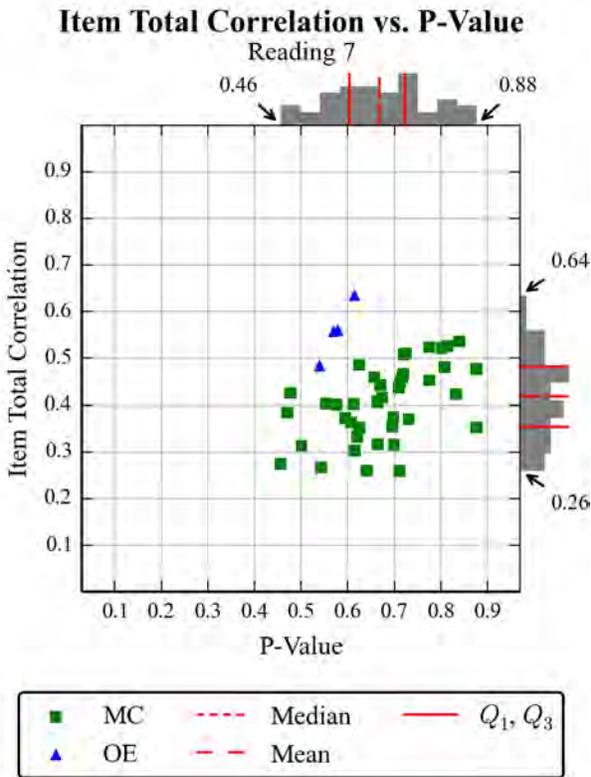
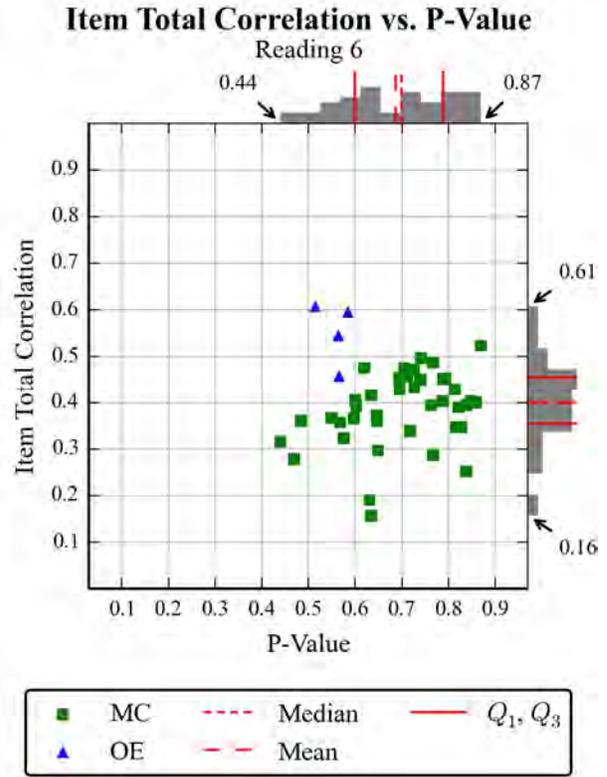
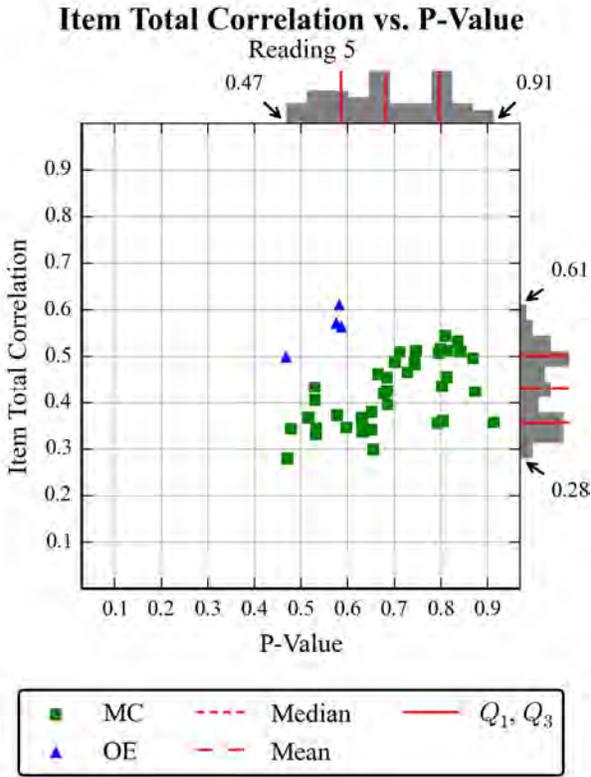
¹¹ Historically, average item difficulties have ranged from mid 0.60s to low 0.70s for most PSSA tests.

¹² Every year each PSSA test is built to the same content and statistical specifications. Since the average item difficulty and discrimination indices are similar, the historic trend is expected.

Figure 11–1. Discrimination on Difficulty Scatterplots







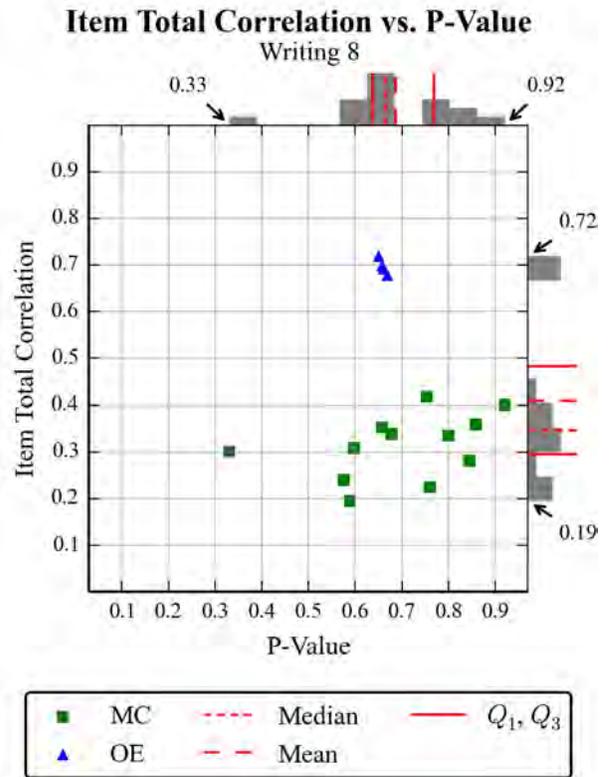
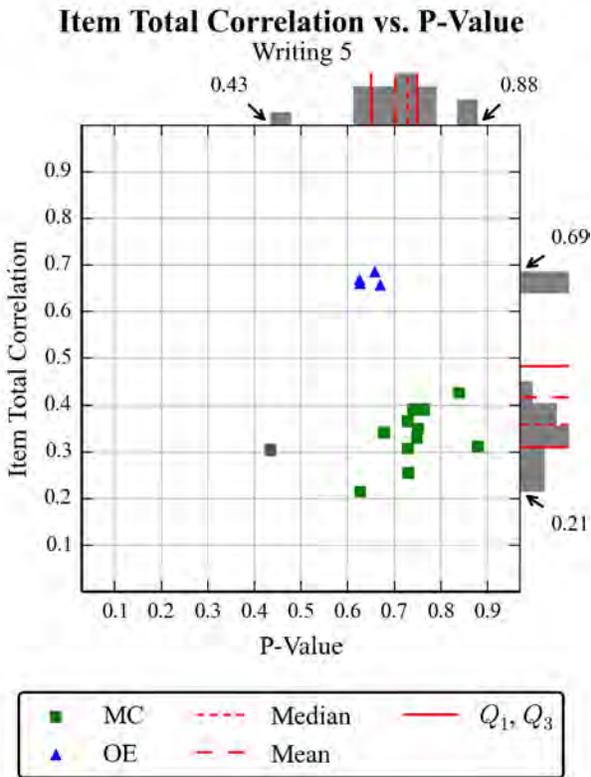
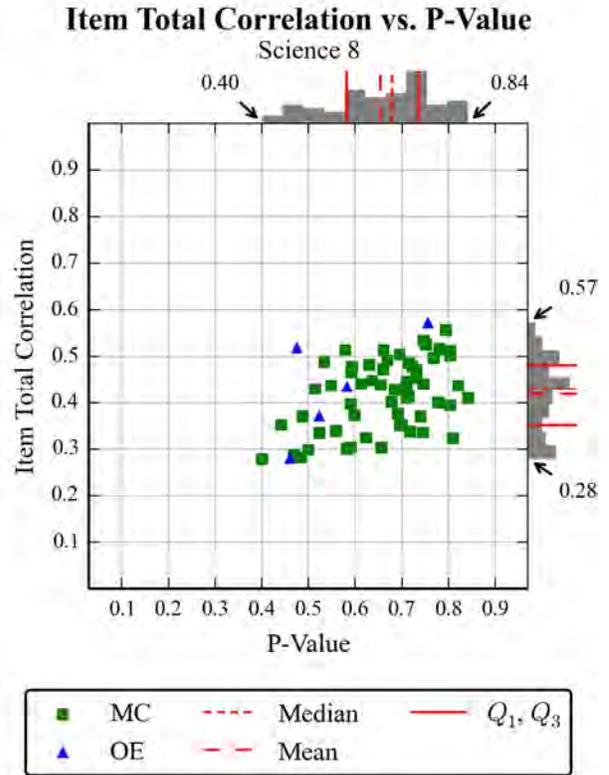
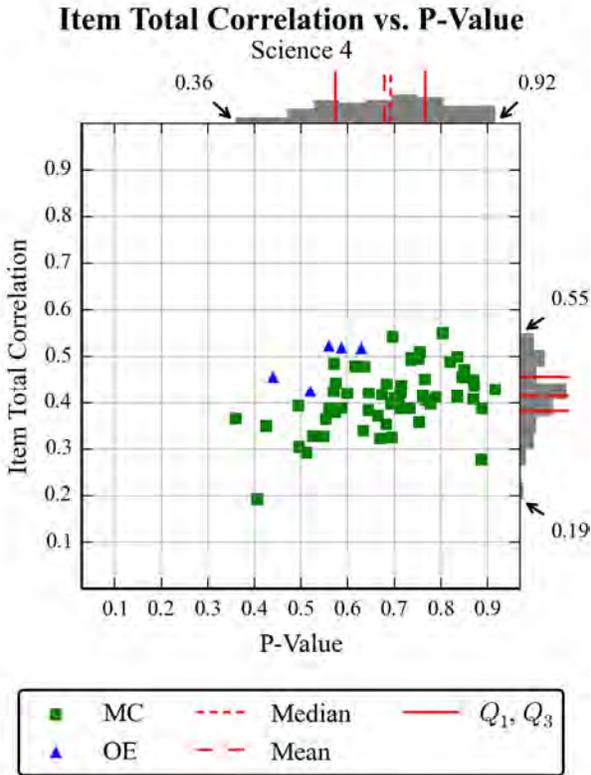


Table 11–1. Sum and Mean Statistics for MC and OE Items

Subject	Grade	Multiple-Choice Items				Open-Ended Items			
		Points	Sum	Mean P-val.	Mean I-T Corr.	Points	Sum	Mean P-Val.	Mean I-T Corr.
Mathematics	3	60	49.30	0.82	0.44	12	7.50	0.62	0.66
	4	60	42.75	0.71	0.43	12	6.07	0.51	0.60
	5	60	40.93	0.68	0.41	12	5.41	0.45	0.62
	6	60	42.23	0.70	0.43	12	6.35	0.53	0.64
	7	60	41.79	0.70	0.43	12	5.46	0.46	0.69
	8	60	41.95	0.70	0.42	12	6.45	0.54	0.66
Reading	3	40	27.87	0.70	0.44	6	3.04	0.51	0.51
	4	40	27.51	0.69	0.41	12	7.21	0.60	0.53
	5	40	27.78	0.69	0.42	12	6.63	0.55	0.56
	6	40	28.00	0.70	0.39	12	6.69	0.56	0.55
	7	40	27.09	0.68	0.40	12	6.91	0.58	0.56
	8	40	26.16	0.65	0.39	12	7.15	0.60	0.61
Science	4	58	39.99	0.69	0.41	10	5.47	0.55	0.49
	8	58	38.44	0.66	0.42	10	5.59	0.56	0.44
Writing	5	12	8.65	0.72	0.33	16	10.32	0.65	0.67
	8	12	8.36	0.70	0.31	16	10.55	0.66	0.70

Note. I-T Corr. is the item-test score correlation.

Chapter Twelve: Rasch Item Calibration

The particular item response theory (IRT) model used for the PSSA is based on the work of Georg Rasch. Rasch models have had a long-standing presence in applied testing programs and it has been the methodology continually used to calibrate PSSA items in recent history. IRT has several advantages over classical test theory, so it has become the standard procedure for analyzing item response data in large-scale assessments. However, IRT models make a number of strong assumptions related to dimensionality, local independence, model-data fit, and item parameter invariance. Resulting inferences derived from any application of IRT rests strongly on the degree to which the underlying assumptions are met.

This chapter outlines the procedures used for calibrating the operational PSSA items. Generally, item calibration is the process of assigning a difficulty-parameter estimate to each item on an assessment so that all items are placed onto a common scale. This chapter briefly introduces the Rasch model, reports the results from evaluations of the adequacy of the Rasch assumptions, and summarizes the Rasch item statistics for the PSSA mathematics, reading, and science tests. Additional Rasch procedures are discussed with respect to scale linking in Chapter Fifteen.

DESCRIPTION OF THE RASCH MODEL

The Rasch partial credit model (RPCM; Wright and Masters, 1982) was used to calibrate PSSA items because both multiple-choice (MC) and open-ended (OE) items were part of the assessment. The RPCM extends the Rasch model (Rasch, 1960) for dichotomous (0, 1) items so that it accommodates the polytomous OE item data. Under the RPCM, for a given item i with m_i score categories, the probability of person n scoring x ($x = 0, 1, 2, \dots, m_i$) is given by:

$$P_{ni}(X = x) = \frac{\exp \sum_{j=0}^x (\theta_n - D_{ij})}{\sum_{k=0}^{m_i} \exp \sum_{j=0}^k (\theta_n - D_{ij})},$$

where θ_n represents a student's proficiency (ability) level, and D_{ij} is the step difficulty of the j^{th} step on item i . For dichotomous MC items, the RPCM reduces to the standard Rasch model and the single step difficulty is referred to as the item's difficulty. The Rasch model predicts the probability of person n getting item i correct as follows:

$$P_{ni}(X = 1) = \frac{\exp(\theta_n - D_{ij})}{1 + \exp(\theta_n - D_{ij})}.$$

The Rasch model places both student ability and item difficulty (estimated in terms of log-odds or logits) on the same continuum. When the model assumptions are met, the Rasch model provides estimates of a person's ability which are independent of the items employed in the assessment, and conversely, estimates item difficulty independently of the sample of examinees. (As noted in Chapter Eleven, interpretation of item p -values confounds item difficulty and student ability.)

Software and Estimation Algorithm

Item calibration was implemented via WINSTEPS 3.54 computer program (Wright and Linacre, 2003), which employs unconditional (UCON), joint-maximum-likelihood estimation (JMLE).

Sample Characteristics

The characteristics of calibration samples are reported in Chapter Nine. These samples only include the students who attempted the tests. All omits (no response) and multiple responses (more than one response selected) were scored as incorrect answers (coded as 0s) for calibration.

CHECKING RASCH ASSUMPTIONS

Since the Rasch model was the basis of all calibration, scoring, and scaling analyses associated with the PSSA, the validity of the inferences from these results depends on the degree to which the assumptions of the model were met and how well the model fits the test data. Therefore, it is important to check these assumptions. This section evaluates the dimensionality of the data, local item independence, item fit, and item parameter invariance. It should be noted that only operational items were analyzed since they are the basis of student scores.

Unidimensionality

Rasch models assume that one dominant dimension determines the difference among students' performances. Principal Components Analysis (PCA) can be used to assess the unidimensionality assumption. The purpose of the analysis is to verify whether any other dominant component(s) exist among the items. If any other dimensions are found, the unidimensionality assumption would be violated.

Figure 12–1 shows the PCA results for the mathematics, reading, science, and writing tests. The results include the eigenvalues and the percentage of variance explained for the first five components as well as the scree plots. The scree plots show the eigenvalues plotted by component number and the results from a parallel analysis. The total number of components in PCA is same as the total number of items in a test; however, Figure 12–1 shows only the first 10 components given that beyond 10th component the additional information would be negligible.

Parallel analysis (Horn, 1965) is a technique to decide how many factors exists in principal components. Parallel analysis is considered better approach than typical rule of thumb, Kaiser's eigenvalues greater than one (Kaiser, 1960), because parallel analysis considers random chance by simulating null data (Buja and Eyuboglu, 1992). For the parallel analysis, 100 randomly simulated MC and OE responses were generated with size equal to the original data. For each random data set, a PCA was performed and the resulting eigenvalues were stored. Then for each component, the upper 95th percentile value of the distribution of the 100 eigenvalues from the random data sets was plotted. Eigenvalues below this parallel analysis line can be considered random.

As can be seen in Figure 12–1, for PSSA mathematics the primary dimension explained about 21 percent to 24 percent of the total variance across Grades 3 through 8. The eigenvalues of the second dimensions ranged from 1.7 to 2.3. This indicates that the second dimension accounted for only 1.7 to 2.3 units out of 63 units of total variance, where 63 is the total number of items in a test. The second dimension is approximately 3 percent of the total variance for all grades. All grades' second eigenvalues were larger than the threshold of parallel analysis, except grade 4, however, the eigenvalues were very close to the threshold. Overall, the PCA suggests that there is one clearly dominant dimension for all mathematics tests¹³.

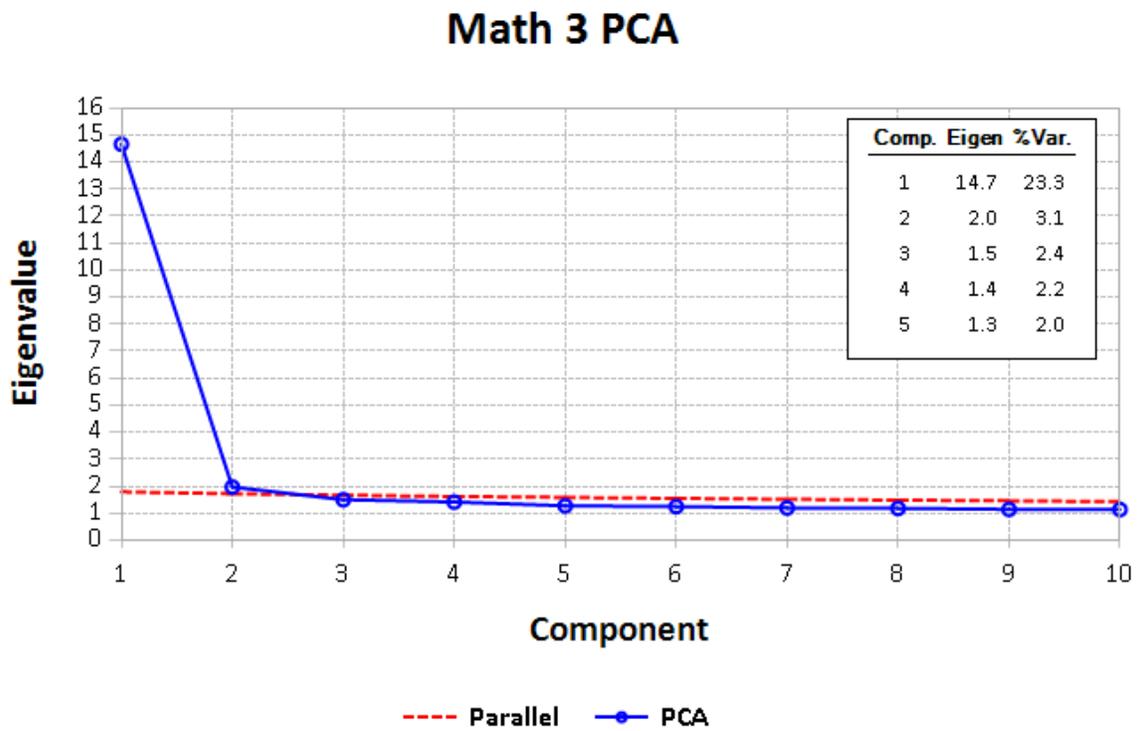
¹³ According to Reckase (1979), the variance explained by the primary dimension should be greater than 20% to indicate unidimensionality.

For the PSSA reading tests, the primary dimension explained about 20 percent to 23 percent of the total variance. The second dimension accounted for only 1.3 to 1.5 units out of 42 or 44 units total variance. The parallel analysis in the scree plots also suggests that only the first component should be retained in each grade. These results also suggest that each reading test essentially measures a single dominant dimension.

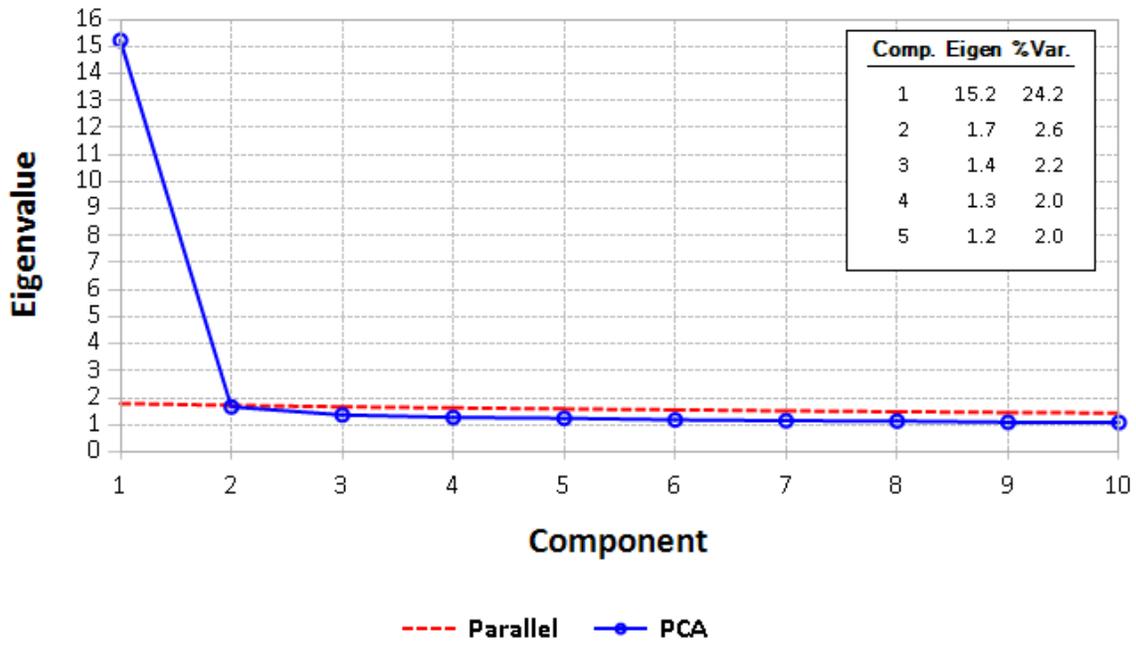
For the PSSA science tests, the primary dimension explained about 20 and 21 percent of the total variance for grades 4 and 8, respectively. The second dimension accounted for only 1.9 and 1.6 units out of 63 unit of total variance. The parallel analysis in the scree plots also suggests that only the first factor should be retained in each grade. This, too, suggests that one dominant dimension was measured by each science test.

For the PSSA writing tests, first dimension accounted for 29 percent of the total variance for both grades 5 and 8. Second dimension accounted for 8 percent of total variance, which was about 1.3 units out of 12 unit of total variance. The figures suggest that one dominant dimension was measured by each writing test.

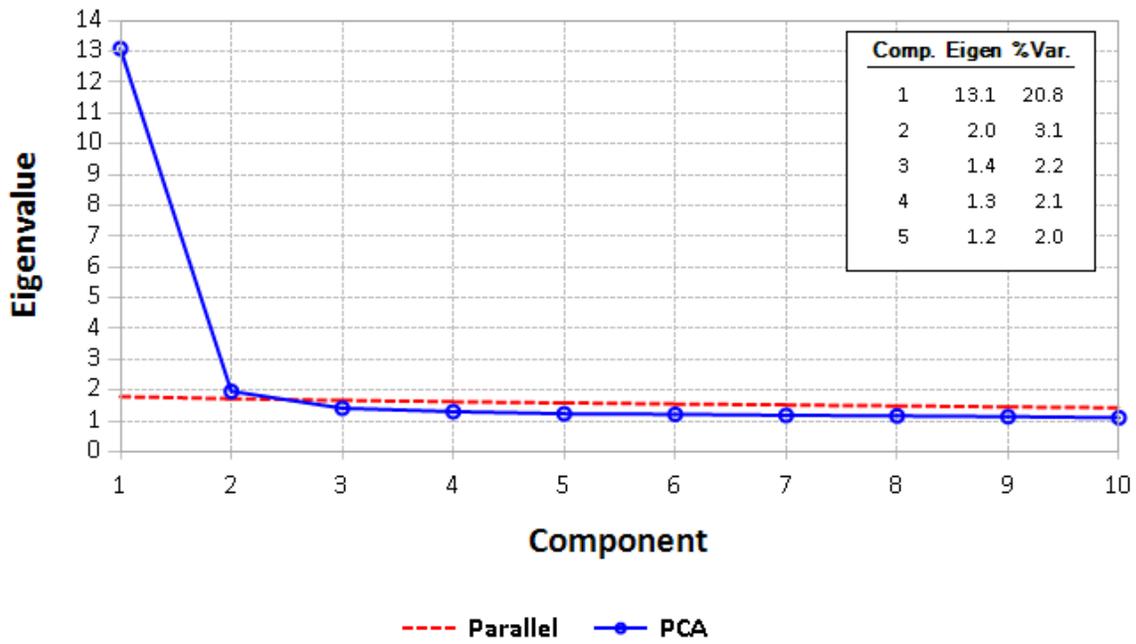
Figure 12–1. Scree Plots



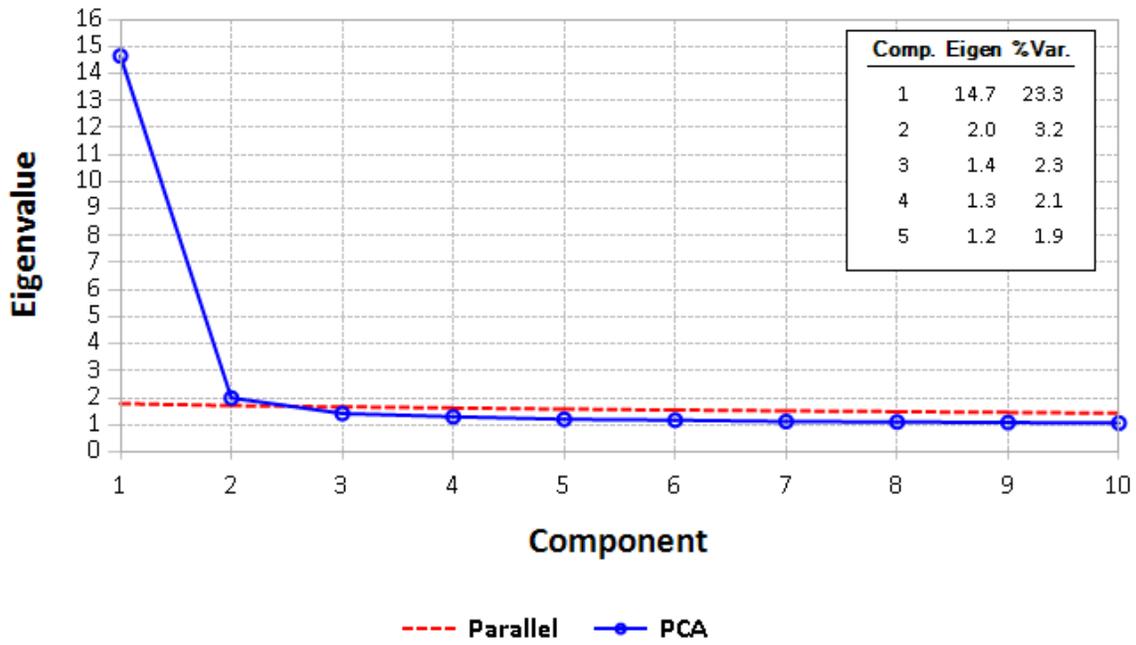
Math 4 PCA



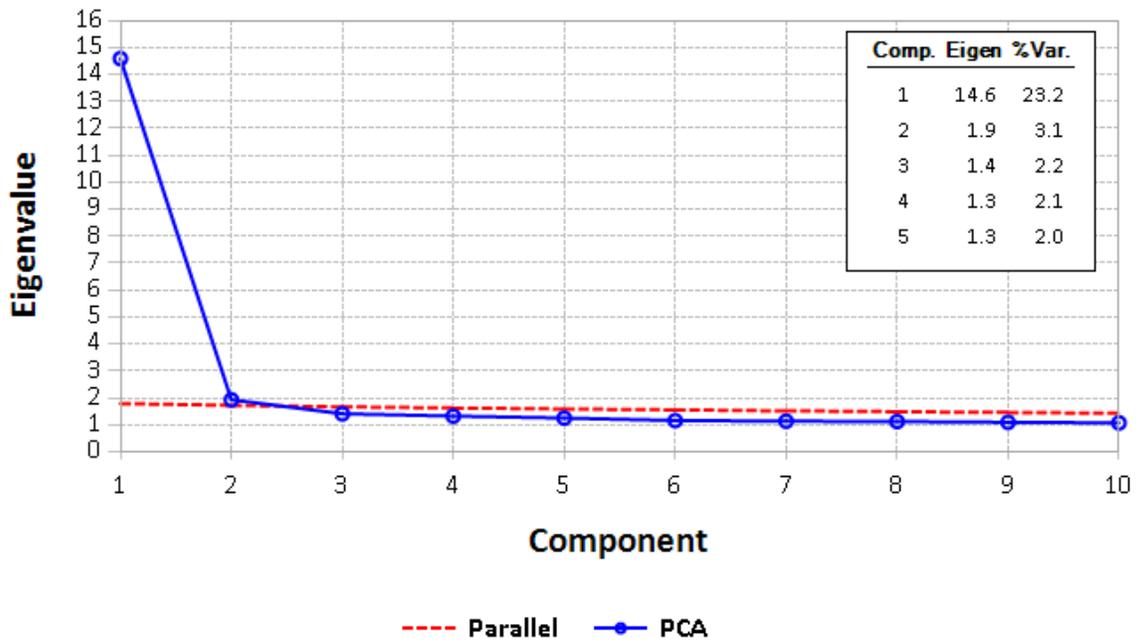
Math 5 PCA



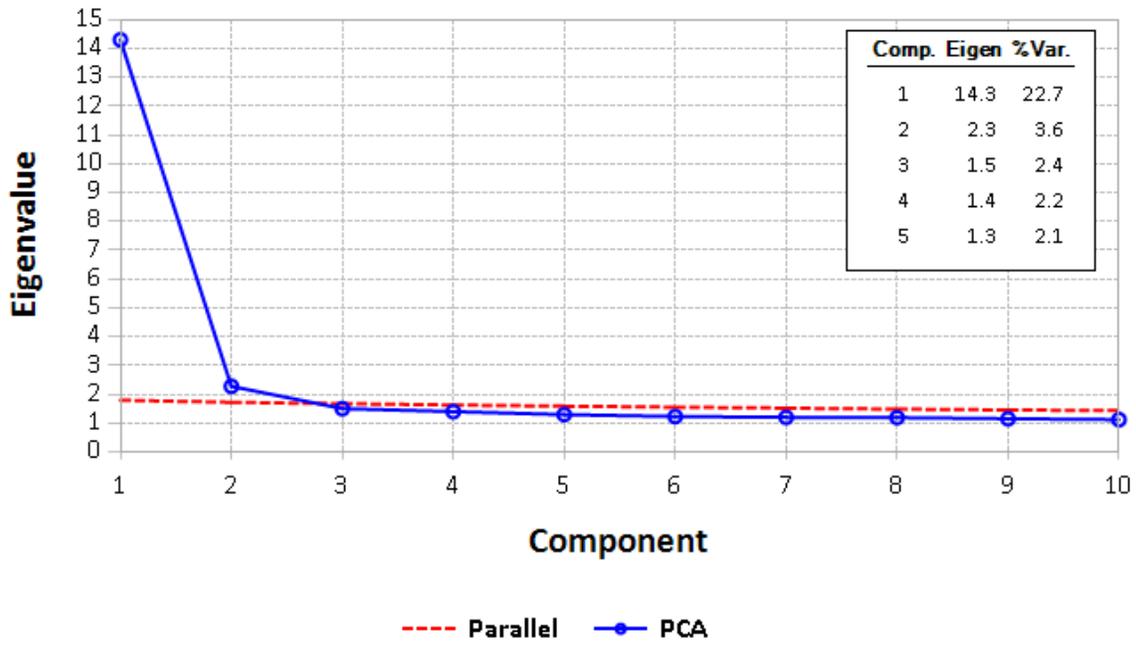
Math 6 PCA



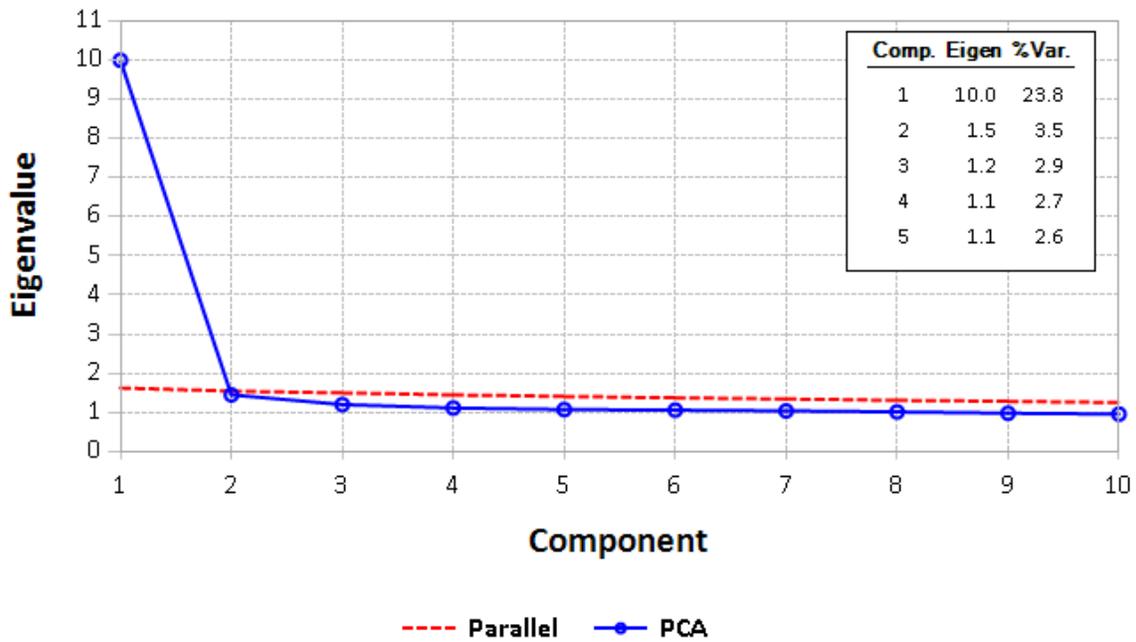
Math 7 PCA



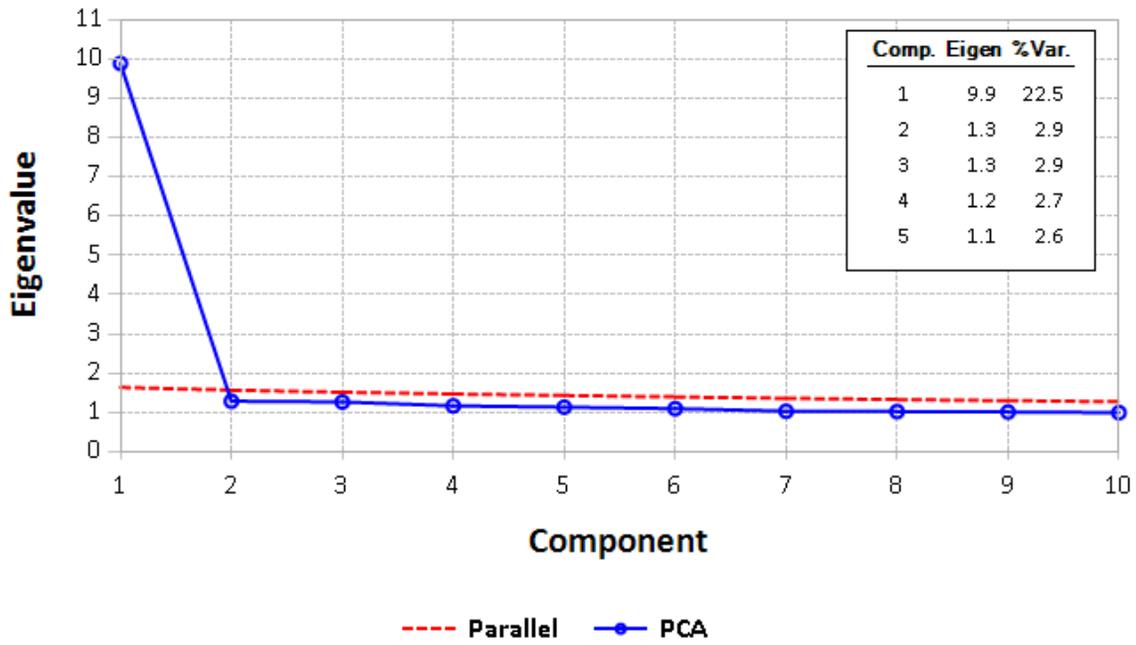
Math 8 PCA



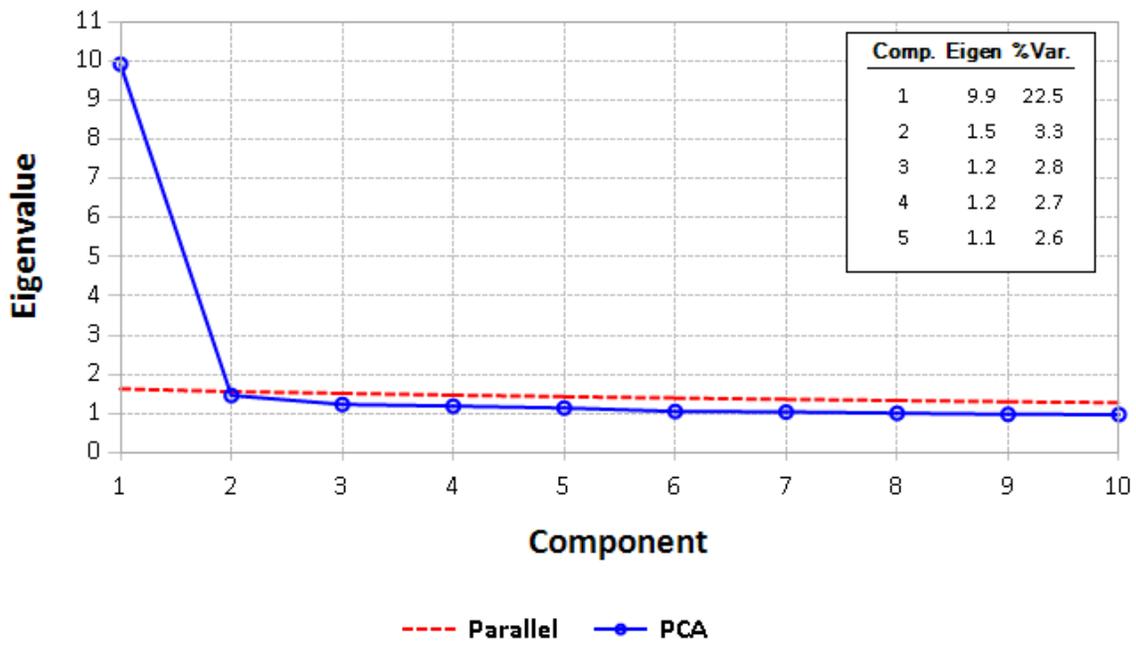
Reading 3 PCA



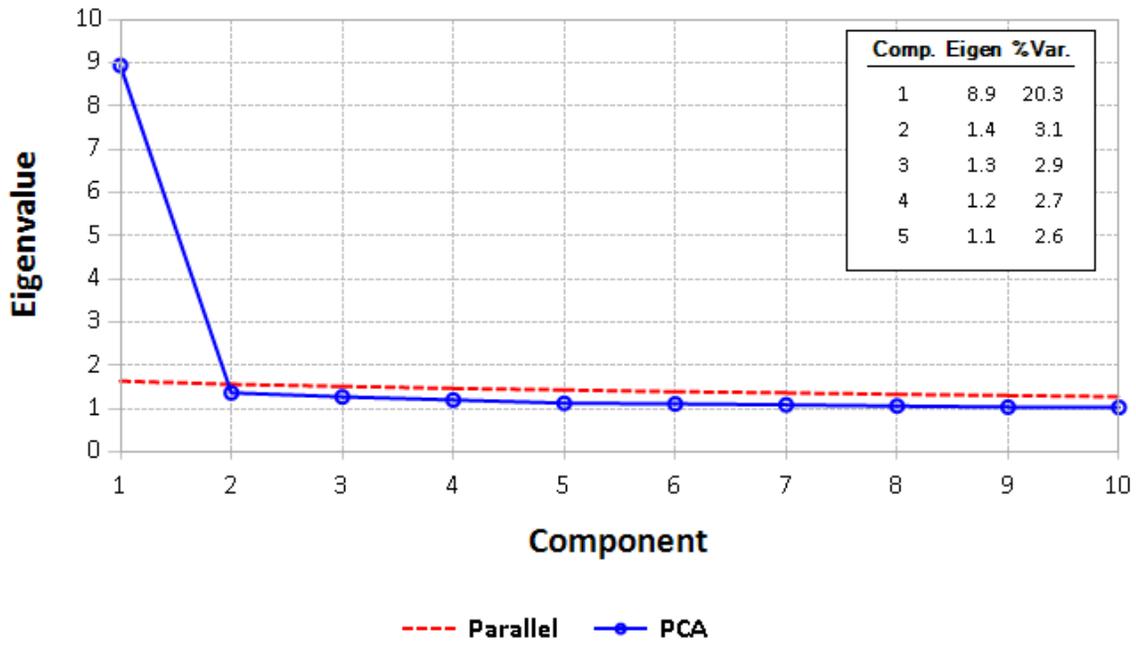
Reading 4 PCA



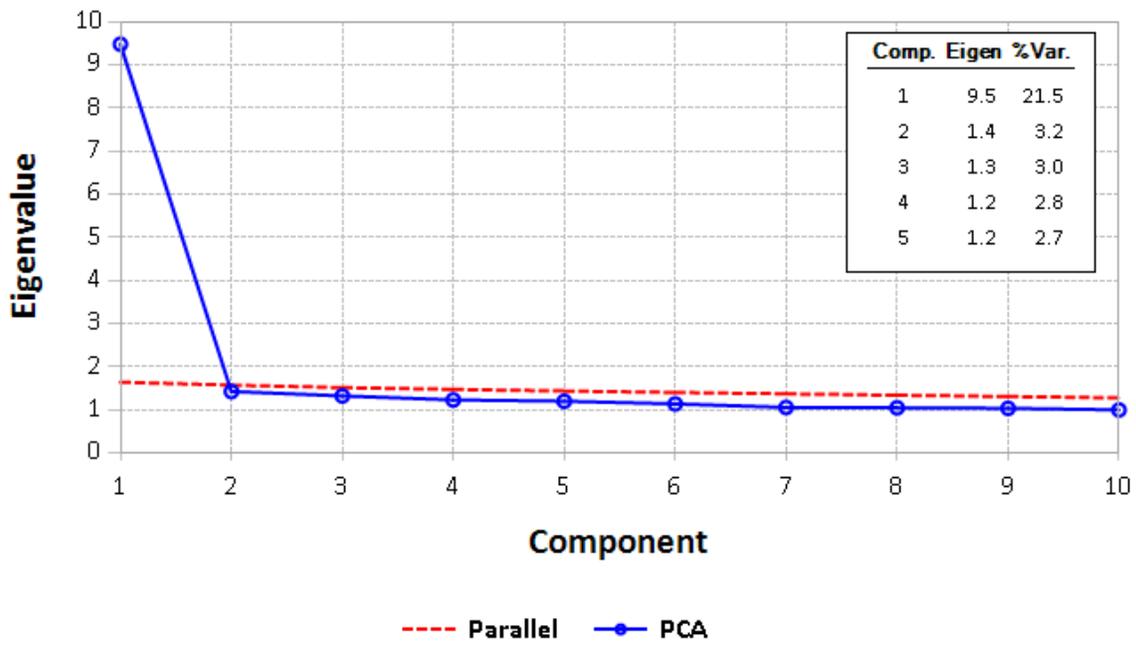
Reading 5 PCA



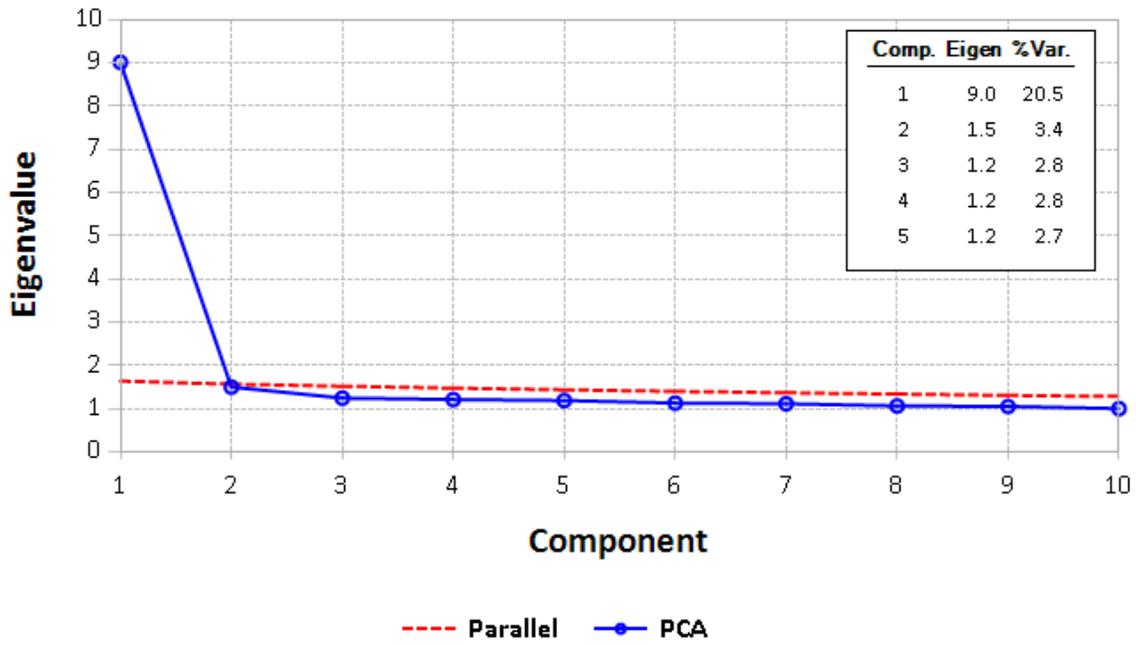
Reading 6 PCA



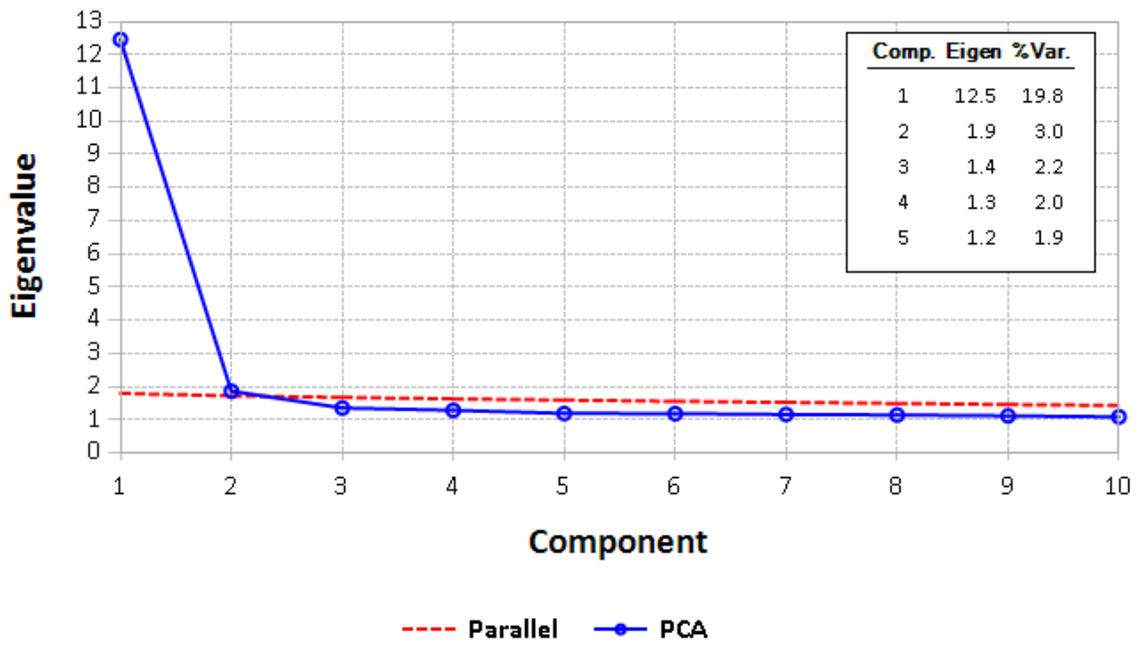
Reading 7 PCA



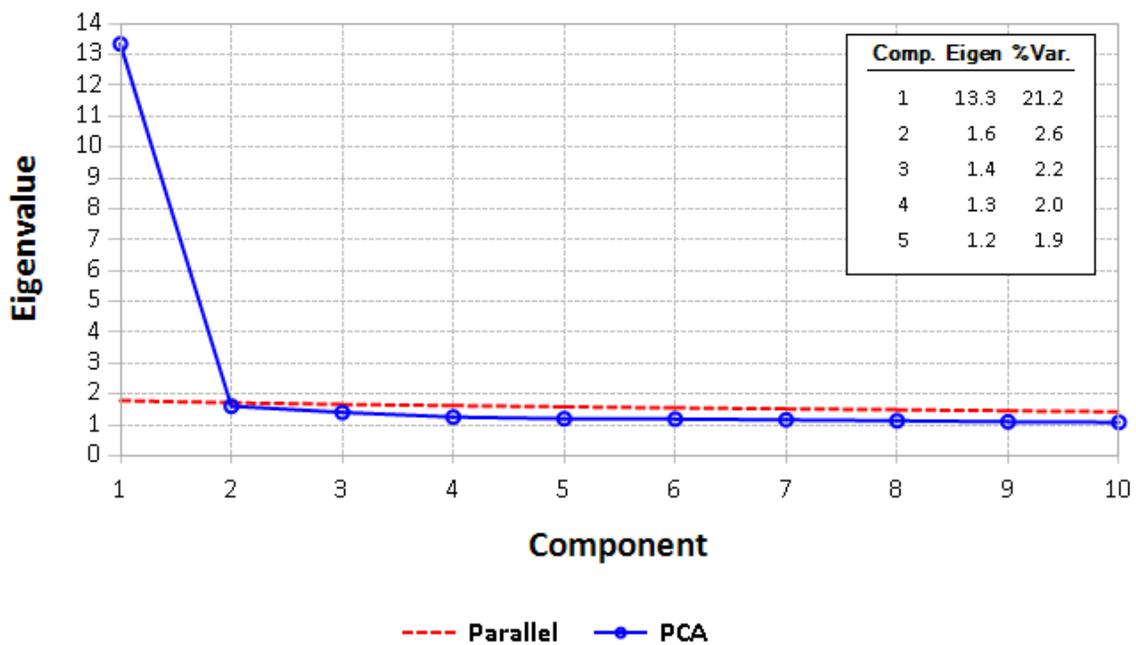
Reading 8 PCA



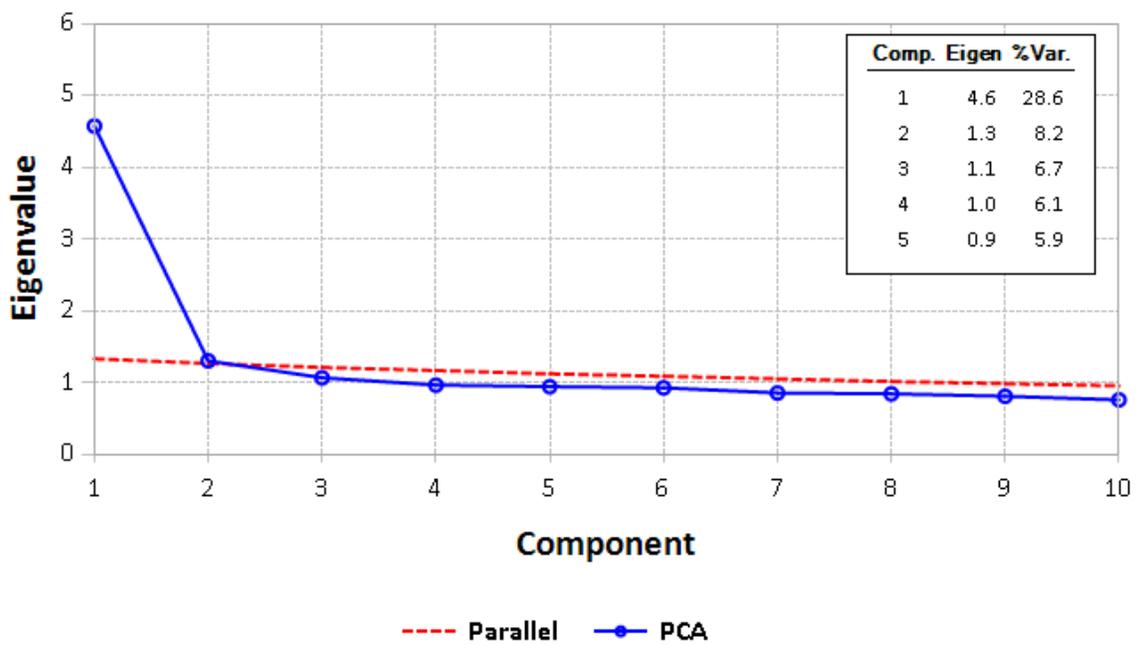
Science 4 PCA



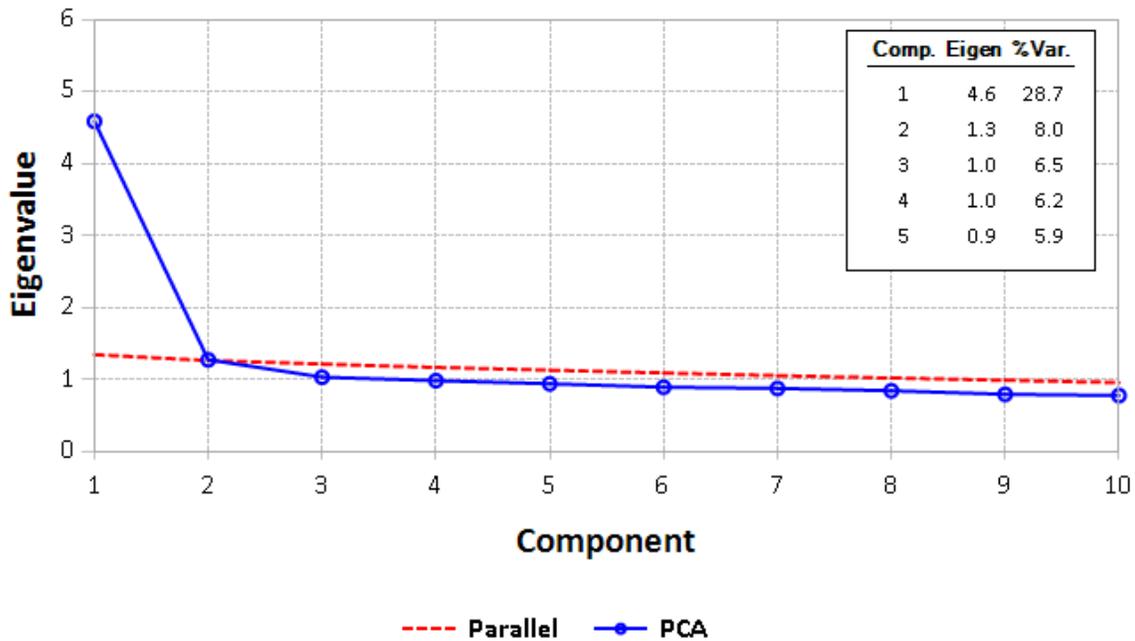
Science 8 PCA



Writing 5 PCA



Writing 8 PCA



Local Independence

Local independence (LI) is a fundamental assumption of IRT. No relationship should exist between examinees' responses to different items after accounting for the abilities measured by a test. In formal statistical terms, a test X that is comprised of items X_1, X_2, \dots, X_n is locally independent with respect to the latent variable θ if, for all $x = (x_1, x_2, \dots, x_n)$ and θ ,

$$P(\mathbf{X} = \mathbf{x} | \theta) = \prod_{i=1}^n P(X_i = x_i | \theta).$$

This formula essentially states that the probability of any pattern of responses across all items (\mathbf{x}), after conditioning on the abilities (θ) measured by the test, should be equal to the product of the conditional probabilities across each item (cf. the multiplication rule for independent events where the joint probabilities are equal to the product of the associated marginal probabilities).

The equation above shows the condition after satisfying the strong form of local independence. A weak form of local independence (WLI) was proposed by McDonald (1979). The distinction is important as many indicators of local dependency are actually framed by WLI. The requirement would be for the conditional covariances of all pairs of item responses, conditioned on the abilities, to be equal to zero. When this assumption is met, the joint probability of responses to an item pair, conditioned on abilities, is the product of the probabilities of responses to these two items, as shown below. (This is a weaker form because higher-order dependencies among items are allowed.) Based on the WLI, the following expression can be derived:

$$P(X_i = x_i, X_j = x_j | \theta) = P(X_i = x_i | \theta)P(X_j = x_j | \theta).$$

Marais and Andrich (2008) pointed out that local item dependence in the Rasch model can occur in two ways that some may not distinguish. The first way occurs when the assumption of unidimensionality is violated. Here, other nuisance dimensions besides a dominant dimension determine student performance (this can be called “trait dependence”). The second violation occurs when responses to an item depend on responses to another. This is a violation of statistical independence and can be called response dependence. Many people treat the assumptions of unidimensionality and local independence as one phenomenon and believe that once unidimensionality holds, that local independence also holds. By distinguishing the two sources of local dependence, one can see that while local independence can be related to unidimensionality, the two are different assumptions and therefore, require different tests.

Residual item correlations provided in WINSTEPS for each item pair were used to assess the local dependence among the PSSA items. In general, these residuals are computed as follows. First, expected item performance based on the Rasch model is determined using ability and item parameter estimates. Next, deviations (residuals) between the examinees’ expected and observed performance is determined for each item. Finally, for each item pair, a correlation between the respective deviations is computed.

Three types of residual correlations are available in WINSTEPS: raw, standardized, and logit. It should be noted that the raw score residual correlation essentially corresponds to Yen’s Q_3 index, a popular LI statistic. The expected value for the Q_3 statistic is approximately $-1/(k-1)$ when no local dependence exists, where k is test length (Yen, 1993). Thus, the expected Q_3 values should be approximately -0.02 for the PSSA tests (since most of the PSSA tests had more than 50 core items). Index values that are greater than 0.20 indicate a degree of local dependence that probably should be examined by test developers (Chen & Thissen, 1997).

Since the three residual correlations are very similar, the default “standardized residual correlation” in WINSTEPS was used for these analyses. Table 12–1 shows the summary statistics—mean, SD, minimum, maximum, and several percentiles (P_{10} , P_{25} , P_{50} , P_{75} , P_{90}) — for all the residual correlations for each test. The total number of item pairs (N) and the number of pairs with the residual correlations greater than 0.20 are also reported in this table. The mean residual correlations were slightly negative and the values were close to -0.02. The vast majority of the correlations were very small, suggesting local item independence generally holds for the PSSA reading, mathematics, and science tests.

Table 12–1. Summary of Item Residual Correlations for PSSA Mathematics, Reading, and Science

Statistic	Mathematics					
	3	4	5	6	7	8
N	1953	1953	1953	1953	1953	1953
Mean	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
SD	0.02	0.02	0.02	0.03	0.03	0.03
Minimum	-0.12	-0.10	-0.20	-0.09	-0.09	-0.11
P ₁₀	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04
P ₂₅	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03
P ₅₀	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
P ₇₅	0.00	0.00	0.00	0.00	-0.01	0.00
P ₉₀	0.01	0.01	0.01	0.01	0.01	0.02
Maximum	0.20	0.30	0.16	0.35	0.49	0.35
> 0.20	0	2	0	3	1	2

Statistic	Reading					
	3	4	5	6	7	8
N	861	946	946	946	946	946
Mean	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
SD	0.02	0.02	0.02	0.02	0.03	0.03
Minimum	-0.10	-0.09	-0.08	-0.09	-0.10	-0.11
P ₁₀	-0.05	-0.05	-0.05	-0.05	-0.05	-0.06
P ₂₅	-0.03	-0.03	-0.03	-0.03	-0.04	-0.03
P ₅₀	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
P ₇₅	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
P ₉₀	0.00	0.01	0.00	0.00	0.01	0.01
Maximum	0.12	0.11	0.08	0.08	0.24	0.18
> 0.20	0	0	0	0	1	0

Statistic	Science	
	4	8
N	1953	1953
Mean	-0.01	-0.02
SD	0.02	0.02
Minimum	-0.08	-0.10
P ₁₀	-0.04	-0.04
P ₂₅	-0.03	-0.03
P ₅₀	-0.02	-0.02
P ₇₅	-0.01	0.00
P ₉₀	0.01	0.01
Maximum	0.11	0.23
> 0.20	0	1

Table 12–1 (continued). Summary of Item Residual Correlations for PSSA Mathematics, Reading, and Science

Statistic	Writing	
	5	8
N	1953	1953
Mean	-0.01	-0.02
SD	0.02	0.02
Minimum	-0.08	-0.10
P ₁₀	-0.04	-0.04
P ₂₅	-0.03	-0.03
P ₅₀	-0.02	-0.02
P ₇₅	-0.01	0.00
P ₉₀	0.01	0.01
Maximum	0.11	0.23
> 0.20	0	1

Table 12–2 lists all item pairs with residual correlations greater than 0.20 with the added information of session, sequence, and Eligible Content. In terms of position, there is not an obvious pattern as some pairs of items were very close together in the test booklet while others appeared at opposites ends of the test booklet in separate sections. The pattern that is evident, however, is that these correlated items share identical or very similar Eligible Content and are testing the same or similar skills. Test blueprints determine what Assessment Anchors, as defined by the Eligible Content, will be assessed. PDE and DRC make every effort to avoid one item cueing another through careful item selection and sequencing.

Table 12–2. Item Pairs With Large Residual Correlations

	Grade	Item 1				Item 2				Resid. Corr.
		Session	Seq.	Type	Eligible Content	Session	Seq.	Type	Eligible Content	
Mathematics	4	1	15	MC	B.1.1.3	3	54	MC	B.1.1.3	0.23
	4	5	101	MC	C.3.1.1	1	25	OE	C.3	0.30
	6	1	16	MC	A.1.1.4	3	60	MC	A.1.1.4	0.34
	6	1	16	MC	A.1.1.4	5	115	MC	A.1.1.4	0.33
	6	3	60	MC	A.1.1.4	5	115	MC	A.1.1.4	0.35
	7	1	16	MC	E.2.1.1	3	50	MC	E.2.1.1	0.49
	8	1	12	MC	D.4.1.3	5	106	MC	D.1.1.3	0.26
	8	1	18	MC	A.1.1.1	5	102	MC	A.1.1.1	0.35
Reading	7	2	45	MC	A.1.4.1	2	46	MC	B.1.1.1	0.24
Science	8	1	19	MC	C.2.1.1	2	59	MC	C.2.1.3	0.23
Writing	5	1	4	MC	B.6	1	11	MC	B.6	0.23
	5	1	18	MC	B.6	1	19	MC	B.5	0.21
	5	2	21	OE	A.1	2	21	OE	B.6	0.65
	5	2	21	OE	A.1	3	22	OE	A.2	-0.74
	5	2	21	OE	A.1	3	22	OE	B.6	-0.68
	5	2	21	OE	B.6	3	22	OE	A.2	-0.57
	5	2	21	OE	B.6	3	22	OE	B.6	-0.51
	5	3	22	OE	A.2	3	22	OE	B.6	0.88
	8	1	3	MC	B.5	1	11	MC	B.5	0.26
	8	1	3	MC	B.5	1	12	MC	B.5	0.24
	8	1	3	MC	B.5	1	19	MC	B.5	0.21
	8	1	11	MC	B.5	1	19	MC	B.5	0.21
	8	1	11	MC	B.5	1	20	MC	B.6	0.21
	8	1	3	MC	B.5	1	20	MC	B.6	0.22
	8	1	11	MC	B.5	1	12	MC	B.5	0.23
	8	2	21	OE	A.2	2	21	OE	B.6	0.57
	8	3	22	OE	A.3	3	22	OE	B.6	0.57
	8	2	21	OE	A.2	3	22	OE	A.3	-0.68
	8	2	21	OE	A.2	3	22	OE	B.6	-0.49
	8	2	21	OE	B.6	3	22	OE	A.3	-0.50

Item Fit

WINSTEPS provides two item fit statistics (infit and outfit) for evaluating the degree to which the Rasch model predicts the observed item responses. Each fit statistic can be expressed as a mean square (MnSq) statistic or on a standardized metric (Zstd with mean = 0 and variance = 1). MnSq values are more oriented toward practical significance, while Zstd values are more oriented toward statistical significance. Though both are informative, the Zstd values are very likely too sensitive to the large sample sizes observed on the PSSA. In this situation it is recommended that the Zstd values be ignored if the MnSq values are acceptable (Linacre, 2009).

Both infit and outfit MnSq are the average of standardized residual variance (the difference between the observed score and the Rasch estimated score divided by the square root of the Rasch model variance). The difference is that the outfit statistic gives all examinees equal weight in computing the fit and tends to be affected more by unexpected responses far from the person, item, or rating scale category measure (i.e., it is more sensitive to outlying, off-target, low information responses). The infit statistic is weighted by the examinee locations relative to item difficulty and tends to be affected more by unexpected responses close to the person, item, or rating scale category measure (i.e., informative, on-target responses). Some feel that extreme infit values are a greater threat to the measurement process than extreme outfit since most tests intend to measure the on-target population rather than extreme outliers.

The expected MnSq value is 1.0 and can range from 0 to infinity. Deviation in excess of the expected value can be interpreted as noise or lack of fit between the items and the model. Values lower than the expected value can be interpreted as item redundancy or overfitting items (too predictable, too much redundancy), and values greater than the expected value indicate underfitting items (too unpredictable, too much noise). Rules of thumb regarding “practically significant” MnSq values vary. More conservative users might prefer items with MnSq values that range from 0.8 to 1.2. Others believe reasonable test results can be achieved with values from 0.5 to 1.5. In the results below, values outside of 0.7 to 1.3 are given practical importance.

Table 12–3 presents the summary statistics of infit and outfit mean square statistics for the PSSA reading, mathematics, science, and writing tests, including the mean, SD, and minimum and maximum values. The number of items within the range of [0.7, 1.3] is also reported in Table 12–3. As can be seen, the mean values for both fit statistics were close to 1.00 for mathematics, reading and science tests. All the items had infit values falling in the range of [0.7, 1.3] for mathematics, reading, and science tests, except grade 3 and 8 mathematics. Though more outfit values fell outside this range than infit values with mathematics, reading, and science tests, most of the extreme values were just barely above 1.3 or below 0.7. Overall, these results indicate that the Rasch model fits the PSSA item data well in mathematics, reading and science. As in previous years, the fit of the model to the writing data is relatively poor compared to the other content areas given its length, structure, and item weighting.

Table 12–3. Summary of Infit and Outfit Mean Square Statistics for PSSA Mathematics, Reading, and Science

	Infit Mean Square					Outfit Mean Square					
	Mean	SD	Min	Max	[0.7,1.3]	Mean	SD	Min	Max	[0.7,1.3]	
Mathematics	3	0.99	0.10	0.80	1.38	80/81	0.97	0.22	0.58	1.88	72/81
	4	0.99	0.10	0.79	1.29	81/81	0.99	0.20	0.63	1.71	71/81
	5	0.99	0.10	0.82	1.28	81/81	0.99	0.17	0.68	1.44	76/81
	6	1.00	0.10	0.81	1.28	81/81	0.98	0.18	0.60	1.44	73/81
	7	0.99	0.10	0.82	1.24	81/81	0.99	0.19	0.61	1.46	70/81
	8	0.98	0.12	0.76	1.34	79/81	0.96	0.21	0.56	1.50	69/81
Reading	3	0.99	0.12	0.78	1.27	58/58	0.97	0.23	0.56	1.57	47/58
	4	0.99	0.09	0.82	1.22	60/60	0.97	0.17	0.64	1.39	56/60
	5	0.99	0.09	0.79	1.16	60/60	0.98	0.18	0.61	1.31	54/60
	6	1.00	0.09	0.75	1.29	60/60	0.98	0.17	0.58	1.50	55/60
	7	0.99	0.10	0.82	1.20	60/60	0.98	0.18	0.64	1.41	52/60
	8	0.99	0.09	0.82	1.21	60/60	0.99	0.18	0.53	1.52	54/60
Science	4	0.99	0.09	0.80	1.29	87/87	0.97	0.16	0.61	1.41	80/87
	8	1.00	0.09	0.82	1.27	87/87	0.99	0.15	0.66	1.29	85/87
Writing	5	1.45	0.51	0.62	2.12	1/16	7.57	4.16	0.54	9.90	1/16
	8	1.55	0.58	0.56	2.33	2/16	7.54	4.16	0.45	9.90	1/16

Population Invariance

The property of invariance is regarded as the cornerstone of IRT and is its major distinguishing attribute from classical test theory (Hambleton, Swaminathan, & Rogers, 1991). It is this property that makes many IRT applications possible (e.g., equating, item banking, investigation of item bias, and adaptive testing) (Hambleton et al., 1991, p.25). Inferences from these IRT applications are valid to the extent that the property of invariance holds. Therefore, it is important to evaluate invariance whenever applying IRT.

Invariance should hold for both item and ability parameters. Item invariance implies that item parameter estimates do not depend on the particular sample of examinees used to derive them. Person (ability parameter) invariance means that examinees’ ability estimates do not depend on which items are administered. For the Rasch item calibrations, it is more important to determine how well the item invariance assumption holds. Therefore, only item invariance is evaluated here. We call item invariance “population invariance” with the intention that item parameters do not depends on particular population.

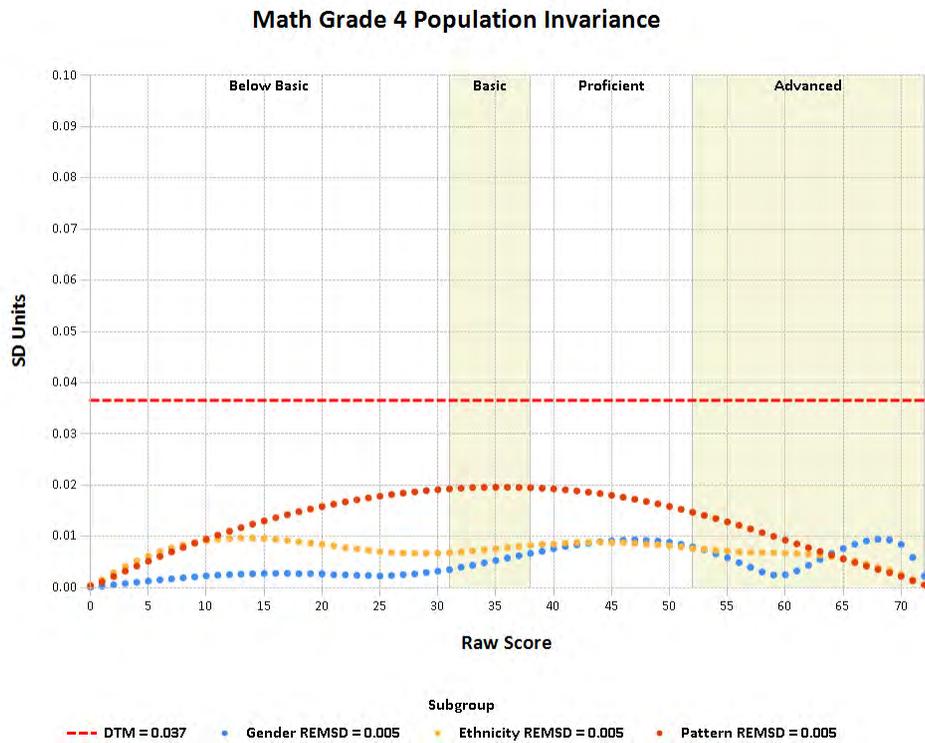
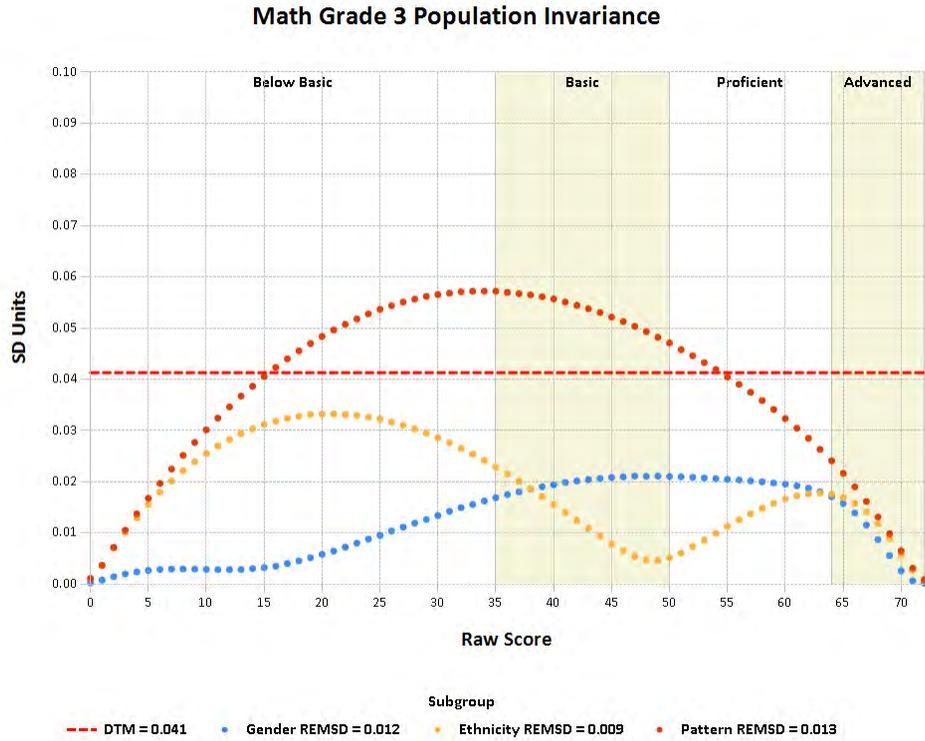
Population invariance was examined using the root mean squared difference (RMSD) and the root expected mean standardized difference (REMSD) statistics (Dorans and Holland, 2000). The RMSD statistic quantifies the difference in the equating relationship at an observed score in terms of the subgroup relationship and the full group equating relationship. The RMSD statistic is given by

$$RMSD(x) = \frac{\sqrt{\sum_{h=1}^H w_h [eq_{Yh}(x) - eq_Y(x)]^2}}{\sigma(Y)}$$

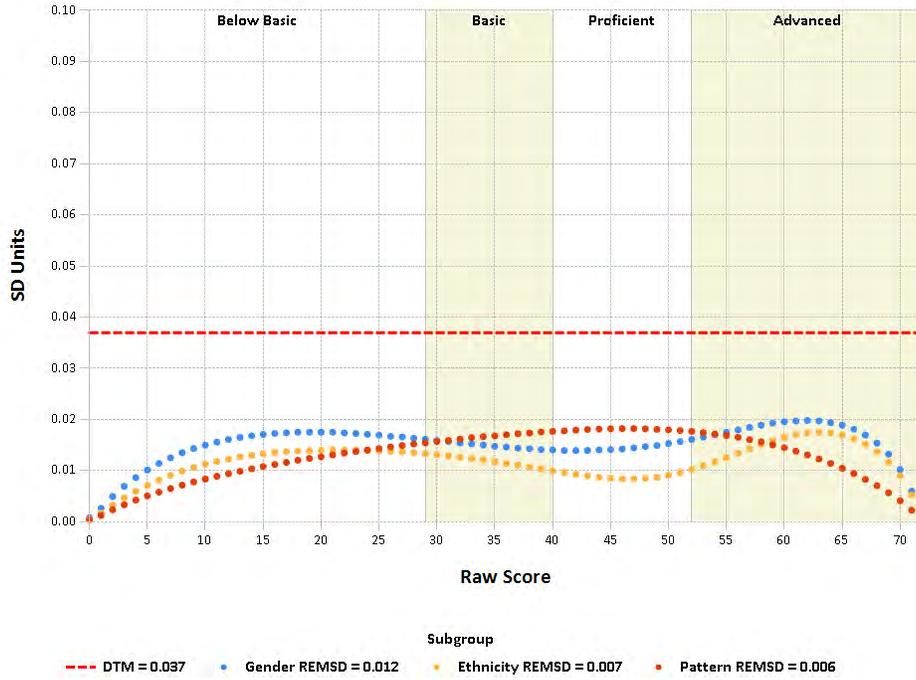
where x is an observed 2013 raw score, $eq_{Yh}(x)$ is the 2013 equating function for subgroup h , $eq_Y(x)$ is the 2013 equating function for the full group, $w_h = \frac{N_h}{N}$, and $\sigma(Y)$ is the standard deviation of the previous year's raw scores. A related index, REMSD, summarizes the average difference between the equating across all observed score points. Dorans and Feigenbaum (1994) and Dorans, Holland, Thayer and Tateneni (2003) used the notion of a "difference that matters" (DTM) index to provide further context for interpreting the population invariance results. The DTM for a particular assessment depends on the reporting scale. For the PSSAs, one raw score point translates to different scaled scores and potentially different performance level classifications. Differences in equating functions greater than half a raw score point would result in different scores reported. For this reason, a DTM of a half a point is used for our evaluation of population invariance. RMSD and REMSD are compared relative to the standardized DTM which is obtained by dividing 0.5 by the standard deviation in the denominator of the RMSD and REMSD.

Figure 12–2 presents the RMSDs for gender, ethnicity and scramble pattern group and includes REMSD estimates for each equating set. The REMSD statistics, which provide a summary of the differences across all observed score points, are all lower than the DTM indicating that the equating results are invariant with respect to gender, ethnicity and scramble pattern group. The plots of the RMSDs typically fall below the DTM for all score points across each test except in mathematics grades 3 and 8. In grade 3 mathematics, differences between the equating based on groups taking the scrambled test forms exceeds the DTM for a range of raw scores mostly below the proficient cut point. In grade 8 mathematics, the differences between the equating based on gender groups is above the DTM for a range of raw scores in the center of the distribution.

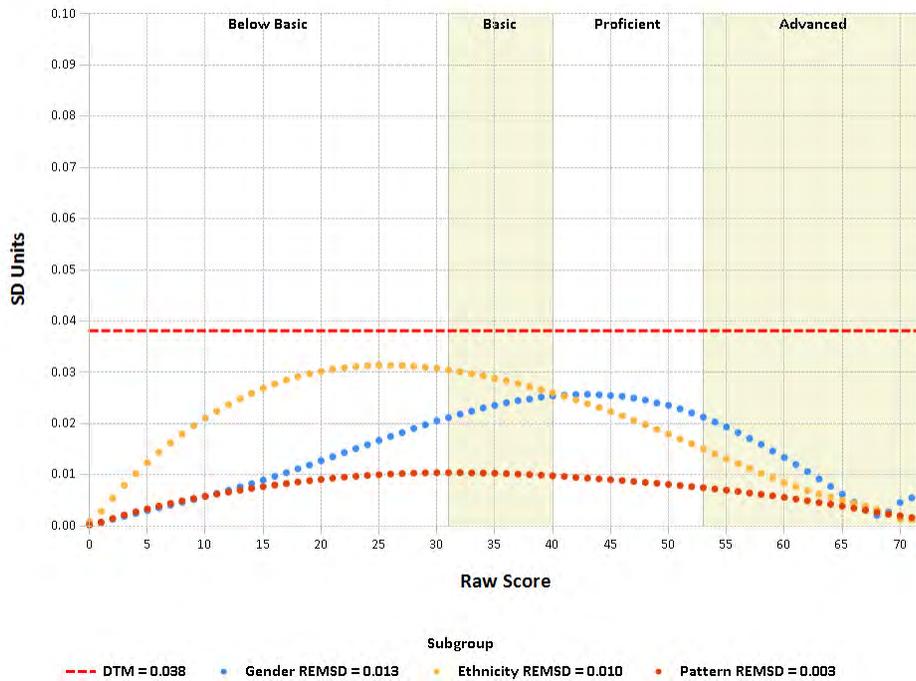
Figure 12–2. Population Invariance Plots



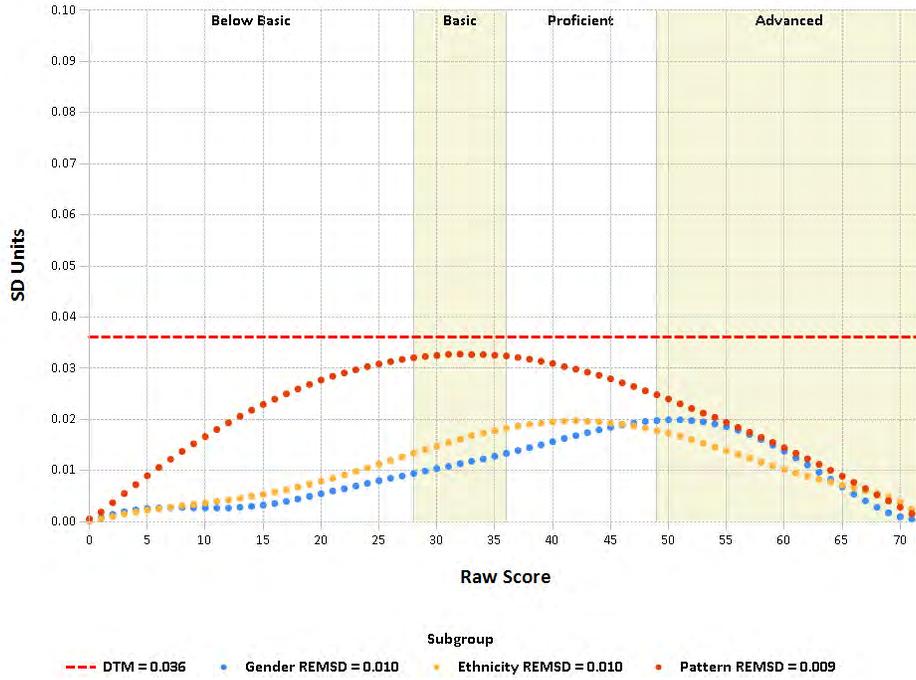
Math Grade 5 Population Invariance



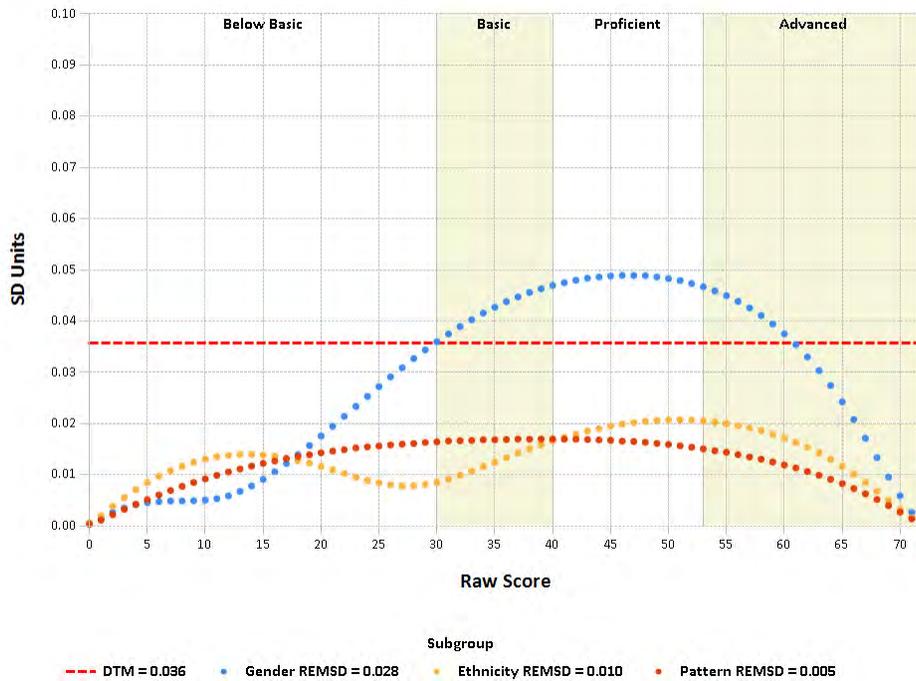
Math Grade 6 Population Invariance



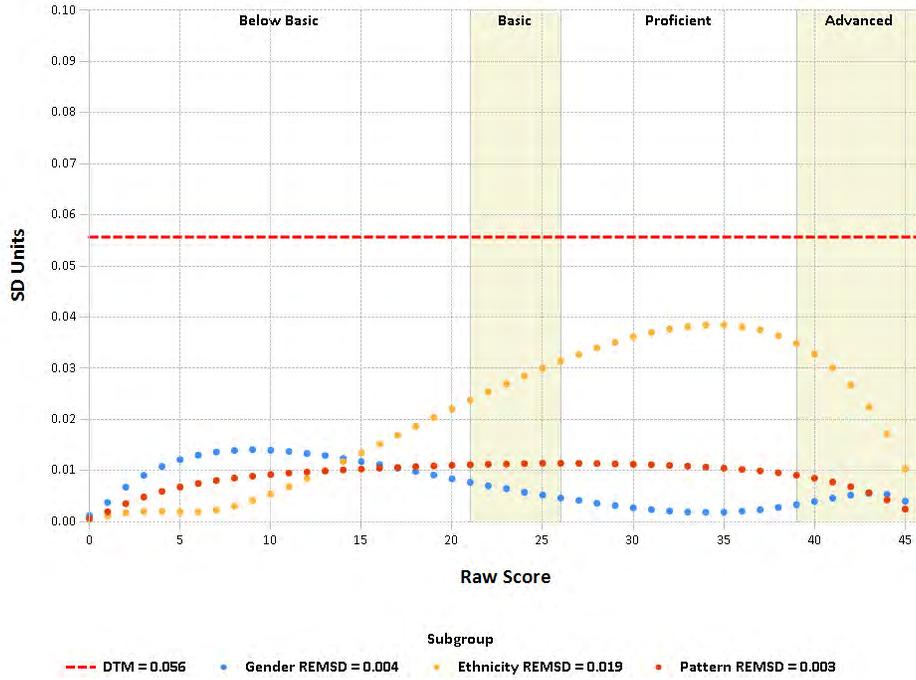
Math Grade 7 Population Invariance



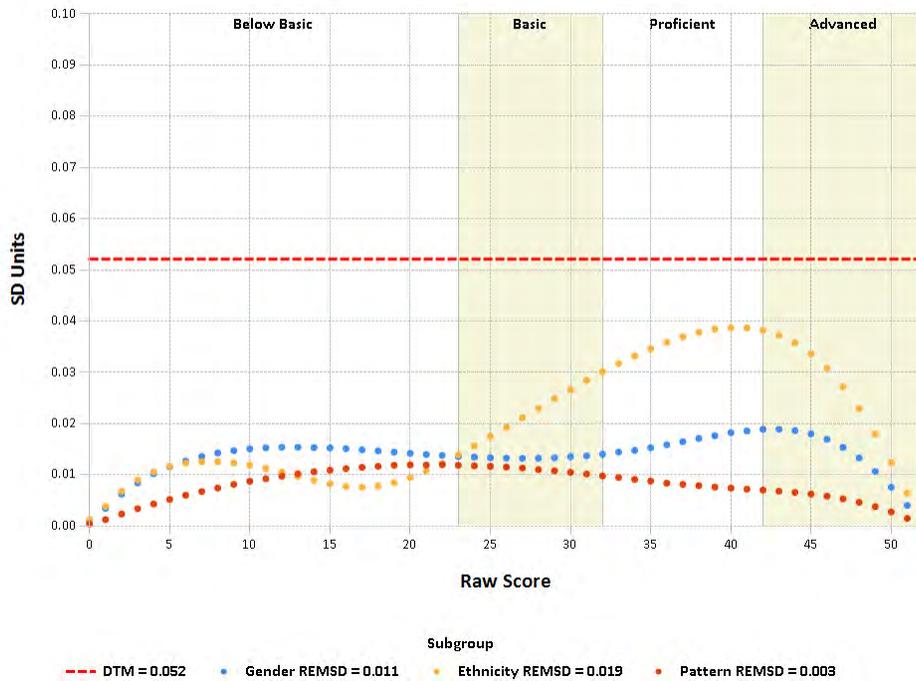
Math Grade 8 Population Invariance



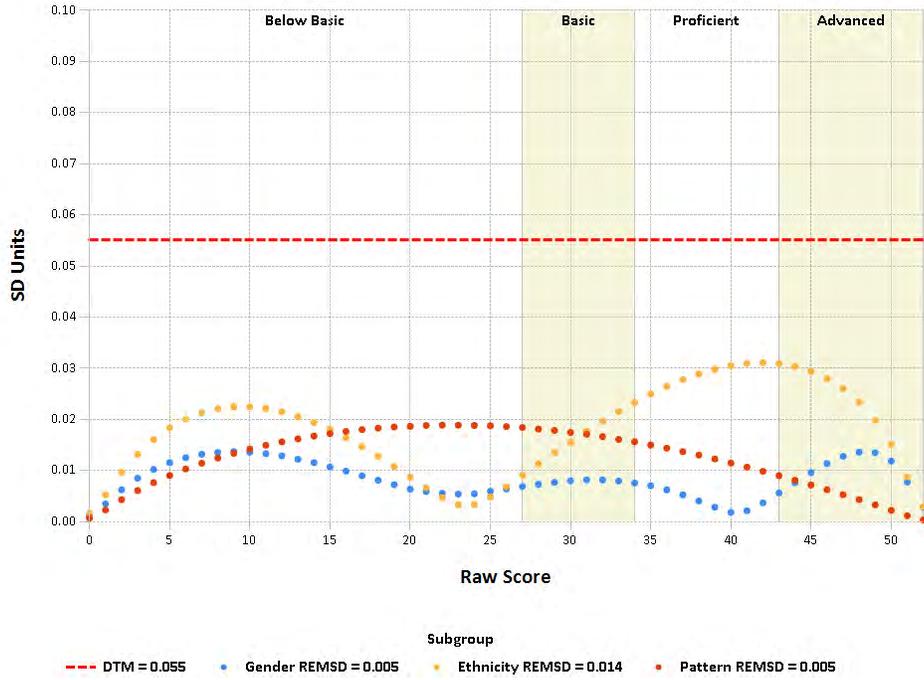
Reading Grade 3 Population Invariance



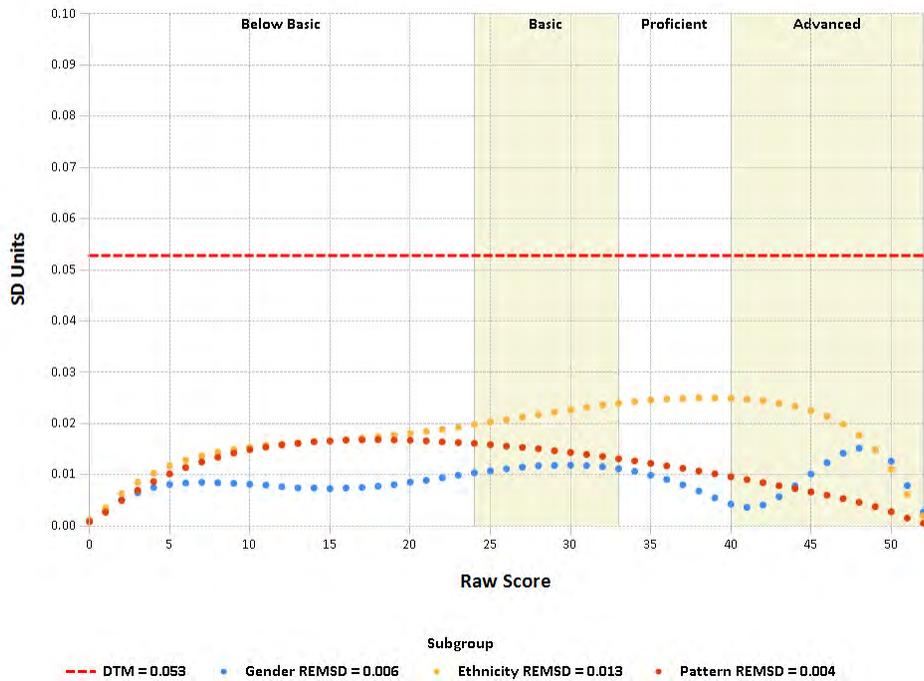
Reading Grade 4 Population Invariance



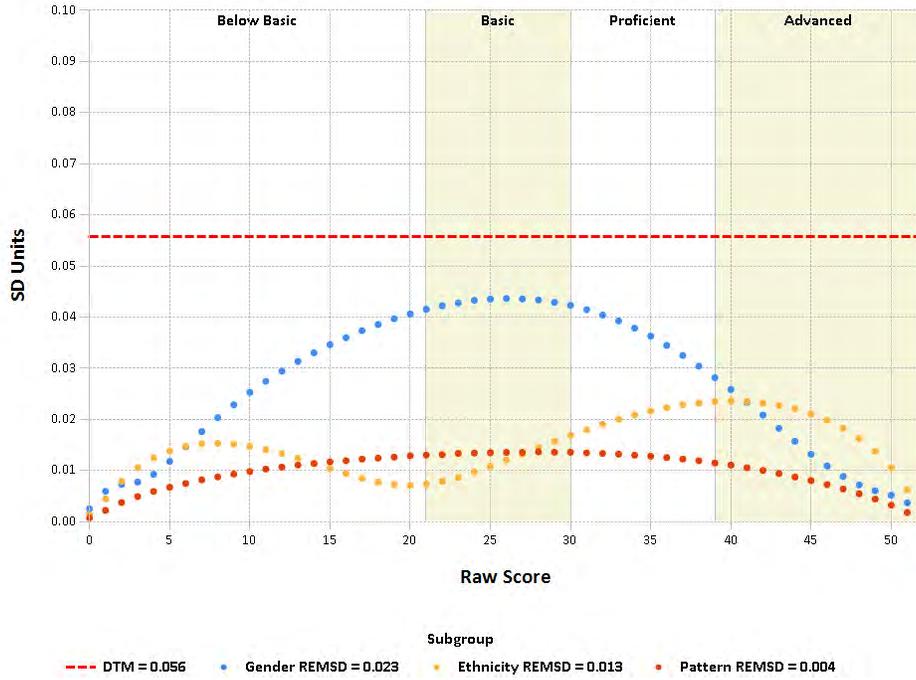
Reading Grade 5 Population Invariance



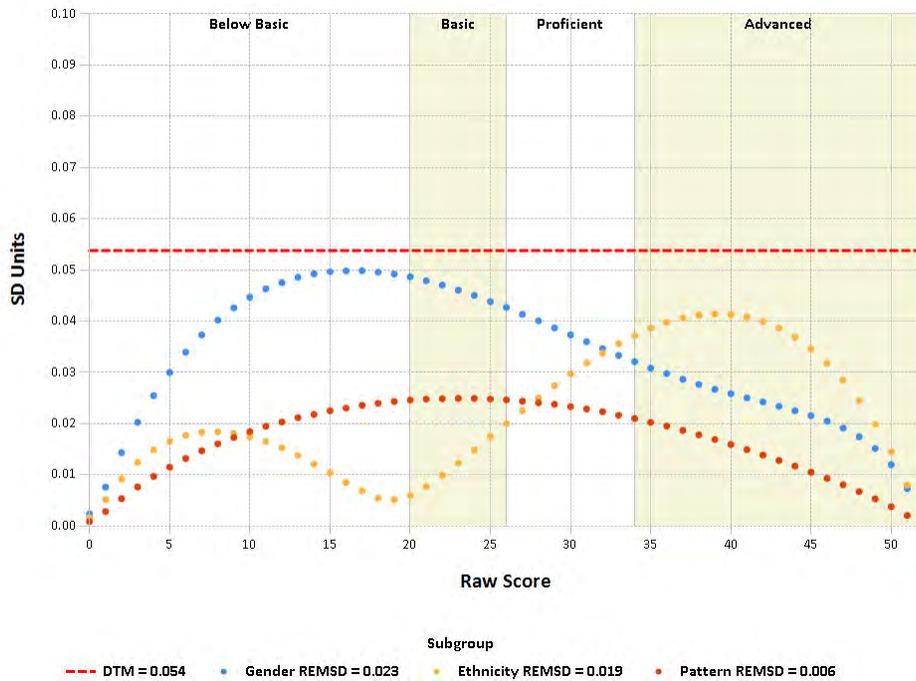
Reading Grade 6 Population Invariance



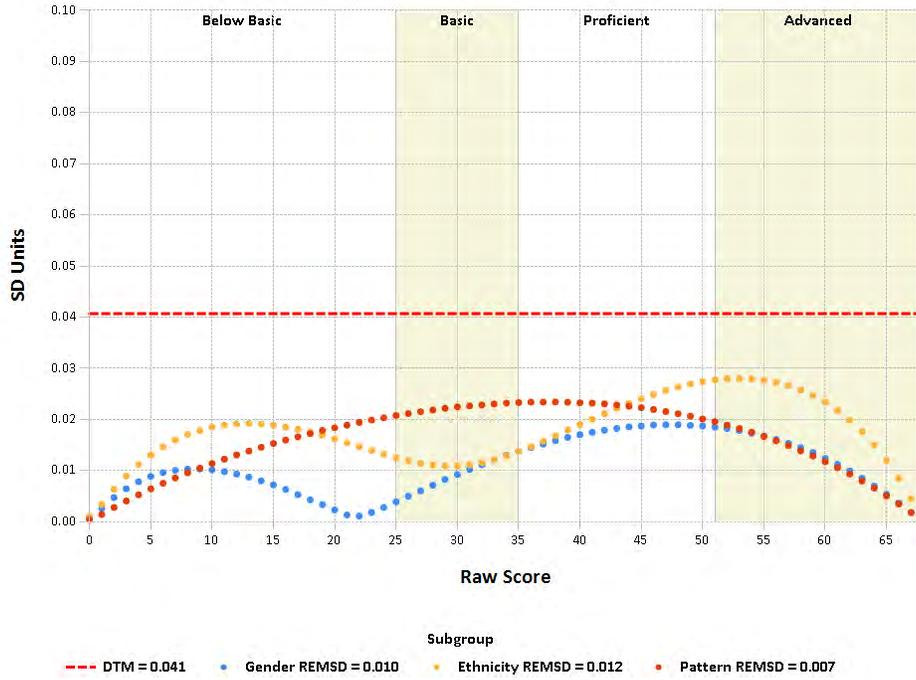
Reading Grade 7 Population Invariance



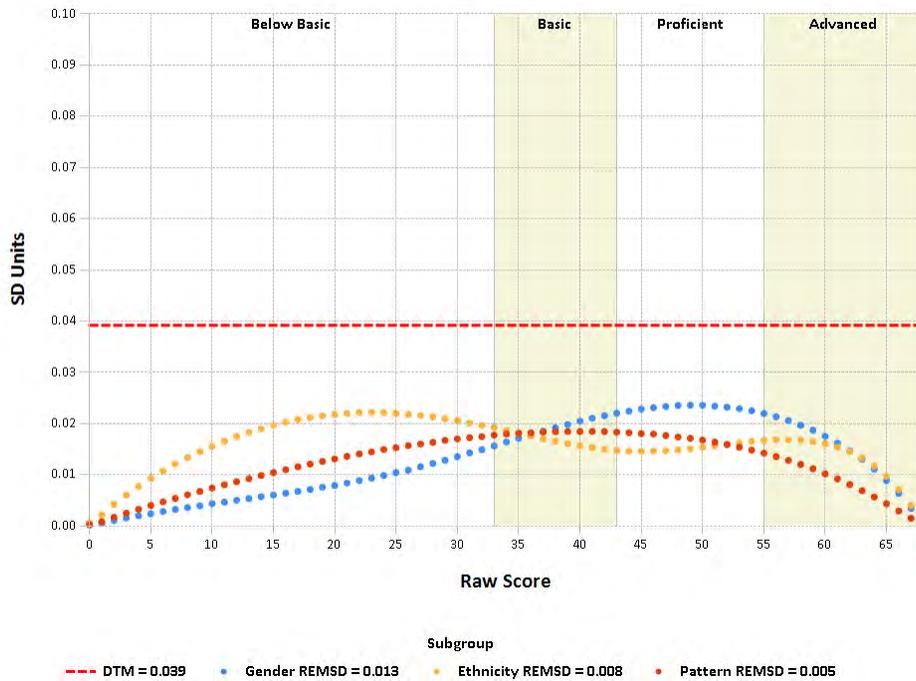
Reading Grade 8 Population Invariance



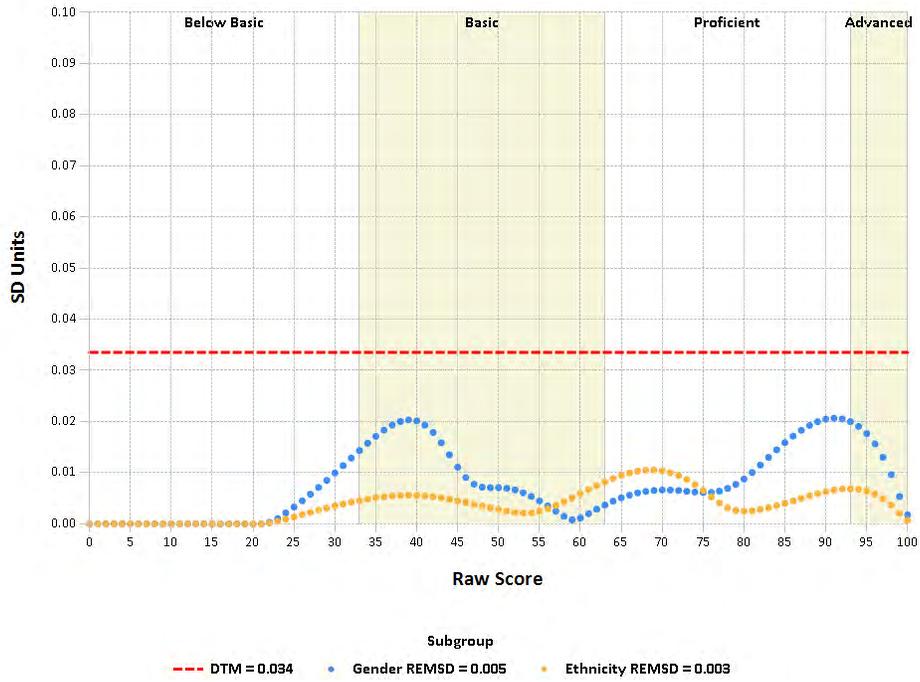
Science Grade 4 Population Invariance



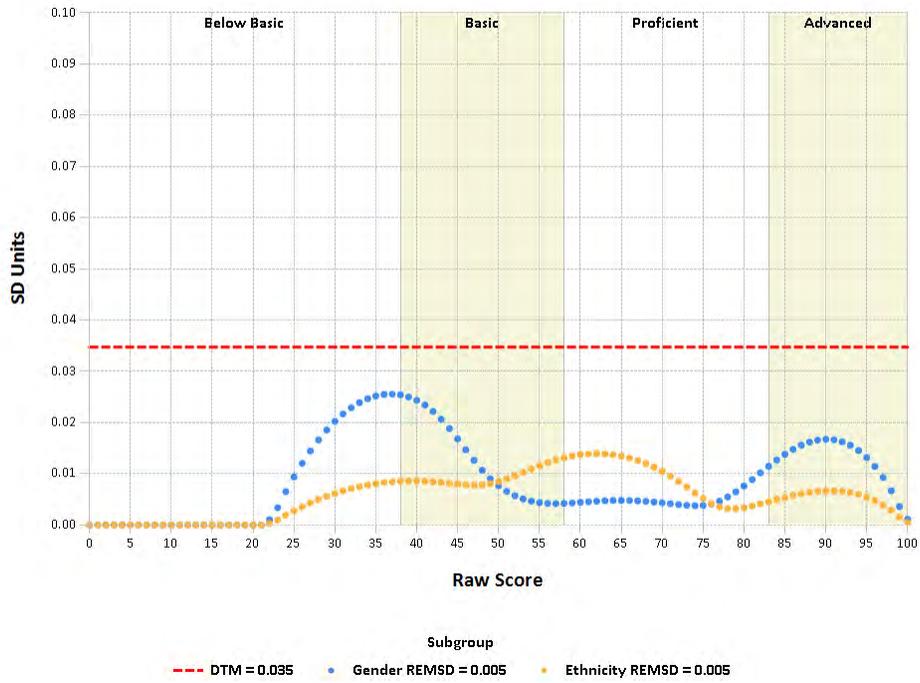
Science Grade 8 Population Invariance



Writing Grade 5 Population Invariance



Writing Grade 8 Population Invariance



RASCH ITEM STATISTICS

As noted earlier, the Rasch model expresses item difficulty (and student ability) in units referred to as *logits*, rather than on the percent-correct metric. In the simplest case, a logit is a transformed *p*-value with the average *p*-value becoming a logit of zero. In this form, logits resemble *z*-scores or standard normal deviates; a very difficult item might have a logit of +4.0 and a very easy item might have a logit of -4.0. However, they have no formal relationship to the normal distribution.

The logit metric has several mathematical advantages over *p*-values. Logits have an interval scale, meaning that two items with logits of 0.0 and +1.0 (respectively) are the same distance apart as two items with logits of +3.0 and +4.0. Logits are not dependent on the ability level of the students. For example, a test form can have a mean logit of zero, whether the average item *p*-value for the student sample is 0.8 or 0.3.

The standard Rasch calibration procedure arbitrarily sets the mean difficulty of the items on any form at zero. Under normal circumstances where all students are administered the same set of items, any item with a *p*-value lower than the average item on the form receives a positive logit difficulty and any item with a *p*-value higher than the average receives a negative logit. Consequently, the logits for any calibration, whether it is a third-grade reading test or a high-school science test, relate to an arbitrary origin defined by the center of items on that form. The average third-grade reading item will have a logit of zero; the average high-school science item will have a logit of zero. Logits for both item difficulties and student abilities are placed on the same scale and relate to the same mean item difficulty.

There are a number of other arbitrary choices that could be made for centering the item difficulties. Rather than using all the items, the origin could be defined by a subset. For the PSSA, all test forms in a particular grade and content area share the same operational item set. All items on each form can then be easily adjusted to a single (but still arbitrary) origin by defining the origin as the mean of the operational items. With this done, the origins for all the forms will be statistically equal. For example, items on any two forms that are equally difficult will now have statistically equal logit difficulties. This is partly how PSSA items can be placed on the same logit difficulty scale across years. Chapter Fifteen has more detailed information about the PSSA scale linking procedures.

Appendix G reports the item statistics including classical and Rasch logit difficulties for all the operational items. Table 12–4 summarizes the Rasch logit difficulties of the operational items on each test. The minimum and maximum values and standard deviations suggest that the PSSA items covered a relatively wide range of difficulties. It is important to note that the logit difficulty values presented have not been linked to a common scale of measurement across grades and subjects. Therefore, the relative magnitude of the statistics across content areas and grades cannot be compared.

Table 12–4. Summary of Rasch Item Difficulties for PSSA Mathematics, Reading, and Science

		N	Mean	SD	Min	Max
Mathematics	3	63	0.56	0.97	-0.96	2.67
	4	63	0.12	0.74	-1.33	2.38
	5	63	0.55	0.90	-1.27	2.30
	6	63	0.15	0.85	-1.56	2.15
	7	63	0.22	0.91	-1.41	2.11
	8	63	0.22	0.91	-1.80	1.80
Reading	3	42	-0.08	0.78	-1.65	1.54
	4	44	-0.01	0.62	-1.60	1.59
	5	44	0.15	0.75	-1.70	1.34
	6	44	-0.09	0.66	-1.22	1.23
	7	44	0.08	0.63	-1.36	1.22
	8	44	0.74	0.81	-1.06	2.47
Science	4	63	0.17	0.81	-1.72	1.92
	8	63	-0.18	0.61	-1.43	1.18
Writing	5	16	0.95	1.12	-1.06	2.81
	8	16	1.35	1.39	-1.50	4.04

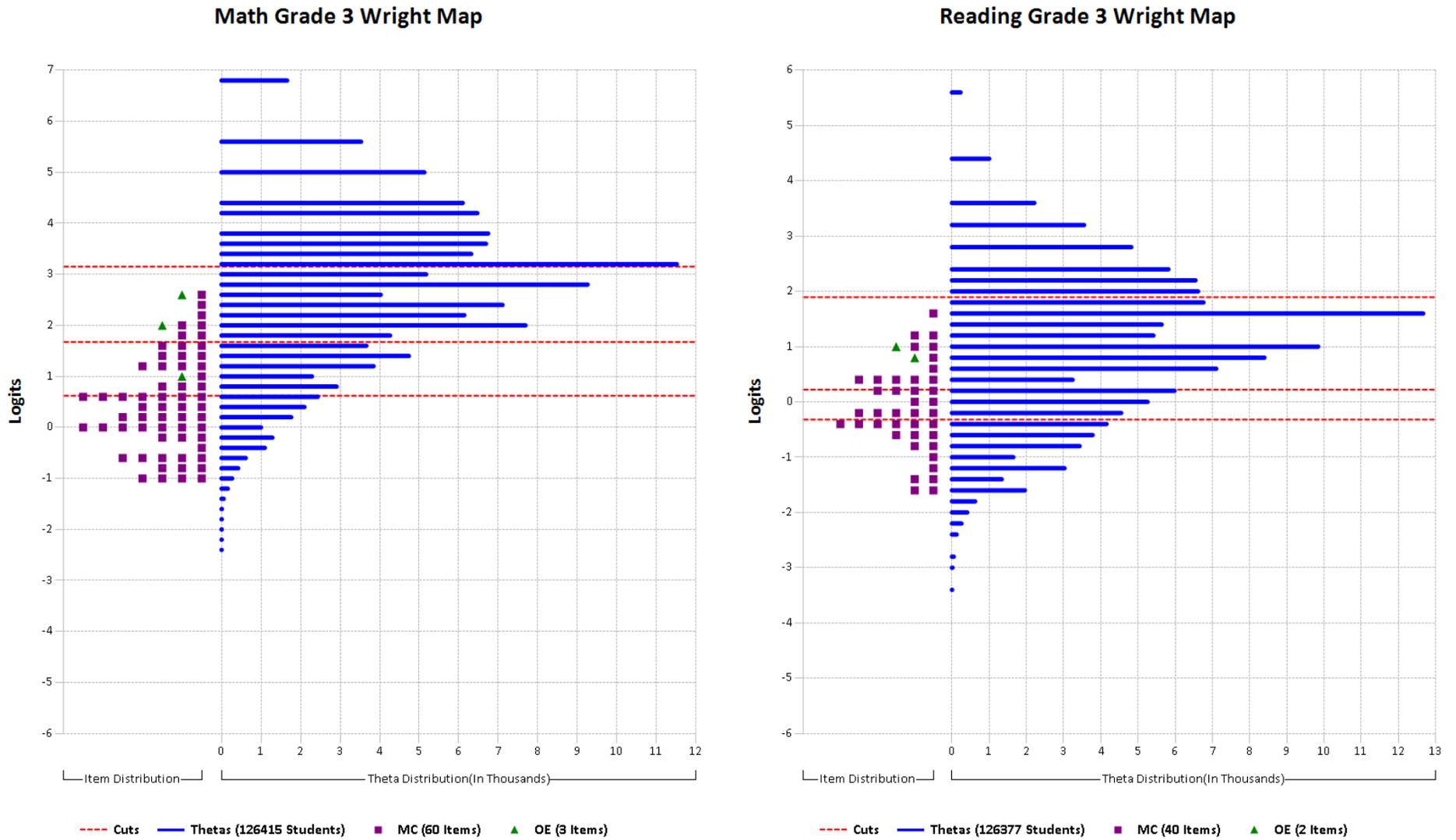
Note. The mean logit values not necessarily 0.0 because the items have been placed on a scale that was developed in prior years.

Item Difficulty-Student Ability Wright Maps

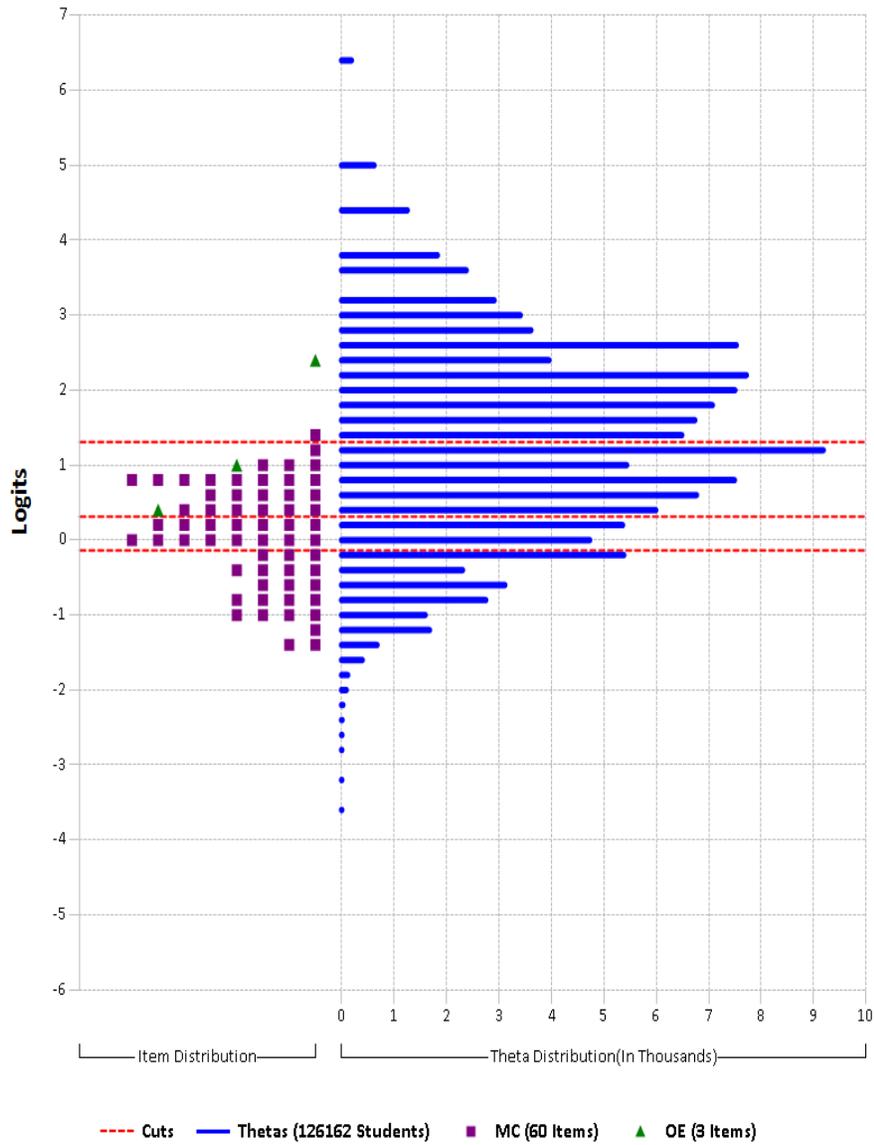
The distributions of the Rasch item logits (item difficulty estimates) are shown on the item difficulty-student ability maps presented in Figure 12–3. In each item-student map, markers on the left-hand side represent item difficulty parameter estimates, whereas markers on the right hand side represent person ability parameter estimates. As noted earlier, the Rasch model enables placement of both items and students on the same scale. Consequently, one can easily visualize information about how the difficulty of the test items related to the ability distribution of students who took the test. The students located in the upper right quadrant of any given plot have relatively more ability. Items in the lower left quadrant are relatively easier. High ability students have higher probabilities of correctly answering easier items. Similarly, low ability students (in lower right quadrant of any given plot) have lower probabilities of answering harder items (in upper left quadrant).

Overall, the most predominant pattern seen across all maps was for students to have relatively higher ability and for items to be relatively easier. It is also important to understand where the items are providing more accurate measurement (e.g., near the cutscores or away from the cutscores). This issue is addressed more fully in Chapter Eighteen (see Figure 18–2).

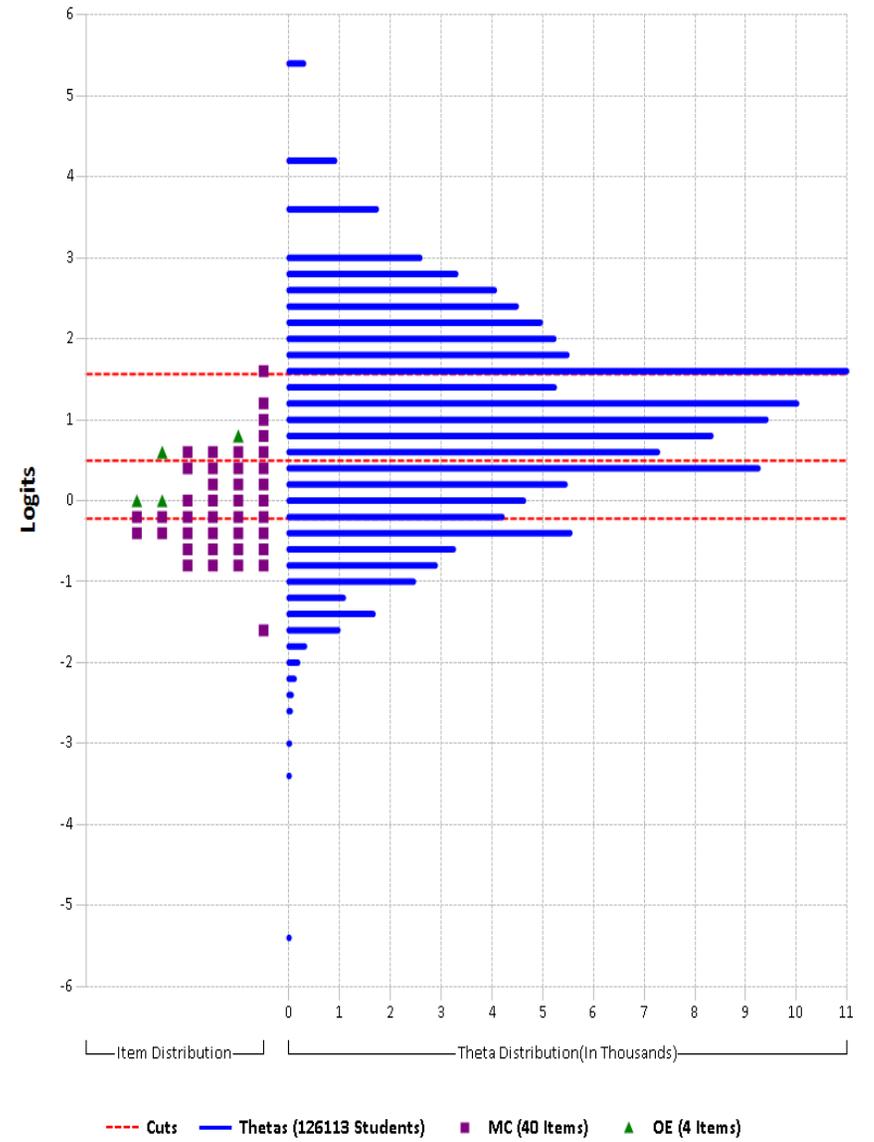
Figure 12–3. Item-Student Maps



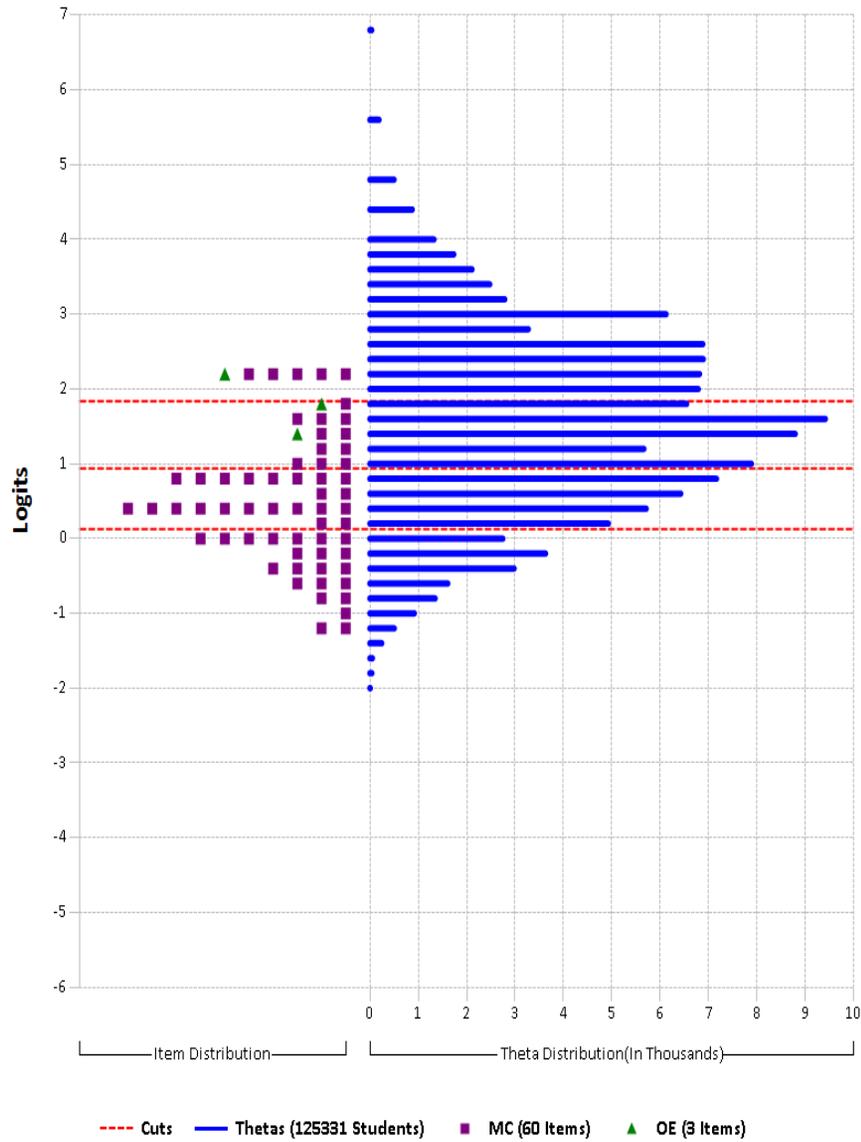
Math Grade 4 Wright Map



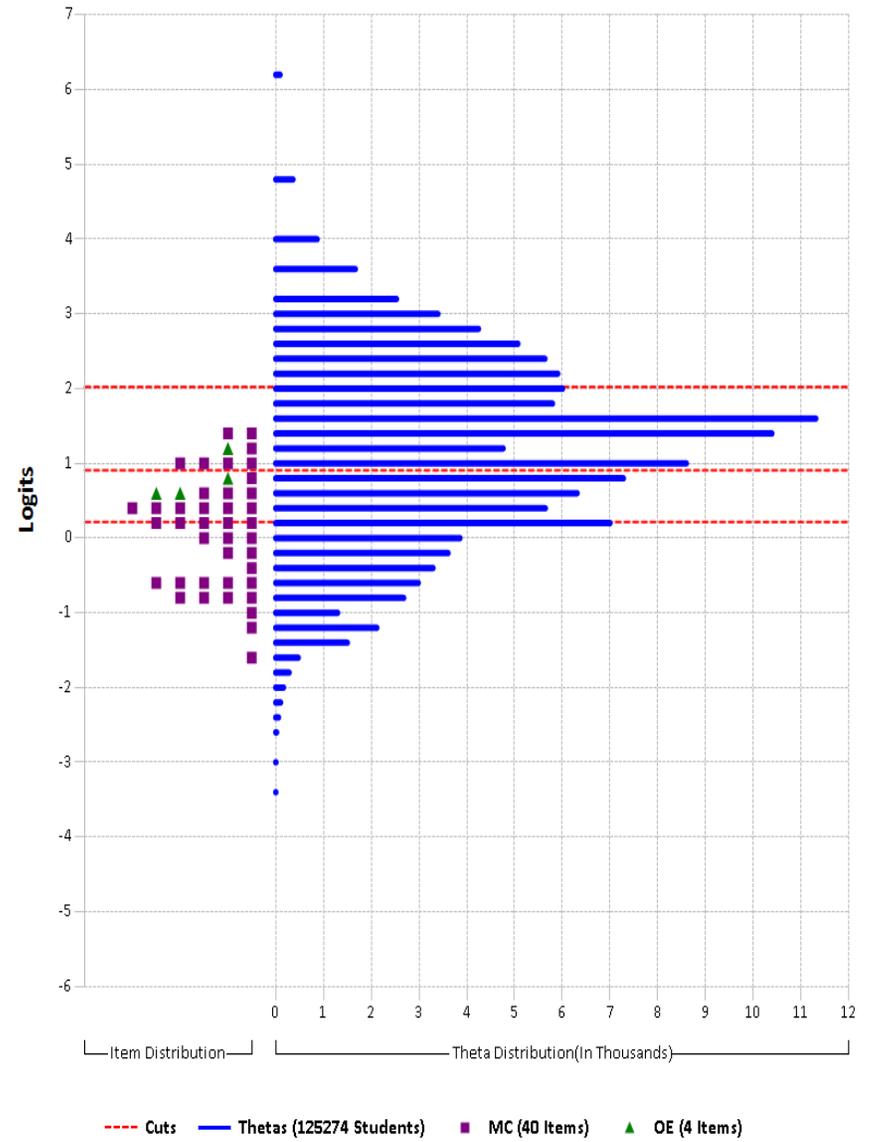
Reading Grade 4 Wright Map



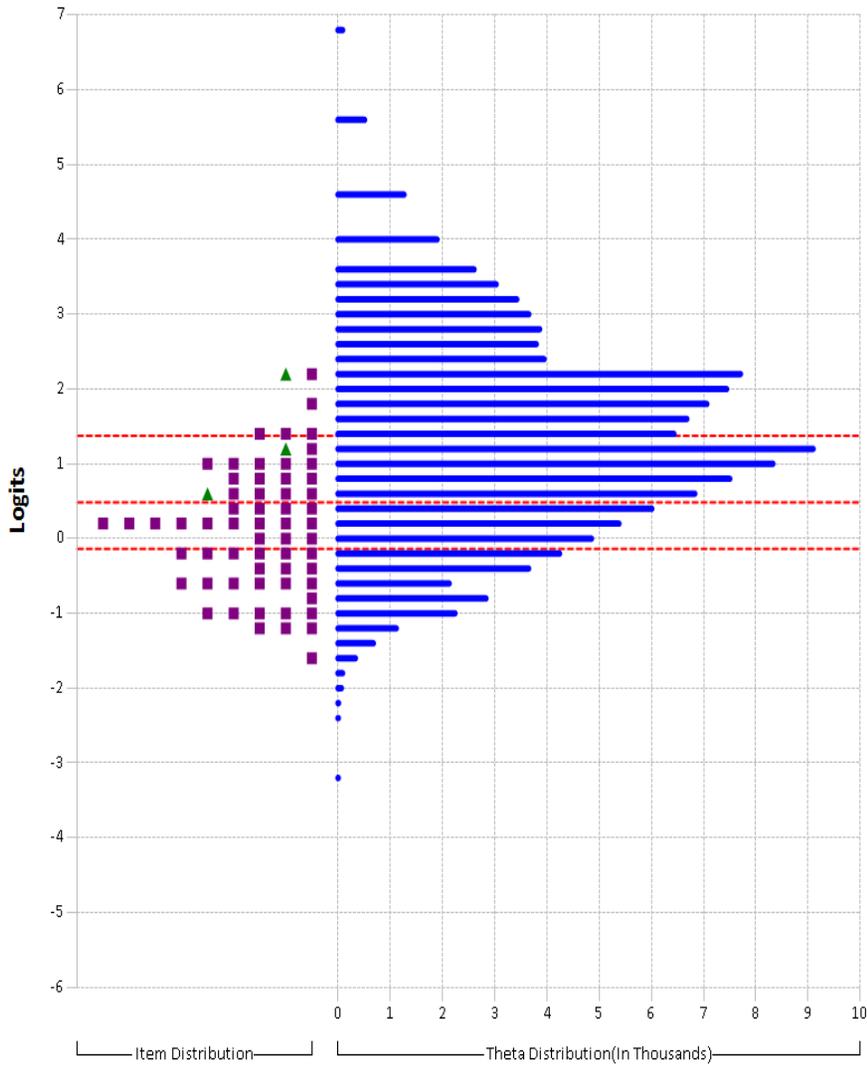
Math Grade 5 Wright Map



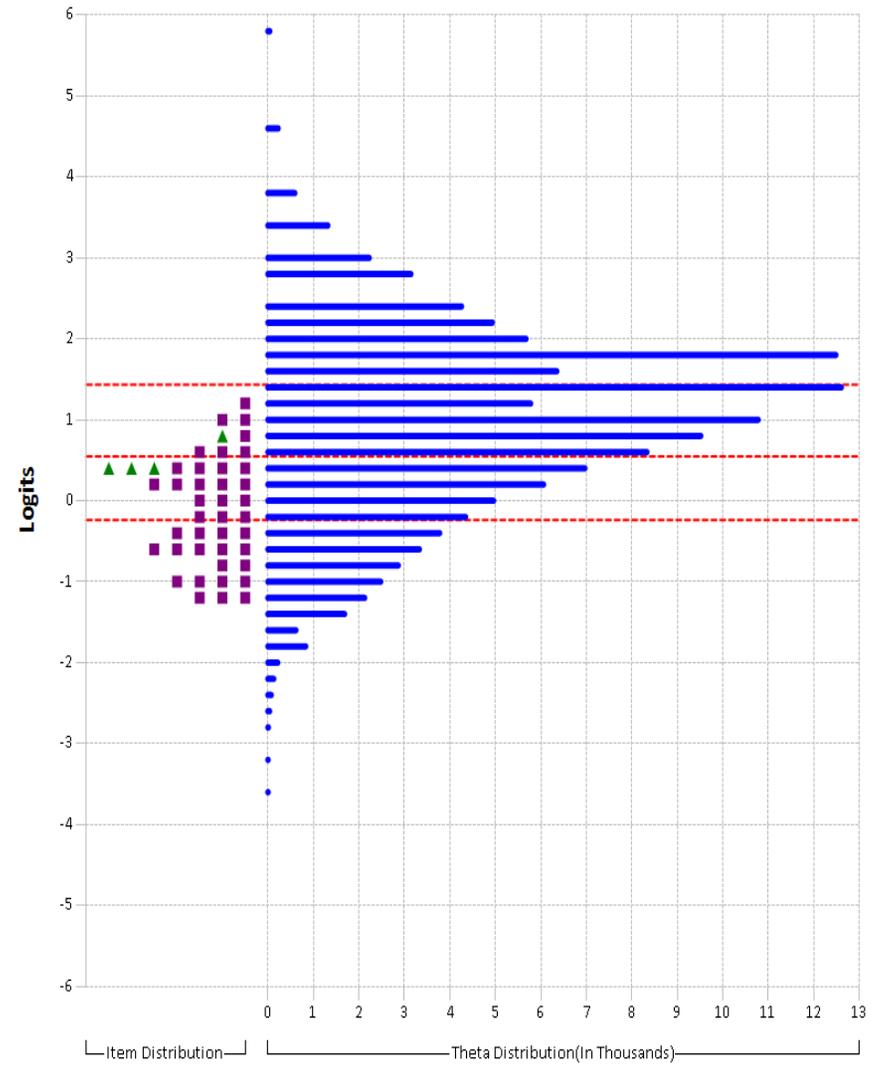
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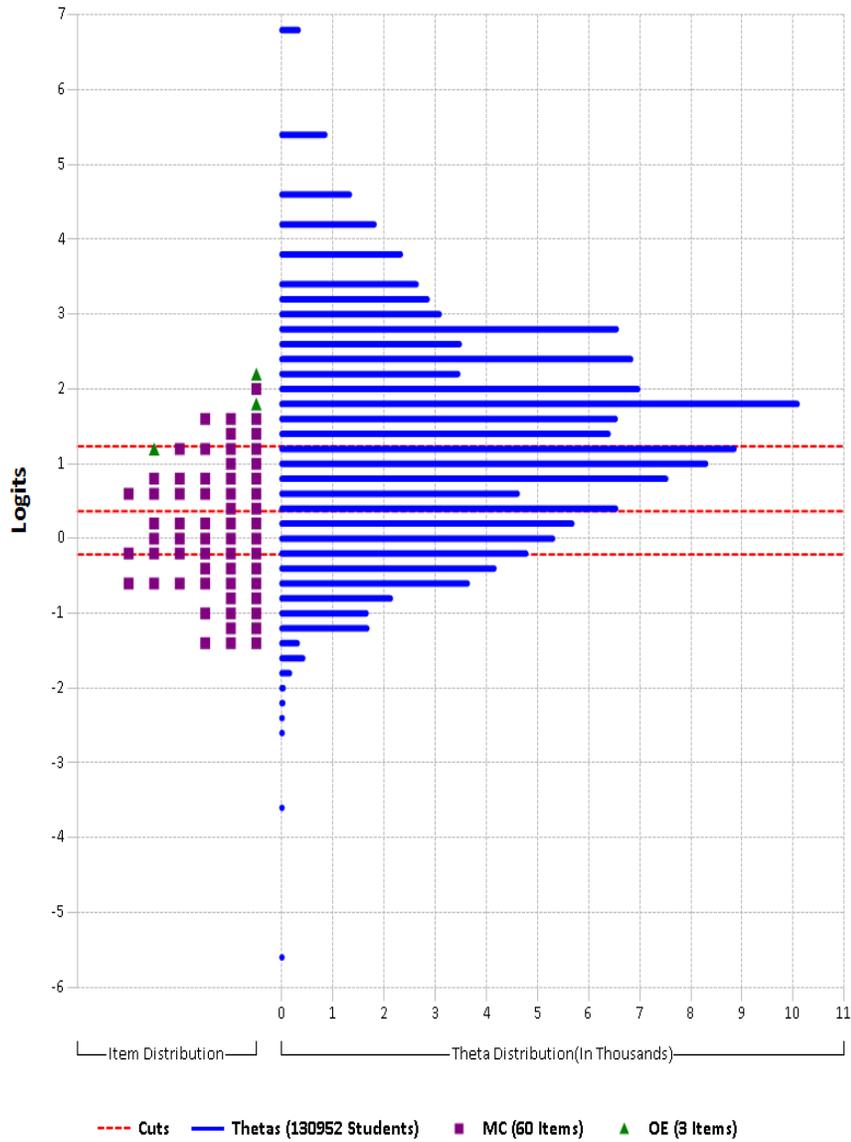
Math Grade 6 Wright Map



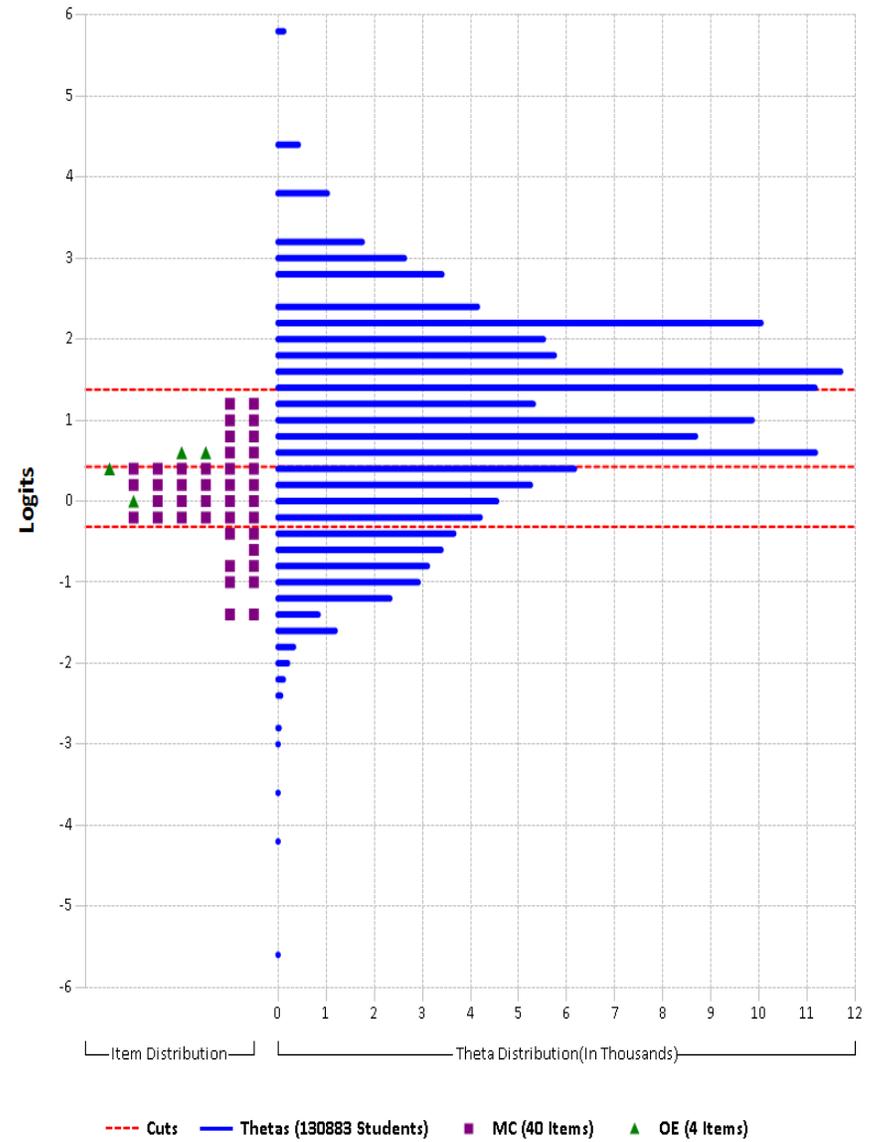
Reading Grade 6 Wright Map



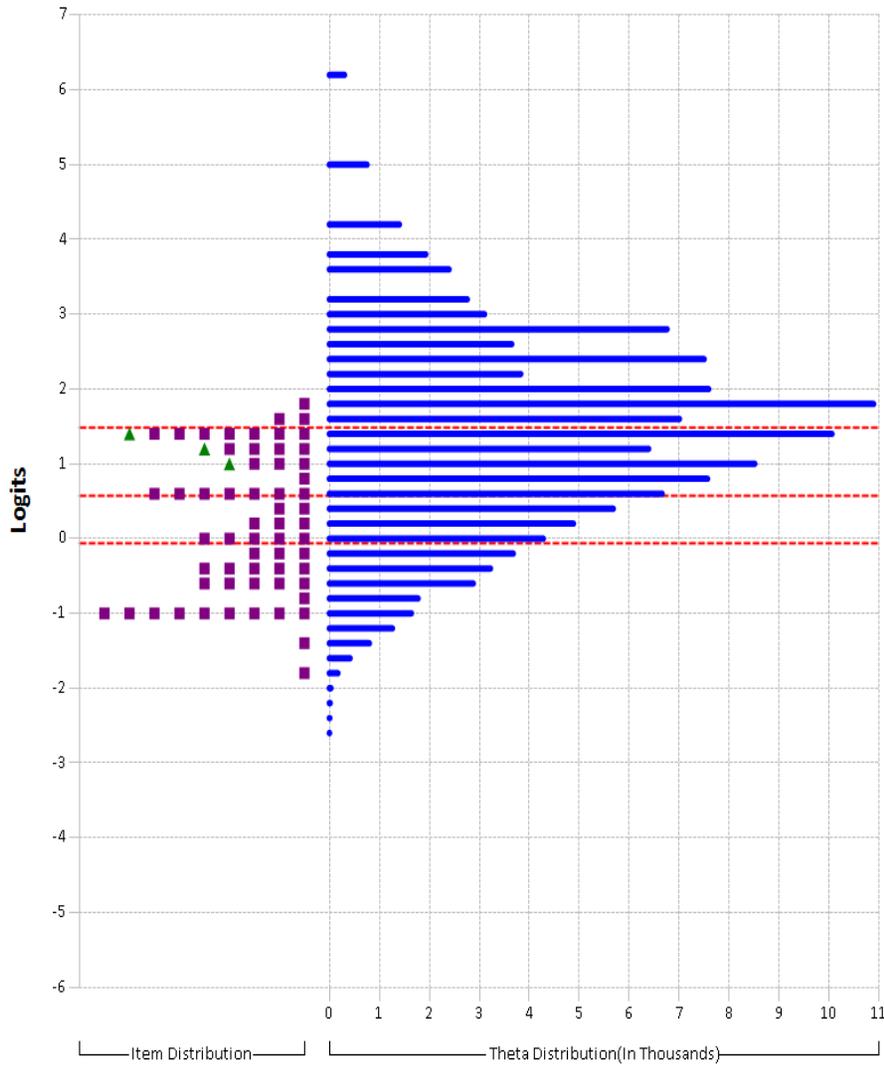
Math Grade 7 Wright Map



Reading Grade 7 Wright Map

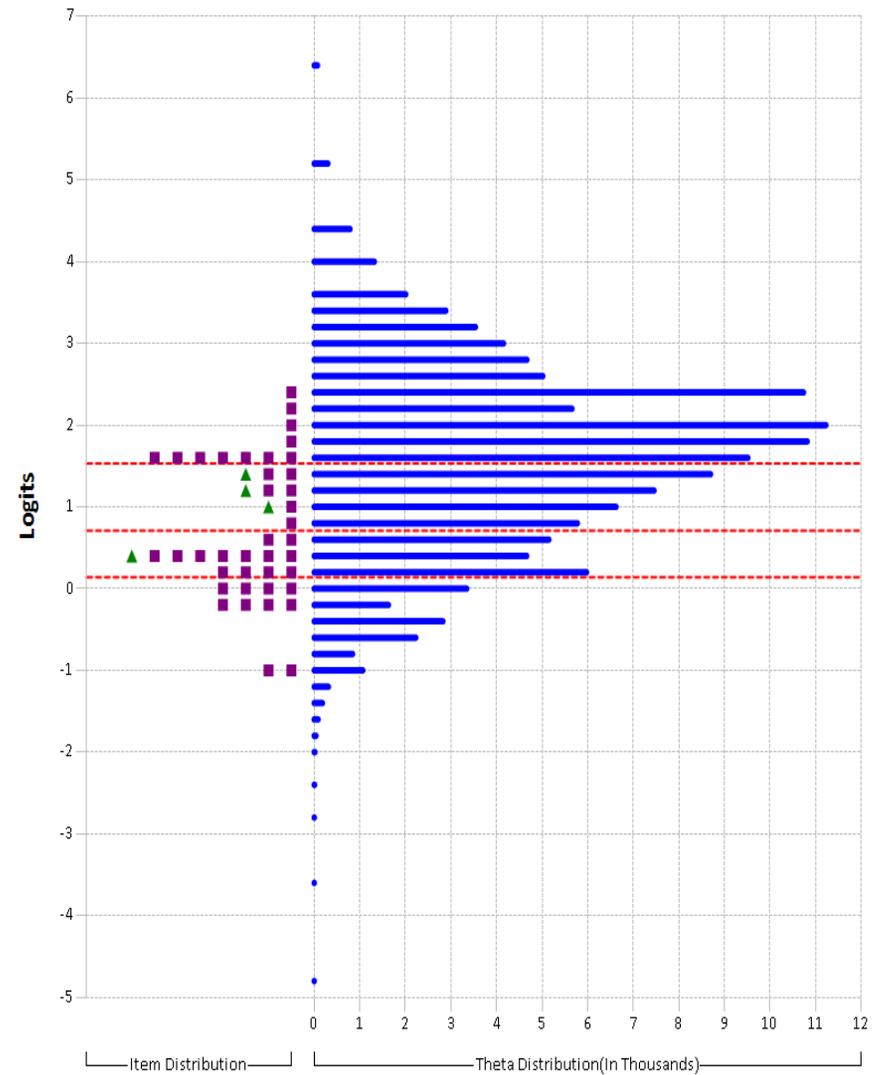


Math Grade 8 Wright Map



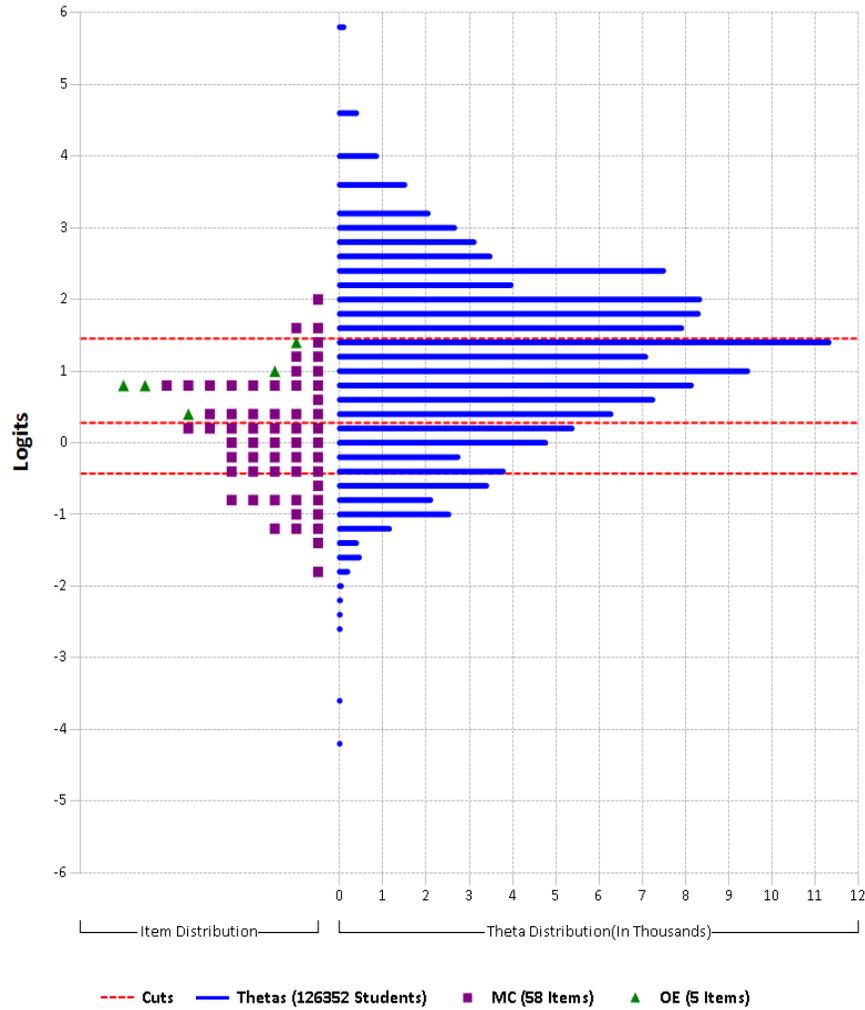
--- Cuts — Thetas (129693 Students) ■ MC (60 Items) ▲ OE (3 Items)

Reading Grade 8 Wright Map

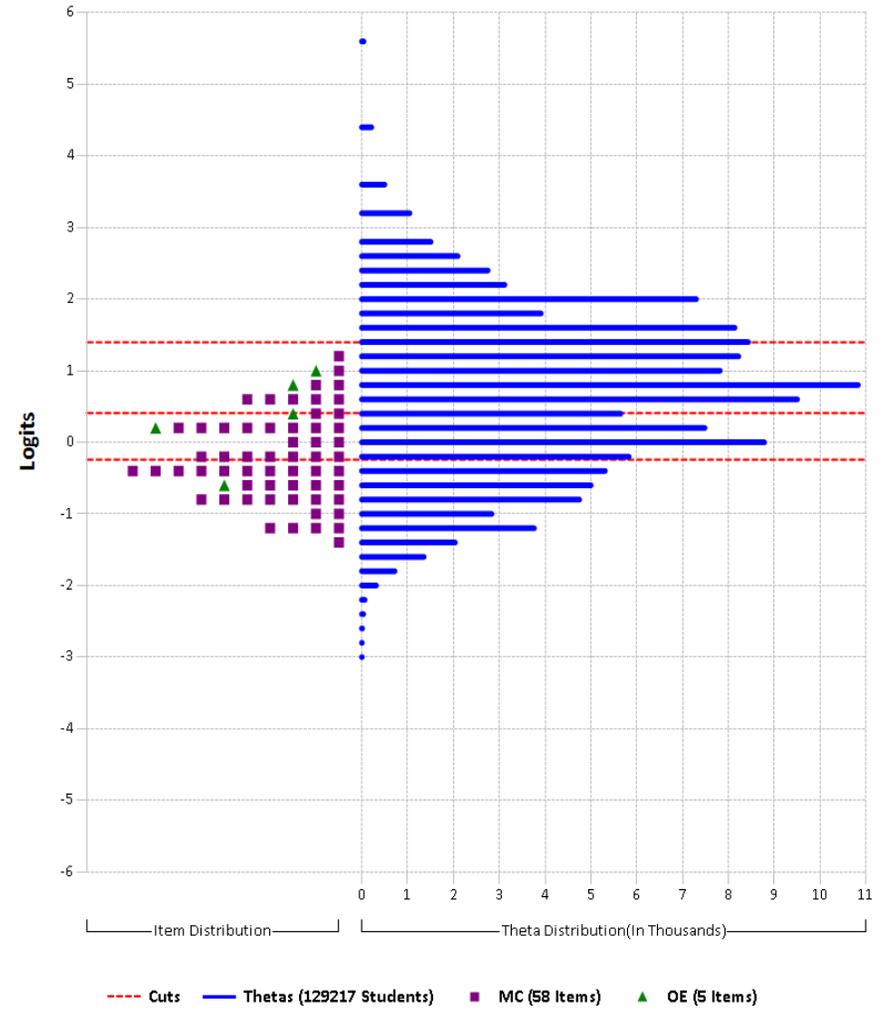


--- Cuts — Thetas (129584 Students) ■ MC (40 Items) ▲ OE (4 Items)

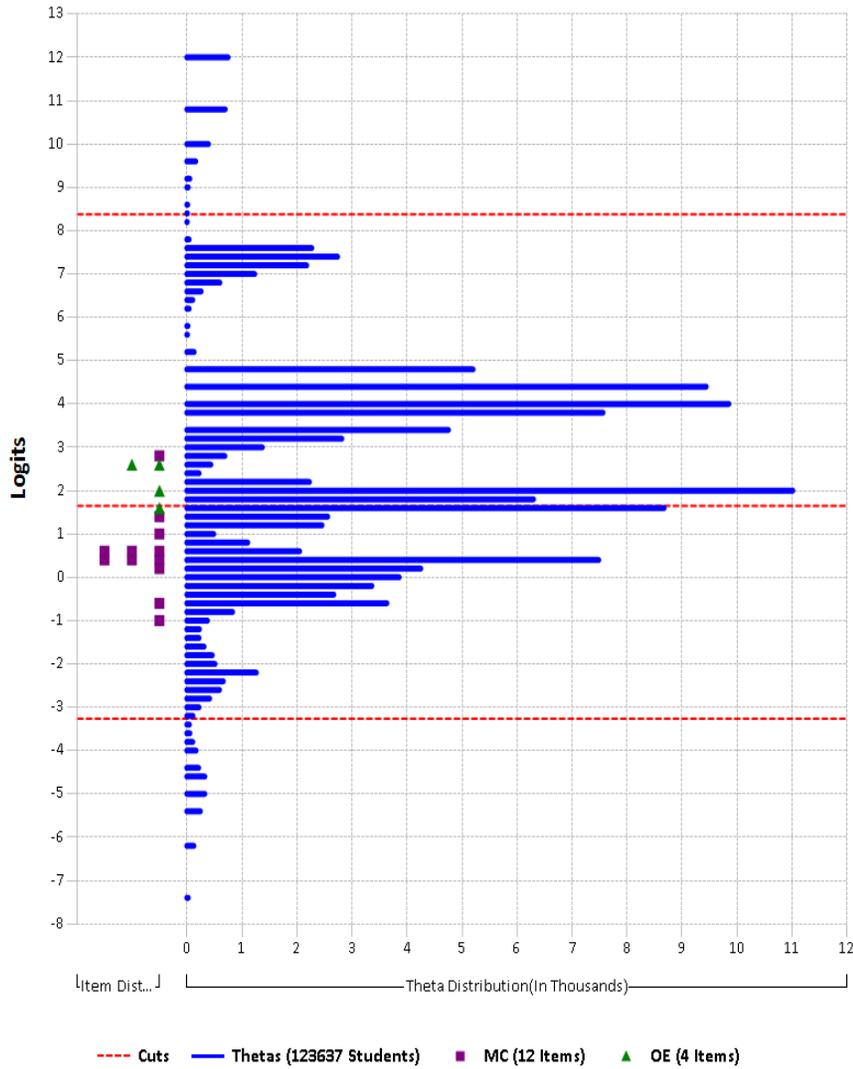
Science Grade 4 Wright Map



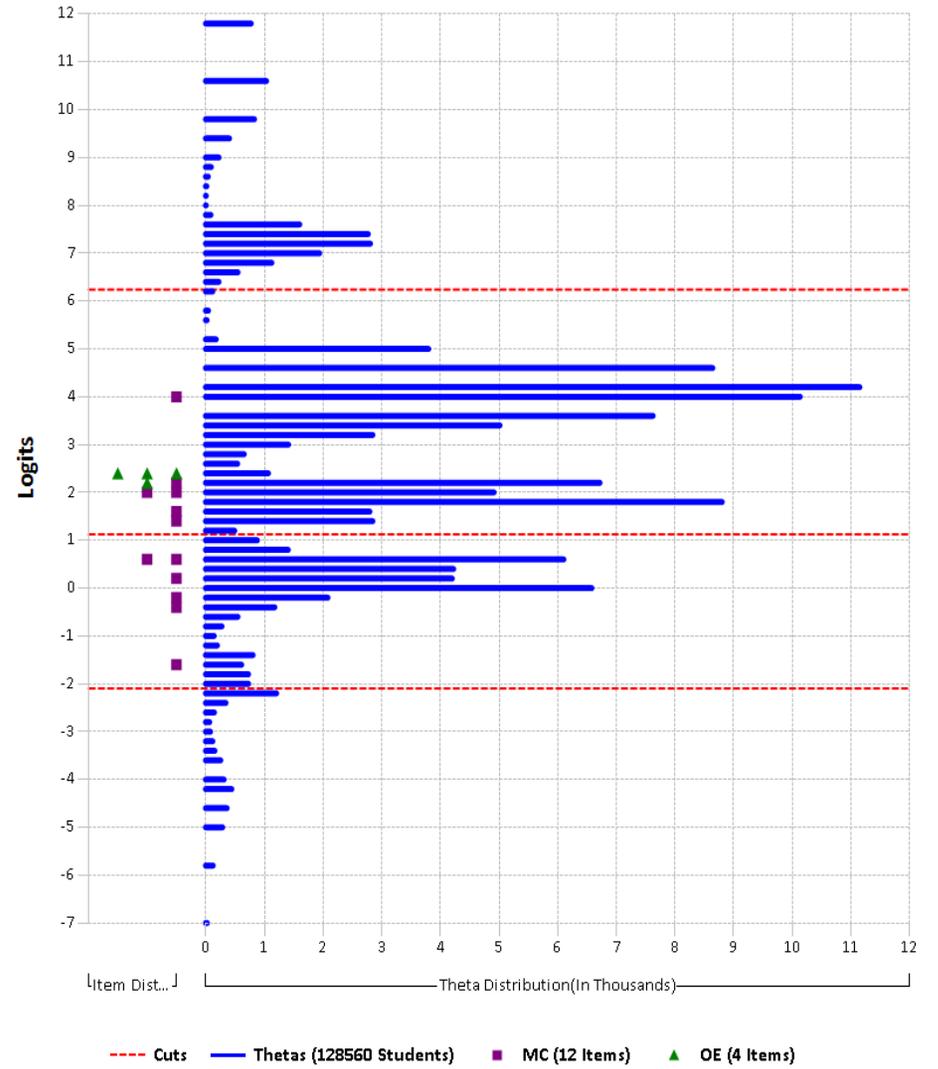
Science Grade 8 Wright Map



Writing Grade 5 Wright Map



Writing Grade 8 Wright Map



Chapter Thirteen: Performance Level Setting

No performance level setting events occurred this year. A history (dates and methodology) of prior performance level setting or validation events are provided in Table 13–1. Validation events utilized starting values; more details of this are provided in the table note. The resulting cut scores from those events are provided in Tables 13–2 and 13–3. For additional details about any given event, refer to the technical report for the year that the event occurred (Data Recognition Corporation, 2005, 2007a, 2007b, 2008a, 2008b).

Table 13–1. Performance Level Setting/Validation Event Dates and Methodology

Subject	Grade	Methodology	Validation?	Event Date
Reading	5, 8, 11	Bookmark	Yes ¹	Summer 2005
Mathematics	5, 8, 11	Bookmark	Yes ¹	Summer 2005
Writing	5, 8, 11	Body of Work	Yes ²	Summer 2006
Reading	4, 6, 7	Bookmark	Yes ²	Summer 2006
Mathematics	4, 6, 7	Bookmark	Yes ²	Summer 2006
Reading	3	Bookmark	Yes ³	Summer 2007
Mathematics	3	Bookmark	Yes ³	Summer 2007
Science	4, 8, 11	Bookmark	No	Summer 2008

Note. 1. Starting values exponentially smoothed using post-equated 2005 results for Grades 5, 8, and 11.
 2. Starting values exponentially smoothed using post-equated 2006 results for Grades 4, 6, and 7.
 3. Starting values were determined using post-equated 2007 results for Grades 4.

PSSA CUT SCORES

Appendix N provides the Rasch ability and scaled score cuts for each PSSA test. For reader convenience, these are documented next in a different format. Table 13–2 documents the Rasch ability (Theta) cut scores for each grade and subject area test. Table 13–3 documents the same but provides the cut scores on the scaled-score metric. PSSA scaling procedures are discussed further in Chapter Fourteen.

Table 13–2. PSSA Theta (θ) Metric Cut Scores by Grade and Subject Area

Subject	Grade	θ Cuts		
		BB/B	B/P	P/A
Mathematics	3	0.6192	1.6750	3.1501
	4	-0.1376	0.3124	1.3074
	5	0.1259	0.9373	1.8383
	6	-0.1377	0.4823	1.3723
	7	-0.2114	0.3636	1.2336
	8	-0.0637	0.5729	1.4854
	11	-0.1749	0.4888	1.4819
Reading	3	-0.3207	0.2205	1.8926
	4	-0.2215	0.4935	1.5635
	5	0.2133	0.9074	2.0241
	6	-0.2398	0.5452	1.4352
	7	-0.3170	0.4230	1.3780
	8	0.1376	0.7082	1.5301
	11	-0.0130	0.5777	1.5351
Science	4	-0.4280	0.2792	1.4560
	8	-0.2435	0.4091	1.3958
	11	-0.4390	0.7888	1.4960
Writing	5	-3.2644	1.6456	8.3756
	8	-2.0984	1.1216	6.2416
	11	-2.9230	-0.0830	5.6170

Note. BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.

Table 13–3. PSSA Scaled-Score Metric Cut Scores by Grade and Subject Area

Note. BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.

Subject	Grade	Scaled Score Cuts		
		BB/B	B/P	P/A
Mathematics	3	1044	1180	1370
	4	1156	1246	1445
	5	1158	1312	1483
	6	1174	1298	1476
	7	1183	1298	1472
	8	1171	1284	1446
	11	1167	1304	1509
Reading	3	1168	1235	1442
	4	1112	1255	1469
	5	1137	1275	1497
	6	1121	1278	1456
	7	1131	1279	1470
	8	1146	1280	1473
	11	1112	1257	1492
Science	4	1150	1275	1483
	8	1150	1275	1464
	11	1150	1275	1347
Writing	5	745	1236	1909
	8	914	1236	1748
	11	952	1236	1806

Note. BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.

Chapter Fourteen: Scaling

The purpose of a scaling analysis is to create a score scale. Scaling is used to transform test score values onto a scale more easily interpreted by users. For the PSSA, the resulting scale scores will be used for score reporting and performance level classification. The PSSA classifies students into four achievement levels: Below Basic, Basic, Proficient, and Advanced.

HISTORICAL INFORMATION

Prior to 2000, when the PSSA design was heavily matrix sampling, estimating school-level scaled scores presented some statistical and psychometric challenges. The statistically correct method to compute the school-level scaled score often gave an answer different from what would be obtained by averaging student ability estimates. To avoid this source of misunderstanding, the school-level scores were made to equal the average of the appropriate students. The matrix sampling component of the design, together with items from the common section, was used at the academic standard category level to estimate relative strengths and weaknesses for schools.

The adoption of the Pennsylvania Academic Standards in 1999 brought structural changes to the PSSA that were implemented in 2000. Beginning with the new reporting design in 2000, subject area total scores for students and schools were based exclusively on the common sections. Thus, greater emphasis was placed on ensuring that the common sections possessed optimal balance at the content standard level and yielded reliable estimates of student-level abilities, as indicated by the standard errors. It was then possible to aggregate all scaled scores at the school, district, and state levels without resorting to any complex algorithms, making the results more understandable.

Since the original design of the PSSA was intended to produce school-level estimates only, the reporting metric was defined at the school level. For the 1996 base year, the mean of all schools in the norming sample was set at 1300 and the standard deviation at 100. The distribution to which these parameters applied was the subject area scaled score with all schools weighted equally. Consequently, the expectation in the base year was for the state-level means to be near 1300 and for standard deviations to be near 100. The state mean of student-level scaled scores was, in general, somewhat different. This difference occurred because the mean of the school-level scores counted schools equally, regardless of size, while the mean of the student-level scores counted students equally.

Although it affected very few students, many administrators believed that their schools were being penalized by the presence of extremely low scoring special-needs students who took the PSSA. A change was made to reduce the impact of these students on the overall school score. Namely, a minimum scaled score of 700 was implemented for all PSSA mathematics, reading, and writing tests beginning in 2002. The Grade 3 mathematics and Grade 3 reading tests as well as all grade levels of science were added after 2002. The minimum of 700 was not applied to these other tests in order to preserve other scale characteristics (e.g., the percentages in performance level categories recommended by standard setting participants and preventing students from achieving Proficient level through random response). Table 14–1 documents the minimum possible scaled scores for all PSSA tests. (There is no prescribed maximum scaled score or upper bound for the PSSA.)

Beginning with the design changes implemented for the 2000 PSSA, student-level scores were based on the common items only. This ensured that any decision made about students was done in the most equitable manner. School-level scaled scores for the subject areas were based on the mean of the student-level scaled scores. This ensured that the scaled scores used for school accountability directly reflected the student-level results. Thus, it is a simple matter to aggregate up to the school, district, and state levels.

As noted earlier, the PSSA scaled score metric was originally anchored to the mean school-level scaled score for a base year and arbitrarily labeled as 1300. In the base year, the standard deviation of the school-level scaled scores was set to a value of 100. If school scores are approximately normally distributed, a scaled score of 1400, one standard deviation above the base year mean, means the school did better than about five-sixths of the schools in the base year. About two-thirds of the schools will have scaled scores between 1200 and 1400. About 16 percent of the schools will be below 1200. Scaled scores of 1000 and 1600 are three standard deviations from the mean, so scores more extreme than this are very rare.

These labels of 1300, 1200, etc., are completely arbitrary; they could have been called zero and one, or 100 and 110, or any other ordered pair without affecting any of the relationships among schools, years, students, or items. Changing the scale would simply be changing the labels on the axis of a graph without moving any of the points.

Setting the mean at 1300 and the standard deviation at 100 was originally chosen to avoid producing negative scores and so that scores on the PSSA would not be confused with the results from any other testing program. Users would acquire greater knowledge of the PSSA scales with experience.

SCALED SCORES

Individual student scores are reported as scaled scores. However, they are initially estimated as Rasch abilities (more information on the Rasch model is given in Chapter Twelve). Generally, scaled scores are preferred over Rasch ability values for reporting purposes. One issue is that Rasch ability values are on a scale that includes negative and decimal values. By transforming the Rasch ability values to scaled scores, all reported values can become positive integers. Scaled scores are usually obtained through some linear transformation of the Rasch ability values. The linear transformations used for the PSSA produce numeric values with three or four digits that are unit interval scaled scores. Each grade and subject has its own unique PSSA scaled score. Positive scores with no decimals make more sense to parents and students. Since Rasch ability values are comparative after linking to the base year, the transformed scaled scores have a common scale across years, even though the corresponding raw scores may differ. (Linking is discussed further in Chapter Fifteen.)

Essentially, PSSA scaled scores are derived through a two step process. First, there is a nonlinear transformation that converts number correct scores to Rasch ability logits. Second, a linear transformation is used to convert logits to scaled scores. These and some additional considerations (e.g., rounding rules), are discussed further below.

Definition of Scoreability

Answer documents are considered scoreable if they meet the criteria for inclusion in the data files (see Chapter Nine). For MC items, all omit (no response) and multiple marks (more than one response selected without machine-discernable erasures) were scored as zeroes. For OE items, all blank, foreign language, off-task, or unreadable responses were scored as zeroes.

WINSTEPS Scaling

Parameter estimates are derived using the WINSTEPS 3.54 computer program (Linacre & Wright, 2003), which employs unconditional (UCON), joint-maximum-likelihood estimation (JMLE). WINSTEPS provides a conversion table that maps raw scores to logits (Rasch ability estimates). The logits are transformed to scaled scores as discussed below. Every year each test is scaled separately and then linked (see Chapter Fifteen).

ZERO AND PERFECT SCORES

WINSTEPS does not provide a direct ability estimate for zero (no points earned) or perfect (all points earned) raw scores. However, WINSTEPS has a default procedure for estimating such extreme scores, and this was used for the PSSA. Essentially, a fractional raw score (a value less than one) is added to zero scores and subtracted from perfect scores to determine the corresponding logit values for these extreme scores.

Linear Transformation Formulas

PSSA scaled scores are obtained through a linear transformation of the Rasch ability estimates ($\hat{\theta}$). Specifically,

$$SS = m\hat{\theta} + b,$$

where m is the slope and b is the intercept. The slopes and intercepts for deriving PSSA scaled scores are provided in Table 14–2. For reference purposes, the PSSA theta cut scores have been reproduced in this table as well.

Rounding

The linearly transformed scaled scores are generally rounded to the nearest integer value for reporting purposes. Values greater than or equal to 0.50 are rounded up. Values less than 0.50 are rounded down. However, at each performance level cut point, scores are rounded up (even if less than 0.50) if this action would put the rounded score into a higher performance level. As an example, the Grade 3 reading proficient cut score (in scaled score units) is 1235. If there had been a raw score that converted to an unrounded scaled score of 1234.20, this scaled score would have been rounded up to 1235 for reporting purposes.

Lowest Obtainable Scaled Scores

Most PSSA mathematics, reading, and writing tests have a lowest obtainable scaled score (LOSS) of 700. The exception is Grade 3 mathematics and reading, which have LOSS values of 750 and 1000, respectively. For PSSA science, the LOSS values have been set to 1050 at Grade 4 and 925 for Grade 8. These LOSS values are documented in Table 14–1. See tables in Appendix O for LOSS n -counts.

Highest Obtainable Scaled Scores

A highest obtainable scaled score (HOSS) is not set for the PSSA. Thus, the maximum possible scaled score value is allowed to float for each subject and grade. The upper bound varies from year to year, depending on the difficulty of the test form. Table 14–1 shows the maximum possible observed score for the current year's test. (Note: It may be that no student actually earned the maximum possible.) See tables in Appendix O for HOSS n -counts.

RAW-SCORE-TO-SCALED-SCORE TABLES

Raw-to-scaled-score tables can be found in Appendix O.

**Table 14–1. PSSA Scaled-Score Cuts
for Each Performance Level by Grade and Subject Area**

Subject	Grade	Min	Scaled Score Cuts ¹			Max ²
			BB/B	B/P	P/A	
Mathematics	3	750	1044	1180	1370	1859
	4	700	1156	1246	1445	2455
	5	700	1158	1312	1483	2430
	6	700	1174	1298	1476	2595
	7	700	1183	1298	1472	2566
	8	700	1171	1284	1446	2288
Reading	3	1000	1168	1235	1442	1907
	4	700	1112	1255	1469	2244
	5	700	1137	1275	1497	2314
	6	700	1121	1278	1456	2350
	7	700	1131	1279	1470	2338
	8	700	1146	1280	1473	2616
Science	4	1050	1150	1275	1483	2269
	8	925	1150	1275	1464	2268
Writing	5	700	745	1236	1909	2274
	8	700	914	1236	1748	2306

Notes. 1. BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.

2. Scaled-score maximum values are unique for the current year's test.

**Table 14–2. PSSA Cut Scores (on θ metric),
Intercept, and Slope by Grade and Subject Area**

Subject	Grade	θ Cuts			Intercept	Slope
		BB/B	B/P	P/A		
Mathematics	3	0.6192	1.6750	3.1501	964.24	128.81
	4	-0.1376	0.3124	1.3074	1183.52	200.00
	5	0.1259	0.9373	1.8383	1134.10	189.80
	6	-0.1377	0.4823	1.3723	1201.54	200.00
	7	-0.2114	0.3636	1.2336	1225.28	200.00
	8	-0.0637	0.5729	1.4854	1182.30	177.53
	11	-0.1749	0.4888	1.4819	1203.10	206.42
Reading	3	-0.3207	0.2205	1.8926	1207.70	123.80
	4	-0.2215	0.4935	1.5635	1156.30	200.00
	5	0.2133	0.9074	2.0241	1094.60	198.80
	6	-0.2398	0.5452	1.4352	1168.96	200.00
	7	-0.3170	0.4230	1.3780	1194.40	200.00
	8	0.1376	0.7082	1.5301	1113.70	234.82
	11	-0.0130	0.5777	1.5351	1115.20	245.45
Science	4	-0.4280	0.2792	1.4560	1225.65	176.75
	8	-0.2435	0.4091	1.3958	1196.64	191.54
	11	-0.4390	0.7888	1.4960	1194.69	101.81
Writing	5	-3.2644	1.6456	8.3756	1071.44	100.00
	8	-2.0984	1.1216	6.2416	1123.84	100.00
	11	-2.9230	-0.0830	5.6170	1244.30	100.00

Notes. Linear transformation intercepts and slopes are used to derive the scaled scores.

BB = Below Basic; B = Basic; P = Proficient; and A = Advanced

STRAND (REPORTING CATEGORY) SCORE STRENGTH PROFILE

Strength profiles for strand (reporting category) scores have been provided since 2009. The following process was followed to derive the profile:

- The items for each strand were identified.
- WINSTEPS runs were undertaken that anchored the logit values for each strand's items to get the raw-to-logit score table for each strand. This is sometimes referred to as fixed item parameter scaling.
- The appropriate linear transformations (based on content and grade from Table 14–2) were applied to the logit values to derive strand scaled scores.

The strand scaled scores were categorized as follows: L=Low (equivalent to Below Basic and Basic); M=Medium (equivalent to Proficient); H=High (equivalent to Advanced). The maximum possible strand scaled score was converted to H in cases where no strand scaled score equaled or exceeded the Advanced scaled score cut. See Chapter Sixteen for more information on strand scores and how they are used in score reports.

Chapter Fifteen: Linking

In large-scale testing programs it is a common practice to have different item sets appear in test forms within and/or across years. Linking operational scores from the different test forms ensures that all forms for a given grade and subject area provide comparable scores. Consequently, students are not given an unfair advantage or disadvantage because the particular test form they took is easier or harder than a test form taken by other students.

When multiple forms are administered, students who have the same ability could obtain different raw (number-correct) scores over the different test forms. As discussed further in Chapter Sixteen, raw scores can only be interpreted relative to the particular set of items used. This is because item difficulty distributions are nearly always different across different item sets.

Just like raw scores are not necessarily interchangeable across forms, Item Response Theory (IRT) item parameters and ability estimates are not necessarily interchangeable across separate calibration runs. Application of an IRT scale linking methodology is usually required to place the item parameters and student ability estimates on the same scale as other forms. (As cautioned earlier, the success of these methods depends on how well the IRT assumptions are met.) The IRT model used for the PSSA is the Rasch Partial Credit Model (RPCM; Masters, 1982). Further descriptions of the RPCM are given in Chapter Twelve.

A chained linking design is utilized for the PSSA operational scores in mathematics, reading, and science. Here, scores from the new test form are linked to the scale of previous test forms. The chain originates from each test's base form, which is used as the reference for calibrating all items in the item pool. The base form is usually the form upon which the cut scores were established (see Chapter Thirteen). When the item parameters from the new test are placed on the bank's scale, the resulting scaled scores for the new test form will be the same as the scaled scores of the base form. In order to compare students' PSSA scaled scores across different years, the new operational items need to be placed on the bank scale via scale linking. Without linking, the Rasch item calibrations for the new test items will be unique to the new test administration.

This chapter begins with a brief summary of the entire PSSA linking procedure. This is followed by a more detailed explanation of selected design elements and processes. Some summary results are also provided. Procedures for mathematics, reading, and science are reviewed first. Writing is addressed at the end of the chapter.

BRIEF SUMMARY OF THE PSSA LINKING PROCEDURE

The following steps outline the linking procedure. It should be noted that the first three steps are actually item calibration, which is referred to as within-year linking in this chapter.

- 1.** Calibrate all operational (OP) multiple-choice (MC) items in an unanchored Winsteps run
 - a.** Include only the Master Core and paper students.
 - b.** Include all MC items in the core operational section (OP MC).
 - c.** Do not include any equating block (EB) items.
 - d.** Do not include any field test (FT) items.

2. Calibrate selected multiple-choice (MC) items in an anchored run:
 - a. Include all forms, but only paper students.
 - b. Include all MC items in the core operational section (OP MC).
 - c. Include all equating block (EB) items.
 - d. Do not include any field test (FT) items.
 - e. Fix all OP MC items from Step 1.
3. Calibrate selected open-ended (OE) items in an anchored run by putting them on the MC item scale from Step 2:
 - a. Include all forms, but only paper students.
 - b. Include all OE items in the Core section (OP OE).
 - c. Do not include any FT items.
 - d. Fix all MC items from Step 2.
4. Compute the rater-effect constant for each OE-Link item:
 - a. Pull sample responses from the previous year ($N \sim 1,000$ students)¹⁴ and create a data file including the selected students' MC and OE response scores (from the previous year's raters).
 - b. Have the current year's raters score the selected OE responses.
 - c. Calibrate the difficulty parameters for OE items based on the previous year's scores. (This is done separately for each OE item.)
 - i. Calibrate all MC items (from the previous year's test) in an unanchored run using the data file from Step 4.a.
 - ii. Calibrate each OE item separately using an anchored run for each item.
 - d. Compute the rater-effect constant for each OE-Link item based on OE parameters from Step 4.c.ii.
 - i. Use current and previous year's rater raw score means as the true/expected raw scores.
 - ii. Using expected score distribution conditional on ability (item characteristic curve) for the previous year's rater scores, determine the two ability values for the two expected raw scores (i.e., the current and previous year's rater score means).
 - iii. The rater-effect constant is the difference between the two abilities.
5. For each OE linking item, adjust the item parameter estimate obtained in Step 3 by the Step 4 Value—remove the rater effect:
 - a. Each OE linking item (LK OE) has a specific rater-effect adjustment value.

¹⁴ This sample is generally stratified on the previous year's total test scores; however, a minimum of 100 responses are selected for each possible score point.

6. Evaluate the stability of the linking items using Robust Z:
 - a. Include all core linking (LK) items—LK MC and LK OE.
 - b. Include all EB items.
 - c. LK OE item parameters should be obtained from Step 5.
 - d. Calculate Robust Z for each item in the linking.

Once the above calculations were made, the following guidelines were used in determining possible sets of linking items used for the equating:

- e. Items with an absolute value of Robust Z exceeding 1.645 may be considered for exclusion.
- f. No more than 20 percent of the pool of linking items may be considered for exclusion.
- g. The ratio of the standard deviations of previous year and current Rasch difficulties should be in the 90 to 110 percent range.
- h. The correlation of previous-year and current-year Rasch difficulties is greater than 0.95.

Final decisions about the linking items were made in the national technical advisory committee (TAC) meeting in collaboration with PDE and DRC staff following these rules:

- i. Drop items that DRC identified as having a large Robust Z and were out of sequence because they were pulled from a separate FT form.
- j. If an item has been changed in any way from the previous year, it may no longer be used for linking.

Scatterplots of the linking item difficulties (logits) were constructed (i.e., the current year values were plotted against those from the prior year). Ideally, these plots should have a strong linear trend. Items straying from the trend line did not perform in the same way in both years. As noted above, items that departed significantly from this were further evaluated. The scatterplots with final LK/EB item sets are shown in Figure 15–1.

7. Calculate the mean shift over MC and OE linking items using global item difficulties (weighted by number of score points) for OE items:
 - a. Include all core linking (LK) items—LK MC and LK OE.
 - b. Include all EB items.
 - c. Weight LK OE items by maximum possible score.
8. Apply the mean shift to the item parameters calibrated in Steps 2 and 3:
 - a. All OP items (OP MC + OP OE).
 - b. All EB items.

9. Scale the operational test by fixing all operational (OP) items obtained in Step 8:
 - a. Include all students (all forms and all modes).
 - b. The result from this step is a Raw-to-Logit (Rasch Ability) table.
10. Apply the appropriate linear transformation to the logit values to derive the scaled scores and SEMs:
 - a. The result from this step is a Raw-to-Scaled-Score table.

PSSA MATHEMATICS, READING, AND SCIENCE

The test designs for the operational PSSA mathematics, reading, and science assessments used multiple test forms that shared several common elements. The operational items are the same on all forms and for all students. Student total raw scores and scaled scores, as well as AYP reporting, are based exclusively on the operational items. In addition, each test form has a different set of nonoperational items (i.e., items that are not part of student scores). One such example is the embedded field test items that are tested for possible inclusion in the PSSA item pool. Equating block items were included to bolster the linking design (discussed further below). The forms containing the nonoperational items were spiraled to ensure the items would have randomly equivalent samples of students responding to them. In summary, each test form for 2013 mathematics, reading, and science was composed of core operational, equating block, and field test sections.

Data Collection Design

The item status codes used in the IDEAS item banking system are given in Table 15–1. For brevity, these codes are used for the remainder of this chapter.

The link between years was based on the core linking (LK) and equating block (EB) items. These items had been used in previous administrations (most often from the prior year). The LK and EB items were used in approximately the same context. That is, the items were not altered in any way, they appeared in about the same position in the booklet, and they were administered at about the same time of year.

The equivalence of student samples across years cannot be assumed. Further, the same item can have different properties in different years because of changes in the item’s position or changes in the students’ experiences. Consequently, between-year linking requires more scrutiny than within-year linking. This chapter focuses more on the linking between years.

The linking design employed for PSSA is often referred to as a common-item nonequivalent groups design. Test forms contained a set of common items, called core LK items or EB items, which served as anchors for linking test forms across years to a common scale. LK items were internal anchor items (i.e., they contribute to student test scores) and EB items were external anchor items (i.e., they did not contribute to student test scores).

Since LK items were in the tests’ operational sections, they were common across all test forms within a year. All LK items were also common between years as well since all came from the prior year’s administration. The forms containing EB items were spiraled, and thus, randomly distributed across the student population. Reading used two EB item sets across forms. All EB items in the 2013 PSSA tests were pulled from the 2012 tests.

The number of the LK/EB items was differed depending on the subject and grade. These are summarized in Table 15–2. Specifically, there were 13 to 24 LK multiple-choice items and 1 to 2 LK open-ended items for all mathematics, reading, and science grade levels. There were two passages with EB items in reading. Each set had eight MC items. Half of forms contained one set, while rest of forms contained the second set.¹⁵ In the grades 3 to 5 mathematics and science tests, each form had two sections with EB items. In 2013, a total of 18 EB items were distributed across forms presented within the two EB sections. Since there were 20 forms at these grades, EB items appeared across multiple forms. Note that a pair of EB items in one form did not appear in another form as a pair. With mathematics grades 5–8, and science grades 4 and 8, each form had unique set of two EB items per block.

There were 40 core MC items in reading, 60 core MC items in mathematics, and science had 58 MC items. There were four core OE items in reading with the exception of Grade 3, which had two. There were three core OE items in mathematics. Science had five OE items.

Table 15–1. Item Status Codes in IDEAS

Item	Comments	Code in IDEAS
Core	Include core linking (i.e., anchor) items and unique core items	OP
Core linking	Linking items in the core section which include MC and OE items	LK
Equating Block	All items in the EB are MC linking items	EB
Field Test	Items in the embedded FT section	FT

Table 15–2 presents the 2013 PSSA linking designs. Each test form contains the core operational, core linking, and EB sections (FT sections are not illustrated as they are not used for linking). The core operational section includes MC and OE items, but the EB Section only has MC items. The operational section contains unique operational items and core-to-core linking items.

¹⁵ In other words, Forms 1, 2, and 3 had the same set of EB MC items, while Forms 4 and 5 shared a different set of EB MC items.

Table 15–2. 2013 PSSA Linking Designs: Mathematics, Reading, and Science

Mathematics Grades 3–5					
Form	Core		Core Links		Equating
	MCs (1 pt)	OE (4 pts)	MC(1)	OE(4)	Blocks
1	36	1	16	2	2
2	36	1	16	2	2
3	36	1	16	2	2
			·		
			·		
18	36	1	16	2	2
19	36	1	16	2	2
20	36	1	16	2	2
Core MC Links: 16 Core OE Links: 2 (4pts) EB MC Links: 2 (per form)			Total Core MC: 60 Total Core OE: 3 (4pts) Total EB items: 18 (across all forms)		

Note: EB items for mathematics grades 3-5 were not made into blocks. Total of 18 EB items were distributed across forms with 2 EB per form. Since there are 20 forms, EB item appeared across multiple forms and the pair were different across forms.

Mathematics Grades 6–8					
Form	Core		Core Links		Equating
	MCs (1 pt)	OE (4 pts)	Blocks	OE(4)	Blocks
1	36	1	16	2	EB1-2
2	36	1	16	2	EB2-2
			·		
			·		
8	36	1	16	2	EB8-2
9	36	1	16	2	EB9-2
Core MC Links: 16 Core OE Links: 2 (4pts) EB MC Links: 2 (per form)			Total Core MC: 60 Total Core OE: 3 (4pts) Total EB items: 18 (across all forms)		

Table 15–2 (continued). 2013 PSSA Linking Designs: Mathematics, Reading, and Science

Reading Grade 3–5						
Form	Core		Core Links		Form Passage-EBs	
	MCs (1 pt)	OEs (3 pts)	MC(1)	OE(3)	EB1	EB2
1	28	1	12	1	P1-8	
2	28	1	12	1	P1-8	
			⋮			
10	28	1	12	1	P1-8	
11	28	1	12	1		P2-8
			⋮			
19	28	1	12	1		P2-8
20	28	1	12	1		P2-8
Core MC Links: 12 Core OE Links: 1 (3pts) EB MC Links: 8 (per passage set)				Total Core MC: 40 Total Core OE: 2 (3pts) Form Blocks: 2 (two passage sets)		

Reading Grades 6–8						
Form	Core		Core Links		Form Passage-EBs	
	MCs (1 pt)	OEs (3 pts)	MC(1)	OE(3)	EB1	EB2
1	23-28	2	12-17	2	P1-8	
2	23-28	2	12-17	2	P1-8	
3	23-28	2	12-17	2	P1-8	
4	23-28	2	12-17	2	P1-8	
5	23-28	2	12-17	2	P1-8	
6	23-28	2	12-17	2		P2-8
7	23-28	2	12-17	2		P2-8
8	23-28	2	12-17	2		P2-8
9	23-28	2	12-17	2		P2-8
Core MC Links: 12-17 Core OE Links: 2 (3pts) EB MC Links: 8 (per passage set)				Total Core MC: 40 Total Core OE: 4 (3pts) Form Blocks: 2 (two passage sets)		

Table 15–2 (continued). 2013 PSSA Linking Designs: Mathematics, Reading, and Science

Science Grade 4, 8					
Form	Core		Core Links		Equating Blocks
	MCs (1 pt)	OEs (2 pts)	Blocks	OE(2)	
1	42	3	16	2	EB1-2
2	42	3	16	2	EB2-2
			·		
			·		
			·		
11	42	3	16	2	EB11-2
12	42	3	16	2	EB12-2
Core MC Links: 16			Total Core MC: 58		
Core OE Links: 2 (2pts)			Total Core OE: 5 (2pts)		
EB MC Links: 2 (per form)			Total EB items: 24 (across all forms)		

LINKING METHOD FOR PSSA MATHEMATICS, READING, AND SCIENCE

The overall linking procedure was summarized at the start of this chapter. In review, the first step was to conduct a within-year linking to place all 2013 item parameters on the same scale. This was accomplished by first calibrating all OP (including LK) MC items with master core and paper students. Then the OP MC items were anchored to calibrate EB MC items with all forms and paper students. Next, the resulting MC item parameters were anchored in WINSTEPS while all OE items in the operational section (including OP LKs) items were calibrated including paper students.¹⁶ At this point all OP and EB item parameters were on a unique scale for 2013. Between-year linking was required to place these items on the bank scale.

Between-year linking utilized the 2013 LK and EB item parameters and their banked counterparts. The scale transformation methodology used for PSSA is the mean-shift procedure. This has been the procedure employed by the PSSA program for some time. After evaluating the robustness of the link by identifying items that did not maintain their relative difficulty across years, the difference between the 2013 and banked parameters was then determined. The mean of the differences was then used to statistically adjust the 2013 parameters to the bank scale. The final (linking) item parameters were then used to estimate student abilities, which were, in turn, transformed to scaled scores. (Transformation formulas are provided in Chapter Fourteen.)

Rater Drift

Before the final mean-shift value was determined, a rater-effect adjustment was applied to the OE LK items. All OE linking items were in the Core section (LK OE). Students' responses from the previous administration ($n = 1,000$ per item) for the OE linking items were selected for the rater drift study (DRC jointly stratified by point value and on ability). The selected responses were scored by 2012 raters. Thus, the selected students' responses had scores from previous year and 2012 raters and the difference between them was used to adjust for the rater effect. See

¹⁶ No field test items were included in any of these calibrations. FT items were calibrated after the operational linking by anchoring all OP and EB items. This placed all FT items on the bank scale.

Tables 18–11 through 18–13 (see Chapter 18) for the correlations between the old and new scores for these OE LK items.

RESULTS SUMMARY

Table 15–3 shows the number of linking items and the shift parameters associated with those over the two years, and the correlation of item difficulties across years for each grade/content area. At first glance, some of the mean shift values may appear large. However, the shift constants are being applied to parameter estimates from Step 1 in the equating process (where the mean of the unanchored MC items is fixed at zero). The adjustment needed to place the Step 1 estimates on the current scale can be large in magnitude as it must take into account multiple factors (e.g., weighting in the case of the writing test, rater drift, changes in student ability since the base-year administration, and differences in difficulty).

Table 15–3. Summary Data for Linking Items

Subject	Grade	Final Counts		2012 Shift	2013 Shift	2013 Correlation
		MC	OE			
Mathematics	3	34	2	0.5028	0.4890	0.9605
	4	34	2	0.3120	0.0662	0.9582
	5	34	2	0.5907	0.4843	0.9851
	6	34	2	0.1774	0.0958	0.9873
	7	34	2	0.1735	0.1517	0.9782
	8	34	2	0.1935	0.1735	0.9817
Reading	3	28	1	-0.0399	-0.1306	0.9883
	4	33	2	0.0520	-0.0434	0.9926
	5	32	2	0.0481	0.0808	0.9882
	6	29	2	-0.1380	-0.1493	0.9868
	7	28	2	-0.1367	0.0463	0.9819
	8	30	2	0.6410	0.7172	0.9935
Science	4	40	2	0.2776	0.1013	0.9778
	8	40	2	-0.0200	-0.2274	0.9560
Writing	5	12	2	1.8791	1.5596	0.9767
	8	12	2	1.8122	1.8092	0.9591

Note: No item was dropped.

Appendix P provides the statistics for the linking items used. The previous and current values for item sequence, p -values, and logits are also provided. Appendix R provides the mean raw and scaled score points across years. Together, these appendices provide a summary of how the items and test changed across years.

VISUALIZATION SUPPLEMENT

As noted earlier, between-year linking requires considerable scrutiny. This is partly because student samples are not equivalent across years. Additionally, identical items can have different properties in different years because of changes in any given item's context or changes in the students' experiences. Since the linking process forces the logit difficulties for the linking items to have the same mean in the new year as they did in the old year, the current-year logit item difficulties will be displaced from the estimates they would have received from an independent calibration. The size of the displacements reflects the difference, if any, in the origins. The variation among the displacements corresponds to the approximate size of the standard errors for the items. The graphs in Figure 15–1 should help visualize this information. The calibration data file described in Chapter Nine was used to construct these plots.

Graphs

This technical report uses figures to help one visualize the across-year differences in linking items for mathematics, reading, and science at each grade. This section presents four types of figures, three of which illustrate the stability between the old (banked) and new (2013) item data:

1. Scatterplot of new-year p -values (2013) on old-year p -values (2012 generally).
2. Scatterplot of new-year logits (2013) on old-year logits (2012 generally).
3. Scatterplot of old and new p -values on new logits.
4. Test Characteristic Curves (TCCs) for the linked score distribution.

All four plots are presented for each grade and subject-area test. It should be noted that some of the linking items were not used to determine the final linking adjustments. These items are not included in the following scatterplots. As a consequence, some graphs will have fewer MC and/or OE items than expected. Each plot is described further below and Grade 3 mathematics results are considered as an example of each.

NEW-YEAR P -VALUES ON OLD-YEAR P -VALUES

The top left-hand plot in Figure 15–1 describes the relationship between the item p -values for the two years. The data points in these plots should have a clear trend where the vertical axis values rise as the horizontal axis values increases (i.e., as one moves from left to right). If the p -values for both years were correlated at 1.0, the relationship would be expected to fall on a straight line. Generally, linking items are not perfectly stable across years, so some scatter is expected. As an example, the plot for Grade 3 mathematics shows excellent across-year stability. The extent to which the trend does not pass through the origin indicates a change in student performance.

Many test score users are familiar with the p -value metric, which is why these charts are provided. However, the logit charts discussed below have advantages for visualizing this trend data.

NEW-YEAR LOGITS ON OLD-YEAR LOGITS

The top right-hand plot in Figure 15–1 focuses on the logit difficulties. It shows more clearly the relationship between new- and old-year item difficulties. Logit plots often provide more defined trends, but still can present varying degrees of scatter and in some instances reveal outlier data points. As with the associated p -value plot, this figure for Grade 3 mathematics suggests excellent across-year stability (with a very strong, but not perfect relationship).

OLD- AND NEW-YEAR P -VALUES ON NEW-YEAR LOGITS

Plotting p -values against logit difficulties across years is not as reliable as it is within a year. Using spiraled forms within a year, a given p -value will translate to a given logit regardless of the form on which it is used, within the limits of statistical precision. Within a year, the p -values-on-logit plot should be a single curved line. The corresponding between-year plots could have separate lines for each year. The difference between the two lines is a reflection of the adjustment (positive or negative) that is required to link the two item sets.

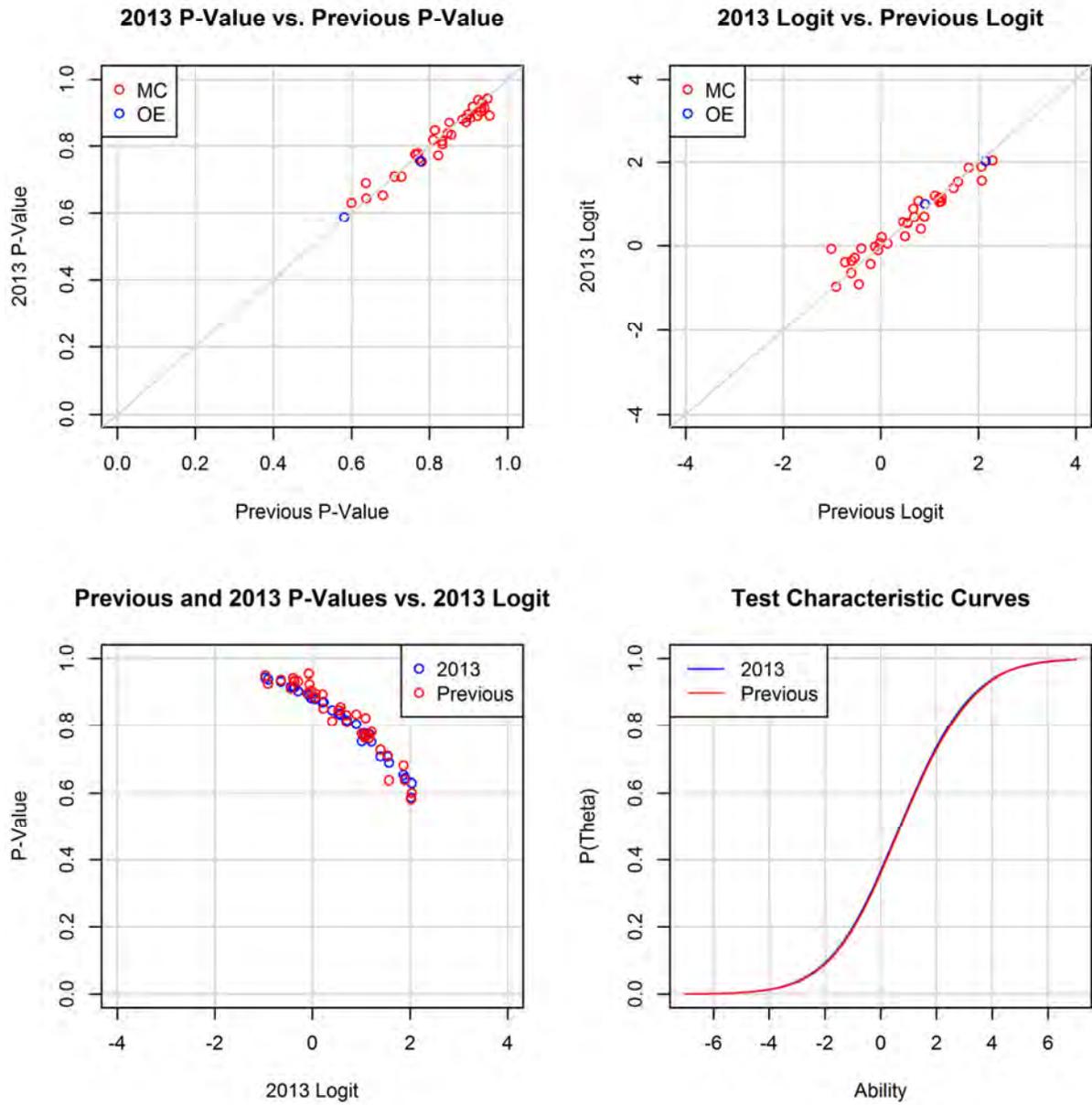
To bolster the number of linking items, different sets of EB linking items were included on different forms. Because the forms were spiraled within classrooms, the samples generated are randomly equivalent and the same p -values would be expected to translate into roughly the same logit, with some random variation expected. This is the case with the Grade 3 mathematics data as the relative smoothness of this curve indicates very good agreement among the forms.

TEST CHARACTERISTIC CURVES

The old and new-year Test Characteristic Curves (TCCs) by grade and subject are shown in the bottom right-hand plot figures. The TCCs show the similarity between the new- and old-year tests in terms of difficulty in the logit metric (new-year results are for the final, linked values). Assuming equal numbers of items for the two years, curves that are close to being coincident will translate into similar raw-score cut points. With extreme differences in test difficulties, some loss of precision and reliability may result. However, this is generally not evidenced in the figures, which display a close match across years. For Grade 3 mathematics the TCCs were essentially coincident.

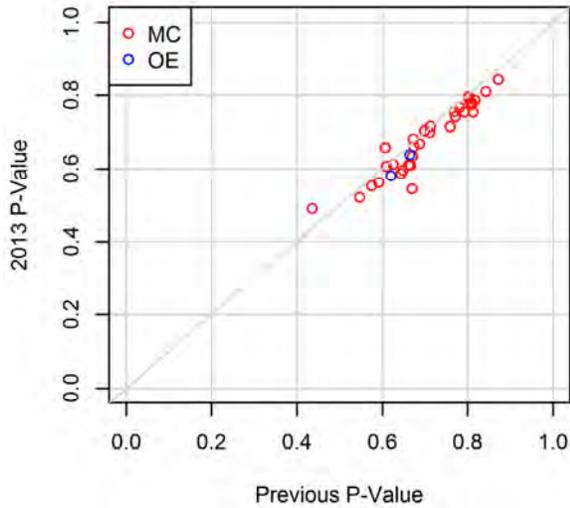
Figure 15–1. Item Stability Plots and Test Characteristic Curves

Mathematics Grade 3

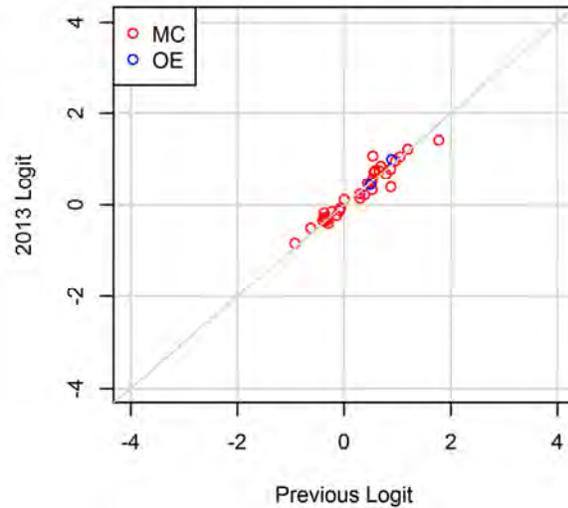


Mathematics Grade 4

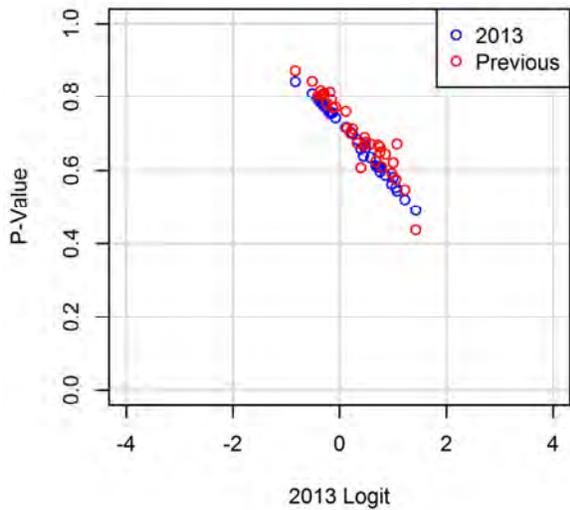
2013 P-Value vs. Previous P-Value



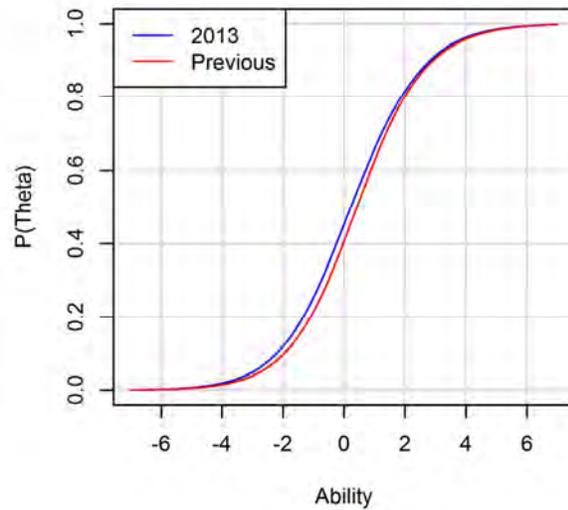
2013 Logit vs. Previous Logit



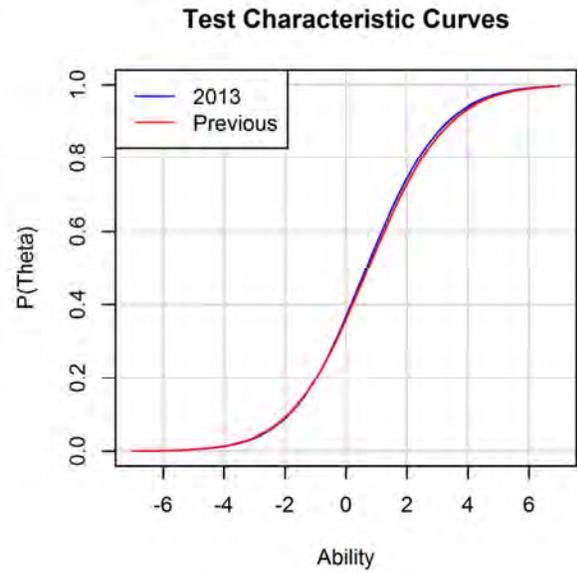
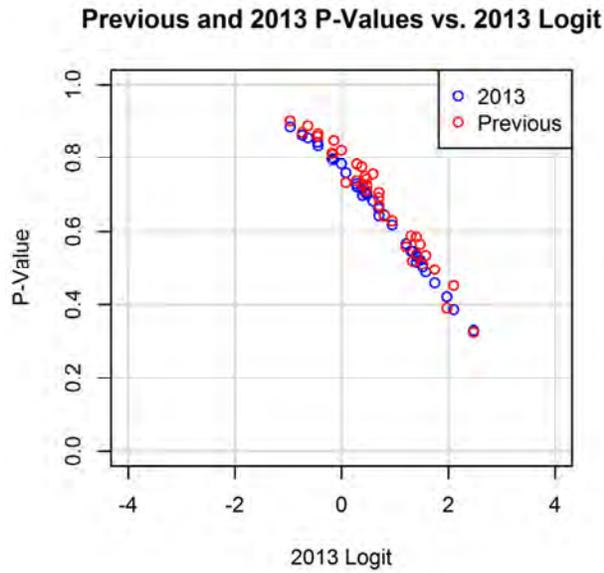
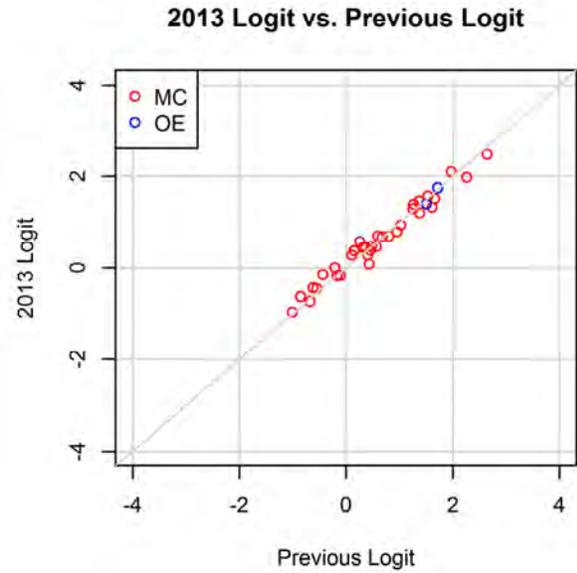
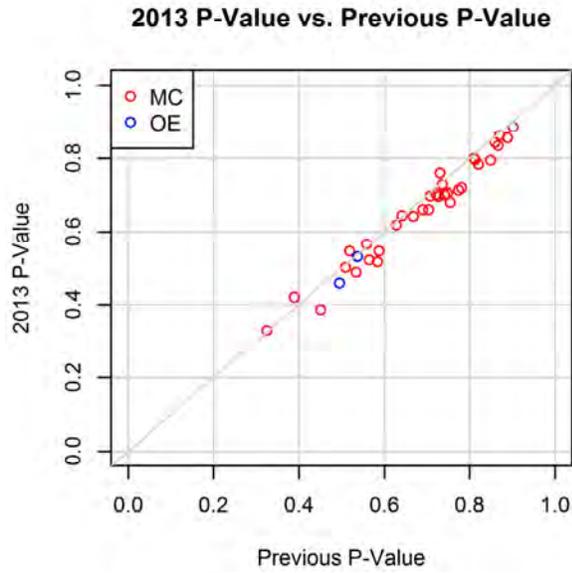
Previous and 2013 P-Values vs. 2013 Logit



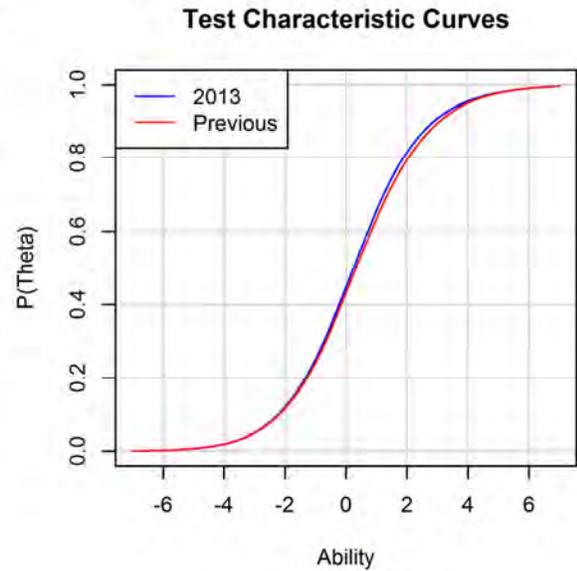
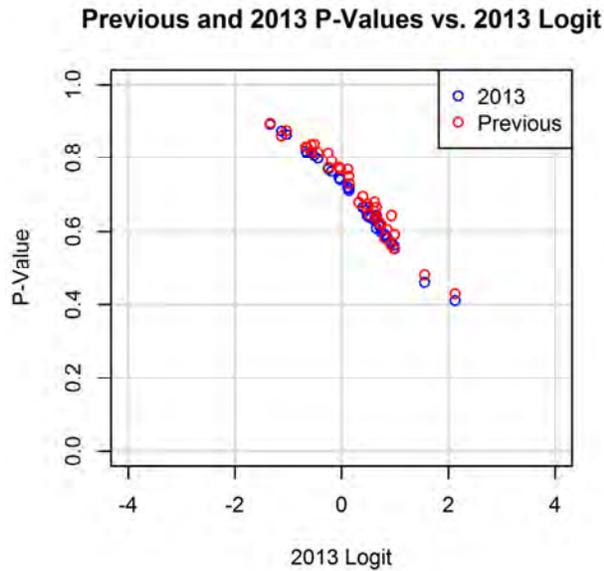
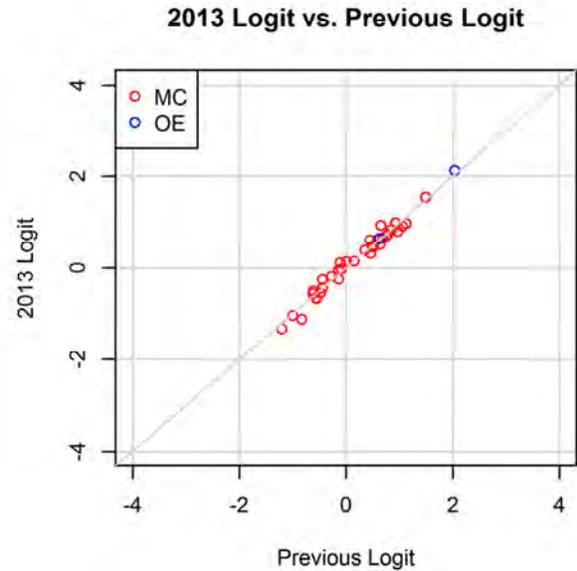
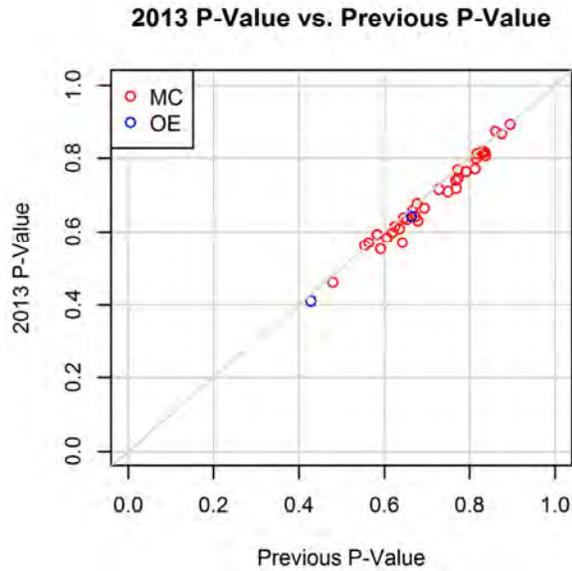
Test Characteristic Curves



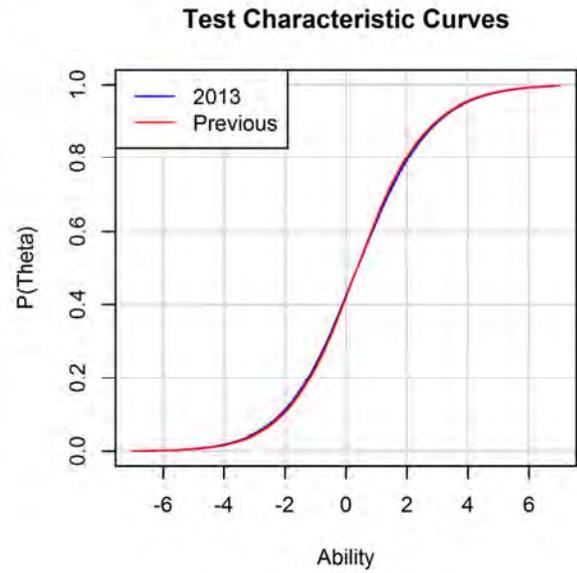
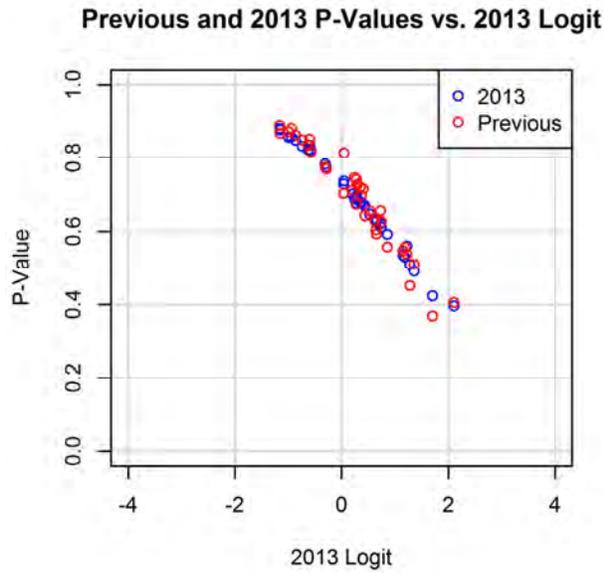
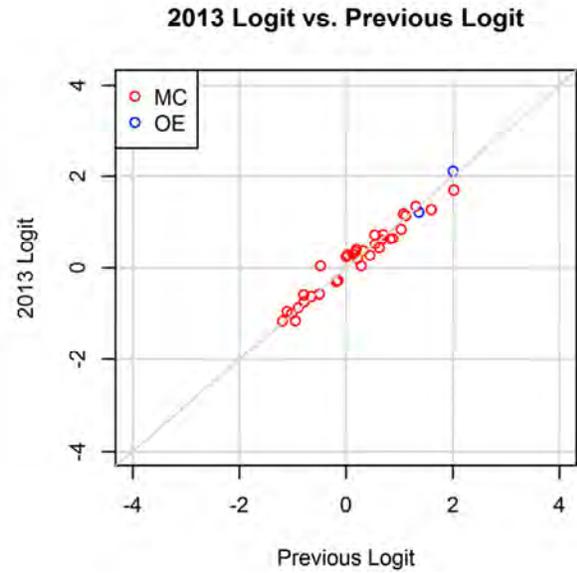
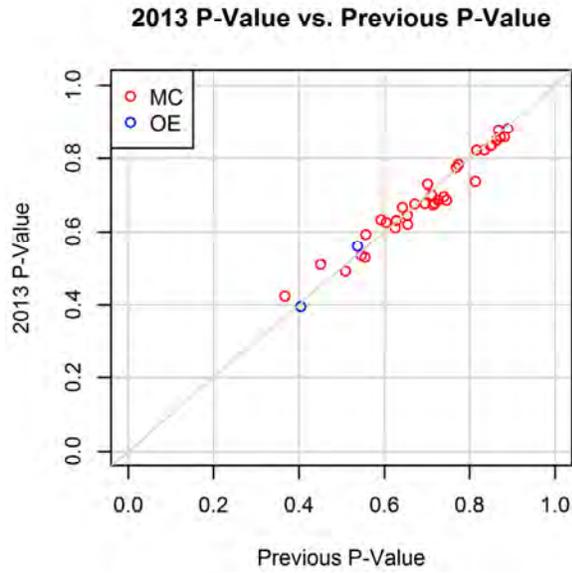
Mathematics Grade 5



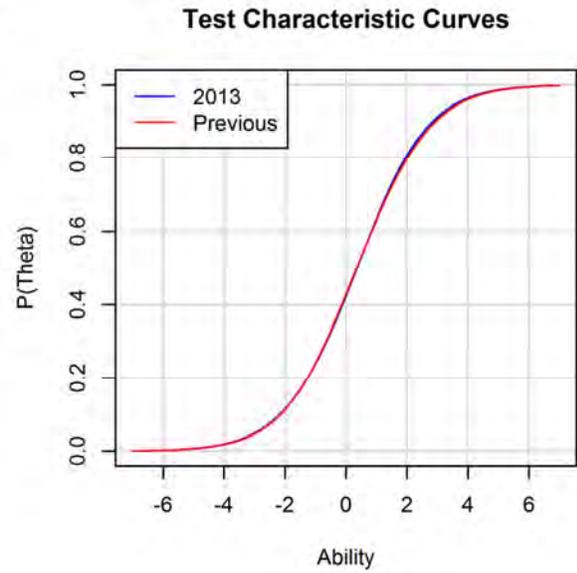
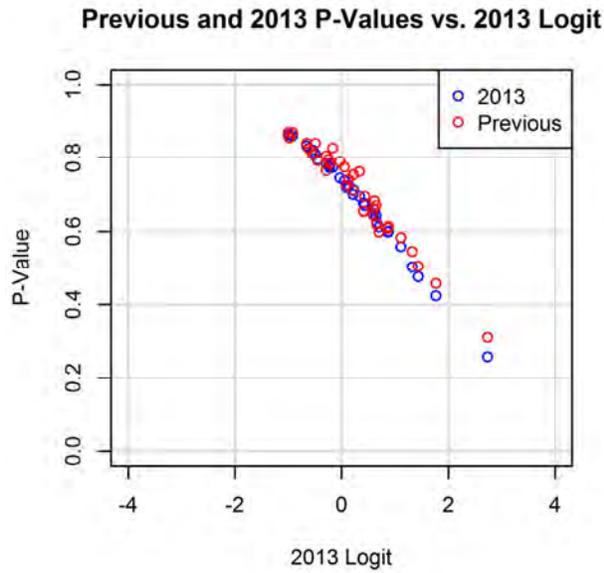
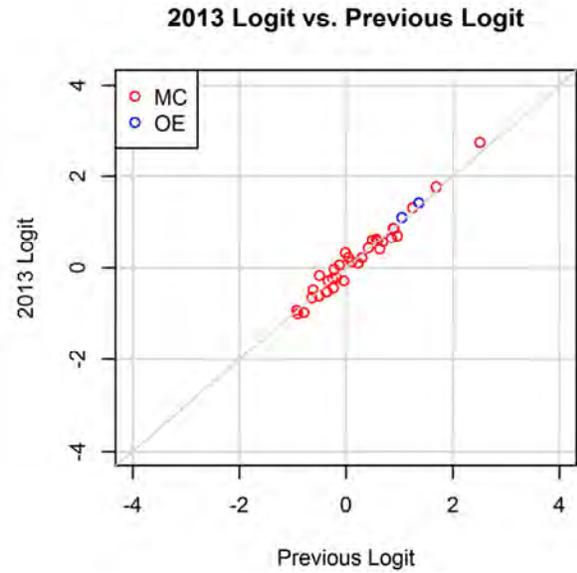
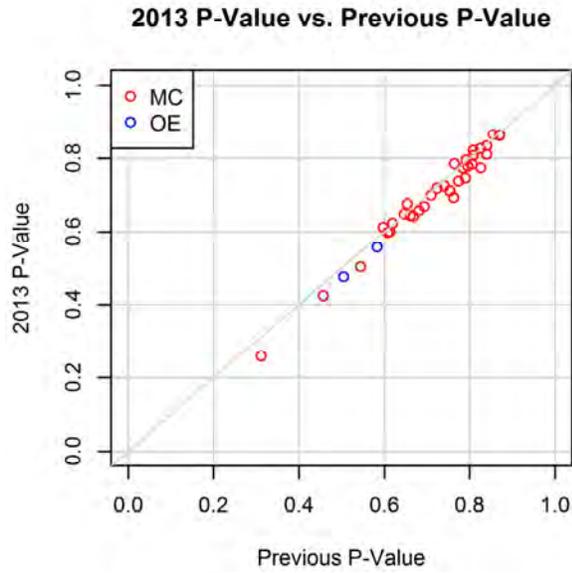
Mathematics Grade 6



Mathematics Grade 7

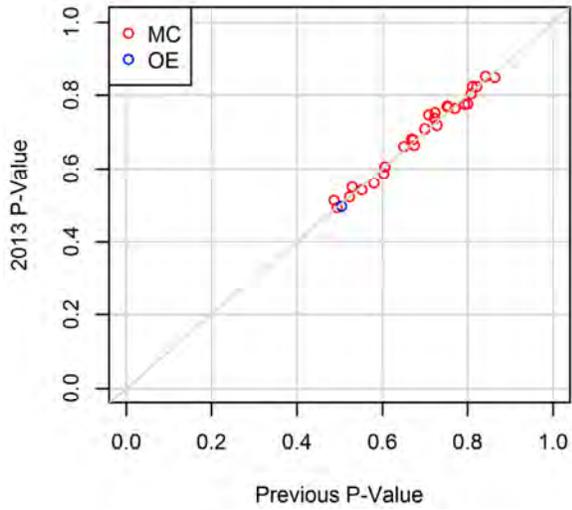


Mathematics Grade 8

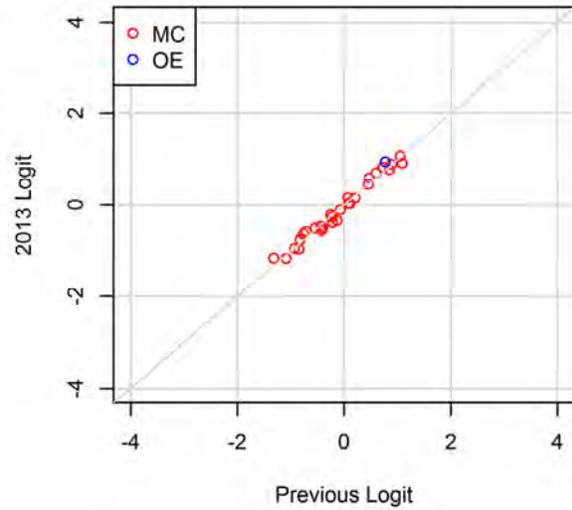


Reading Grade 3

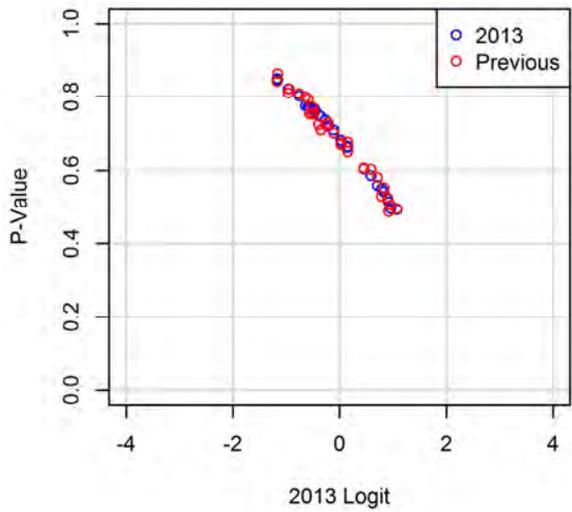
2013 P-Value vs. Previous P-Value



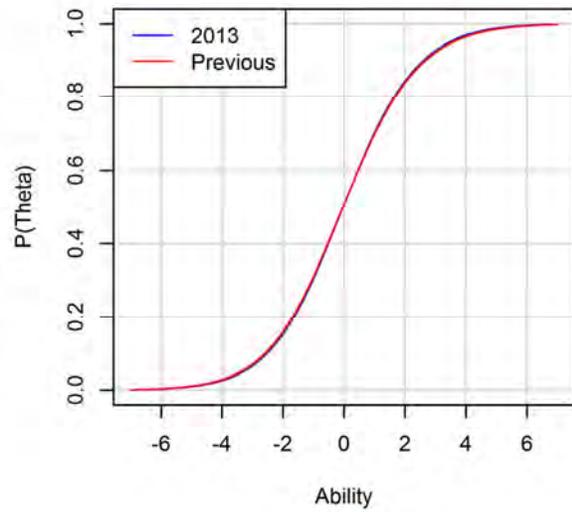
2013 Logit vs. Previous Logit



Previous and 2013 P-Values vs. 2013 Logit

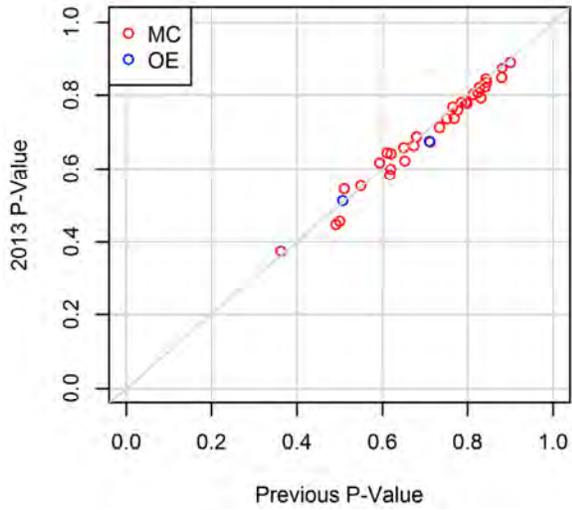


Test Characteristic Curves

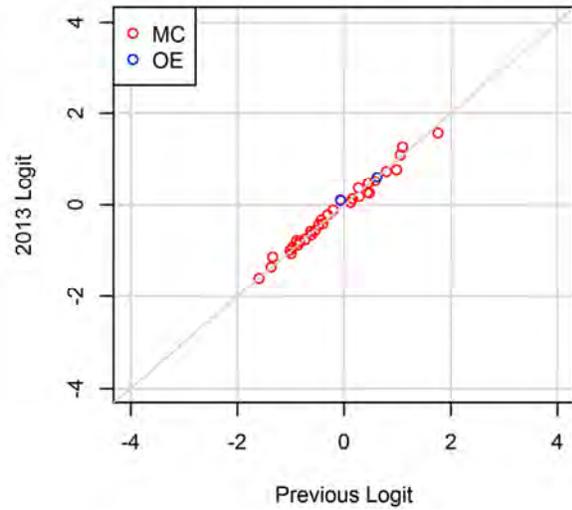


Reading Grade 4

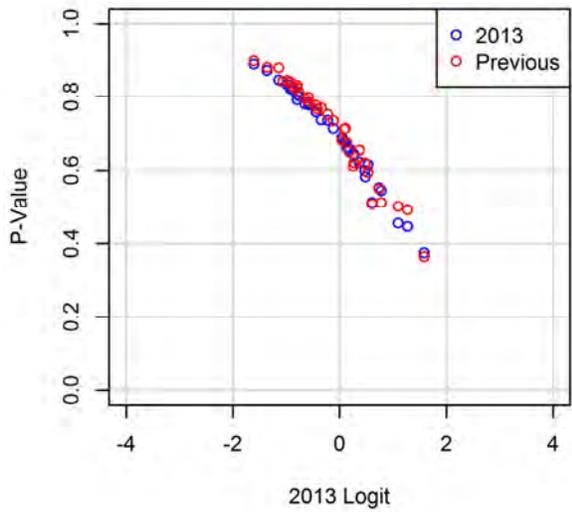
2013 P-Value vs. Previous P-Value



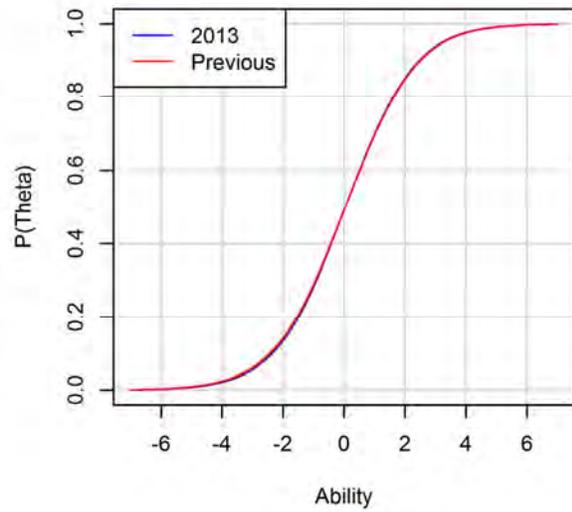
2013 Logit vs. Previous Logit



Previous and 2013 P-Values vs. 2013 Logit

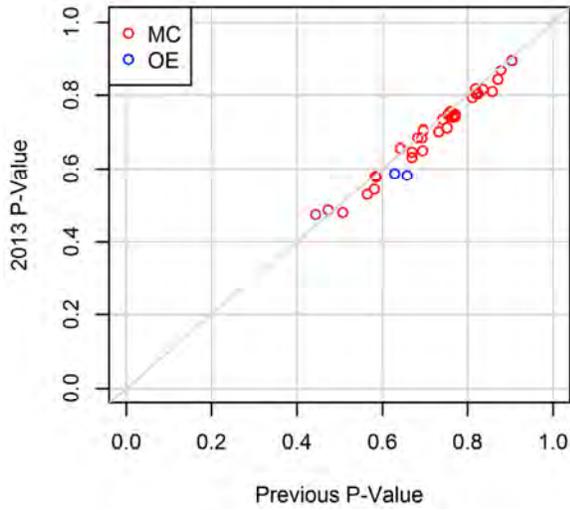


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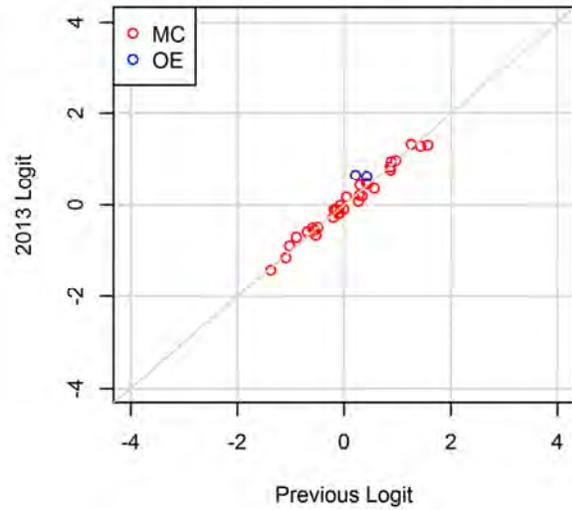


Reading Grade 5

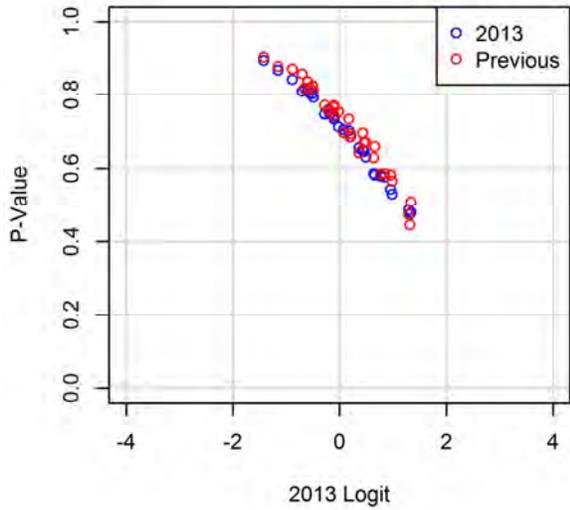
2013 P-Value vs. Previous P-Value



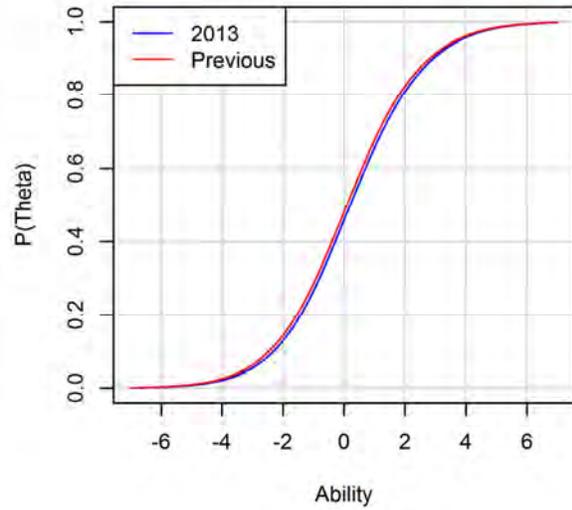
2013 Logit vs. Previous Logit



Previous and 2013 P-Values vs. 2013 Logit

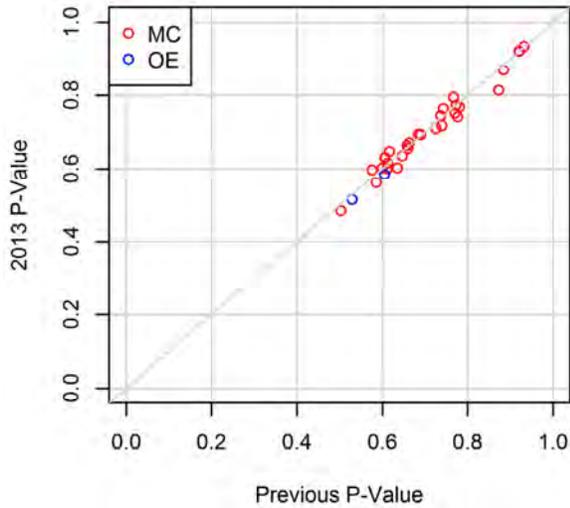


Test Characteristic Curves

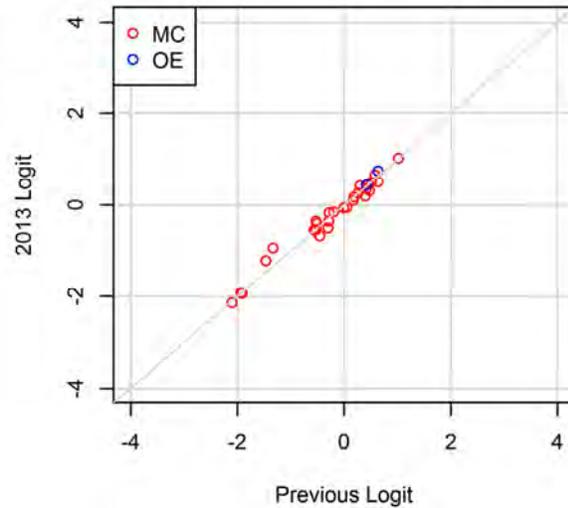


Reading Grade 6

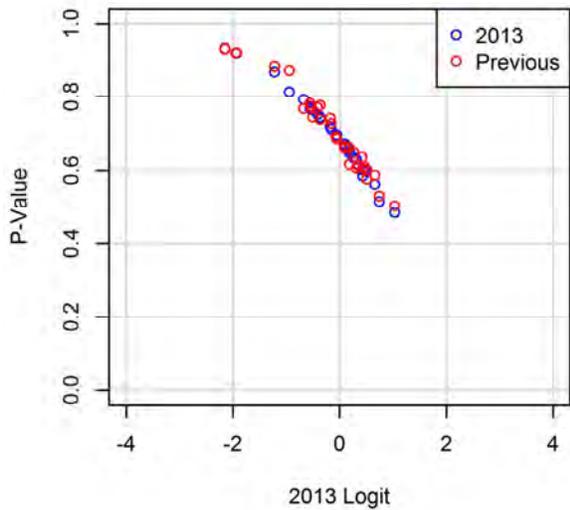
2013 P-Value vs. Previous P-Value



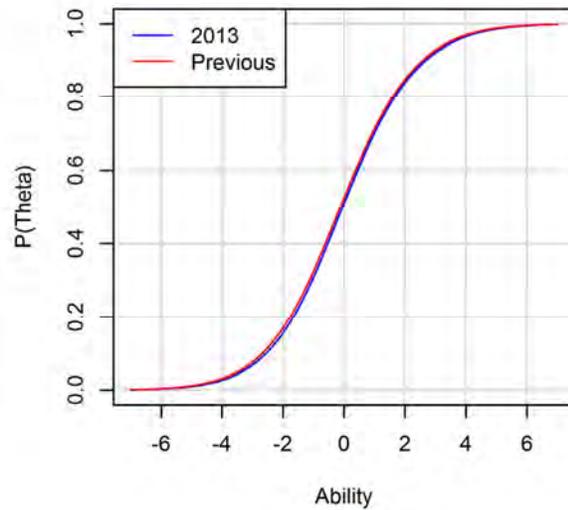
2013 Logit vs. Previous Logit



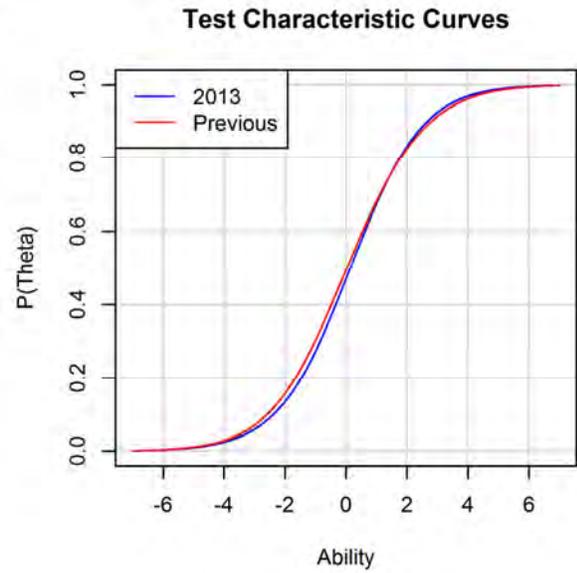
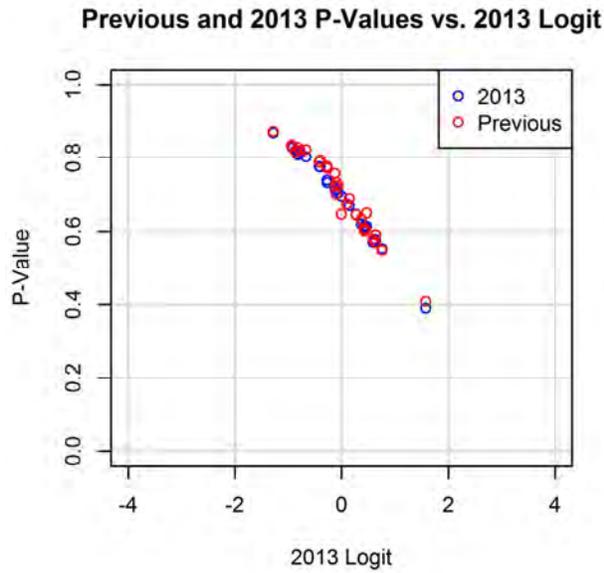
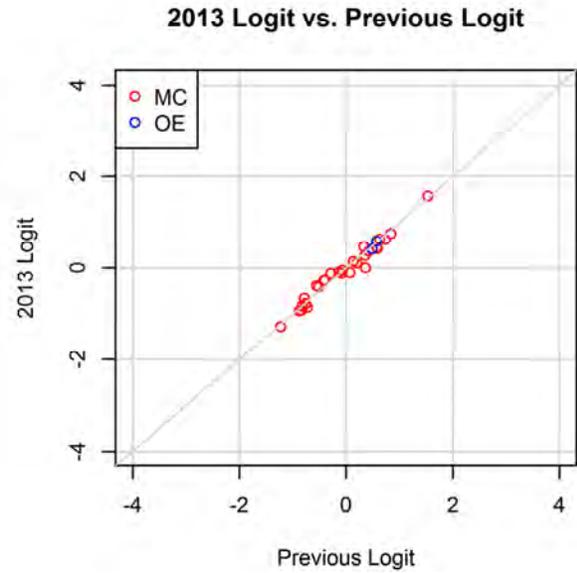
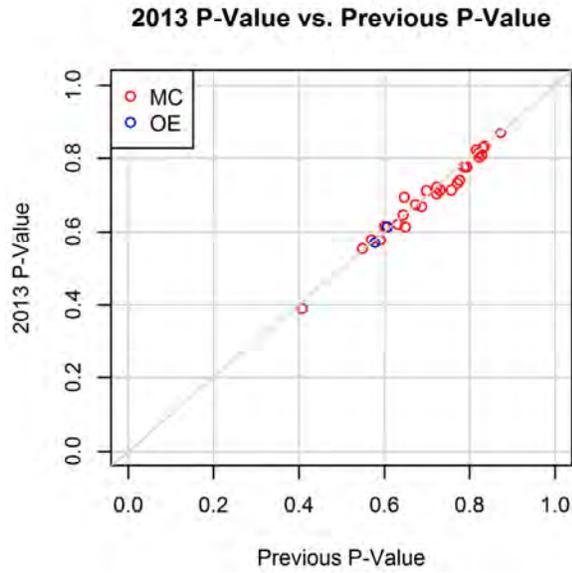
Previous and 2013 P-Values vs. 2013 Logit



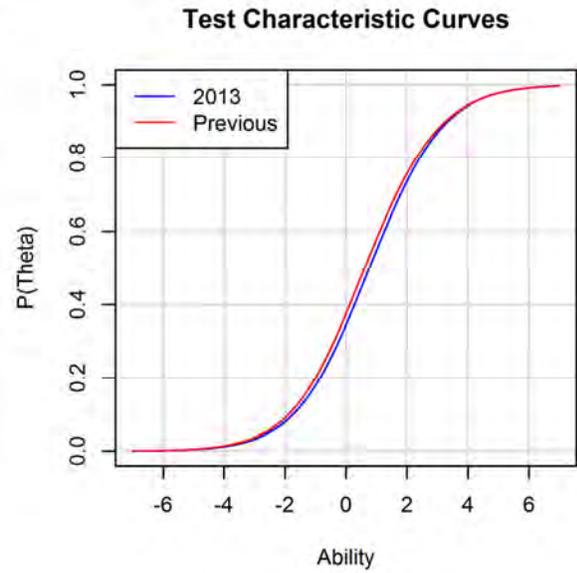
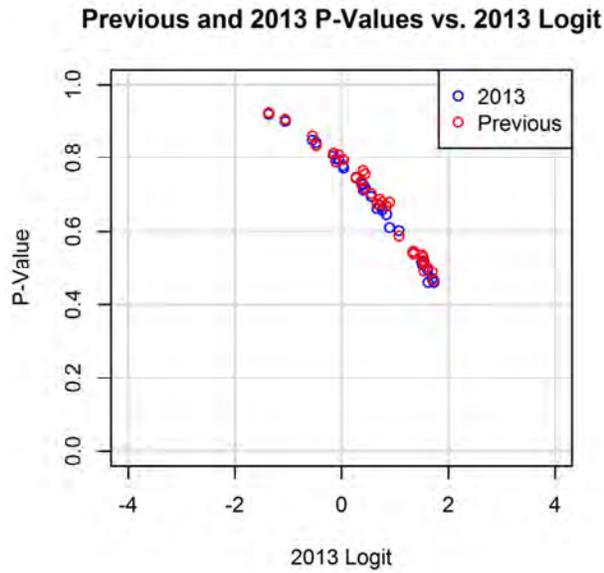
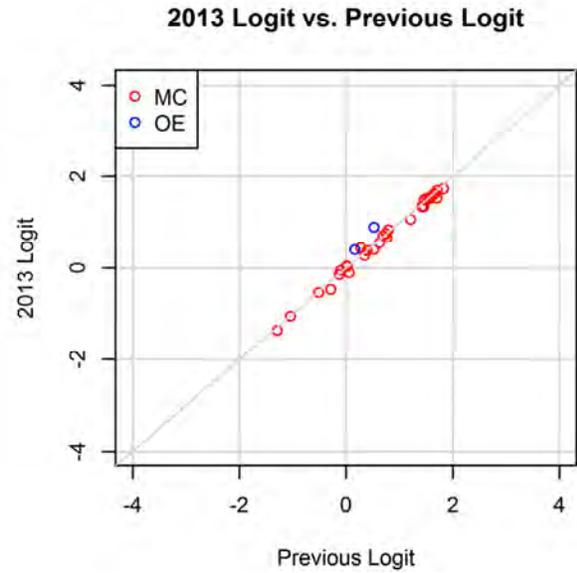
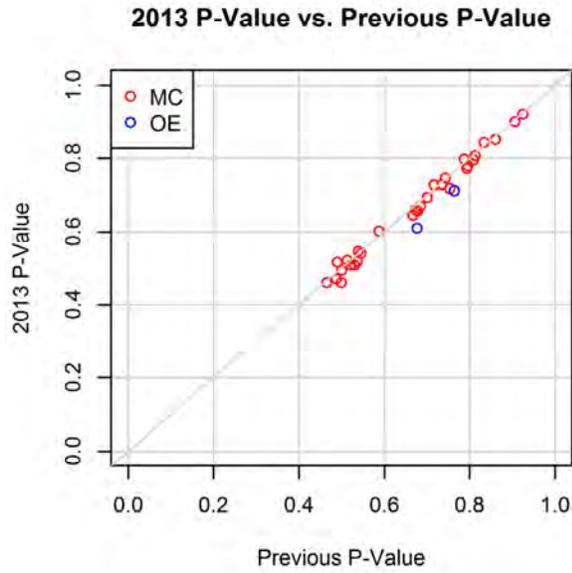
Test Characteristic Curves



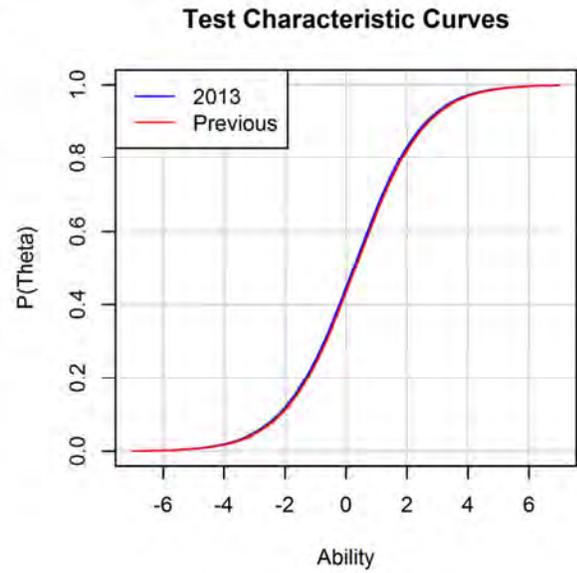
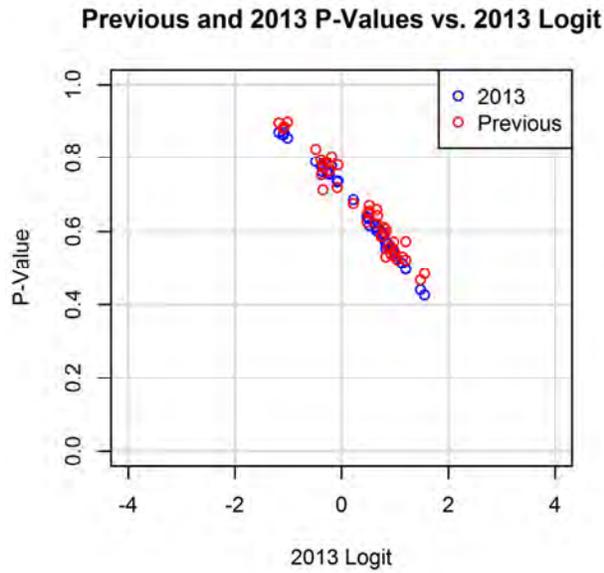
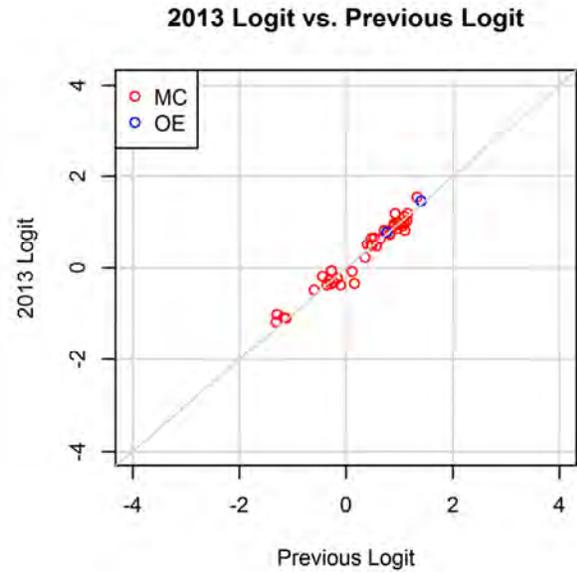
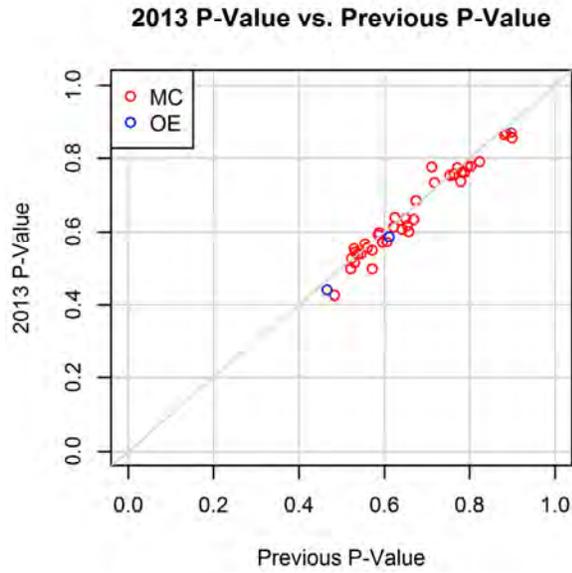
Reading Grade 7



Reading Grade 8

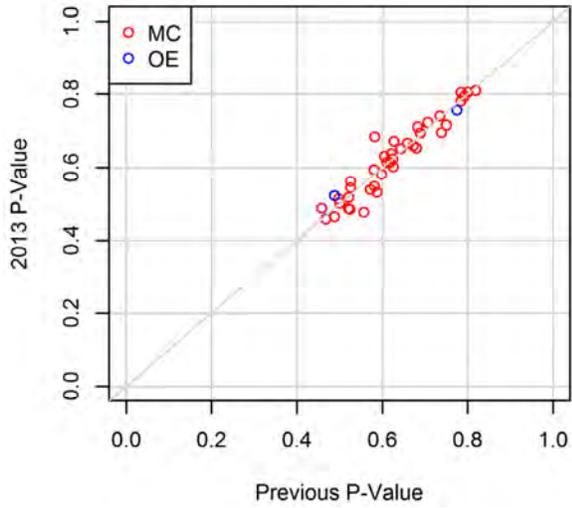


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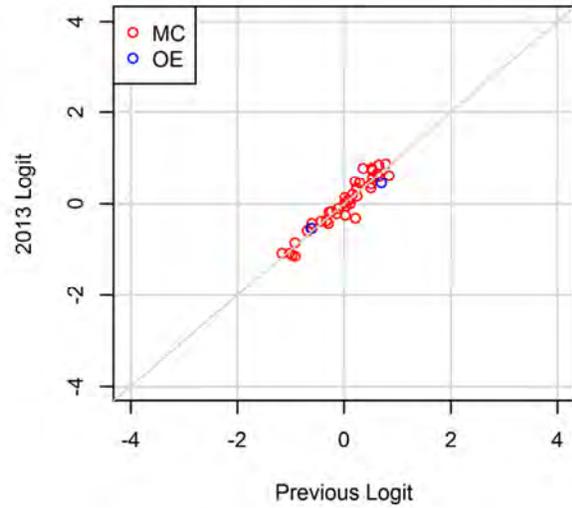


Science Grade 8

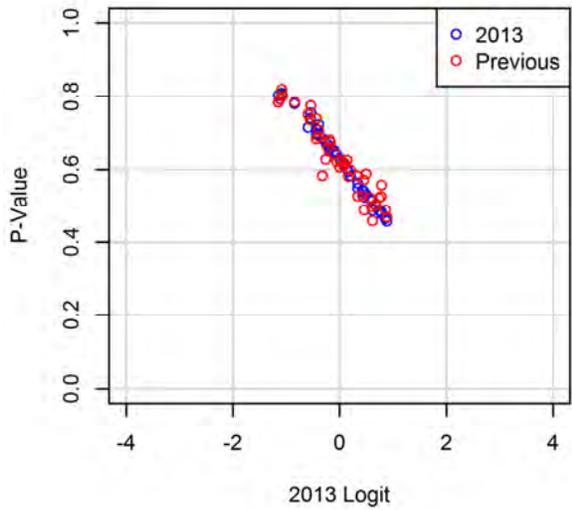
2013 P-Value vs. Previous P-Value



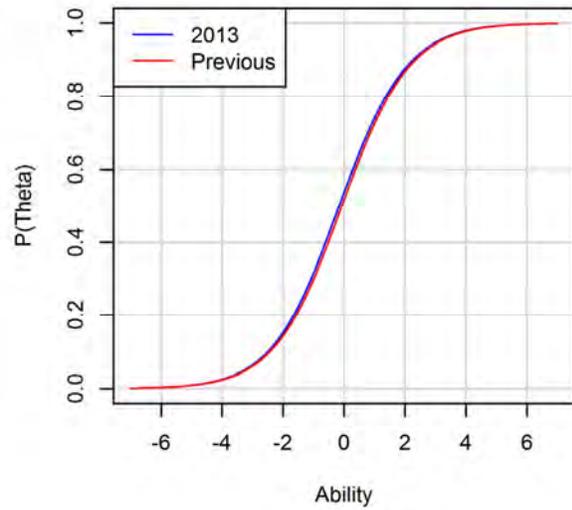
2013 Logit vs. Previous Logit



Previous and 2013 P-Values vs. 2013 Logit



Test Characteristic Curves



WRITING

The writing exams were comprised of one form for grade 5 and six forms for grade 8. Each form contained 12 core operational revising and editing (R&E) MC items and 8 field test R&E MC items (the MC items were associated with stimulus-based writing samples). Each test form also included two core operational writing prompts (WP). In addition, one WP item was included in the FT section. As with other PSSA programs, student scores were based solely on the core operational MC and core operational WP items. Table 15–4 summarizes the 2013 PSSA writing equating design.

Raw-to-scaled score tables for the writing tests were derived somewhat differently from the other subject areas. Essentially, all operational items were treated as core linking items and there were no EB items.¹⁷ However, the actual linking procedure is essentially the same as described at the beginning of this chapter (i.e., prompt scores get a rater effect adjustment; prompt scores are weighted accordingly when computing the mean shift; and the mean shift is applied to all item parameter estimates before scoring tables are derived in a fully anchored WINSTEPS run).

Table 15–4. 2013 Writing Test Design

Grade	Unique Core MC	Core		FT		Total # (MC/WP)	Total # Core Points	Forms
		Core Linking MC	Core Linking WP	MC	WP			
5	0	12	2	8	0	20/3	100	1
8	0	12	2	8	1	20/3	100	6

Note: Each WP is worth four points for conventions and four points for mode. However, the mode score is weighted by 10 to get the total possible points of 100.

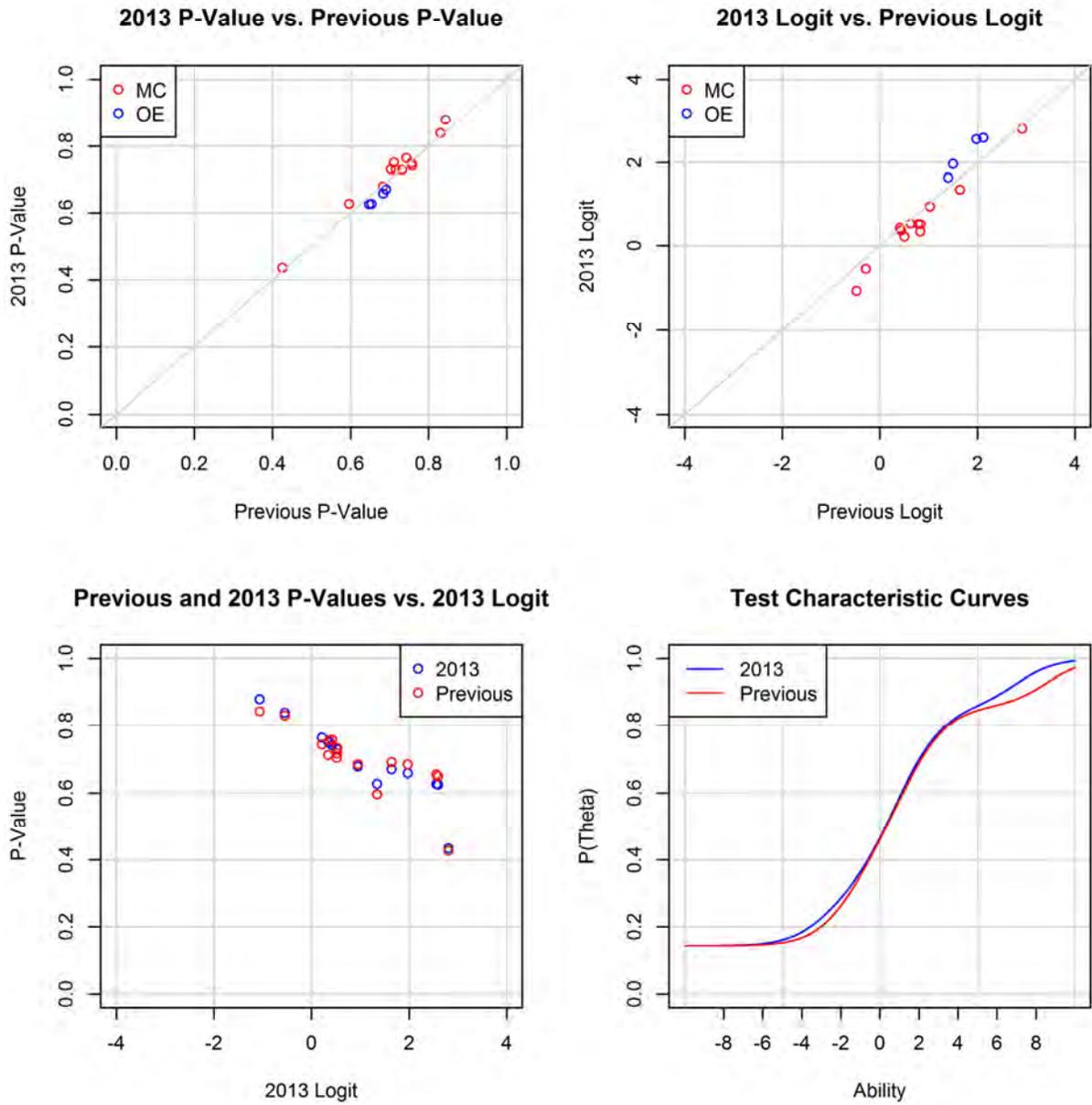
Graphs

Graphs, similar to those presented for other subject areas, are provided for writing in Figure 15–2. The TCCs for writing are less parallel and more irregular than those for the other subjects. Overall, the plots suggest that the writing results are less stable than the other content areas. The nature of the construct (with MC and weighted WP items contributing to the student scores) may have partial responsibility for this.

¹⁷ In other subjects only a subset of operational items are treated as core linking items and there were EB linking items as well.

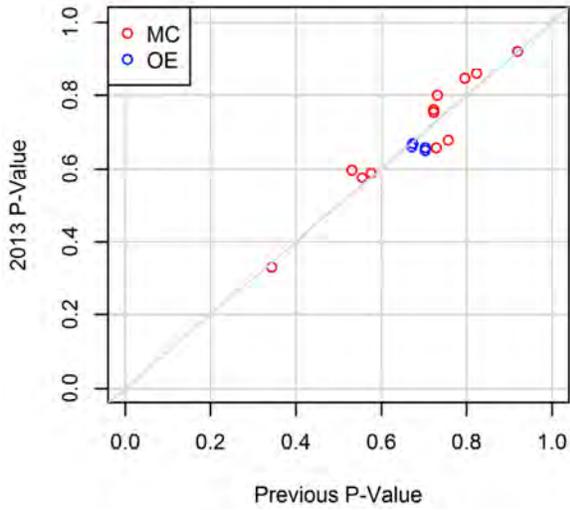
Figure 15–2. Item Stability Plots and Test Characteristic Curves for Writing

Writing Grade 5

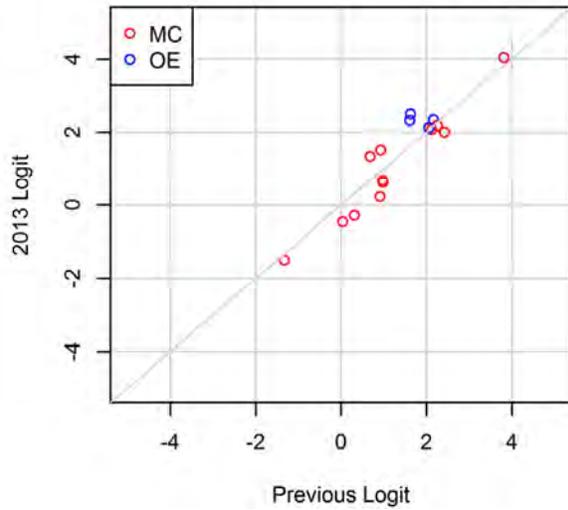


Writing Grade 8

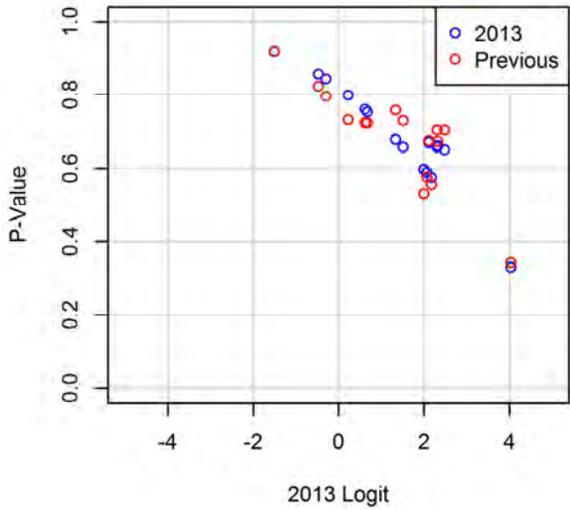
2013 P-Value vs. Previous P-Value



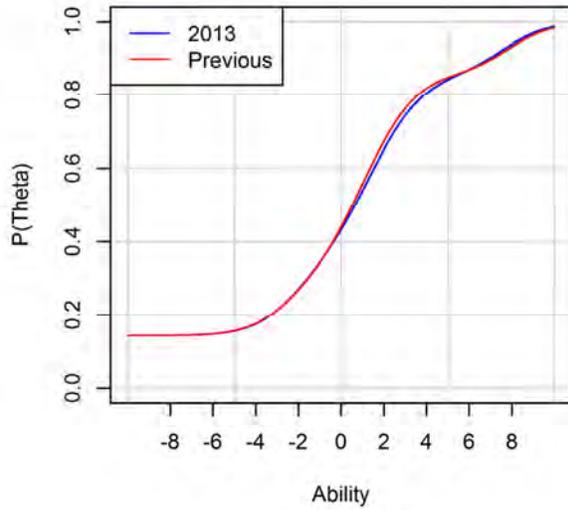
2013 Logit vs. Previous Logit



Previous and 2013 P-Values vs. 2013 Logit



Test Characteristic Curves



Chapter Sixteen: Scores and Score Reports

This chapter provides information about the scores provided for the PSSA (e.g., scaled scores, performance levels, and strand scores), how they are presented on score reports, and appropriate and inappropriate uses of the scores.

SCORING THE PSSA

PSSA items are composed of multiple-choice (MC) and open-ended (OE) items. Each correct response to an MC item receives a score of 1. Incorrect responses receive a score of zero. Scores on OE items range from zero to four, depending on the grade and subject area. Table 16–1 summarizes the types of items used on each subject-area test. More detailed information about the various item types is provided in Chapter Three.

Table 16–1. Item Types Used by Subject Area

Item Type	Subject			
	Mathematics	Reading	Science	Writing
Multiple-Choice (1 point)	■	■	■	■
Open-Ended (2 point)			■	
Open-Ended (3 point)		■		
Open-Ended (4 point)	■			
Prompt (4 point)				■

DESCRIPTION OF TOTAL TEST SCORES

Different types of scores have been developed for PSSA reporting. Since the underlying properties of these scores are not necessarily the same, the particular scores used depend on the purposes for which the test has been given. The following types of scores are provided for reporting a student’s overall performance on each PSSA subject-area test:

- Raw scores
- Scaled scores
- Performance levels

Raw Scores

A raw score is the number of points a student earned over the operational MC and OE items. By itself, the raw score has very limited utility. One limitation is that it can only be interpreted with reference to the total number of items on a subject-area test (e.g., a raw score of 15 on a 20-item test is different than a raw score of 15 on a 30-item test). In addition, raw scores depend on the difficulty of test items across test forms (e.g., a raw score of 15 on a test with 20 easy items is different than a raw score of 15 on a test with 20 difficult items). Because the difficulty of the items on a test can change from year to year, raw scores should not be compared across tests or administrations.

Scaled Scores

Scaled scores are introduced in Chapter Fourteen, and additional information is provided there including historical information about the development of the PSSA scaled score system. In the simplest sense, a scaled score is a transformed number-correct score. The specifics of the transformation processes for the PSSA are also discussed in Chapter Fourteen. When all students take the same items, as with the operational items on the PSSA, the more points the student earns, the higher the associated scaled score will be.

The value of switching to the more abstract scaled score metric is that it produces more general, interpretable, and equitable results. As noted above, a raw score of 30 is meaningless unless the maximum raw score is known. The difficulty of the test items was also mentioned as an additional challenge with interpreting raw scores. Number-correct scores are transformed to scaled scores to remove the effects of test length and item difficulty. (Strictly speaking, transformation of number-correct scores to percent-correct scores would also remove the effect of test length, but it would do nothing to adjust for the difficulty of the items.)

Another advantage of scaled scores is that they lend themselves to interpretations of what is referred to as an interval level, while raw scores do not. Interval-level scales allow an interpretation of a scaled score difference of 5 points to be the same whether the scores are 1295 vs. 1300 or 1445 vs. 1450. Raw score differences, in this context, cannot be interpreted in this manner and are thus neither generalizable nor equitable.

When test scores are properly linked across years, a scaled score of 1300—or any other value for a particular grade and content area test, such as Grade 4 reading—should have the same absolute meaning in the current year as it had in previous years. For example, a school with a scaled score above 1300 in Grade 4 reading in 2013 performed better than the average school in the base year in Grade 4 reading.

More importantly, an increase in the scaled score for Grade 4 reading from last year to the current year means that student performance improved;¹⁸ it does not say anything about whether this year's test is easier or harder than last year's test. To make these interpretations requires no information about the length or the difficulty of the test in either year, although these variables are essential for the process of deriving the scaled scores.

There is considerable auxiliary information presented in this report that might aid the reader in further contextualizing PSSA scaled scores. The reader is specifically referred to the following information:

- Chapter Fourteen provides information on the development of the PSSA scaled score system, including historical information, transformation formulas, rounding rules, and general scale characteristics (e.g., minimum values).
- Chapter Seventeen provides total test score statistics. In particular, Table 17–2 lists the scaled score means and standard deviations for this year's test results.

¹⁸ This example is not an endorsement of conducting a trend analysis with only two years of results. Further, small differences may not be statistically or practically significant.

Performance Levels

PSSA results are also reported using four Performance Levels: Below Basic, Basic, Proficient, and Advanced. The cut scores on the scaled score metric (i.e., the lowest possible scaled score to enter the Basic, Proficient, and Advanced levels) were presented earlier in this report. However, the information is repeated below (Table 16–2) for convenience.

**Table 16–2. PSSA Scaled Score Cuts
for Each Performance Level by Grade and Subject Area**

Subject	Grade	Min	Scaled Score Cuts ¹			Max ²
			BB/B	B/P	P/A	
Mathematics	3	750	1044	1180	1370	1859
	4	700	1156	1246	1445	2455
	5	700	1158	1312	1483	2430
	6	700	1174	1298	1476	2595
	7	700	1183	1298	1472	2566
	8	700	1171	1284	1446	2288
Reading	3	1000	1168	1235	1442	1907
	4	700	1112	1255	1469	2244
	5	700	1137	1275	1497	2314
	6	700	1121	1278	1456	2350
	7	700	1131	1279	1470	2338
	8	700	1146	1280	1473	2616
Science	4	1050	1150	1275	1483	2269
	8	925	1150	1275	1464	2268
Writing	5	700	745	1236	1909	2274
	8	700	914	1236	1748	2306

Notes. ¹ BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.

² Scaled Score Maximum Values are unique for the current year's test.

Performance levels descriptors (PLDs) are another way to attach meaning to the scaled score metric. PLDs associate precise quantitative ranges of scaled scores with verbal, qualitative descriptions of student status. While much less precise, the qualitative description of the levels is one way for parents and teachers to interpret the student scores. They are also useful in assessing the status of the school. The Pennsylvania General Performance Level Descriptors, as developed by PDE and teacher panels, are given below. These are also included on student score reports.

- **Advanced:** The Advanced Level reflects superior academic performance. Advanced work indicates an in-depth understanding and exemplary display of the skills included in the Pennsylvania Academic Content Standards.
- **Proficient:** The Proficient Level reflects satisfactory academic performance. Proficient work indicates a solid understanding and adequate display of the skills included in the Pennsylvania Academic Content Standards.

- **Basic:** The Basic Level reflects marginal academic performance. Basic work indicates a partial understanding and limited display of the skills included in the Pennsylvania Academic Content Standards. This work is approaching satisfactory performance, but has not yet reached it. There is a need for additional instructional opportunities and/or increased student academic commitment to achieve the Proficient Level.
- **Below Basic:** The Below Basic Level reflects inadequate academic performance. Below Basic work indicates little understanding and minimal display of the skills included in the Pennsylvania Academic Content Standards. There is a major need for additional instructional opportunities and/or increased student academic commitment to achieve the Proficient Level.

DESCRIPTION OF STRAND (REPORTING CATEGORY) SCORES

The following types of scores are provided for PSSA strand scores:

- Strand (Reporting Category) Scores
- Strength Profile

Strand (Reporting Category) Scores

A strand (reporting category) score describes performance of a student, school, or district on a particular strand (content standard defined in the test). For the PSSA, strand scores are raw scores, indicating the points a student or a school/district earned for that strand. (Attributes of raw scores are described earlier in this chapter.)

Strand scores cannot be compared across years because they are not statistically linked nor are they interval scores. Also, it is not advisable to compare strand raw scores even within the same form because some strands may contain items that are easier or more difficult than other strands (the strength profile, discussed below, mitigates this problem to some degree). A greater concern is the low reliability of many of these scores, especially for strand scores based on a small number of possible points. Chapter Eighteen provides more information about strand-score reliability.

When compared to other results from the same year, strand scores can be somewhat helpful in identifying a group's strengths and weaknesses as measured by the test. For example, it can be informative to compare average strand scores of a school against the scores of another reference group (e.g., the state average). Hence, strand scores can suggest group strengths and weaknesses relative to another reference group. (Challenges pertaining to interpreting results for individual students are discussed below.)

Strength Profile

The strength profile provides another indication of a student's performance within each of the strands. This profile can be used to identify areas in which a student needs to improve and areas in which a student has performed more successfully. Unlike strand scores that are reported as raw scores, strength profile scores categorize students into one of three levels: Low, Medium, and High. These categories take into account the difficulty of the items and are based on the same scaling techniques used to derive the PSSA scaled scores. (Details regarding the creation of the strength profile are provided in Chapter Fourteen. These scaled scores are not printed on score reports. They only exist to determine whether performance in the strands was Low, Medium, or High.) A Low score on the strength profile indicates performance that is below

Proficient on the overall PSSA scale. A Medium score on the strength profile indicates performance that is comparable to Proficient on the PSSA. A High score on the strength profile indicates performance that is comparable to Advanced.

APPROPRIATE SCORE USES

Individual Students

Scaled scores on the PSSA indicate a student's achievement of the PSSA Assessment Anchors and Eligible Content. Scaled scores are primarily used to determine student performance level classifications (i.e., a criterion-referenced inference). Scaled scores that are based on Item Response Theory (IRT) models are typically assumed to be of the interval type; so comparisons may be made on differences in scaled scores. If this assumption holds, then it would be safe to infer for Grade 4 reading that the ability difference between 1110 and 1120 represents the same ability difference that separates 1250 and 1260. Scaled scores can also be used to compare the performance of an individual student to the performance of a similar demographic or subgroup at a school or district. However, when comparing performance of an individual student, test score standard errors (discussed in Chapter Eighteen) should be considered because scale scores are estimate of students' achievement which comes with estimation error.

Groups of Students

Test results can be used to evaluate performance over time. Mean scaled scores can be compared across administrations within the same grade and subject area to indicate whether student performance is improving across years. Generally, such trend analyses benefit from using mean results from as many test administration years as possible. Different cohorts of students are used (i.e., the same student or students are not tracked across grade levels). All scores can be analyzed within the same subject and grade for any single administration to determine which demographic or program group had, for example, the highest average performance or the highest percentage of students at or above the Proficient standard.

Strand scores can help evaluate academic areas for relative strengths or weaknesses. These category scores provide information to identify areas where further diagnosis is warranted. Generalizations from test results may be made to the specific content domain represented by the academic standards measured in the PSSA. However, all instruction and program evaluations should include as much information from other sources as possible to provide a more complete picture of performance.

CAUTIONS FOR SCORE USES

Extreme Error for Extreme Scores

Student scores toward the minimum or maximum ends of the score range will have very large standard errors of measurement and, therefore, such scores should be viewed very cautiously. The maximum scaled score only provides a very rough estimate of a student's ability. For instance, if the maximum score for the PSSA Grade 6 mathematics test were 2500¹⁹ and a student achieved this score, it could not be determined whether the student could have achieved an even higher scaled score. If the test were 10 items longer, a different estimate might have been obtained. Similarly, if the items in a new test were more difficult than the items on a previous administration, the maximum scaled score would likely be higher on the new test

¹⁹ It is not, at least for this year

because it would take a greater level of achievement to answer the items correctly. In this manner, extreme scaled scores may vary from one administration to the next even if the number of test items does not change. The fluctuation of extreme scaled scores complicates the comparisons of students with scaled scores at the extreme ends of the score distribution. To minimize confusion and potential misinterpretation, the minimum scaled scores possible on the PSSA tests have been fixed (see Table 16–2) so they do not change between administrations. However, the maximum scaled score values have not been fixed. Therefore, caution must be taken when comparing scores at the maximum end of the scale.

Each Test Has a Unique Scale

Scaling was conducted for each grade and subject area test separately. Therefore, PSSA scale scores should be interpreted only within each content area. PSSA scaled scores are not status indicators in the same sense as percentile ranks (or scales that are essentially transformations of percentile ranks) and, therefore, cannot be used to profile relative strengths and weaknesses across subject areas. As an example, student scaled scores of 1450 in Grade 4 reading and 1400 in Grade 4 mathematics do not necessarily imply that the student performed better in reading than in mathematics. Neither do the PSSA scaled scores represent a developmental or vertical scale. This means that no across-grade comparisons or growth statements for a student are appropriate. For example, a 1400 in Grade 4 reading and a 1400 in Grade 5 reading does not indicate a student had no achievement growth in reading from Grade 4 to Grade 5.

Strength Profile Caveats

The category labels of Low, Medium, and High are deliberately used instead of the PSSA performance level names—Below Basic, Basic, Proficient, and Advanced—to acknowledge that the PSSA cut scores were established on the basis of the total test score. Therefore, the categories should not be interpreted in the same way as PSSA performance levels because they likely do not carry the same meaning.

While the strength profile might facilitate comparisons of a student’s strengths and weaknesses across strands in some cases, several factors merit caution. As noted earlier, many of the strand scores are very unreliable. The scaling underlying the strength profile does not mitigate this problem.

Additionally, the categories reflect more absolute comparisons. Relative comparisons are more difficult to make. As an example, if one scored High in both strand A and B, we know the student did very well in both strands compared to overall performance in the state (i.e., absolute status). However, we do not know whether the student’s performance in strand A was better or worse relative to the performance in strand B (relative status).

Finally, some seemingly unusual results might occur that may be difficult for users to understand. As one example, it may be possible for a student to earn Medium in all strands but have an Advanced performance level. This can happen because the strand scores are correlated, meaning the distributional properties of the total score depends not only on the variances of the strand scores, but also on the covariances among the strand scores. (An analogy would be when a school track team places first overall in a competition although they did not win a single event.)

Using PSSA Results for Other Purposes

Should PSSA results be used for placement decisions such as eligibility for gifted/talented programs or for other special programs or services? Frequently asked questions about the PSSA pertain to the maximum possible PSSA scaled scores for various subjects or to which PSSA score represents the 90th percentile. The motivation behind many of these questions may be associated with special program eligibility.

Other uses or inferences based on PSSA results may or may not be valid as the validity evidence and arguments provided in Chapter Nineteen may not necessarily support other score uses and interpretations. According to the AERA/APA/NCME *Standards* (1999) (i.e., Standard 1.4), if a test is used in a way that has not been validated, it is incumbent on the user to justify the new use, collecting new evidence if necessary. Finally, a universal caveat for any test's result is that it not be used for placement and educational planning alone. Instead, other information about the student (e.g., other test performance data) should be considered.

REPORTS

The following score reports are provided to students, parents, schools, and districts for the PSSA tests in mathematics, reading, science, and writing:

- Parent Letter
- Individual Student Report
- School Summary Report
- District Summary Report
- Interpretive Guide

Parent Letter

Parent letters were delivered to Pennsylvania districts on June 13, 2013. This score report provided parents and students with their first glimpse of performance on the spring 2013 PSSA tests. This report provides results at the student level. A sample of the report is provided in Figure 16–1.

Figure 16–1. Parent Memo

Dear Parents:

I am pleased to provide you with information about your child's performance on the 2011 Pennsylvania System of School Assessment (PSSA) exam. The annual PSSA is a standards-based assessment used to measure a student's attainment of the academic standards while also determining the degree to which school programs enable students to attain academic proficiency.

For additional information about the PSSA, visit the Pennsylvania Department of Education's website at *Education.state.pa.us*, or contact your child's school.

Sincerely,
 Ronald J. Tomalis
 Secretary of Education



Student Name:	
PA Student ID:	
School:	
District:	
Test Date:	
Grade:	

MATHEMATICS			
How did perform OVERALL?			
Performance Level:	Advanced	Score:	1528
Below Basic	Basic	Proficient	Advanced
700	1167	1304	1509
Your student's score is indicated by the . If your student were to test again, his or her score would likely remain in the following range: 1462–1594.			
How did perform by REPORTING CATEGORY?			
Reporting Categories	Student's Points	Total Points Possible	
Numbers and Operations	9	11	
Measurement	11	11	
Geometry	10	13	
Algebraic Concepts	22	27	
Data Analysis and Probability	7	10	

WRITING			
How did perform OVERALL?			
Performance Level:	Advanced	Score:	1918
Below Basic	Basic	Proficient	Advanced
700	952	1236	1806
Your student's score is indicated by the . If your student were to test again, his or her score would likely remain in the following range: 1875–1961.			
How did perform by REPORTING CATEGORY?			
Reporting Categories	Student's Points	Total Points Possible	
Composition	70	80	
Informational	40	40	
Persuasive	30	40	
Revising and Editing	18	20	
Informational	4	4	
Persuasive	3	4	
Multiple Choice	11	12	

READING			
How did perform OVERALL?			
Performance Level:	Proficient	Score:	1429
Below Basic	Basic	Proficient	Advanced
700	1112	1257	1492
Your student's score is indicated by the . If your student were to test again, his or her score would likely remain in the following range: 1343–1515.			
How did perform by REPORTING CATEGORY?			
Reporting Categories	Student's Points	Total Points Possible	
Comprehension and Reading Skills	17	22	
Interpretation and Analysis of Fictional and Nonfictional Text	22	30	

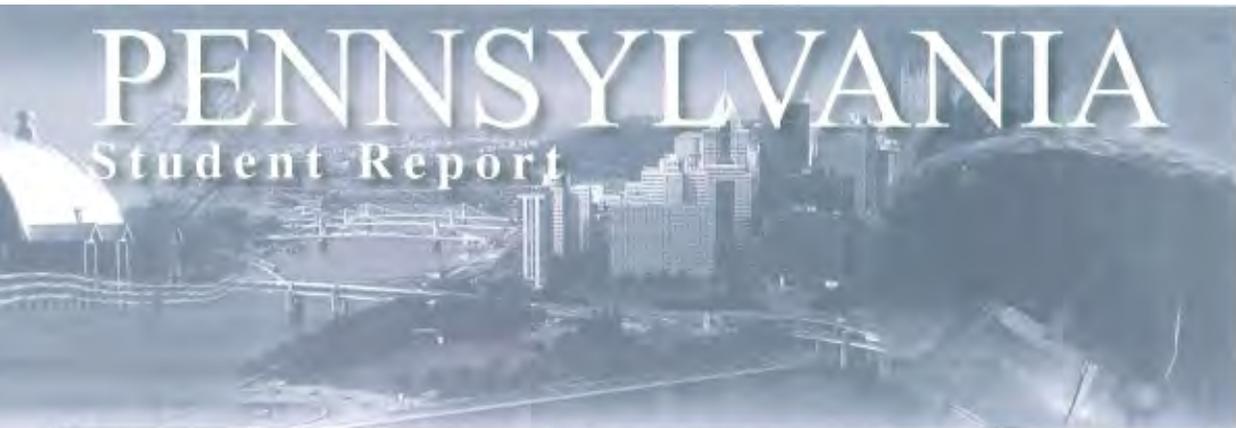
SCIENCE			
How did perform OVERALL?			
Performance Level:	Proficient	Score:	1330
Below Basic	Basic	Proficient	Advanced
1050	1150	1275	1347
Your student's score is indicated by the . If your student were to test again, his or her score would likely remain in the following range: 1302–1358.			
How did perform by REPORTING CATEGORY?			
Reporting Categories	Student's Points	Total Points Possible	
The Nature of Science	27	38	
Biological Sciences	7	12	
Physical Sciences	10	14	
Earth and Space Sciences	9	10	

Note that the performance level line graphs are not drawn to scale because some performance levels have more scaled score points than others. Additionally, the graphs do not display the actual percentage of students in each performance level.

Individual Student Report

An individual student report is provided for all students who took the PSSA. This report was delivered to Pennsylvania school districts in September 2013. Districts are responsible for sending the reports home to individual students. This report is a four-page color document that provides the types of scores explained earlier in this chapter. Screen shots of the four pages from a sample individual student report are provided in Figures 16–2 through 16–5.

Figure 16–2. Page 1 of the Individual Student Report



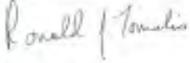
PENNSYLVANIA

Student Report

Dear Parents:

The following report is designed to provide you with specific information about your child's strengths and needs as measured by the 2011 Grade 11 Pennsylvania System of School Assessment (PSSA). The PSSA is an annual exam designed to measure a student's attainment of academic standards. I encourage you to use this information to talk with your child's teacher(s) to develop methods to enhance your student's education.

For additional information about the PSSA, visit the Pennsylvania Department of Education's website at www.education.state.pa.us, or contact your child's school.

Sincerely,

 Ronald J. Tomalis
 Secretary of Education

Student Name: [Redacted]

PA Student ID: ****[Redacted]

School: [Redacted]

District: [Redacted]

Test Date: Spring 2011

Grade: 11

Student's PSSA Results by Subject

Subject	Goal Range			
	Below Basic	Basic	Proficient	Advanced
Mathematics			✓	
Reading			✓	
Science		✓		
Writing		✓		

Table of Contents

Page 1..... General Overview

Page 2..... Math, Reading, and Science Detailed Results

Page 3..... Writing Detailed Results

Page 4..... Making the Most of Your Senior Year!

An Interpretation Guide for this report is available at www.education.state.pa.us (Type "student report guide" in the search box) or see your local school district.



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DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment page 1

www.education.state.pa.us

Figure 16–3. Page 2 of the Individual Student Report

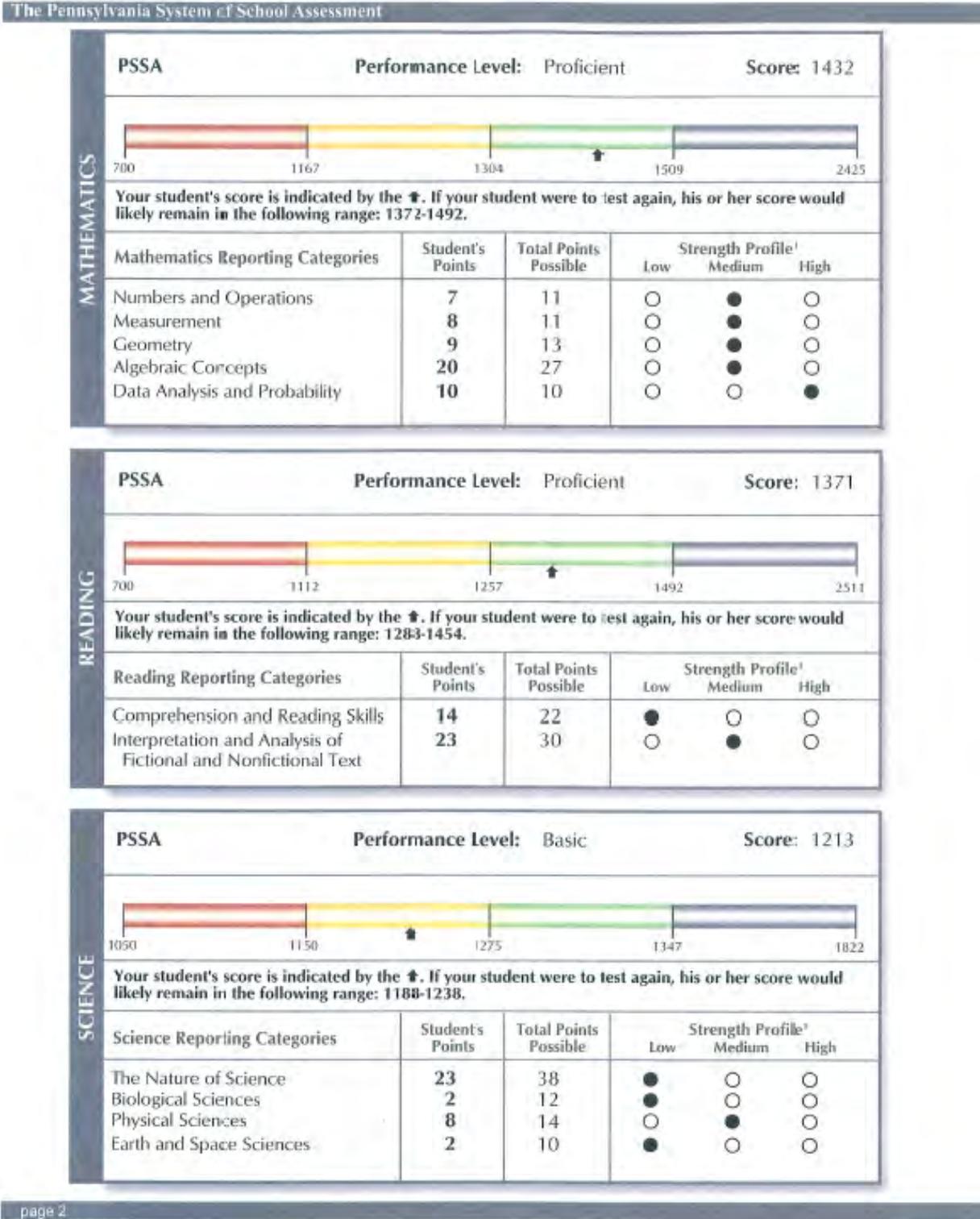


Figure 16–4. Page 3 of the Individual Student Report

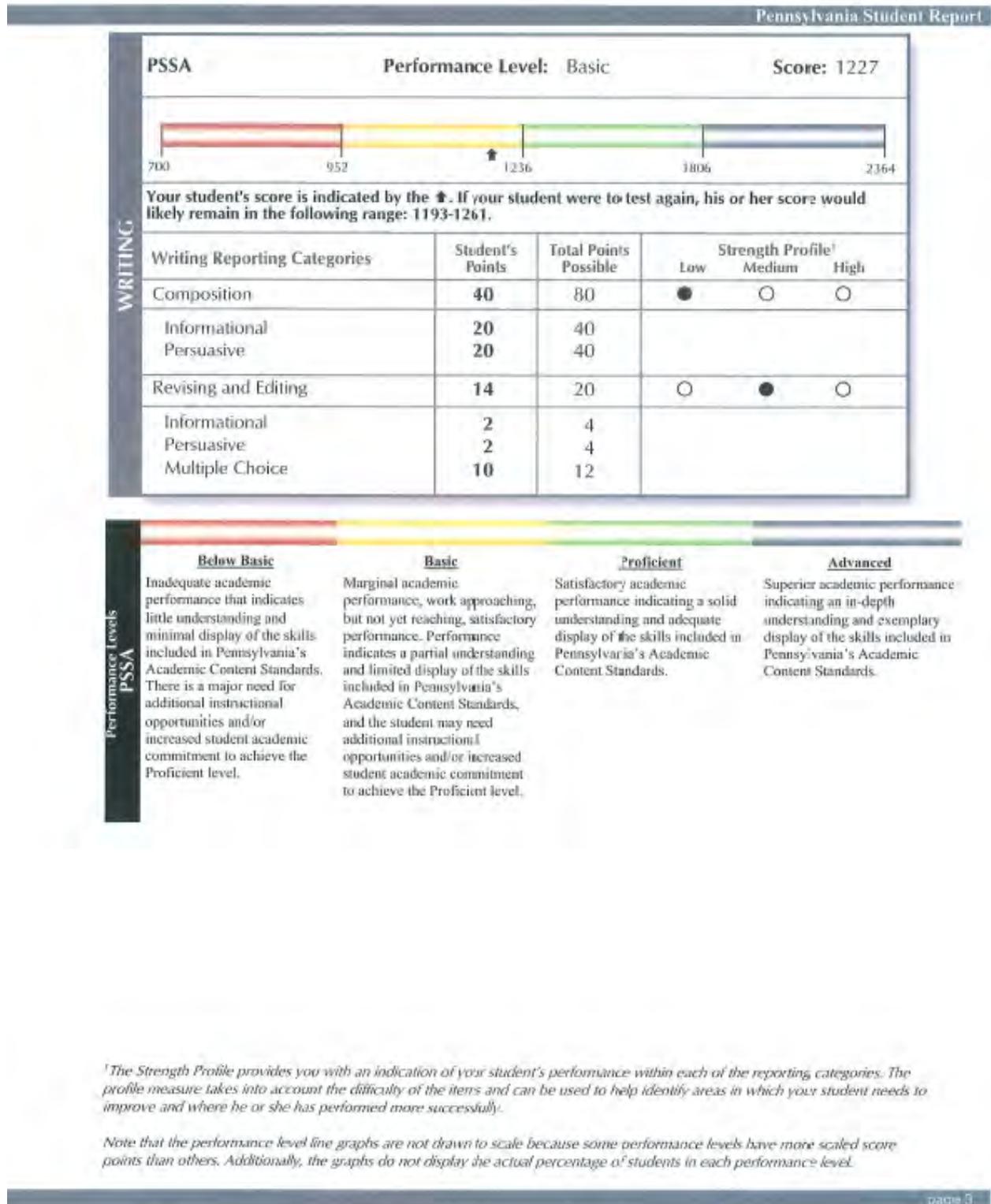
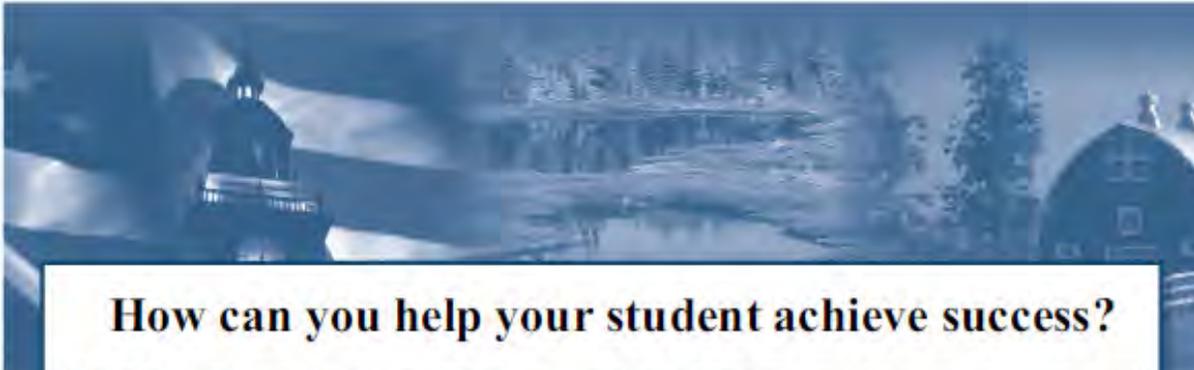


Figure 16–5. Page 4 of the Individual Student Report



How can you help your student achieve success?

Make sure your student reads as much as possible.
 Reading at home helps children do better at school. Find books and special programs for families at your regional or neighborhood library. Go to www.statelibrary.state.pa.us to learn about Pennsylvania's POWER Library Initiative or to find a library near you.

Remember to make connections!
 Success in school involves more than just reading and mathematics. Children can master these other skills by engaging in enriching activities outside the classroom. Practicing music, for example, can build skills that will be valuable throughout school and life. Remember that taking trips to a museum, a show or a concert is a positive way to strengthen your student's overall education.

What should your student be able to know and do?
 Every school year you can learn about what your student should be able to know and do in each specific content area. You can follow the grade level expectation for each content area and see samples of the type of work students should be producing. Follow this link to find this information: <http://pdesas.org/>

Education pays...
 Education pays in higher earnings and lower unemployment rates.

Unemployment rate in 2008

2.0	Doctoral degree
1.7	Professional degree
2.4	Master's degree
2.8	Bachelor's degree
3.7	Associate degree
5.1	Some college, no degree
5.7	High school graduate
9.0	Less than a high school diploma

Median weekly earnings in 2008

\$1,561	Doctoral degree
1,531	Professional degree
1,233	Master's degree
1,012	Bachelor's degree
757	Associate degree
699	Some college, no degree
618	High school graduate
453	Less than a high school diploma

Source: Bureau of Labor Statistics, Current Population Survey

Early career planning
 Free printed materials and career exploration CDs from Pennsylvania Higher Education Assistance Agency (PHEAA) are available by visiting: www.educationplanner.org

Resources for parents and students
www.CollegeBoard.com/PAPlanforHighSchool



School and District Summary Reports

Summary reports are provided at the school and district level. These reports contain summary information about the percentage of students in each of the four performance levels. Raw scores are also provided by assessment anchor to allow schools or districts to identify strengths or weaknesses at the content strand level.

Interpretative Guide

An interpretative guide is provided to help parents and other PSSA stakeholders better understand test result information presented in the individual student report. The interpretative guide can be found on the PDE website.

Chapter Seventeen: Operational Test Statistics

This chapter presents various summary statistics for the PSSA total test scores based on the final data file described in Chapter Nine. Related information covered elsewhere in this report includes the item-level statistics presented in Chapter Eleven (classical item statistics) and Chapter Twelve (Rasch item statistics). These chapters provide additional consideration as item difficulty distributions can affect total score distributions.

PERFORMANCE LEVEL STATISTICS

Table 17–1 presents performance level percentages by grade and content. Appendix R provides performance level percentages for prior years.

Table 17–1. Performance-Level Percentages for 2013 PSSA

Subject	Grade	Percentage in Each Performance Level			
		Below Basic	Basic	Proficient	Advanced
Mathematics	3	7.7	15.1	38.9	38.3
Reading		16.6	10.0	49.1	24.3
Mathematics	4	13.4	9.1	27.6	49.9
Reading		14.8	18.6	36.2	30.4
Science		9.2	12.2	36.0	42.5
Mathematics	5	12.7	18.0	27.9	41.4
Reading		21.7	17.3	37.3	23.7
Writing		1.4	35.3	61.7	1.7
Mathematics	6	13.8	12.6	27.1	46.5
Reading		14.4	20.5	28.3	36.9
Mathematics	7	12.3	10.9	24.9	51.9
Reading		12.8	16.9	30.7	39.7
Mathematics	8	12.9	13.1	28.4	45.7
Reading		11.7	10.8	21.9	55.6
Science		22.3	17.7	33.4	26.7
Writing		3.3	24.1	61.5	11.1

SCALED SCORES

Summary Statistics

Table 17–2 provides the scaled score means and standard deviations. See the section Every Test has a Unique Scale in Chapter Sixteen for caveats regarding interpretation of scale scores.

Table 17–2. Means and Standard Deviations for the 2013 PSSA Scaled Scores

Grade	Mathematics		Reading		Science		Writing	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
3	1317.2	187.6	1335.8	157.7				
4	1448.0	254.6	1355.8	232.2	1435.5	196.0		
5	1428.2	227.3	1331.7	238.7			1315.6	262.6
6	1467.2	259.9	1358.9	222.5				
7	1497.1	267.3	1397.5	228.1				
8	1425.8	221.7	1483.1	263.4	1323.2	209.9	1402.9	268.4

Scaled Score Distributions

Scaled scores are based on a linear transformation of the Rasch ability estimates. Distributions of the Rasch abilities are provided at the end of Chapter Twelve.

RAW SCORES

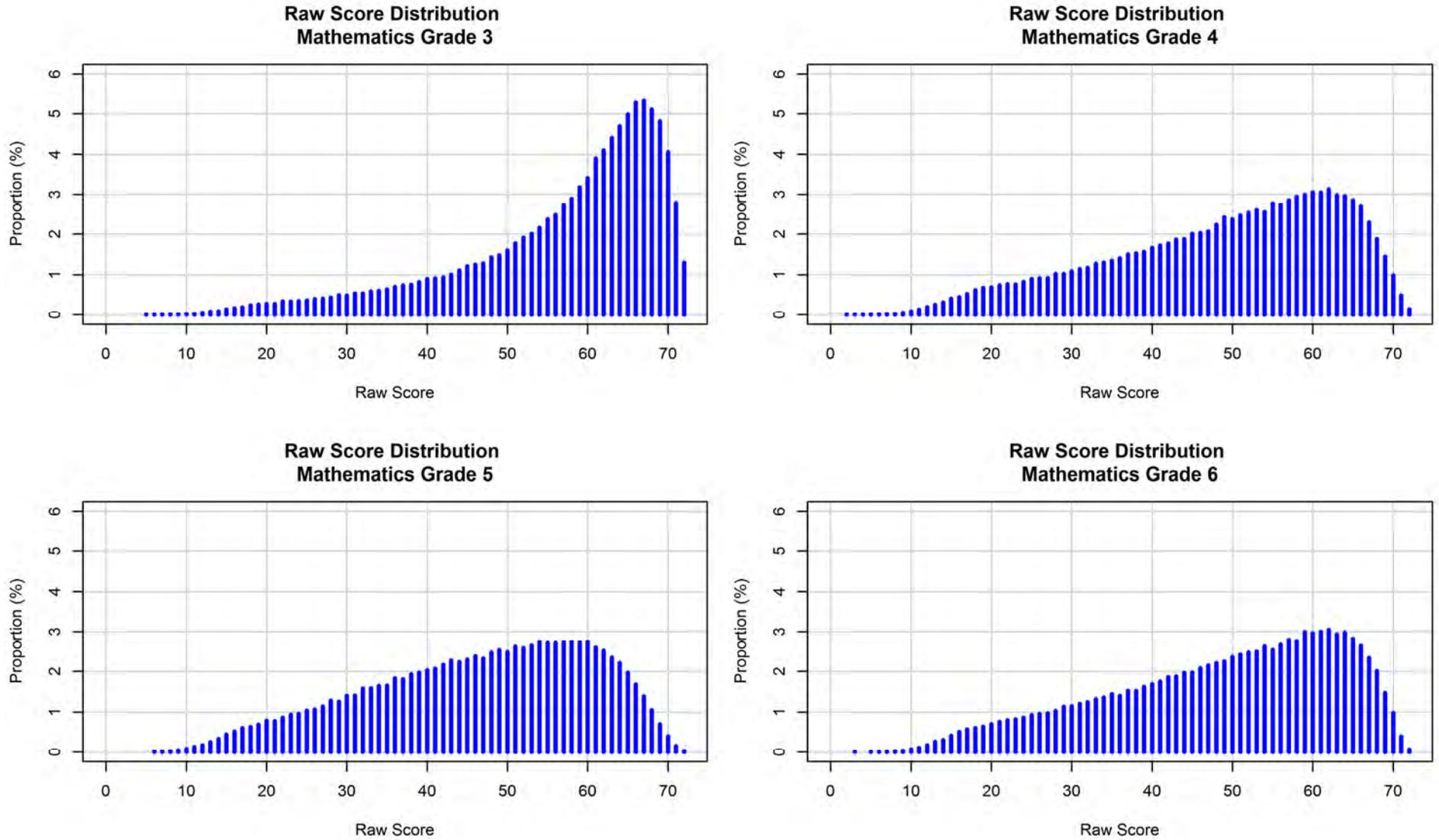
Summary Statistics

Appendix Q provides summary statistics for the operational raw scores. The statistics reported include the number of points possible (Pts.), number of items (Len.), number of students tested (N), mean number of score points received (Mean), standard deviation of test scores (SD), reliability (r), traditional standard error of measurement (SEM), and item types (Items) used to determine each score. These statistics are based on the total test using both multiple-choice (MC) and open-ended (OE) items for the operational sections of each form. (For information disaggregated by item type, Chapter Eleven provides breakout statistics for MC and OE items.)

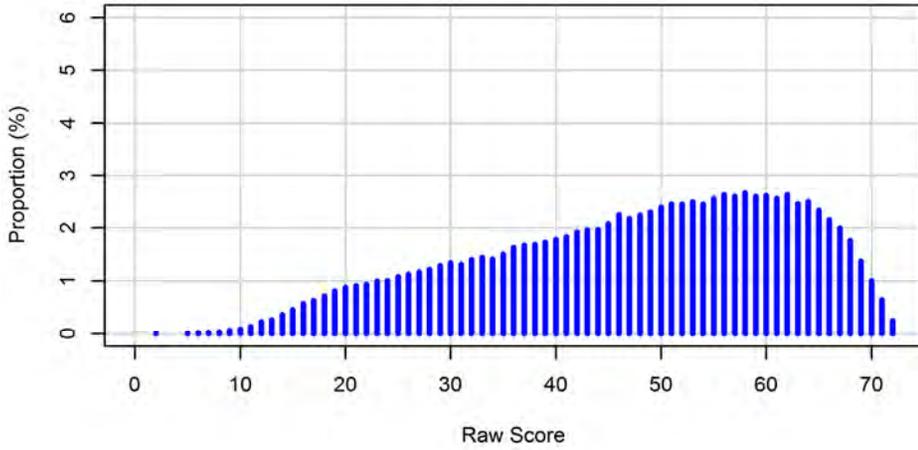
Score Distributions

Raw score relative-frequency (rf) distributions are provided in Figure 17–1. Most distributions are negatively skewed and unimodal. Writing has one major mode and several minor modes (because of the differential weighting given to the writing prompt scores).

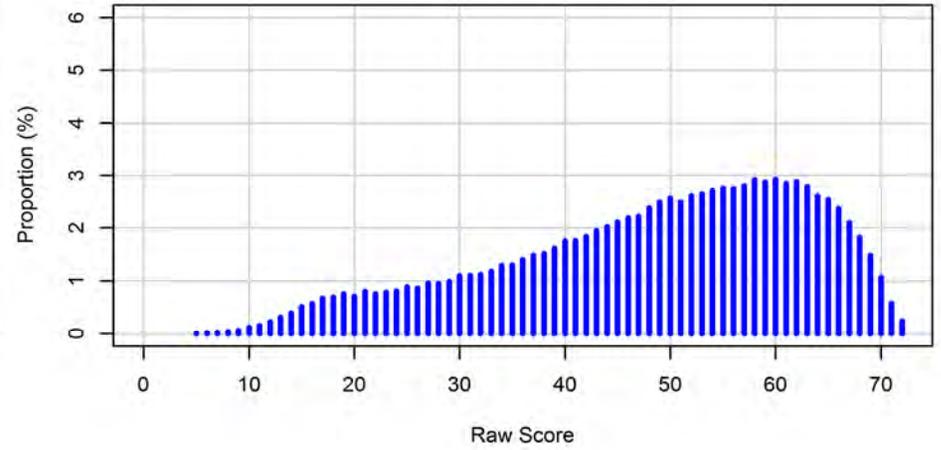
Figure 17–1. 2013 PSSA Raw Score Distributions



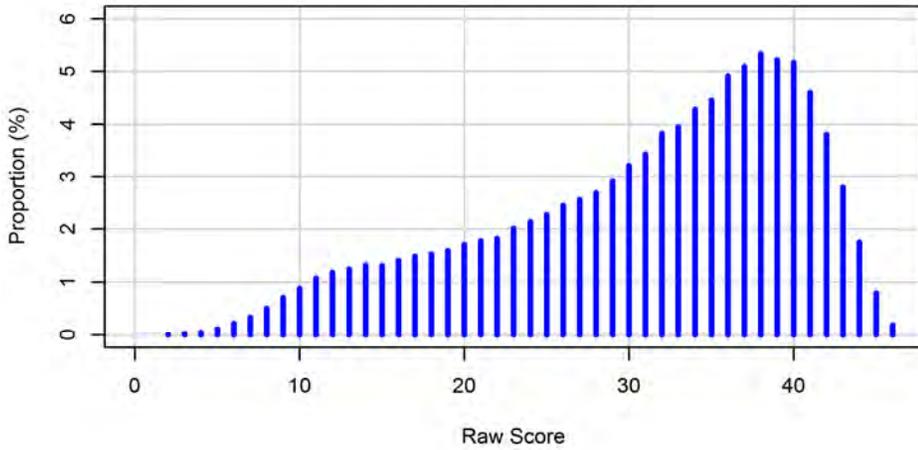
**Raw Score Distribution
Mathematics Grade 7**



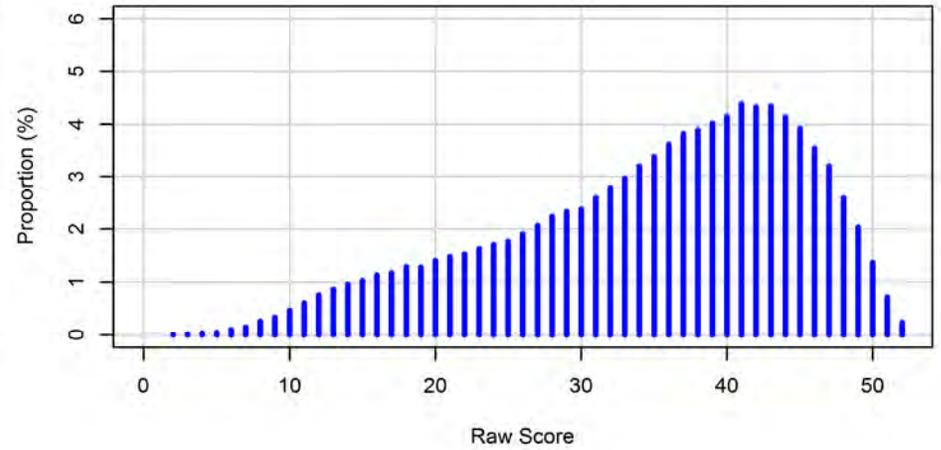
**Raw Score Distribution
Mathematics Grade 8**



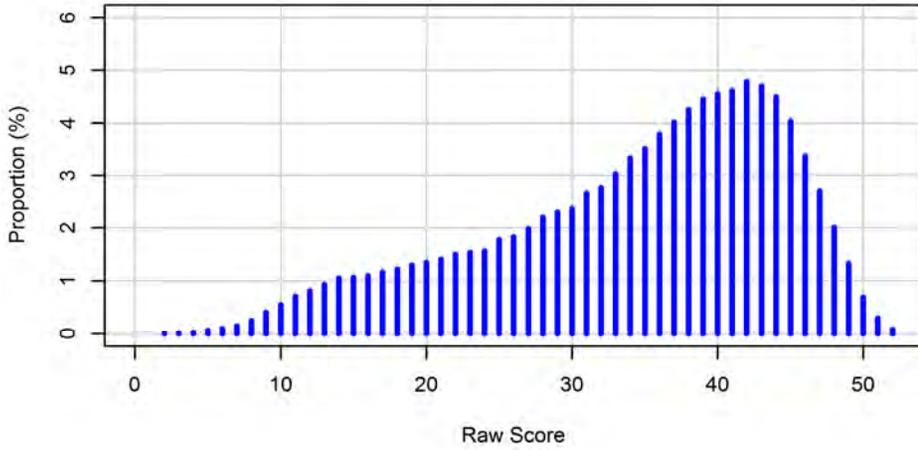
**Raw Score Distribution
Reading Grade 3**



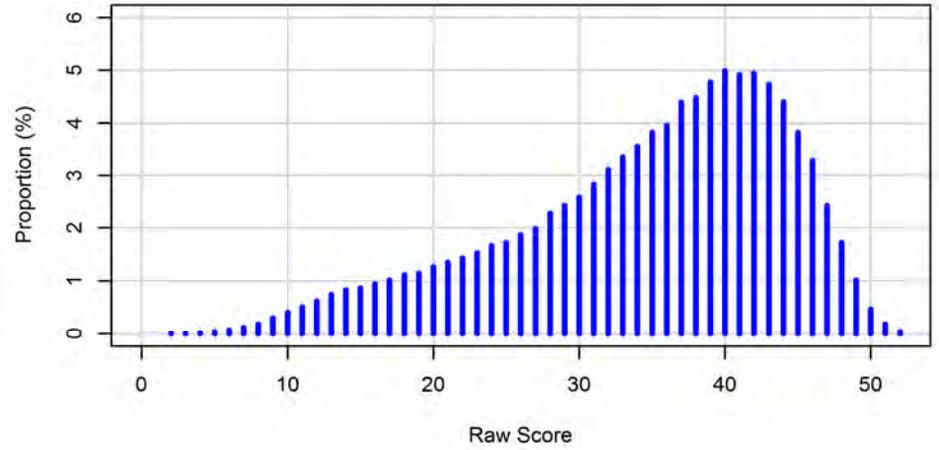
**Raw Score Distribution
Reading Grade 4**



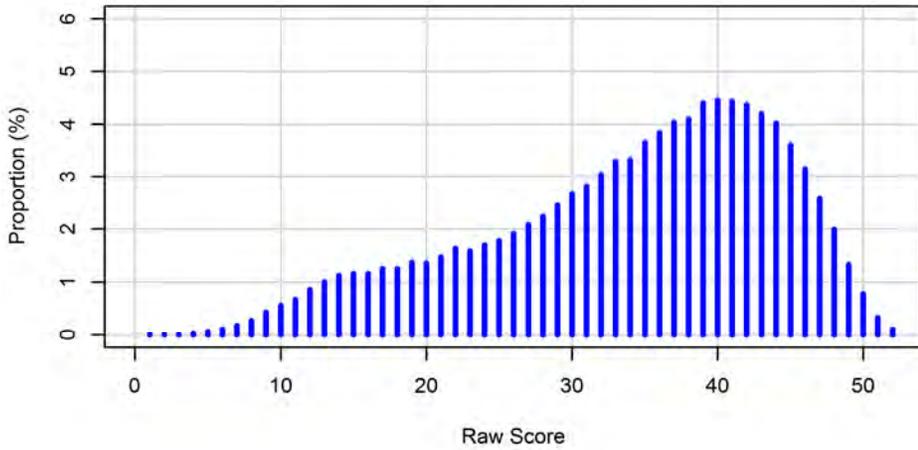
**Raw Score Distribution
Reading Grade 5**



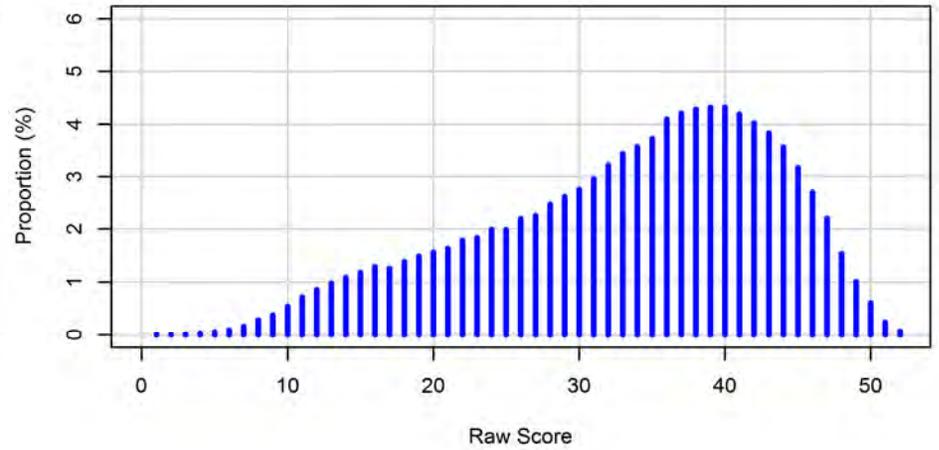
**Raw Score Distribution
Reading Grade 6**



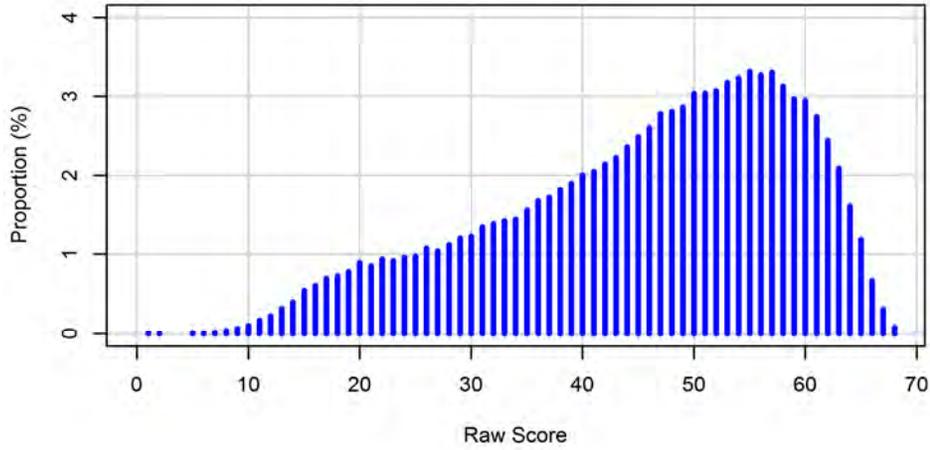
**Raw Score Distribution
Reading Grade 7**



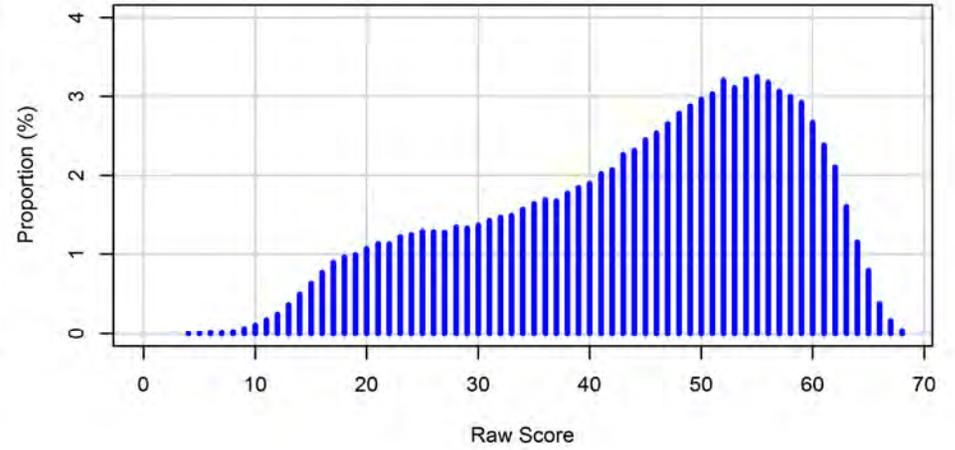
**Raw Score Distribution
Reading Grade 8**



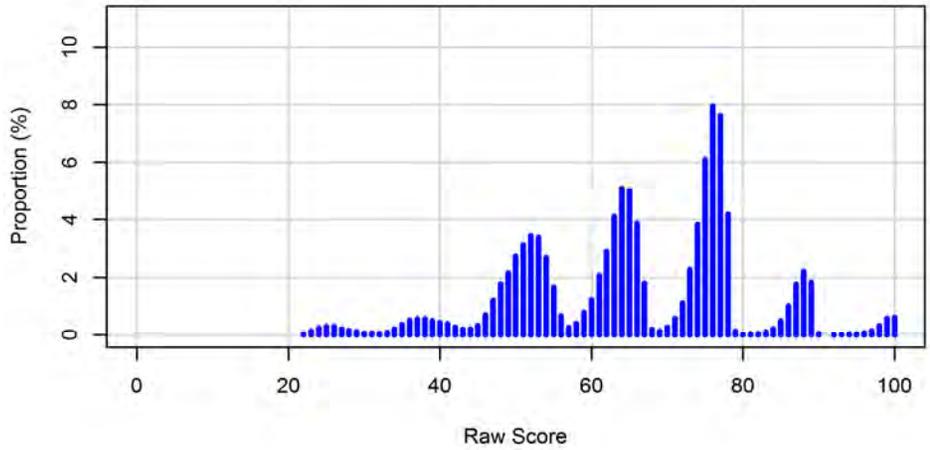
Raw Score Distribution
Science Grade 4



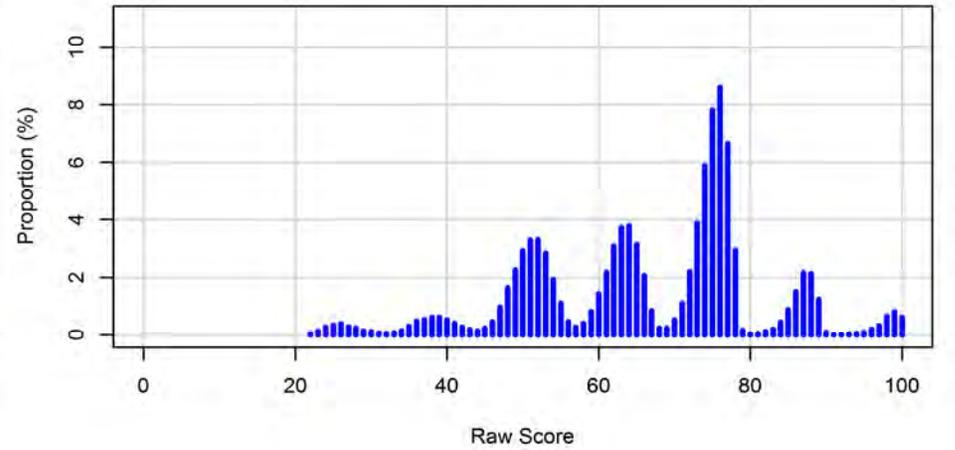
Raw Score Distribution
Science Grade 8



Raw Score Distribution
Writing Grade 5



Raw Score Distribution
Writing Grade 8



Chapter Eighteen: Reliability

This chapter²⁰ addresses the reliability of PSSA test scores. According to the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999), reliability refers to:

the degree to which test scores for a group of test takers are consistent over repeated applications of a measurement procedure and hence are inferred to be dependable and repeatable for an individual test taker; the degree to which scores are free of errors of measurement for a given group (p. 25).

Frisbie (2005) highlighted several elements of this definition. First, reliability is a property of test scores, not a test itself. Many may appreciate this distinction, but in casual usage, individuals frequently make reference to a reliable test. While reliability concerns test scores (and not the test specifically), it is important to appreciate the fact that test scores can be affected by characteristics of the instrument. For example, all other things being equal, tests with more items/points tend to be more reliable than tests with fewer items/points. Second, reliability coefficients are group specific. Reliabilities tend to be higher in populations that are more heterogeneous and lower in populations that are more homogeneous. Consequently, both test length and population heterogeneity should be considered when evaluating reliability.

There are other reliability considerations that may be less evident from the *Standard's* definition, yet are still important for test users to understand. While freedom from measurement error is highlighted in the definition above, reliability is specifically concerned with random sources of error. Indeed, the degree of inconsistency due to random error sources is what determines reliability: less consistency is associated with lower reliability and more consistency is associated with higher reliability. Of course, systematic error sources also exist. These can artificially increase reliability and decrease validity. (Validity is further discussed in Chapter Nineteen.)

Another noteworthy issue is that multiple sources of error exist (e.g., the day of testing, the items used, the raters who score the items). However, most widely used reliability indices only reflect a single type of error. Consequently, it is important for test users to understand what specific type of error is being considered in a reliability study, and equally, if not more important, what types are not.

Understanding the distinction between relative error and absolute error is also important as many reliability indices only reflect relative error. Relative error is of interest whenever the relative ordering of individuals respective to their test performance is of interest. Understanding examinee rank-order stability is important; however, such stability might be well achieved even when the specific score values are considerably different. When specific score values are considered important (e.g., if cuts cores are used), then absolute error is too. Generally, there is more error variance when considering the absolute scores of examinees, which in turn suggests lower reliability.

²⁰ Please note that some of the material in this chapter is technical in nature.

As suggested, reliability is a complex, nonunitary notion that cannot be adequately represented by a single number. There are several reliability indices available, and these may not provide the same results (Frisbie, 2005). The remainder of this chapter covers the following:

- Reliability coefficients and their interpretation
- Unconditional and conditional standard errors of measurement (SEMs and CSEMs)
- Decision consistency
- Rater agreement

RELIABILITY INDICES

As shown below, the reliability coefficient expresses the consistency of test scores as the ratio of true score variance to total score variance. The total variance contains two components: 1) the variance in true scores and 2) the variance due to the imperfections in the measurement process. Put differently, total variance equals true score variance plus error variance.²¹

$$\rho_x^2 = \frac{\sigma_T^2}{\sigma_X^2} = \frac{\sigma_T^2}{\sigma_T^2 + \sigma_E^2}$$

Reliability coefficients indicate the degree to which differences in test scores reflect true differences in the attribute being tested rather than random fluctuations. Total test score variance (i.e., individual differences) is partly due to real differences in the attribute (true variance) and partly due to random error in the measurement process (error variance).

Reliability coefficients range from 0.0 to 1.0. If all test score variances were true, the index would equal 1.0. The index will be 0.0 if none of the test score variances were true. Such scores would be pure random noise (i.e., all measurement error). If the index achieved a value of 1.0, scores would be perfectly consistent (i.e., contain no measurement error). Although values of 1.0 are never achieved in practice, it is clear that larger coefficients are more desirable because they indicate that test scores are less influenced by random error. (How big is big enough and how small is too small are issues considered in a later section.)

As noted in the introduction, there are several different indices that can be used to estimate this ratio. One approach is referred to as internal consistency, which is derived from analyzing the performance consistency of individuals over the items within a test. As discussed below, these internal consistency indices do not take into account other sources of error, for example, variations due to random errors associated with the linking process, day-to-day variations (student health, testing environment, etc.), and rater inconsistency.

COEFFICIENT ALPHA

Although a number of reliability indices exist, perhaps the one most frequently reported for achievement tests is Coefficient Alpha. Consequently, this index is the one reported for the PSSA. Alpha indicates the internal consistency over the responses to a set of items measuring an underlying trait, in this case, academic achievement in subject areas such as mathematics, reading, and science. (The approach taken for writing is slightly different and is described later in this chapter.)

²¹ A covariance term is not required as true scores and error are assumed to be uncorrelated in classical test theory.

Alpha is an internal consistency index. It can be conceptualized as the extent to which an exchangeable set of items from the same domain would result in a similar rank ordering of students. Note that relative error is reflected in this index. Variation in student performance from one sample of items to the next should be of particular concern for any achievement test user. Consider two hypothetical vocabulary tests intended for the same group of students. Each test contains different sets of unique words that are believed to be randomly equivalent, perhaps like the ones shown below.

Table 18–1. Two Hypothetical Vocabulary Tests

Test One	Test Two
Abase	Abate
Boon	Bilk
Capricious	Circuitous
Deface	Debase
....
Zealous	Zenith

If a representative group of students could take both of these tests, and the correlation between the scores could be obtained, then that result would represent the parallel forms reliability of the test scores. However, such data-collection designs are impractical in large-scale settings and experimental confounds like fatigue and practice effects are likely to affect the results. Internal-consistency reliability indices arose in part to provide reliability measures using the data from just a single test administration. So, if students only took Test One and the Coefficient Alpha index for those test scores was high, then this would suggest that Test Two would provide a very similar rank ordering of the students if they had taken it instead. If Coefficient Alpha were low, dissimilar rank orderings would likely be observed—again, relative-error variance is reflected in Alpha. (It should also be noted that Coefficient Alpha is algebraically identical to a *Person* × *Item* design under Generalizability Theory when relative error variance is assumed.)

Formula

Consider the following data matrix representing the scores of persons (rows) on items (columns).

Table 18–2. Person × Item Score (X_{pi}) Infinite (Population-Universe) Matrix

Person	Item			
	1	2	... <i>I</i>	... <i>k</i>
1	<i>Y</i> ₁₁	<i>Y</i> ₁₂	... <i>Y</i> _{1<i>i</i>}	... <i>X</i> _{1<i>k</i>}
2	<i>Y</i> ₂₁	<i>Y</i> ₂₂	... <i>Y</i> _{2<i>i</i>}	... <i>X</i> _{2<i>k</i>}
.....				
.....				
<i>P</i>	<i>Y</i> _{<i>p</i>1}	<i>Y</i> _{<i>p</i>2}	... <i>Y</i> _{<i>p</i><i>i</i>}	... <i>X</i> _{<i>p</i><i>k</i>}
.....				
.....				
<i>N</i>	<i>Y</i> _{<i>N</i>1}	<i>Y</i> _{<i>N</i>2}	... <i>Y</i> _{<i>N</i><i>i</i>}	... <i>X</i> _{<i>N</i><i>k</i>}

Notes. Adapted from Cronbach and Shavelson (2004).

Then, a general computational formula for Alpha is as follows:

$$\alpha = \frac{N}{N-1} \left(1 - \frac{\sum_{i=1}^N \sigma_{Y_i}^2}{\sigma_X^2} \right),$$

where N is the number of parts (items or testlets), σ_X^2 is the variance of the observed total test scores, and $\sigma_{Y_i}^2$ is the variance of part i .

FURTHER INTERPRETATIONS

Rules of Thumb

What reliability value is considered high enough? What values are considered too low? Although frequently asked for, any rules of thumb for interpreting the magnitude of reliability indices are mostly arbitrary. Another approach is to research the reliabilities from similar testing instruments to see what values are commonly observed. For the PSSA, comparisons to tests of similar lengths that were administered to similar student populations from other large-scale assessment programs would be relevant. For many other state assessment programs, reliabilities in the low 0.90s are usually the highest ever observed and reliabilities in the high 0.80s are very common.

The lower a given reliability coefficient, the greater the potential for over-interpretation of the associated results. As suggested above, there is no firm guideline regarding how low is too low. However, as an informative point of reference, a reliability coefficient of 0.50 would suggest that there is as much error variance as true-score variance in the scores.

Is Alpha a Lower Limit to Reliability?

According to Brennan (1998), “the conventional wisdom that Coefficient Alpha is a lower limit to reliability is based largely on a misunderstanding.” In reflecting on the 50th anniversary of his seminal 1951 article, Cronbach—in Cronbach and Shavelson (2004)—expressed similar misgivings about this conventional wisdom:

one could argue that alpha was almost an unbiased estimate of the desired reliability...the almost in the preceding sentence refers to a small mathematical detail that causes the alpha coefficient to run a trifle lower than the desired value. This detail is of no consequence and does not support the statement made frequently in textbooks or in articles that alpha is a lower value to the reliability coefficient. That statement is justified by reasoning that starts with the definition of the desired coefficient as the expected consistency among measurements that had a higher degree of parallelism than the random parallel concept implied.

The assumptions for three common parallelism models are presented in Table 18–3. Alpha’s assumptions come from the Essentially-Tau Equivalent model, which does not require equal means or equal variances across test parts. Based on this, Brennan (1998) asserts that the lower-limit issue, as conceptualized by many, provides an answer to a question that is of minimal importance. Reframed differently, the goal of selecting a reliability coefficient is not to find the one that provides the highest coefficient, but the one that most accurately reflects the test data under study.

It is important to note that there are factors encountered in practice that may legitimately make Coefficient Alpha an underestimate of reliability. However, there are also factors that might make Coefficient Alpha an overestimate of reliability. Both possibilities are discussed further below and generally arise when the Essentially-Tau Equivalent assumptions are strained.

Table 18–3. Summary of Expectations/Observable Relationships for Different Parallelism Models

Relationship	Degree of Measurement Parallelism*		
	Classically Parallel	Essentially Tau-Equivalent	Congeneric
Content Similarity	Yes	Yes	Yes
Equal Means across Parts	Yes	No	No
Equal Variances across Parts	Yes	No	No
Equal Covariances across Parts	Yes	Yes	No
Equal Covariances with Other Variables	Yes	Yes	No

*Other models exist, but are not considered here due to their limited application in practice.

Biases That Might Make Alpha an Underestimate of Reliability

There are factors that might negatively bias Coefficient Alpha, making the apparent reliability lower than it may actually be. Two situations frequently encountered in practice that might cause this include tests that are composed of mixed item types (e.g., multiple-choice (MC) and open-ended (OE) items) and tests that include a planned stratification of the test items according to topics or subdomains.

Although both situations strictly violate the assumptions on which Coefficient Alpha is derived (i.e., the tests are not based on equal part lengths in the former case and are not randomly parallel in the latter case), neither necessarily guarantees that the reliability will be markedly lower. In the latter case, reliability will be underestimated only when strand items are homogeneous enough for the average covariance within strata to exceed the average covariance between strata. Although both are potential influences for the PSSAs, most of the total test score reliabilities reported in Appendix Q are all close to or above 0.90, indicating highly consistent test scores for these instruments. Writing is an exception discussed further below.

Biases That Might Make Alpha an Overestimate of Reliability

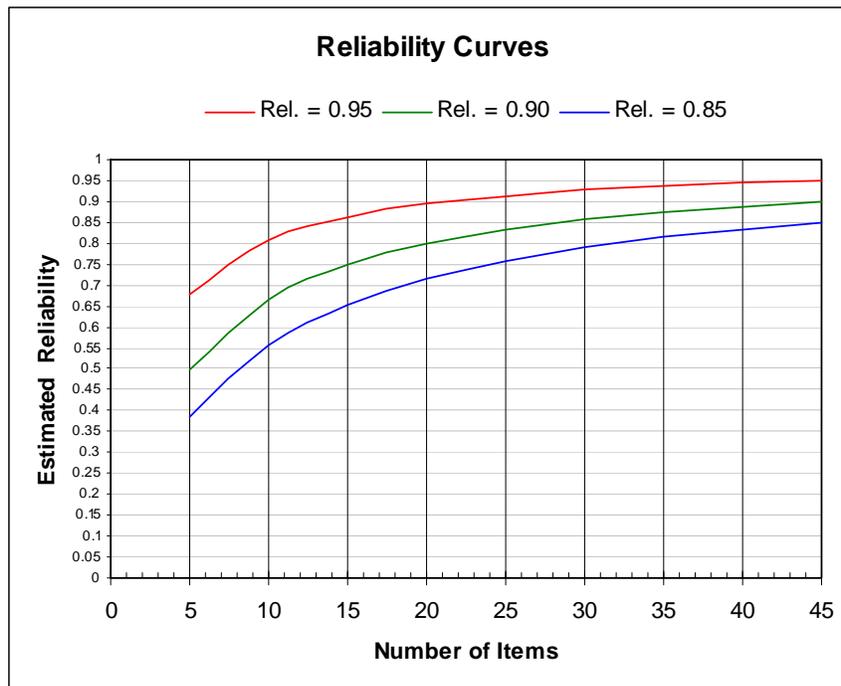
As emphasized in earlier sections, Coefficient Alpha only takes into account measurement error that arises from the selection of items used on a particular test form. There are other sources of random inaccuracy. One is due to the occasion of testing. Other various random conditions that might affect students on any particular testing occasions include illness, fatigue, and anxiety. Also, when a test includes OE items, as the PSSA does, another source that can cause random fluctuation is the OE item scorers. In a sense, Alpha may be positively biased because it does not take into account these other important sources of random error. Any internal consistency reliability index could understate the overall problem of measurement error because it ignores such sources or random error.

Another positive bias can occur when items are associated (clustered) with a common stimulus. Item bundles and testlets are other frequently used terms for this situation. One concrete example is when multiple reading comprehension items are associated with a common passage selection. Again, such a situation does not guarantee that the reliability estimate will be markedly affected, but the potential exists.

Strand Scores

As noted in the introduction, reliabilities tend to go up in value with an increase in test length and go down in value with a decrease in test length. Figure 18–1 illustrates this relationship for a hypothetical 45-point test with three total score reliabilities: 0.95, 0.90, and 0.85. As an example, the curve for reliability equal to 0.90 suggests that a 10-item strand would be expected to have a score reliability of just over 0.65. The use of the Spearman-Brown prophecy formula assumes all items are exchangeable, which in practice they may not be. While such a chart may not perfectly model actual strand correlations, the intent is only to illustrate the substantial impact that limited numbers of strand items can have on strand-score reliability. One should not be surprised that strand scores with more points tend to show higher reliability coefficients and those with fewer points tend to show lower reliability coefficients. Further, what is most important for PSSA users to note is that some strand score reliabilities may be too low to warrant interpretation at the individual student level.

Figure 18–1. Example of the Relationship between Test Length and Reliability



Note. Tabled values derived using the Spearman-Brown formula.

Individual-Level versus Group-Level Scores

The results presented in this chapter pertain to the reliability of individual scores. Group results (e.g., is state and district levels) are also provided on PSSA score reports, but the reliability of those scores is not specifically calculated here. However, as a general rule, the reliabilities of group mean scores are almost always higher (sometimes substantially) than the corresponding reliabilities for individual scores. This is especially important to remember for strand scores because those scores can be quite reliable at the group level, even though their individual reliabilities may be too low. Because the reliability of group mean scores (e.g., school or district means) tends to be higher than that of individual scores, the interpretation of strand scores at these aggregate levels is likely very reasonable in most instances. Even though the reliability for means scores based on only a few items might be adequate, the validity of those same scores might be suspect because use of only a few items may not adequately cover the construct of interest. Validity is further discussed in Chapter Nineteen.

RELIABILITY OF WRITING SCORES

An extension of Coefficient Alpha that was derived to specifically fit stratified parallel tests (sometimes called stratified alpha; Cronbach, Schonemann, & McKie, 1965) was used to compute the PSSA writing score reliabilities. This approach is often used when it is believed that Alpha may be yielding a lower coefficient than it should for the reasons noted above. Although originally developed for content-stratified tests, Qualls (1995) demonstrated its utility for mixed-format tests as well when the stratification is based on item type. It may be computed as

$$\rho_{xx'}^{\text{strata}} = 1 - \frac{\sum \sigma^2_{x_h} (1 - \alpha \rho_{x_h x_{h'}})}{\sigma^2_x},$$

where h indexes the individual strata.

The reliability of writing assessments (and many other performance-based tests) tends to be lower than reliabilities for other tests. Part of the reason for this is that there tends to be large student-by-task interactions on such assessments. For writing, this means individual student performance fluctuates significantly across different writing prompts, a student may score high on one prompt but much lower on another. In principle, adding more prompts can improve reliability to a more acceptable level. However, this is challenging in practice because of costs, testing time, and student fatigue. In sum, the large student-by-task interaction combined with the limited number of tasks often results in a relatively low reliability for writing assessments.

STANDARD ERROR OF MEASUREMENT

The reliability coefficient is a unit-free indicator that reflects the degree to which scores are free of measurement error. It always ranges between 0.0 and 1.0 regardless of the test's scale. Reliability coefficients best reflect the extent to which measurement inconsistencies may be present or absent in a group. However, they are not that useful for helping users interpret test scores. The standard error of measurement (SEM) is another indicator of test score precision that is better suited for determining the effect of measurement inconsistencies for the scores obtained by individual examinees. This is particularly so for Conditional SEMs (CSEM) discussed further below.

Traditional Standard Error of Measurement

A precise, theoretical interpretation of the SEM is somewhat unwieldy. A beginning point for understanding the concept is as follows. If everyone being tested had the same true score,²² there would still be some variation in observed scores due to imperfections in the measurement process, such as random differences in attention during instruction or concentration during testing and the sampling of test items. The standard error is defined as the standard deviation²³ of the distribution of observed scores for students with identical true scores. Because the SEM is an index of the random variability in test scores in actual score units, it represents very important information for test score users.

The SEM formula is provided below.

$$SEM = SD\sqrt{1 - reliability}$$

This formula indicates the value of the SEM depends on both the reliability coefficient and the standard deviation of test scores. If the reliability were equal to 0.00 (the lowest possible value) the SEM would be equal to the standard deviation of the test scores. If test reliability were equal to 1.00 (the highest possible value) the SEM would be 0.0. In other words, a perfectly reliable test has no measurement error (Harvill, 1991). Additionally, the value of the SEM takes the group variation (i.e., score standard deviation) into account. Consider that an SEM of 3 on a 10-point test would be very different than an SEM of 3 on a 100-point test.

Traditional Standard Error of Measurement Confidence Intervals

The SEM is an index of the random variability in test scores in actual score units, which is why it has such great utility for test score users. SEMs allow statements regarding the precision of individual test scores. SEMs help place ‘reasonable limits’ (Gulliksen, 1950) around observed scores through construction of an approximate score band. Often referred to as confidence intervals, these bands are constructed by taking the observed scores, X , and adding and subtracting a multiplicative factor of the SEM. As an example, students with a given true score will have observed scores that fall between ± 1 SEM about two-thirds of the time.²⁴ For ± 2 SEM confidence intervals, this increases to about 95 percent.

Further Interpretations

ONE STANDARD ERROR OF MEASUREMENT FOR ALL TEST SCORES

The SEM approach described above only provides a single numerical estimate for constructing the confidence intervals for examinees regardless of their score level. In reality however, such confidence intervals vary according to a student’s score. Consequently, care should be taken using the SEM for students with extreme scores. (In the next sections, an alternate approach is described that conditions the SEM on a student’s score estimate.)

²² True score is the score the person would receive if the measurement process were perfect.

²³ The standard deviation of a distribution is a measure of the dispersion of the observations. For the normal distribution, about 16 percent of the observations are more than one standard deviation above the mean.

²⁴ Some prefer the following interpretation: if a student were tested an infinite number of times, the ± 1 SEM confidence intervals constructed for each score would capture the student’s true score 68 percent of the time.

GROUP SPECIFIC

As noted in the introduction, reliabilities are group specific. The same is true for SEMs because both score reliabilities and score standard deviations vary across groups.

RAW SCORE METRIC

The SEM approach is calculated using raw scores, and as such, the resulting confidence interval bands are on the raw score metric. Error bands on the scaled score metric are considered in the next section.

TYPE OF ERROR REFLECTED

The interpretation of the SEM should be driven by the type of score reliability that underpins it. So, the PSSA SEMs involve the same source of error relevant to internal consistency indices. As noted earlier, a precise technical explanation of the SEM (and resulting confidence intervals) can be unwieldy. Because of this, score users are often provided less complex interpretations.

One simpler description is that a confidence interval represents the possible score range one would observe if a student could be tested twice with the same instrument. Taking the same test on a different day implies the only source of random error being considered is related to the occasion of testing, such as a student might be sleepier one day than another, or may be sick, or did not get a good breakfast. There is a reliability index that captures this source of random error, and it is referred to as the test-retest reliability coefficient. This is not the type of reliability computed for the PSSAs. When internal consistency reliability estimates are used, such an explanation blurs the fact that random error based on the occasion of testing is not considered.

When SEMs are derived from internal consistency reliability estimates, a better approach is to describe the confidence interval as providing reasonable bounds for the range of scores that a student might receive if he or she took an equivalent version of the test; that is, the student took a test that covered exactly the same content but included a different set of items (if an infinite number of tests with equivalent content were taken, the student's true score will lie within the constructed confidence intervals 68 percent of the time). As an example, if the PSSA score was 1750 and the SEM band was 1700 to 1800, then a student would be likely to receive a score somewhere between 1700 and 1800 if a different version of the test had been taken.

RESULTS AND OBSERVATIONS

Coefficient Alpha results and associated (traditional) SEMs for various PSSA scores are documented in Table 18–4 and Appendix Q. Values were derived using the PSSA final data file (see Chapter Nine). The results are organized by subject area and grade. Each table in Appendix Q also breaks out the various reporting strands and groups of interest (i.e., the total student population, gender and ethnic groups, English language learners (ELL), students with individualized education plan (IEP), and the economically disadvantaged (ED)). The statistics reported in Appendix Q include number of points possible (Pts.), number of items (Len.), number of students tested (N), mean number of score points received (Mean), standard deviation of test scores (SD), reliability (r), traditional standard error of measurement (SEM), and item types (Items) used to determine each score.

Table 18–4. Reliabilities and Standard Errors of Measurement

Subject	Grade	Reliability	SEM
Mathematics	3	0.94	3.2
	4	0.94	3.5
	5	0.93	3.6
	6	0.94	3.6
	7	0.94	3.6
	8	0.93	3.7
Reading	3	0.92	2.7
	4	0.91	3.1
	5	0.91	2.9
	6	0.90	2.9
	7	0.91	3.0
	8	0.91	3.0
Science	4	0.93	3.5
	8	0.93	3.5
Writing	5	0.77	6.7
	8	0.81	6.3

Note that these tables in Appendix Q report the standard deviations of observed scores. Assuming normally distributed scores, one would expect about two-thirds of the observations to be within one standard deviation of the mean. An estimate of the standard deviation of the true scores can be computed as

$$\hat{\sigma}_T = \sqrt{\hat{\sigma}_x^2 - \hat{\sigma}_x^2(1 - \hat{\rho}_{xx})}.$$

The results are historically consistent with past PSSA reliability results. The overall test score reliability values are excellent, with many in the low 0.90s, for mathematics, reading, and science. Writing reliabilities are lower, as they have been historically. (Possible reasons for this were discussed earlier.) It was also noted that reliabilities tend to go up in value with an increase in test length and population heterogeneity and go down in value with a decrease in test length and more homogeneous populations. Across the grades and subjects tabled in Appendix Q, reliabilities for the sub-strands tended to follow these same trends. That is, strands with more items tended to show higher reliability coefficients. Also, groups exhibiting more variability in test scores tended to have higher reliability coefficients. Perhaps the most significant result pertains to an earlier caution (i.e., that some strand score reliabilities may be too low to warrant interpretation at the individual student level). Once again, there is no firm guideline regarding how low is too low. The lower a given reliability coefficient, the greater the potential for over-interpretation. As a point of reference, a reliability coefficient of 0.50 would suggest that there is as much error variance as true-score variance in the scores. It should be noted that the reliability of group mean scores (e.g., school or district means) tends to be higher than that of individual scores, suggesting interpretation of strand scores at these aggregate levels is likely reasonable.

RASCH CONDITIONAL STANDARD ERROR OF MEASUREMENT

The CSEM also indicates the degree of measurement error but does so in scaled-score units and varies as a function of a student's actual scaled score. Therefore, the CSEM may be especially useful in characterizing measurement precision in the neighborhood of a score level used for decision-making—such as cut scores for identifying students who meet a performance standard.

Technically, when a Rasch model is applied, the CSEM at any given point on the ability continuum is defined as the reciprocal of the square root of the test information function derived from the Rasch scaling model.

$$CSEM(\hat{\theta}) = \frac{1}{\sqrt{I(\hat{\theta})}}$$

where $CSEM(\hat{\theta})$ is the conditional standard error of measurement and $I(\hat{\theta})$ is the test information function. Test information depends on the sum of the corresponding information functions for the test items. Item information depends on each item's difficulty and conditional item score variance. The formula above utilizes the Rasch ability (θ) metric. The conditional standard error on the scaled score (SS) metric is determined by simply multiplying the $CSEM(\hat{\theta})$ by the slope (multiplicative constant, m) of the linear transformation equation used to convert the Rasch ability estimates to scaled scores.

$$CSEM(SS) = CSEM(\hat{\theta}) * m$$

Chapter Fourteen provides the linear transformation formulas for each PSSA test.

Rasch Conditional Standard Error of Measurement Confidence Intervals

CSEMs also allow statements regarding the precision of individual tests scores. And like SEMs, they help place reasonable limits around observed scaled scores through construction of an approximate score band. The confidence intervals are constructed by adding and subtracting a multiplicative factor of the CSEM and may be interpreted as described in the earlier section.

Further Interpretations

DIFFERENT CONDITIONAL STANDARD ERROR OF MEASUREMENT FOR DIFFERENT TEST SCORES

The CSEM approach provides different numerical estimates for constructing the confidence intervals for examinees depending on their specific score level. The magnitude of the CSEM values is U-shaped with larger CSEM values associated with lower and higher scores.

GROUP SPECIFIC

Assuming reasonable model-data fit—as explored in Chapter Twelve—the Rasch based CSEMs (conditioned on score level) should not vary across groups.

SCALED SCORE METRIC

The CSEM and associated confidence interval bands are on the scaled score metric.

TYPE OF ERROR REFLECTED

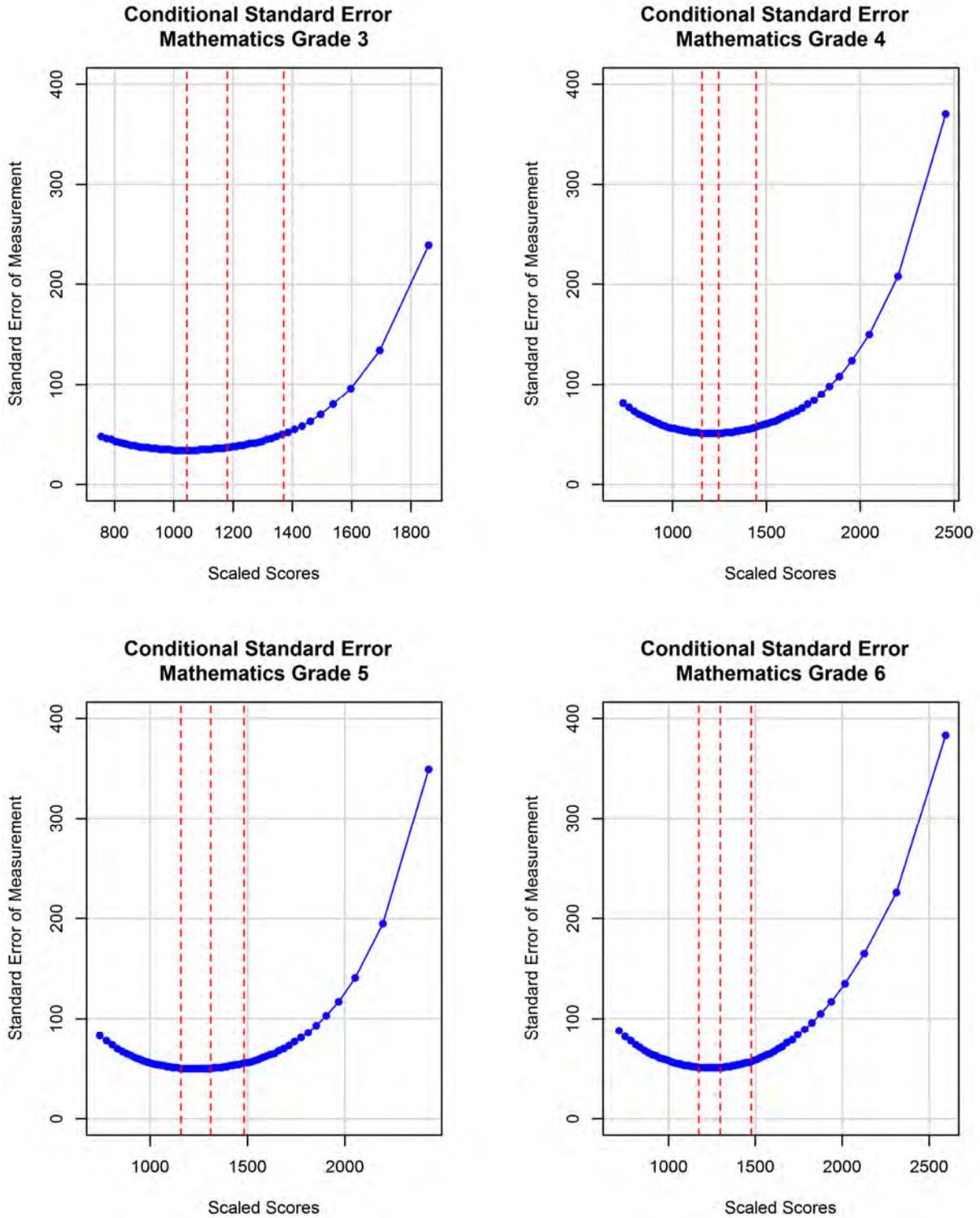
The SEMs documented on the PSSA score reports are the Rasch-based conditional standard errors of measurement described above. These are provided by the WINSTEPS scaling program described in Chapter Twelve. As noted earlier, these CSEMs are based on the concept of statistical information. For the purpose of providing a simpler explanation of SEMs to test score users, the earlier description of SEMs framed using the idea of internal consistency reliability was provided in the PSSA score report interpretive documents.²⁵ Score report content is considered in greater detail in Chapter Sixteen.

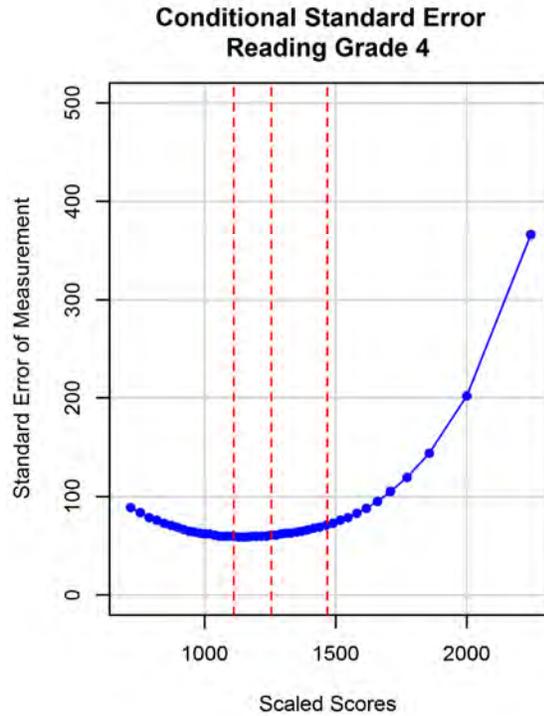
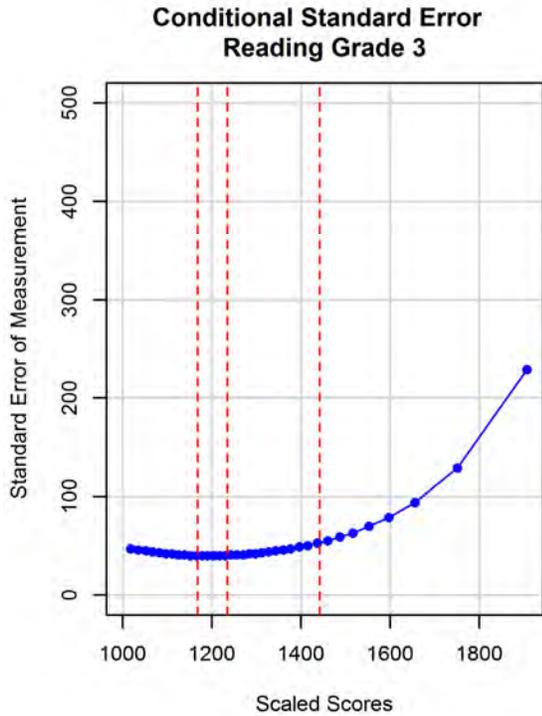
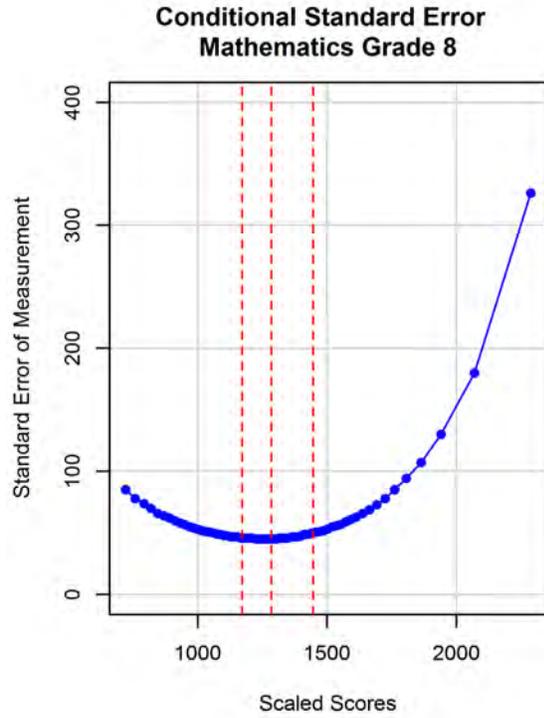
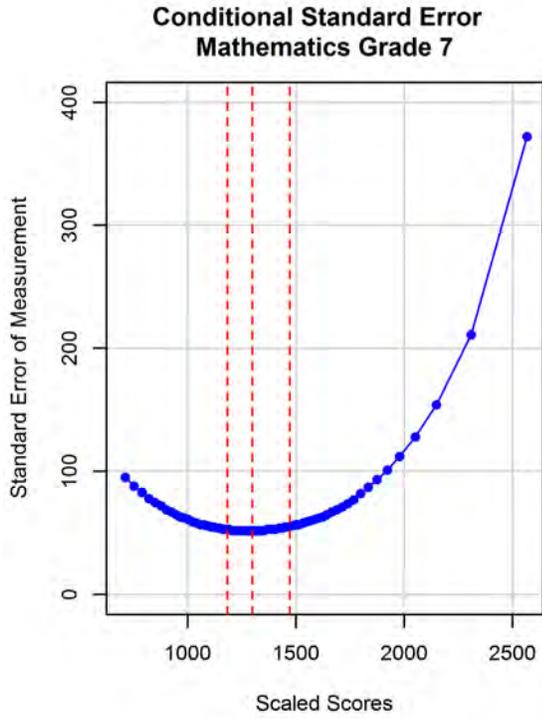
RESULTS AND OBSERVATIONS

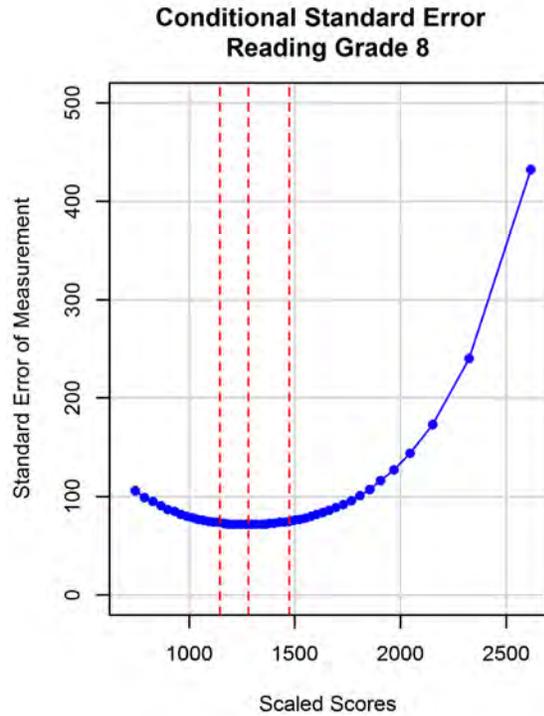
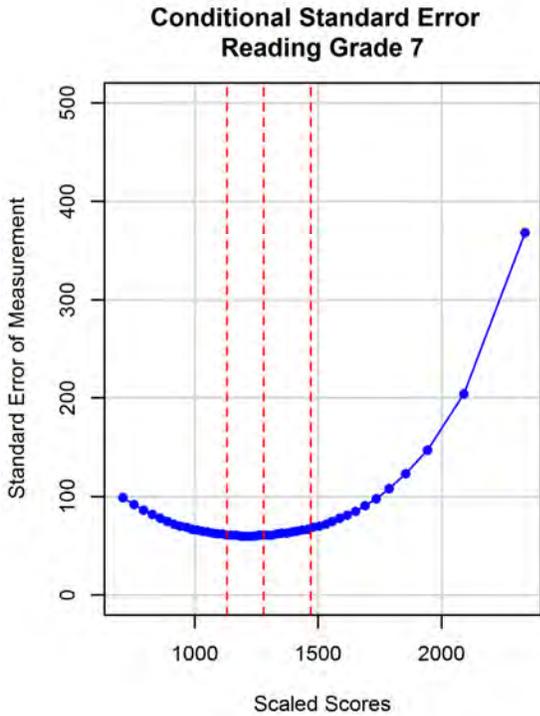
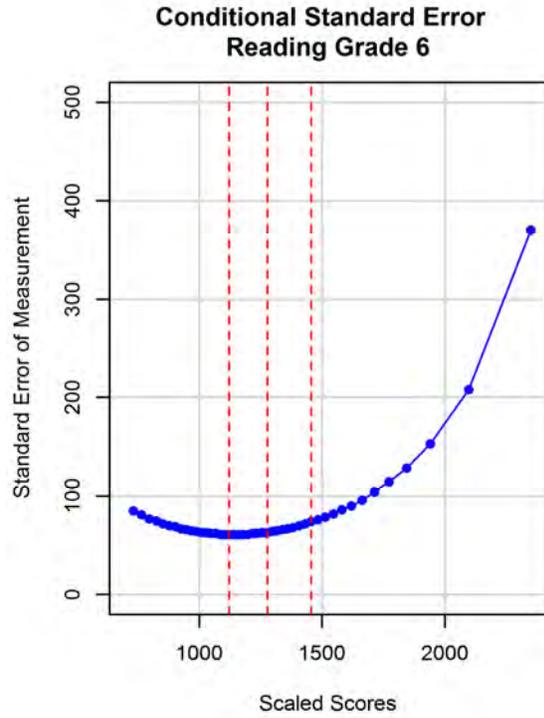
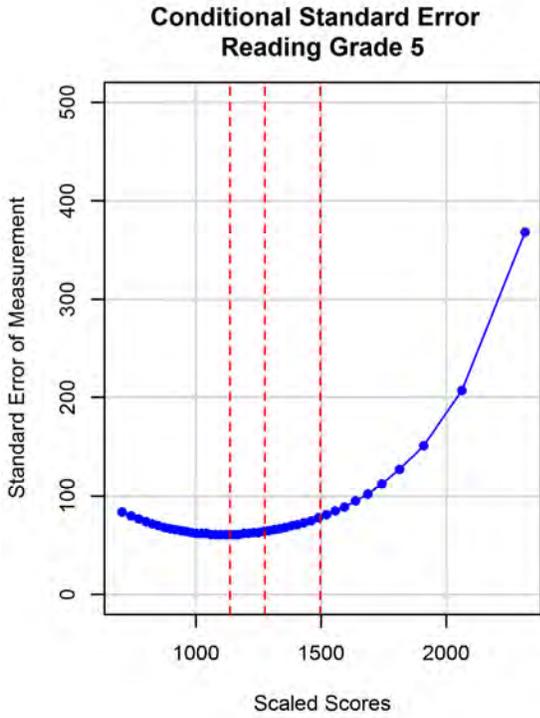
Figure 18–2 shows the Rasch CSEMs associated with each scaled score level. (This information is also provided in tabular form in Appendix Q.) Values were derived using the calibration data file described in Chapter Nine. The values are fairly consistent across a noticeably large range of the scaled scores, as demonstrated by the relatively flat bottoms of most plots. The values increase at both extremes (i.e., at smaller and larger scaled scores) giving these figures their typical U-shaped pattern. (Only the SEMs for scores greater than the lowest observable scaled scores [LOSS] are shown in the figures; consequently, the complete U-shape does not appear in most plots.) The three red-dashed lines represent the Basic, Proficient, and Advanced scaled score cuts, respectively, moving from lower to higher scaled score values. SEM values at the cut score lines were generally associated with smaller SEM values, indicating more precise measurement occurs at these cuts. The plots for writing are somewhat irregular in shape, which is likely due to the differential weighting that occurs for portions of these tests.

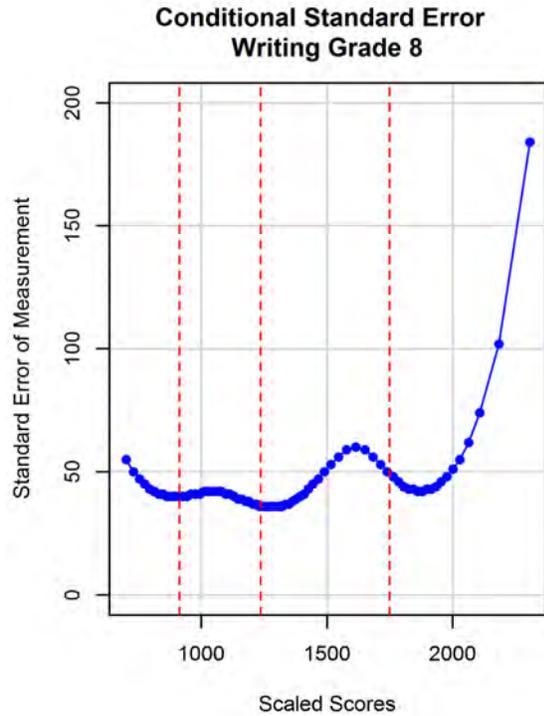
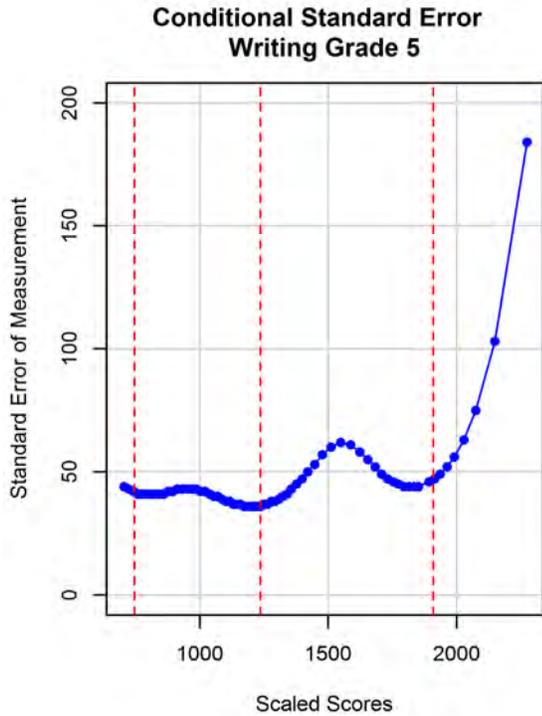
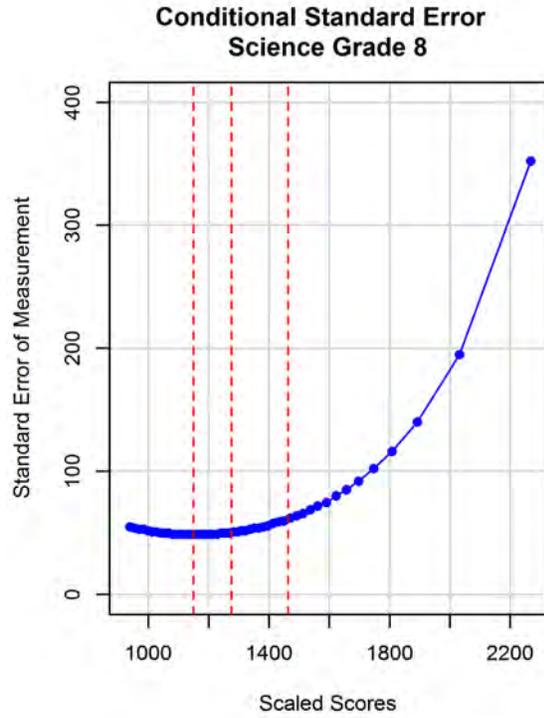
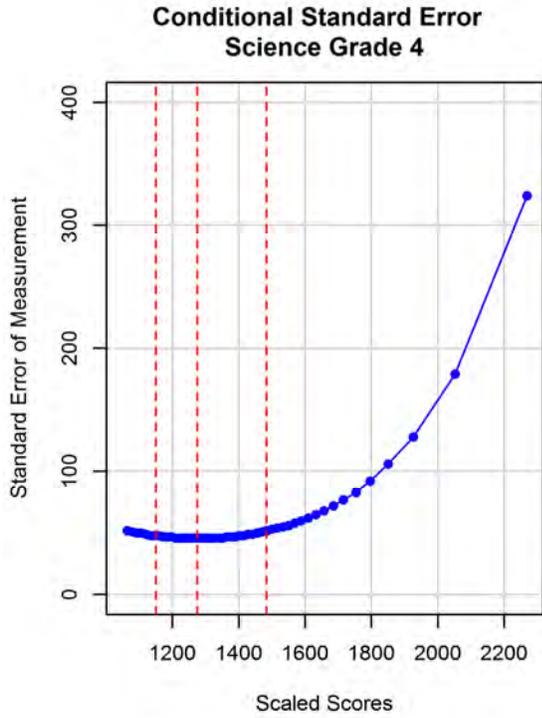
²⁵ Because IRT CSEMs are based on statistical information, it is questionable whether they account for error variance due to items. However, it seems difficult to construct a simple explanation of IRT CSEMs for the general public.

Figure 18–2. Conditional Standard Error Plots for Each Grade and Subject









DECISION CONSISTENCY AND ACCURACY

In a standards-based testing program there should be great interest in knowing how accurately students are classified into performance categories. In contrast to Coefficient Alpha that is concerned with the relative rank-ordering of students, it is the absolute values of student scores that are important in decision consistency and accuracy.

Classification consistency refers to the degree to which the achievement level for each student can be replicated upon retesting using an equivalent form (Huynh, 1976). Decision consistency answers the question: What is the agreement between the classifications based on two non-overlapping, equally difficult forms of the test. If two parallel forms of the test were given to the same students, the consistency of the measure would be reflected by the extent that the classification decisions made from the first set of test scores matched the decisions based on the second set of test scores. Consider Tables 18–5 and 18–6 below.

Table 18–5. Pseudo-Decision Table for Two Hypothetical Categories

		TEST ONE		
		LEVEL I	LEVEL II	MARGINAL
TEST TWO	LEVEL I	φ_{11}	φ_{12}	$\varphi_{1\bullet}$
	LEVEL II	φ_{21}	φ_{22}	$\varphi_{2\bullet}$
	MARGINAL	$\varphi_{\bullet 1}$	$\varphi_{\bullet 2}$	1

Table 18–6. Pseudo-Decision Table for Four Hypothetical Categories

		TEST ONE				
		LEVEL I	LEVEL II	LEVEL III	LEVEL IV	MARGINAL
TEST TWO	LEVEL I	φ_{11}	φ_{12}	φ_{13}	φ_{14}	$\varphi_{1\bullet}$
	LEVEL II	φ_{21}	φ_{22}	φ_{23}	φ_{24}	$\varphi_{2\bullet}$
	LEVEL III	φ_{31}	φ_{32}	φ_{33}	φ_{34}	$\varphi_{3\bullet}$
	LEVEL IV	φ_{41}	φ_{42}	φ_{43}	φ_{44}	$\varphi_{4\bullet}$
	MARGINAL	$\varphi_{\bullet 1}$	$\varphi_{\bullet 2}$	$\varphi_{\bullet 3}$	$\varphi_{\bullet 4}$	1

If a student is classified as being in one category based on Test One’s score, how probable would it be that the student would be reclassified as being in the same category if he or she took Test Two (a non-overlapping, equally difficult form of the test)?

The proportions of correct decisions, φ , for two and four categories are computed by the following two formulas, respectively:

$$\varphi = \varphi_{11} + \varphi_{22}$$

$$\varphi = \varphi_{11} + \varphi_{22} + \varphi_{33} + \varphi_{44}$$

It is the sum of the diagonal entries—that is, the proportion of students classified by the two forms into exactly the same achievement level—that signifies the overall consistency.

Classification accuracy refers to the agreement of the observed classifications of students with the classifications made on the basis of their true scores. An observed score contains measurement error while a true score is free of measurement error. A student's observed score can be formulated by the sum of his or her true score plus measurement error, or $Observed = True + Error$. Decision accuracy is an index to determine the extent to which measurement error causes a classification different than expected from the true score.

Since true scores are unobserved and since it is not feasible to repeat PSSA testing in order to estimate the proportion of students who would be reclassified in the same performance levels, a statistical model needs to be imposed on the data to estimate the true scores and to project the consistency and accuracy of classifications solely using data from the available administration (Hambleton & Novick, 1973). Although a number of procedures are available, one well-known method was developed by Livingston and Lewis (1995) utilizing a specific True Score Model. This approach is fairly complex, and the cited source contains details regarding the statistical model used to calculate decision consistency and accuracy from the single PSSA administration.

Further Interpretations

Several factors might affect decision consistency and accuracy. One important factor is the reliability of the scores. All other things being equal, more reliable test scores tend to result in more similar reclassifications and less measurement error. Another factor is the location of the cut score in the score distribution. More consistent and accurate classifications are observed when the cut scores are located away from the mass of the score distribution. For example, when scores are close to being normally distributed, the mass is concentrated in the middle of the distribution, and, thus classifications tend to become more consistent when cut scores go up from 70 percent to 80 percent to 90 percent or, alternatively, go down from 30 percent to 20 percent to 10 percent. The number of performance levels is also a consideration. Consistency and accuracy indices for four performance levels should be lower than those based on two categories. This is not surprising since classification and accuracy using four levels would allow more opportunity to change achievement levels. Hence, there would be more classification errors and less accuracy with four achievement levels, resulting in lower consistency indices.

RESULTS AND OBSERVATIONS

The results for the overall consistency across all four performance levels as well as for the dichotomies created by the three cut scores are presented in Table 18–7. The tabled values, derived using the program *BB-Class* (Brennan, 2004) using the Livingston and Lewis method. Across all subject areas, the overall decision consistency ranged from the mid 0.60s to the high 0.70s while the decision accuracy ranged from the low 0.70s to the mid 0.80s. The overall consistency and accuracy in reading was slightly lower than the other subject areas on average. It should be noted that consistency and accuracy indices for the four performance levels should be lower than those based on two categories (discussed above).

Dichotomous decisions using the Below Basic/Basic cuts generally have the highest consistency and accuracy values and exceeded 0.90 in all cases. The next highest values, on average, are associated with the Basic/Proficient and Proficient/Advanced cuts, respectively, for mathematics, reading and science. In writing, the latter two are reversed.

Table 18–7. Decision Consistency and Accuracy Results

	Grade	Statistic	Overall	BBas/Bas	Bas/Prof	Prof/Adv
Mathematics	3	Consist.	0.76	0.97	0.93	0.87
		Accuracy	0.83	0.98	0.95	0.91
	4	Consist.	0.78	0.95	0.93	0.90
		Accuracy	0.84	0.96	0.95	0.93
	5	Consist.	0.74	0.94	0.91	0.89
		Accuracy	0.81	0.96	0.93	0.92
	6	Consist.	0.77	0.94	0.92	0.90
		Accuracy	0.83	0.96	0.94	0.93
	7	Consist.	0.78	0.94	0.92	0.90
		Accuracy	0.84	0.96	0.95	0.93
	8	Consist.	0.75	0.94	0.91	0.89
		Accuracy	0.82	0.96	0.94	0.92
Reading	3	Consist.	0.71	0.93	0.91	0.85
		Accuracy	0.79	0.95	0.94	0.89
	4	Consist.	0.69	0.93	0.89	0.87
		Accuracy	0.78	0.95	0.92	0.90
	5	Consist.	0.66	0.92	0.89	0.85
		Accuracy	0.75	0.94	0.92	0.89
	6	Consist.	0.67	0.93	0.88	0.85
		Accuracy	0.76	0.95	0.92	0.89
	7	Consist.	0.71	0.94	0.90	0.86
		Accuracy	0.79	0.96	0.93	0.90
	8	Consist.	0.75	0.94	0.91	0.88
		Accuracy	0.82	0.96	0.94	0.91
Science	4	Consist.	0.77	0.95	0.92	0.89
		Accuracy	0.84	0.97	0.95	0.92
	8	Consist.	0.71	0.92	0.90	0.88
		Accuracy	0.80	0.95	0.93	0.92
Writing	5	Consist.	0.79	0.98	0.82	0.98
		Accuracy	0.85	0.99	0.87	0.99
	8	Consist.	0.71	0.97	0.84	0.90
		Accuracy	0.79	0.98	0.89	0.93

Note. Results derived using PSSA final data file (see Chapter Nine).

RATER AGREEMENT

Because open-ended items are included on the PSSAs, another source of random error is related to the scorers of those items. Frisbie (2005) noted that “test score reliability differs from scorer reliability” and that “the need for one kind of estimate cannot be satisfied by the other.” Additionally, the data most easily obtainable that captures this information comes from the “10 percent read behinds” collected during the scoring process (see Chapter Eight for a description). Partly because of the way that this data is obtained and reported (i.e., it is not a ratio of true score variance over observed score variance), the term rater agreement is used here, not rater reliability or inter-rater reliability as these terms are somewhat misleading as explained above.

Further Interpretations

For the PSSAs, both within-year and across-year rater consistency are available. As noted earlier, the linking process adjusts for across-year changes (see Chapter Sixteen). As part of the data collected for that process, additional across-year rater consistency data is available for consideration.

RESULTS AND OBSERVATIONS

Within-year rater agreement information is provided in Chapter Eight. This information is reformatted in Tables 18–8 through 18–11 for PSSA mathematics, reading, science, and writing OE items, respectively. In addition, the percentages awarded to each score point are also presented in these tables. As seen from these tables, the inter-rater agreement percentages range from 82 percent to 97 percent for mathematics, 72 percent to 86 percent for reading, 80 percent to 97 percent for science, and 78 percent to 86 percent for writing. Mathematics had validity ranging from 81 percent to 97 percent; reading had validity ranging from 72 percent to 89 percent; and science had validity ranging from 85 percent to 99 percent. (Validity is discussed further in Chapter Eighteen.) The ranges above are similar to prior results for the PSSA.

Across-year data are presented in Tables 18–12 through 18–14 for mathematics, reading, and science. Note that for these subjects, data are only available for the designated OE core anchor items. The number of responses (N), the old score and new score means, and the Pearson correlations are tabled. Mathematics correlations range from the high 0.80s to high 0.90s. Reading correlations range from the low 0.70s to high 0.80s. Science correlations range from the mid 0.60s to high 0.80s. Correlations for the writing prompt scores are reported in Table 18–15 and range from the mid 0.60s to 0.70. The correlation ranges above are similar to prior results for the PSSAs.

Table 18–8. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Mathematics

Grade	Item	Inter-Rater Agreement %		Validity	Percentage Awarded for Each Score Point %					
		Exact	Adjacent		0	1	2	3	4	B/NS
3	1	89	10	94	13	20	21	33	13	1
	2	88	12	95	5	20	34	17	24	1
	3	97	3	96	2	9	20	23	45	1
4	1	93	7	96	8	15	23	43	10	2
	2	94	6	94	28	39	11	12	5	4
	3	94	6	91	4	10	35	26	24	1
5	1	94	6	96	4	12	54	22	6	1
	2	94	6	93	12	27	25	21	11	5
	3	88	12	92	27	32	17	17	6	1
6	1	92	8	97	5	12	14	52	14	2
	2	87	13	91	11	32	27	22	2	5
	3	95	5	96	16	20	16	29	18	1
7	1	86	14	96	17	31	32	16	4	2
	2	85	14	94	24	25	18	12	16	5
	3	88	12	95	15	8	25	40	11	1
8	1	91	9	95	12	21	13	35	17	2
	2	84	15	91	14	6	25	25	24	5
	3	82	18	81	12	31	22	22	12	1

Note. B = blank; NS = non-scoreable.

Table 18–9. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Reading

Grade	Item	Inter-Rater Agreement %		Validity	Percentage Awarded for Each Score Point %				
		Exact	Adjacent		0	1	2	3	B/NS
3	1	84	16	80	9	42	33	13	2
	2	74	26	79	7	41	38	12	2
4	1	84	16	82	7	14	44	32	1
	2	84	16	89	5	21	39	33	2
	3	86	14	87	7	53	16	22	1
	4	85	15	88	12	31	34	21	2
5	1	79	21	87	5	26	56	12	1
	2	75	25	85	6	27	52	13	2
	3	75	25	87	8	29	43	19	1
	4	76	24	84	12	46	27	13	1
6	1	81	19	77	8	42	37	12	1
	2	75	25	74	3	33	49	12	2
	3	82	18	85	4	33	51	11	1
	4	80	20	82	7	28	45	18	1
7	1	83	17	86	2	44	31	22	1
	2	78	22	79	7	19	54	18	2
	3	77	23	76	8	29	44	17	1
	4	80	19	82	9	39	30	21	2
8	1	72	28	72	8	36	41	13	2
	2	77	23	80	4	18	35	41	2
	3	75	25	84	6	25	45	21	2
	4	77	23	86	9	39	30	20	2

Note. B = blank; NS = non-scoreable.

Table 18–10. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Science

Grade	Item	Inter-Rater Agreement %		Validity	Percentage Awarded for Each Score Point %			
		Exact	Adjacent		0	1	2	B/NS
4	1	80	18	85	34	27	38	1
	2	88	12	92	34	41	23	1
	3	88	12	95	26	27	45	2
	4	97	3	99	24	37	37	1
	5	81	18	91	17	39	43	1
8	1	92	8	97	25	56	18	2
	2	83	17	93	13	64	19	3
	3	86	14	96	32	36	29	4
	4	93	7	98	14	19	65	2
	5	94	6	97	22	35	40	3

Note. B = blank; NS = non-scoreable. For more information regarding validity, see the section on Handscoring Validity Process in Chapter Eight.

Table 18–11. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Writing

Grade	Promp	Inter-Rater Agreement %		Percentage Awarded for Each Score Point %				
		Exact	Adjacent	1	2	3	4	NT/NS
5	1 (Com)	86	14	3	34	54	8	1
	1 (R&E)	82	18	5	36	52	7	1
	2 (Com)	84	16	5	44	45	4	2
	2 (R&E)	81	19	5	44	45	4	1
8	1 (Com)	80	20	4	33	56	7	1
	1 (R&E)	78	22	4	34	54	6	1
	2 (Com)	82	18	5	35	51	7	1
	2 (R&E)	80	20	6	36	50	7	1

Note. NT = not taken; NS = non-scoreable.

Table 18–12. Mathematics Mean Scores and Correlations

Grade	Item ID	N	Prev. Mean	2013 Mean	Corr.
3	1	997	2.21	2.21	0.92
	2	999	2.78	2.80	0.97
4	1	1000	2.47	2.42	0.94
	2	1000	2.42	2.38	0.95
5	1	1000	2.00	1.99	0.96
	2	1000	2.08	2.07	0.95
6	1	1000	1.92	1.85	0.87
	2	1000	2.53	2.54	0.96
7	1	1000	1.79	1.80	0.91
	2	1000	2.17	2.17	0.93
8	1	1000	2.02	1.94	0.88
	2	1000	2.31	2.33	0.97

Table 18–13. Reading Mean Scores and Correlations

Grade	Item ID	N	Prev. Mean	2013 Mean	Corr.
3	1	999	1.46	1.45	0.85
4	1	998	2.05	1.95	0.89
	2	1000	1.45	1.48	0.86
5	1	999	1.77	1.70	0.75
	2	1000	1.85	1.67	0.73
6	1	999	1.51	1.53	0.80
	2	998	1.77	1.73	0.72
7	1	1000	1.75	1.86	0.74
	2	998	1.69	1.69	0.77
8	1	999	2.17	2.18	0.82
	2	1000	1.90	1.79	0.71

Table 18–14. Science Mean Scores and Correlations

Grade	Item ID	N	Prev. Mean	2013 Mean	Corr.
4	1	999	1.25	1.20	0.86
	2	1000	0.95	0.92	0.82
8	1	1000	1.00	1.04	0.67
	2	1000	1.56	1.55	0.89

Table 18–15. Writing Mean Scores and Correlations

Grade	Item ID	N	Prev. Mean	2013 Mean	Corr.
5	1-A	998	2.76	2.67	0.66
	1-B	998	2.73	2.63	0.66
	2-A	998	2.63	2.60	0.67
	2-B	998	2.61	2.60	0.68
8	1-A	999	2.69	2.69	0.68
	1-B	999	2.68	2.66	0.66
	2-A	1000	2.80	2.69	0.70
	2-B	1000	2.81	2.65	0.67

Chapter Nineteen: Validity

As defined in the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999), validity refers to “the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests” (p. 9). The *Standards* provides a framework for describing the sources of evidence that should be considered when evaluating validity. These sources include evidence based on 1) test content, 2) response processes, 3) the internal structure of the test, 4) the relationships between test scores and other variables, and 5) the consequences of testing. In addition, when Item Response Theory (IRT) models are used to analyze assessment data, validity considerations related to those processes should also be explored.

The validity process involves the collection of a variety of evidence to support the proposed test score interpretations and uses. This entire technical report describes the technical aspects of the PSSA tests in support of their score interpretations and uses. Each of the previous chapters contributes important evidence components that pertain to score validation: test development, test administration, test scoring, item analysis, Rasch calibration, scaling, linking, score reporting, and reliability. This chapter summarizes and synthesizes the evidence based on the *Standards*’ framework. The purposes and intended uses of PSSA test scores are reviewed first, then each type of validity evidence is addressed in turn.

PURPOSES AND INTENDED USES OF THE PSSA

The *Standards* emphasize that validity pertains to how test scores are used. To help contextualize the evidence that will be presented below, the purposes of the PSSA will be reviewed first. As stated in Chapter One, the three main purposes of the PSSA include the following

1. Measuring how well students acquire the knowledge and skills described in the *Pennsylvania Assessment Anchor Content Standards* (Assessment Anchors) as defined by the Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing.
2. Providing information on school and district accountability.
3. Improving curricular and instructional practices in order to help students reach proficiency in the Academic Standards.

EVIDENCE BASED ON TEST CONTENT

Test content validity evidence for the PSSA rests greatly on establishing a link between each piece of the assessment (i.e., the items) and what the students should know and be able to do as required by the Assessment Anchors, Eligible Content, and/or the Academic Content Standards. The PSSA tests are intended to measure students’ knowledge and skills described in the Assessment Anchors as defined by the Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing. Thus the evidence supporting the alignment among the PSSA tasks, the Assessment Anchors as defined by the Eligible Content, and the Academic Content Standards should be provided.

Lane (1999) suggests taking the following steps to support the content validity of the PSSA:

- Evaluate the degree to which the PSSA test specifications represent and align with the knowledge and skills described in the Assessment Anchors as defined by the Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing in terms of both content and cognitive processes.
- Evaluate the alignment between the PSSA items and test specifications to ensure representativeness.
- Evaluate the extent to which the curriculum aligns with the Assessment Anchors. If some contents are not included in the curriculum, then low scores on PSSA should not be interpreted as meaning that instruction was ineffective.
- Conduct content reviews of the PSSA items using a panel of content experts to see whether they measure the intended construct or are the sources of construct-irrelevant variance.
- Conduct fairness reviews of the items to avoid issues related to a specific subpopulation.
- Evaluate procedures for administration and scoring, such as the appropriateness of instructions to examinees, time limit for the assessment, and training of raters.
- Submit operational tests to third-party, independent reviews (i.e., Achieve.org).

Chapters Two through Eight of this report present a considerable amount of evidence related to test content. As described in these chapters, all the PSSA items were developed and aligned with the PSSA Assessment Anchors and Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing following well-established procedures. After the items were developed, they underwent multiple rounds of content and bias reviews. After they were field tested, they were reviewed with respect to their statistical properties. Items selected for the operational assessment had to pass content, psychometric, and PDE reviews. Tests were administered according to standardized procedures with allowable accommodations.

Some efforts made to ensure content validity are summarized below:

- DRC used Webb's (1999) Depth of Knowledge (DOK) model to ensure the PSSA items aligned with the Assessment Anchors as defined by the Eligible Content and the Academic Content Standards in terms of both content and cognitive levels.
- DRC established detailed test and item/passage development specifications and ensured the items were sufficient in number and adequately distributed across content and levels of cognitive complexity and difficulty.
- DRC and WestEd selected qualified item writers and provided training to help ensure they wrote high-quality items.
- Each newly-developed item was first reviewed by content specialists and editors at DRC and/or WestEd to make sure that all items measured the intended Assessment Anchors, as defined by the Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing. Appropriateness for the intended grade was also considered, as well as depth of knowledge, graphics, grammar/punctuation, language demand, and distractor reasonableness.

- Before field testing, the test items were submitted to content committees (composed of Pennsylvania educators) for review using, but not limited to, the following categories:
 - Overall quality and clarity
 - Anchor, eligible content, and/or standard alignment
 - Grade-level appropriateness
 - Difficulty level
 - Depth of knowledge
 - Appropriate sources of challenge (e.g., unintended content and skills)
 - Correct answer
 - Quality of distractors
 - Graphics
 - Appropriate language demand
 - Freedom from bias
- The items were also submitted to a Bias, Fairness, and Sensitivity Committee for review. This committee reviewed items for issues related to diversity, gender, and other pertinent factors.
- Items passing all the prior hurdles were tried out in a field test event. Several statistical analyses were conducted on the field test data, including classical item analyses, distractor analyses, and differential item functioning (DIF). Items were once again carefully reviewed by DRC staff and a committee of Pennsylvania teachers with respect to their statistical characteristics. DIF was used to detect test items that might bias test scores for particular groups. Empirical investigation of DIF strengthens the validity evidence related to score interpretations for students in particular groups by eliminating potential sources of construct-irrelevant variance as such, DIF results might be better considered as internal structure validity evidence.
- The PSSA tests were administered according to standardized procedures with allowable accommodations. Students were given ample time to complete the tests (i.e., there were no speededness issues).
- As shown in Chapter Eight, the raters for open-ended (OE) items were carefully recruited and well trained. Their scoring was monitored throughout the scoring session to ensure that an acceptable level of scoring accuracy was maintained.

EVIDENCE BASED ON RESPONSE PROCESSES

Response-process evidence is used to examine the extent to which the cognitive skills and processes employed by students match that identified in the test developer's defined construct domains for all students and for each subgroup. Think-aloud procedures or cognitive labs can be used to collect this type of evidence. In addition, when an assessment includes OE items, an examination of the extent to which the raters interpret and apply the scoring criteria accurately when assigning scores to students' responses on OE items also provides validity of the response-processes evidence.

For the PSSA science tests, DRC conducted a science cognitive lab study to gather relative information about the thinking processes students used to solve science scenario items. The use of the cognitive lab helped ensure that the intended response processes were employed by students. (No cognitive lab studies have been conducted for the PSSA mathematics, reading, or writing assessments because these assessments do not have scenarios.)

For all the PSSA tests, well-organized scorer training and subsequent monitoring of rating accuracy helped ensure that raters strictly followed the scoring criteria and that no rubric-unrelated features significantly affected their scoring.

EVIDENCE BASED ON INTERNAL STRUCTURE

As described in the *Standards* (1999), internal-structure evidence refers to the degree to which the relationships between test items and test components conform to the construct on which the proposed test interpretations are based. For each PSSA test, one total test score as well as strand scores are reported (see Chapter Sixteen for more information about PSSA scores). Several dimensionality studies were conducted in order to provide internal-structure evidence relating to the use of both types of scores.

Item-Test Correlations

Item-test correlations are reviewed in Chapter Eleven. All values are positive and of acceptable magnitude.

Item Response Theory Dimensionality

Results from principle components analyses conducted using WINSTEPS were presented in Chapter Twelve. The PSSA mathematics, reading and science tests were essentially unidimensional, providing evidence supporting interpretations based on the total scores for the respective PSSA tests. (Writing was not studied for reasons discussed in Chapter Twelve. However, one might expect some dimensionality issues because the writing MC items and Prompt tasks are so different.)

Strand Correlations

Correlations and disattenuated correlations between strand scores within each subject area are presented below. Values were derived from the PSSA final data file (see Chapter Nine). This data can also provide information on score dimensionality that is part of internal-structure evidence. As noted in Chapter Three, the PSSA mathematics tests have five strands (denoted by M.A, M.B, M.C, M.D, and M.E), the PSSA reading tests have two strands (denoted by R.A and R.B), the PSSA science tests have four strands (denoted by S.A, S.B, S.C, and S.D), and the PSSA writing tests include two strands (denoted by W.A and W.B).

For each grade, Pearson's correlation coefficients between these strands are reported in Tables 19–1a through 19–1f. The inter-correlations between the strands within the content areas are positive and generally range from moderate to high in value.

Table 19–1a. Correlations between Mathematics and Reading Strands for Grade 3

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	0.75	-					
M.C	0.67	0.57	-				
M.D	0.80	0.65	0.60	-			
M.E	0.77	0.65	0.59	0.68	-		
R.A	0.74	0.65	0.59	0.68	0.66	-	
R.B	0.71	0.63	0.57	0.66	0.64	0.84	-

Table 19–1b. Correlations between Mathematics, Reading, and Science Strands for Grade 4

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D
M.A	-										
M.B	0.76	-									
M.C	0.69	0.58	-								
M.D	0.76	0.65	0.61	-							
M.E	0.74	0.64	0.62	0.66	-						
R.A	0.76	0.62	0.65	0.67	0.69	-					
R.B	0.69	0.57	0.61	0.62	0.63	0.80	-				
S.A	0.79	0.65	0.66	0.68	0.70	0.82	0.72	-			
S.B	0.67	0.56	0.58	0.58	0.62	0.74	0.65	0.79	-		
S.C	0.67	0.55	0.57	0.57	0.60	0.70	0.61	0.77	0.69	-	
S.D	0.66	0.55	0.57	0.57	0.59	0.71	0.61	0.77	0.70	0.67	-

Table 19–1c. Correlations between Mathematics, Reading, and Writing Strands for Grade 5

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	W.A	W.B
M.A	-								
M.B	0.79	-							
M.C	0.70	0.65	-						
M.D	0.75	0.67	0.59	-					
M.E	0.72	0.63	0.60	0.61	-				
R.A	0.75	0.68	0.62	0.66	0.61	-			
R.B	0.71	0.65	0.59	0.63	0.59	0.83	-		
W.A	0.53	0.47	0.44	0.47	0.45	0.58	0.59	-	
W.B	0.69	0.62	0.57	0.61	0.58	0.75	0.72	0.75	-

Table 19–1d. Correlations between Mathematics and Reading Strands for Grade 6

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	0.73	-					
M.C	0.76	0.69	-				
M.D	0.79	0.70	0.72	-			
M.E	0.78	0.69	0.72	0.74	-		
R.A	0.70	0.62	0.65	0.72	0.68	-	
R.B	0.70	0.62	0.65	0.71	0.68	0.83	-

Table 19–1e. Correlations between Mathematics and Reading Strands for Grade 7

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	0.76	-					
M.C	0.73	0.67	-				
M.D	0.80	0.79	0.72	-			
M.E	0.72	0.70	0.67	0.73	-		
R.A	0.68	0.67	0.65	0.72	0.64	-	
R.B	0.69	0.68	0.64	0.72	0.64	0.84	-

Table 19–1f. Correlations between Mathematics, Reading, Science, and Writing Strands for Grade 8

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D	W.A	W.B
M.A	-												
M.B	0.71	-											
M.C	0.69	0.70	-										
M.D	0.78	0.74	0.72	-									
M.E	0.73	0.70	0.68	0.76	-								
R.A	0.67	0.65	0.61	0.69	0.69	-							
R.B	0.69	0.66	0.62	0.71	0.70	0.83	-						
S.A	0.71	0.69	0.66	0.73	0.73	0.78	0.77	-					
S.B	0.61	0.60	0.57	0.62	0.63	0.70	0.69	0.78	-				
S.C	0.59	0.59	0.56	0.60	0.61	0.65	0.62	0.75	0.69	-			
S.D	0.63	0.62	0.59	0.64	0.64	0.71	0.70	0.80	0.74	0.71	-		
W.A	0.52	0.51	0.47	0.54	0.53	0.59	0.63	0.55	0.48	0.44	0.49	-	
W.B	0.64	0.61	0.58	0.67	0.65	0.73	0.75	0.70	0.63	0.57	0.63	0.75	-

The correlations in Tables 19–1a through 19–1f are based on the observed strand scores. These observed-score correlations are weakened by existing measurement error contained within each strand. As a result, disattenuating the observed correlations can provide an estimate of the relationships between strands if there were no measurement error. (An important caveat is provided further below.) The disattenuated correlation coefficients (R_{xy}) can be computed by using the formula (Spearman 1904, 1910) below:

$$R_{xy} = \frac{r_{xy}}{\sqrt{r_{xx}r_{yy}}}$$

where r_{xy} is the observed correlation, and r_{xx} and r_{yy} are the reliabilities for strand X and strand Y. Disattenuated correlations very near 1.00 might suggest that the same or very similar constructs are being measured. Values somewhat less than 1.00 might suggest that different strands are measuring slightly different aspects of the same construct. Values markedly less than 1.00 might suggest the strands reflect different constructs.

Tables 19–2a through 19–2f show the corresponding disattenuated correlations for the 2013 PSSA tests for each grade. Given that none of these strands has perfect reliabilities (see Chapter Eighteen), the disattenuated strand correlations are higher than their observed score counterparts.

Some within-subject correlations are very high (e.g., above 0.95), suggesting that the within-subject strands might be measuring essentially the same construct. This, in turn, suggests that some strand scores might not provide unique information about the strengths or weaknesses of students.

On the other hand, some within-subject strand correlations are somewhat lower than 1.00. For such strands, partial evidence is provided regarding the multidimensional structure of some tests and further supporting the validity of those specific strand scores.

On a fairly consistent basis, the correlations between the strands within each subject area were higher than the correlations between strands across different subject areas. In general, within-subject strand disattenuated correlations are mostly larger than 0.90, while across-subject strand disattenuated correlations generally ranged from 0.70 to 0.90. As a specific example, Grade 3 disattenuated correlations for the M.A, M.B, M.C, M.D, and M.E strands range from 0.86 to 1.08 and the correlations between R.A and R.B was 1.01. In contrast, the disattenuated correlations between the two reading strands with the five mathematics strands only range from 0.75 to 0.93. Such a pattern is expected since the two subject-area tests were designed to measure different constructs. Similar patterns are also observed at other grade levels.

Table 19–2a. Disattenuated Strand Correlations for Mathematics and Reading: Grade 3

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	1.02	-					
M.C	0.86	0.89	-				
M.D	1.01	1.00	0.86	-			
M.E	1.05	1.08	0.91	1.05	-		
R.A	0.84	0.90	0.75	0.86	0.91	-	
R.B	0.85	0.91	0.77	0.87	0.93	1.01	-

Table 19–2b. Disattenuated Strand Correlations for Mathematics, Reading, and Science: Grade 4

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D
M.A	-										
M.B	0.95	-									
M.C	0.93	0.87	-								
M.D	0.97	0.92	0.93	-							
M.E	1.01	0.97	1.00	1.02	-						
R.A	0.86	0.78	0.88	0.86	0.95	-					
R.B	0.86	0.79	0.90	0.87	0.96	1.00	-				
S.A	0.89	0.83	0.89	0.87	0.97	0.93	0.91	-			
S.B	0.84	0.78	0.87	0.82	0.95	0.93	0.90	1.01	-		
S.C	0.87	0.80	0.89	0.85	0.95	0.92	0.88	1.01	1.01	-	
S.D	0.86	0.79	0.87	0.83	0.92	0.92	0.88	1.00	1.00	1.01	-

Table 19–2c. Disattenuated Strand Correlations for Mathematics, Reading, and Writing: Grade 5

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	W.A	W.B
M.A	-								
M.B	0.99	-							
M.C	0.93	0.95	-						
M.D	1.03	1.02	0.95	-					
M.E	1.00	0.98	0.97	1.02	-				
R.A	0.85	0.86	0.82	0.90	0.85	-			
R.B	0.86	0.87	0.83	0.91	0.87	1.00	-		
W.A	0.70	0.67	0.67	0.73	0.71	0.76	0.82	-	
W.B	0.84	0.82	0.81	0.88	0.86	0.91	0.93	1.03	-

Table 19–2d. Disattenuated Strand Correlations for Mathematics and Reading: Grade 6

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	1.03	-					
M.C	0.96	1.03	-				
M.D	1.00	1.03	0.95	-			
M.E	0.99	1.02	0.96	0.98	-		
R.A	0.84	0.87	0.82	0.90	0.86	-	
R.B	0.86	0.89	0.84	0.91	0.87	1.01	-

Table 19–2e. Disattenuated Strand Correlations for Mathematics and Reading: Grade 7

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	1.01	-					
M.C	0.94	0.89	-				
M.D	1.02	1.03	0.92	-			
M.E	0.95	0.95	0.88	0.96	-		
R.A	0.85	0.84	0.81	0.87	0.81	-	
R.B	0.86	0.86	0.80	0.89	0.82	1.00	-

**Table 19–2f. Disattenuated Strand Correlations
for Mathematics, Reading, Science, and Writing: Grade 8**

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D	W.A	W.B
M.A	-												
M.B	1.03	-											
M.C	0.91	1.02	-										
M.D	0.99	1.02	0.92	-									
M.E	1.01	1.05	0.95	1.01	-								
R.A	0.86	0.91	0.78	0.85	0.92	-							
R.B	0.86	0.91	0.78	0.86	0.92	1.01	-						
S.A	0.88	0.94	0.82	0.86	0.94	0.93	0.90	-					
S.B	0.83	0.90	0.79	0.81	0.89	0.93	0.90	0.99	-				
S.C	0.80	0.88	0.77	0.78	0.87	0.85	0.80	0.95	0.96	-			
S.D	0.83	0.90	0.79	0.82	0.89	0.91	0.88	1.00	1.01	0.96	-		
W.A	0.70	0.74	0.64	0.70	0.74	0.76	0.80	0.69	0.66	0.60	0.66	-	
W.B	0.84	0.88	0.76	0.84	0.89	0.92	0.93	0.86	0.84	0.77	0.83	1.00	-

Some caution is needed in interpreting the disattenuated results because the reliabilities used to calculate the disattenuated correlations are subject to both upward and downward biases. (These are discussed in some detail in Chapter Eighteen.) Consequently, some of the values tabled above may be higher or lower than they should be, depending on which bias prevails for any given pair of strand scores. When the reliabilities are lower than they should be, the disattenuated correlations will be inflated (and in some instances can appear larger than the theoretical correlation maximum value of 1.00).

Exploratory Factor Analysis

In order to further explore the internal structure of the PSSA tests, an exploratory factor analysis (EFA) of the strand scores across all the PSSA subject areas was conducted. The PSSA final data file (see Chapter Nine) was used to create the observed correlation matrices shown in Tables 19–1a through 19–1f, which in turn were used in the EFAs. In SPSS, Principle Axis Factor extraction was utilized with an oblique rotation (Promax) of the initial factor solution to improve interpretability. Oblique rotations allow for correlated factors which seemed more appropriate for the PSSA tests because of a priori expectations that academic achievement across subject areas should be correlated.

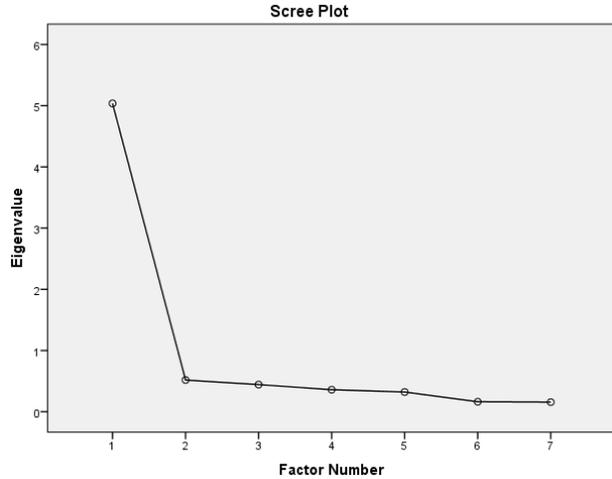
Table 19–3 presents the eigenvalues and the explained variance for the extracted factors for the Grade 3 PSSA tests. The Scree Plot graphing the eigenvalues against the factor number is shown in Figure 19–1. The first factor accounted for about 72 percent of the total variance, while the second factor explained about 7 percent of the total variance. Only the first factor had an eigenvalue greater than 1.0, typically suggesting a one-factor solution using the Kaiser criterion. However, the one-factor solution resulted in many large fitted residual values in the reproduced correlation matrix: 19 of 21 residuals were greater than absolute value 0.005 with one as large as 0.14, while two-factor solution had only 3 out of 21 residuals larger than absolute value 0.005.

Based on this finding and the prior belief that there should be two distinct factors at Grade 3 (one for mathematics and another for reading), a two-factor solution was further explored.

Table 19–3. Eigenvalues and Explained Variance for Grade 3

Factor	Eigenvalue	%
1	5.04	71.96
2	0.52	7.41
3	0.44	6.34
4	0.36	5.14
5	0.32	4.60
6	0.16	2.33
7	0.16	2.24

Figure 19–1. Scree Plot for Grade 3



The Pattern loadings resulting from the two-factor solution are presented in Table 19–4a. The Pattern loadings have simple structure which show that the five mathematics strands clearly loaded on the first factor while the two reading strands clearly loaded on the second factor. The respective factor loadings are quite high. The factor correlation matrix shows that the correlation between the two latent factors is 0.79, which is similar to the observed correlation between mathematics and reading (0.77 as seen Table 19–5) but just lower than the disattenuated correlation.

Table 19–4a. Pattern Matrix and Factor Correlation for Grade 3

Domain	Factor	
	1	2
Mathematics		
M.A	0.92	0.03
M.B	0.68	0.13
M.C	0.62	0.12
M.D	0.75	0.11
M.E	0.73	0.11
Reading		
R.A	0.11	0.84
R.B	0.07	0.85
Correlation (F1, F2) = 0.79		

Other grades have similar results. The eigenvalue scree plots consistently indicate a one-factor solution. This possibly resulted because of the high correlations between the PSSA subjects. (The eigenvalues and explained variances are not shown for the other grades due to space considerations.) The pattern matrices and the factor correlations are reported in Table 19–4b through 19–4f for the remaining five grades, respectively. The Pattern loadings clearly suggested that the PSSA tests measured different but correlated constructs.

Table 19–4b. Pattern Matrix and Factor Correlations for Grade 4

Domain	Factor		
	1	2	3
Mathematics			
M.A	0.85	0.10	0.01
M.B	0.82	0.05	-0.07
M.C	0.48	0.16	0.16
M.D	0.73	-0.01	0.11
M.E	0.57	0.14	0.14
Reading			
R.A	0.06	0.28	0.63
R.B	0.10	0.05	0.75
Science			
S.A	0.16	0.76	0.05
S.B	0.00	0.77	0.09
S.C	0.09	0.75	-0.01
S.D	0.06	0.77	0.01
Correlation (F1, F2) = 0.80		Correlation (F1, F3) = 0.79	
Correlation (F2, F3) = 0.82			

Table 19–4c. Pattern Matrix and Factor Correlations for Grade 5

Domain	Factor		
	1	2	3
Mathematics			
M.A	0.90	0.02	0.01
M.B	0.81	-0.03	0.07
M.C	0.71	0.03	0.03
M.D	0.71	0.03	0.08
M.E	0.73	0.05	0.00
Reading			
R.A	0.09	0.01	0.86
R.B	0.12	0.12	0.69
Writing			
W.A	-0.03	0.87	-0.04
W.B	0.11	0.75	0.11
Correlation (F1, F2) = 0.70		Correlation (F1, F3) = 0.80	
Correlation (F2, F3) = 0.77			

Table 19–4d. Pattern Matrix and Factor Correlation for Grade 6

Domain	Factor	
	1	2
Mathematics		
M.A	0.86	0.06
M.B	0.78	0.04
M.C	0.79	0.06
M.D	0.68	0.22
M.E	0.75	0.13
Reading		
R.A	0.07	0.85
R.B	0.08	0.85
Correlation (F1, F2) = 0.80		

Table 19–4e. Pattern Matrix and Factor Correlation for Grade 7

Domain	Factor	
	1	2
Mathematics		
M.A	0.85	0.05
M.B	0.80	0.08
M.C	0.69	0.14
M.D	0.81	0.12
M.E	0.75	0.08
Reading		
R.A	0.08	0.85
R.B	0.09	0.84
Correlation (F1, F2) = 0.79		

Table 19–4f. Pattern Matrix and Factor Correlations for Grade 8

Domain	Factor			
	1	2	3	4
Mathematics				
M.A	0.78	0.03	0.02	0.06
M.B	0.75	0.11	0.02	-0.02
M.C	0.81	0.09	0.01	-0.11
M.D	0.84	-0.03	0.03	0.07
M.E	0.67	0.11	0.03	0.08
Reading				
R.A	0.05	0.25	0.07	0.59
R.B	0.08	0.09	0.11	0.70
Science				
S.A	0.16	0.72	0.03	0.06
S.B	0.00	0.77	0.01	0.09
S.C	0.11	0.83	-0.01	-0.11
S.D	0.03	0.82	0.02	0.02
Writing				
W.A	0.02	-0.06	0.85	0.00
W.B	0.04	0.12	0.79	0.02
Correlation (F1, F2) = 0.79		Correlation (F1, F3) = 0.72		
Correlation (F1, F4) = 0.78				
Correlation (F2, F3) = 0.69		Correlation (F2, F4) = 0.80		
Correlation (F3, F4) = 0.78				

Taken as a whole, all the internal structure evidence presented above generally indicates that related elements of each of the PSSA tests correlate in the intended manner. Different PSSA subject area tests seem to measure different constructs. Additionally, the strands within each subject area have stronger relationships than those across subject strands. This further supports using a total score to report student performance in the different subject areas.

The strand scores present more of a mixed message. Since the strands in each subject area were designed to measure distinct components of the subject area, it is reasonable to expect that the inter-subject strand correlations should be positive and strong, but ideally, not extremely high. However, the disattenuated correlations imply that some strands are essentially measuring the same constructs. Consequently, there may be less support for providing results for some strand scores beyond the total score. While there is content rationale underlying the creation of the strand scores, the empirical correlations illustrate that caution is required when using the strand scores as a way to identify individual student's strengths and weaknesses. Certainly, instructional programs should not be based on strand score information alone but in conjunction with other sources of evidence available (e.g., teacher observations, other exam performance).

EVIDENCE BASED ON RELATIONSHIPS WITH OTHER VARIABLES

As described in the *Standards* (1999), “Evidence based on relationships with other variables addresses questions about the degree to which relationships are consistent with the construct underlying the proposed interpretations” (p. 13). This category of evidence refers to external structure evidence and is classified on three types—convergent, discriminant, and criterion-related evidence. Convergent evidence is provided by relationships between students' performance on different assessments intended to measure a similar construct. Discriminant evidence is provided by relationships between students' performance on different tests intended to measure different constructs. Criterion-related evidence, either predictive or concurrent, is provided by relationships between students' test scores and their performance on a criterion measure (Cronbach, 1971; Messick, 1989).

External evidence for the PSSA tests has been examined by HumRRO in a series of independent studies using 2001–2003 PSSA data (Koger, Thacker & Dickinson, 2004; Sinclair & Thacker, 2005; Thacker, Dickinson, & Koger, 2004). In their studies, the correlations of PSSA scores with a variety of measures including SAT, CTB, and other commonly administered assessments were investigated to provide the convergent and discriminant evidence. The criterion-related evidence was evaluated by the relationships between PSSA and criterion variables such as grade point average (GPA), course grades, university proficiency exams, and students' GPA in their first college course.

The results from their studies provided strong external evidence in support of PSSA as a valid measure of student achievement. Same-subject correlations were highest for mathematics, typically ranging from about 0.70 to about 0.90. For reading, correlations were also quite high, although slightly weaker than for mathematics and ranging from about 0.60 to about 0.80 (Thacker, Dickinson, & Koger, 2004). For example, the correlations between PSSA and SAT were high ($r = 0.78$ for reading and $r = 0.87$ for mathematics in 2003). They also found that PSSA scores positively correlated with students' course grades and GPAs, although not as highly as with SATs ($r = 0.46$ to $r = 0.55$) (Koger, Thacker & Dickinson, 2004). Regarding the predictive evidence, they found that the university proficiency tests were moderately to highly correlated with the PSSA. Students' course GPAs in their first college English and Mathematics classes generally showed positive relationships with both the PSSA and the university

proficiency exams, but these correlations were not as strong as the correlations between the PSSA and the proficiency exams (Sinclair & Thacker, 2005). Moreover, the different assessments measuring the same subject were found to be more highly related to each other than with the assessments measuring different subjects, providing some discriminant evidence. All these results suggest that PSSA subject-area tests measure the intended constructs.

In addition, Thacker and his colleagues also examined the relationship between the PSSA and some irrelevant characteristics to determine whether the PSSA exhibited any differential impact based on gender, ethnicity, English proficiency, or socioeconomic status. None of these characteristics appeared to influence the PSSA scores more than would be expected based on observed differences for SAT scores and other comparison tests. In other words, PSSA items are not injecting any unexpected gender, racial/ethnic, socioeconomic status, or limited English proficiency bias.

For the 2013 PSSA dataset, the correlations between students' test scores on different PSSA tests, including mathematics, reading, science, and writing, are shown in Table 19–5 in order to provide some discriminant validity evidence. In this table, both the observed and disattenuated correlations are reported.

Table 19–5. Correlations among Students' Performances on All PSSA Tests

	Mathematics/ Reading	Mathematics/ Science	Mathematics/ Writing	Reading/ Science	Reading/ Writing	Science/ Writing
G3	.77 (.83)	-	-	-	-	-
G4	.79 (.86)	.80 (.86)	-	.82 (.89)	-	-
G5	.78 (.85)	-	.60 (.71)	-	.66 (.79)	-
G6	.77 (.84)	-	-	-	-	-
G7	.77 (.84)	-	-	-	-	-
G8	.78 (.85)	.79 (.85)	.62 (.71)	.80 (.87)	.68 (.80)	.59 (.68)

Note. Numbers in the parenthesis are disattenuated correlations. The PSSA final data file was used for these calculations (see Chapter Nine). Case-wise elimination of missing data was used.

Each PSSA assessment measures a different construct, so the correlations between them were not expected to be extremely high. The values in this table are consistent with this expectation. As can be seen, the correlations between the PSSA tests range from 0.59 to 0.82. The correlations between the mathematics, reading, and science were relatively higher, while the correlations between writing and other subjects were relatively lower. In addition, the correlations are very stable across different grade levels. For example, the correlation between mathematics and reading tests was around 0.78 for all grades. (Factor correlations between the latent variables are presented in Tables 19–4a through 19–4f.)

EVIDENCE BASED ON CONSEQUENCES OF TESTING

Based on the *Standards* (1999), evidence of the consequences of implementing an assessment program is an additional source of validity information. Both positive and negative (intended and unintended) consequences of score-based inferences must be investigated to fully evaluate the pool of validity evidence. It is important to note that the consequences of the assessment program themselves do not serve as indicators of validity. That is, the investigation and evaluation of the consequences provides a richer context for establishing the validity of an assessment program.

Given that the evaluation of consequential validity is broadly defined, it is difficult to specifically measure aspects of consequential validity. Test data only provide one small insight into this type of validation evidence. Chapter Sixteen includes several different types of scores and score reports used for the PSSA. This chapter also provides accurate and clear test score and report information to help users avoid unintended uses and interpretations of the PSSA results. The extent to which various groups of users (e.g., students, teachers, and parents) interpret these scores and reports appropriately affects the validity of subsequent uses of these results. PDE continues to gather evidence to improve or guide decisions pertaining to all aspects of intended and unintended consequences of the PSSA program.

EVIDENCE RELATED TO THE USE OF THE RASCH MODEL

Since the Rasch model is the basis of all calibration, scaling, and linking analyses associated with the PSSA, the validity of the inferences from these results depends on the degree to which the assumptions of the model are met as well as the fit between the model and test data. As discussed at length in Chapter Twelve, the underlying assumptions of Rasch models were essentially met for all the PSSA data, indicating the appropriateness of using the Rasch models to analyze the PSSA data.

In addition, the Rasch model was also used to link different operational PSSA tests across years. The accuracy of the linking also affects the accuracy of student scores and the validity of score uses. As described in Chapter Fifteen, DRC Psychometric Services staffers follow linking procedures previously vetted by the Pennsylvania National TAC. Moreover, DRC internal and the third-party (HumRRO) checks ensured the accuracy of the linking results.

VALIDITY EVIDENCE SUMMARY

Validity evidence related to test content was reviewed earlier in this chapter. On the whole, the early chapters of this technical report show that a strong link can be established between each PSSA item and its associated eligible content. Details regarding how the PSSA operational assessments were assembled to reflect the state content standards and detailed information regarding educator reviews (including content, bias, and sensitivity reviews) are presented in Chapter Three.

Strand score intercorrelations are also presented in this chapter. In general, within-subject-area strands (e.g., mathematics) correlate more highly with themselves than they do with other subject-area strands (e.g., reading). Consequently, this provides some favorable evidence regarding the internal and external relationships between the tests' components.

PDE's commitment to validity is also evidenced by the fact that the Pennsylvania State Board of Education commissioned an independent study of an earlier version of the PSSA. That study, conducted by HumRRO, included an extensive evaluation of the items (Thacker & Dickinson, 2004) and statistical relationships of the PSSA, including convergent and discriminant validity (Thacker, Dickinson & Koger, 2004).

Validity of score inferences is bolstered when test scores are consistent. Here, the reliabilities of the total test scores (see Chapter Eighteen) are very good, with many being in the low 0.90s.

Additionally, reported in Chapter Five, differential item functioning with respect to gender and ethnicity helps address construct-irrelevant variance, which represents an important threat to the validity of inferences made from achievement test scores. As noted in that chapter, field test items are screened and reviewed for DIF. Only items approved by teacher committees are eligible for operational use.

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Appendix A:
Assessment Anchor Explanations

PENNSYLVANIA DEPARTMENT OF EDUCATION
About the Mathematics Assessment Anchors

Introduction

This is a brief introduction to the Mathematics Assessment Anchors. For more information on the Assessment Anchors and how they were developed, please read the *General Introduction* provided on the website and the *Frequently Asked Questions*.

How the Assessment Anchors Connect to the Standards

The PA Academic Standards for Mathematics are:

- 2.1 Numbers, Number Systems and Number Relationships
- 2.2 Computation and Estimation
- 2.3 Measurement and Estimation
- 2.4 Mathematical Reasoning and Connections
- 2.5 Mathematical Problem Solving and Communication
- 2.6 Statistics and Data Analysis
- 2.7 Probability and Predictions
- 2.8 Algebra and Functions
- 2.9 Geometry
- 2.10 Trigonometry
- 2.11 Concepts of Calculus

All of the Mathematics Standards categories are still included on the PSSA but the Assessment Anchors tighten the focus of what is assessed. The Assessment Anchors also clarify what is expected from grade level to grade level. There is a clear vertical alignment in the Assessment Anchors that did not exist in the standards. Teachers will be able to see how concepts build on one another from year to year. In addition, the Assessment Anchors have fewer Reporting Categories to help create more valid scores (there are more items per reporting category). Rather than report student results in all 11 standards, the reports will be organized into five major categories.

How the Assessment Anchors are Organized

These categories are similar to the five NCTM (National Council of Teachers of Mathematics) Standards and the five NAEP (National Assessment of Educational Progress) Reporting Categories. Each PA Standard Category was examined and then placed in the appropriate Reporting Category. Some of the specific Standards Statements cut across different Reporting Categories (e.g., 2.11- Concepts of Calculus, which occurs in different categories rather than being a separate category). The following is a general summary of where the bulk of the PA Mathematics Standards can be found in the Reporting Categories:

Appendix A: Assessment Anchor Explanations

Reporting Category	Standard
A. Numbers & Operations	2.1 (Numbers) & 2.2 (Computation)
B. Measurement	2.3 (Measurement)
C. Geometry	2.9 (Geometry) & 2.10 (Trigonometry)
D. Algebraic Concepts	2.8 (Algebra)
E. Data Analysis & Probability	2.6 (Statistics & Data) & 2.7 (Probability)

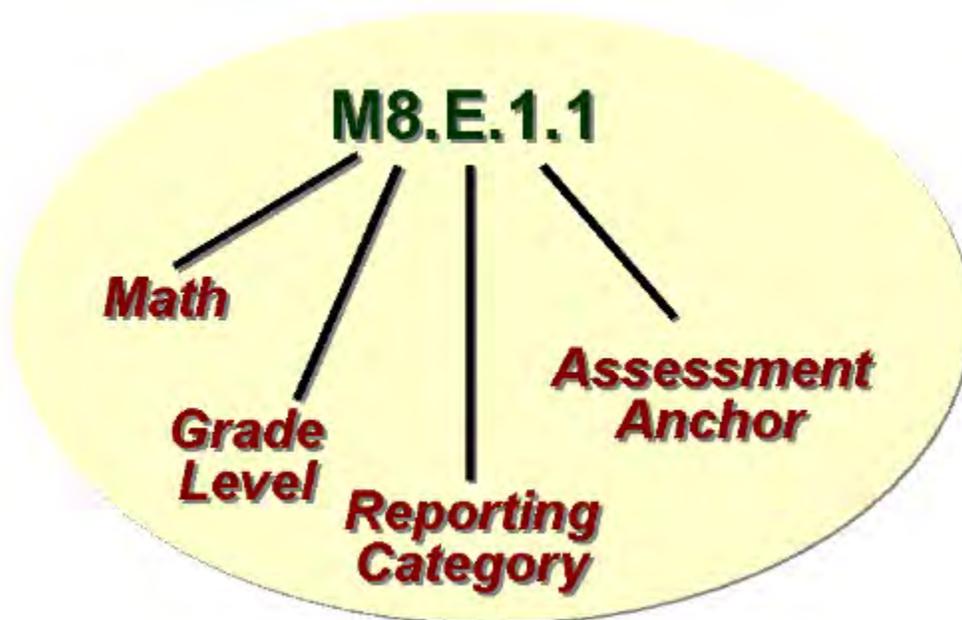
Important Patterns

The PA Mathematics Standards 2.4 (Reasoning) and 2.5 (Problem Solving) are not listed in the chart above. These two standards are not included because the above Reporting Categories focus on content (not process) and both Reasoning and Problem Solving are processes. However, knowing how to perform these processes is a very important part of the PSSA. Most of the multiple-choice items and all of the open-ended items will require students to know how to reason and solve problems, in addition to being knowledgeable about the content area being assessed. Even though Problem Solving is not one of the five content Reporting Categories, the PSSA will still show a separate score for the open-ended items on the school report, reflecting students' problem solving performance.

How to Read the Assessment Anchors

The Mathematics Assessment Anchors begin with an “M” to distinguish them from the Reading Assessment Anchors “R”. The number after the “M” in the label is the grade level (e.g., M8 would be Mathematics at eighth grade). The second letter in the labeling system is the Reporting Category (A through E). The same reporting categories continue across all Grade levels, 3 through 8 and 11. The final number in the label is the actual Assessment Anchor. (e.g., 1.1, 1.2, 1.3, etc.) Essentially, you read the Assessment Anchors like an outline, with the Assessment Anchor shaded across the top of the page and more specific details underneath.

For example, M8.E.1.1 is a Mathematics Assessment Anchor (M stands for Math) at 8th Grade (8). The E indicates that this Anchor is in the Data Analysis and Probability Reporting Category and the 1.1 means that it is the first Assessment Anchor in the Data Analysis and Probability Reporting Category (1.1). (*See below*)



NOTE: Below each specific descriptor of the Assessment Anchor is a reference in italics. This reference relates to the Pennsylvania Academic Standards and helps you cross-walk the Anchors to the Standards.

Eligible Content and Sample Items

Two other important features* appear in this document:

Eligible Content. The column on the right-hand side of the page underneath each Assessment Anchor is the Eligible Content. This is often known as the “assessment limits” and helps teachers identify how the anchor will be assessed. Not all of the Eligible Content is assessed on the PSSA, but it shows the range of knowledge drawn upon to design the test.

Sample Items. The sample items appear on the bottom half of the page. These are examples of how the Assessment Anchor might appear on the PSSA. Some of the pages may not have any sample items because we only created three per Assessment Anchor. We will be continually adding to the sample items. For other sample items teachers should consult the released items on the state website.

*NOTE: These features are found in the Assessment Anchors document for each grade, which are located on the PDE website: www.education.state.pa.us. Click on the green check mark, select “Pennsylvania System of School Assessment (PSSA),” and then select “Assessment Anchors and Anchor Toolkit” under “Other Materials” in the yellow box.

PENNSYLVANIA DEPARTMENT OF EDUCATION

Overview of Mathematics Assessment Anchors

*Note that on this overview document, the grade level does not appear because these anchors occur at all Grade levels 3 through 8.

MA. Numbers and Operations

MA.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

MA.2 Understand the meanings of operations, use operations and understand how they relate to each other.

MA.3 Compute accurately and fluently and make reasonable estimates.

MB. Measurement

MB.1 Demonstrate an understanding of measurable attributes of objects and figures, and the units, systems and processes of measurement (not assessed at Grade 11).

MB.2 Apply appropriate techniques, tools and formulas to determine measurements.

MC. Geometry

MC.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

MC.2 Identify and/or apply concepts of transformations or symmetry (not assessed at Grades 6, 7 or 11).

MC.3 Locate points or describe relationships using the coordinate plane (not assessed at Grade 3).

MD. Algebraic Concepts

MD.1 Demonstrate an understanding of patterns, relations and functions.

MD.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

MD.3 Analyze change in various contexts (not assessed at Grades 3, 4 or 8).

MD.4 Describe or use models to represent quantitative relationships (not assessed at Grade 3, 4, 5, 6 or 7).

ME. Data Analysis and Probability

ME.1 Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data.

ME.2 Select and/or use appropriate statistical methods to analyze data (not assessed at Grade 3).

ME.3 Understand and/or apply basic concepts of probability or outcomes.

ME.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays (not assessed at Grades 3, 4, 5 or 6).

PENNSYLVANIA DEPARTMENT OF EDUCATION
About the Reading Assessment Anchors

Introduction

This is a brief introduction to the Reading Assessment Anchors. For more information on the Assessment Anchors and how they were developed, please read the *General Introduction* provided on the website and the *Frequently Asked Questions*.

How the Assessment Anchors Connect to the Standards

The PA Academic Standards for Reading, Writing, Speaking and Listening are:

- 1.1 Learning to Read Independently
- 1.2 Reading Critically in All Content Areas
- 1.3 Reading, Analyzing and Interpreting Literature
- 1.4 Types of Writing
- 1.5 Quality of Writing
- 1.6 Speaking and Listening
- 1.7 Characteristics and Function of the English Language
- 1.8 Research

In the past, the Reading PSSA assessed standards 1.1, 1.2, 1.3, 1.7 and 1.8 in Grades 5, 8 and 11. The Writing PSSA assessed standards 1.4 and 1.5. Speaking and Listening have always been assessed through local assessments. *Because of the shift to create a clearer and more focused test using the Assessment Anchors, the 2005 PSSA will only assess the first three reading standards.* Learning to read independently and critically and the ability to analyze and interpret are at the heart of what students must be able to do to be good readers in today's society. Standards 1.7 and 1.8 are not specific to reading and for the most part these standards are better assessed at the district level.

How the Assessment Anchors Are Organized

Instead of having five reporting categories, the Assessment Anchors will have two:

Reporting Category	Standard
A. Comprehension and Reading Skills	1.1 (Learning to Read Independently) and 1.2 (Reading Critically in All Content Areas)
B. Interpretation and Analysis of Fiction and Nonfiction Text	1.1 (Learning to Read Independently) and 1.2 (Reading Critically in All Content Areas) and 1.3 Reading, Analyzing and Interpreting Literature)

Important Patterns

There are additional patterns within each Reporting Category. Each Reporting Category includes some basic elements that are consistent across all of the grade levels.

A. Comprehension and Reading Skills

Comprehension and Reading Skills have two basic elements:

- A.1 Fiction
- A.2 Nonfiction

B. Interpretation and Analysis of Fiction and Nonfiction Text

Interpretation and Analysis of Fiction and Nonfiction Text has three basic elements:

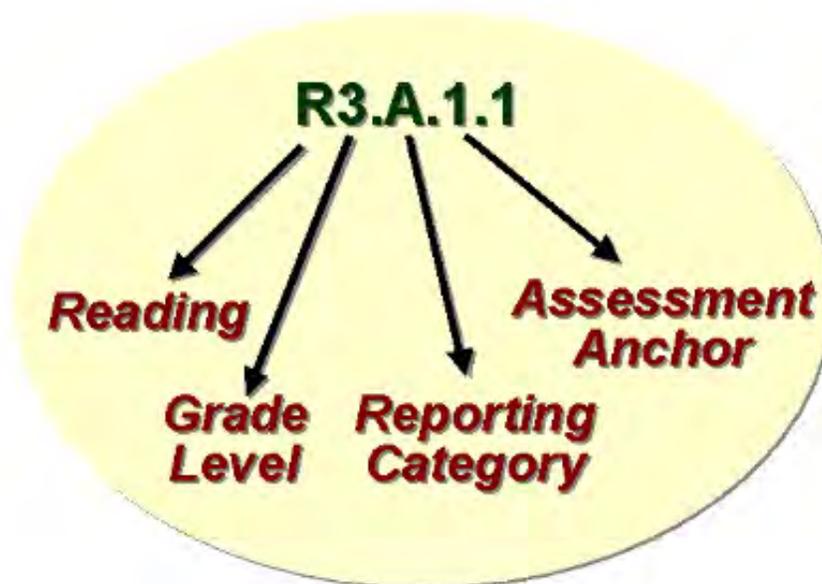
- B.1 Components within text **or** components within and across texts
- B.2 Literary Devices
- B.3 Concepts and Organization of Nonfiction Text

The Anchors generally target the same comprehension skills from Grades 3 through 8, although the depth of knowledge required to comprehend the text grows in complexity over the years. In addition, the expectation is that the level of texts themselves will grow in complexity.

How to Read the Assessment Anchors

The Reading Assessment Anchors begin with “R” to distinguish them from the Mathematics Assessment Anchors, which begin with “M”. The number after the “R” in the label is the grade level (e.g., R3 would be Reading at third grade). The second letter in the labeling system is the Reporting Category (A or B). The same reporting categories continue across all Grades 3 through 8. The final number in the label is the actual Assessment Anchor (e.g., 1.1, 1.2, 1.3, etc.). Essentially, you read the Assessment Anchors like an outline, with the Assessment Anchor shaded across the top of the page and more specific details underneath.

For example, R3.A.1.1 is a Reading Assessment Anchor (R stands for Reading) at 3rd grade (3). The A indicates that this Anchor is in the Comprehension and Reading Skills Reporting Category and the 1.1 means that it is the first Assessment Anchor in that Reporting Category. (*See below*)



NOTE: Below each specific descriptor of the Assessment Anchor is a reference in italics. This reference relates to the Pennsylvania Academic Standards and helps you crosswalk the Anchors to the Standards.

Eligible Content and Sample Items

Two other important features* appear in this document:

Eligible Content. The column on the right-hand side of the page underneath each Assessment Anchor is the Eligible Content. This is often known as the “assessment limits” and helps teachers identify how deeply they need to cover an Anchor and/or the range of the content they should teach to best prepare their students for the PSSA. Not all of the Eligible Content is assessed on the PSSA, but it shows the range of knowledge drawn upon to design the test.

Sample Items. For sample items please see the Item Bank currently on the web page and the Item Samplers, soon to be on the web page and distributed to districts via CD.

*NOTE: These features are found in the Assessment Anchors document for each grade, which are located on the PDE website: www.education.state.pa.us. Click on the green check mark, select “Pennsylvania System of School Assessment (PSSA),” and then select “Assessment Anchors and Anchor Toolkit” under “Other Materials” in the yellow box.

PENNSYLVANIA DEPARTMENT OF EDUCATION

Overview of Reading Assessment Anchors

GRADE 3

R3.A. Comprehension and Reading Skills

- R3.A.1 Understand Fiction Appropriate to Grade level
- R3.A.2 Understand Nonfiction Appropriate to Grade Level

R3.B. Interpretation and Analysis of Fictional and Nonfictional Text

- R3.B.1 Understand Components Within and Between Texts
- R3.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R3.B.3 Understand Concepts and Organization of Nonfictional Text

GRADE 4

R4.A. Comprehension and Reading Skills

- R4.A.1 Understand Fiction Appropriate to Grade level
- R4.A.2 Understand Nonfiction Appropriate to Grade Level

R4.B. Interpretation and Analysis of Fictional and Nonfictional Text

- R4.B.1 Understand Components Within and Between Texts
- R4.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R4.B.3 Understand Concepts and Organization of Nonfictional Text

GRADE 5

R5.A. Comprehension and Reading Skills

- R5.A.1 Understand Fiction Appropriate to Grade level
- R5.A.2 Understand Nonfiction Appropriate to Grade Level

R5.B. Interpretation and Analysis of Fictional and Nonfictional Text

- R5.B.1 Understand Components Within and Between Texts
- R5.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R5.B.3 Understand Concepts and Organization of Nonfictional Text

GRADE 6

R6.A. Comprehension and Reading Skills

- R6.A.1 Understand Fiction Appropriate to Grade level
- R6.A.2 Understand Nonfiction Appropriate to Grade Level

R6.B. Interpretation and Analysis of Fictional and Nonfictional Text

- R6.B.1 Understand Components Within and Between Texts
- R6.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R6.B.3 Understand Concepts and Organization of Nonfictional Text

GRADE 7

R7.A. Comprehension and Reading Skills

- R7.A.1 Understand Fiction Appropriate to Grade level
- R7.A.2 Understand Nonfiction Appropriate to Grade Level

R7.B. Interpretation and Analysis of Fictional and Nonfictional Text

- R7.B.1 Understand Components Within and Between Texts
- R7.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R7.B.3 Understand Concepts and Organization of Nonfictional Text

GRADE 8

R8.A. Comprehension and Reading Skills

- R8.A.1 Understand Fiction Appropriate to Grade level
- R8.A.2 Understand Nonfiction Appropriate to Grade Level

R8.B. Interpretation and Analysis of Fictional and Nonfictional Text

- R8.B.1 Understand Components Within and Between Texts
- R8.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R8.B.3 Understand Concepts and Organization of Nonfictional Text

Pennsylvania Science

About the Science Assessment Anchors

Introduction

The Pennsylvania Science Assessment is based on the Academic Standards adopted by the State Board of Education in January of 2002. The standards are comprised of two documents: Science and Technology Standards and Environment and Ecology Standards. These documents contain seventeen important categories that describe what students need to know. The purpose of the Assessment Anchors is to articulate essential and assessable elements, and to provide clarity for instruction and for the focus of the state assessment in Grades 4 and 8.

How the Assessment Anchors Connect to the Standards

The Pennsylvania Academic Standards for Science are:

- | | |
|--|---|
| 3.1 Unifying Themes | 4.1 Watersheds and Wetlands |
| 3.2 Inquiry and Design | 4.2 Renewable and Nonrenewable Resources |
| 3.3 Biological Sciences | 4.3 Environmental Health |
| 3.4 Physical Science, Chemistry,
and Physics | 4.4 Agriculture and Society |
| 3.5 Earth Sciences | 4.5 Integrated Pest Management |
| 3.6 Technology Education | 4.6 Ecosystems and their Interactions |
| 3.7 Technological Devises | 4.7 Threatened, Endangered and Extinct Species |
| 3.8 Science, Technology and
Human Endeavors | 4.8 Humans and the Environment |
| | 4.9 Environmental Laws and Regulations |

All of the Science Standards categories are included in the Assessment Anchors, but the anchors tighten the focus of what is assessed. The Assessment Anchors clarify what is expected from grade span to grade span (K-4, 5-7, and 8-10). In addition, the Assessment Anchors have fewer Reporting Categories to help create more reliable scores (meaning that there are more items per reporting category making interpretations about what students actually know more reliable). Rather than reporting student results in all 17 standards, the reports will be organized into four reporting categories.

How the Assessment Anchors are Organized

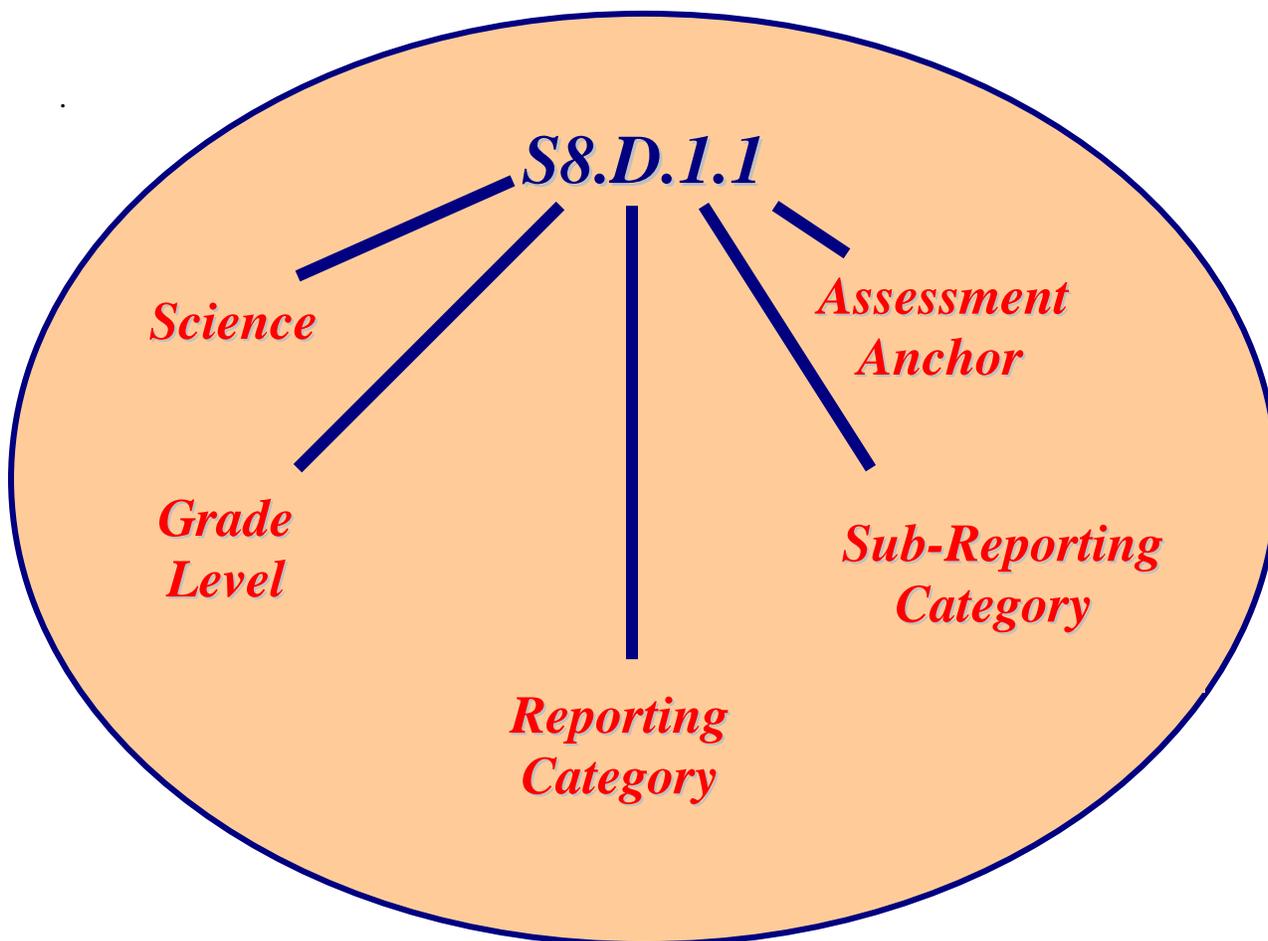
The four reporting categories are similar to those used by the National Assessment of Educational Progress (NEAP) and The Third International Mathematics and Science Study (TIMSS). The four categories for the assessment anchors are included in these major assessments, but are organized differently. In the following table are the four student reporting categories for the assessment anchors for the Pennsylvania System of School Assessment (PSSA) in Science and the related standards.

Appendix A: Assessment Anchor Explanations

Reporting Categories	Connections to the Standards
A. The Nature of Science	3.1 Unifying Themes of Science 3.2 Inquiry and Design 3.6 Technology Education 3.7 Technological Devices 3.8 Science, Technology, and Human Endeavors 4.4 Agriculture and Society 4.6 Ecosystems and their Interactions 4.7 Threatened, Endangered, and Extinct Species 4.8 Humans and the Environment
B. Biological Sciences	3.1 Unifying Themes of Science 3.3 Biological Sciences 4.2 Renewable and Nonrenewable Resources 4.3 Environmental Health 4.6 Ecosystems and Their Interactions 4.7 Threatened, Endangered, and Extinct Species
C. Physical Sciences	3.2 Inquiry and Design 3.4 Physical Science, Chemistry, and Physics 3.6 Earth Sciences
D. Earth and Space Sciences	3.2 Inquiry and Design 3.4 Physical Science, Chemistry, and Physics 3.5 Earth Sciences 3.7 Technological Devices 4.1 Watersheds and Wetlands 4.2 Renewable and Nonrenewable Resources 4.8 Humans and the Environment

How to Read the Assessment Anchors

All of the Science Assessment Anchors begin with an “S” to indicate science. The number after the “S” in the label is the grade level (e.g., S8 would be Science at eighth grade). The second letter in the labeling system is the Reporting Category (A through D) followed by the sub-reporting category number. The same reporting categories continue across all Grade levels, 4, 8, and 11. The final number in the label is the actual Assessment Anchor number (e.g., 1.1, 1.2, 1.3, etc.). Essentially, you read the Assessment Anchors like an outline, with the Assessment Anchor shaded across the top of the page and more specific details underneath. (*See example below.*)



For example, **S8.D.1.1** is the code for the first science (S) assessment anchor for Grade 8 in the reporting category of (D) Earth and Space Sciences, and the sub-category of Earth Features and Processes That Change Earth and Its Resources.

Other Important Features* that Appear in the Assessment Anchors

Eligible Content

The column on the right-hand side of the page underneath each Assessment Anchor is the Eligible Content. This is often known as the “assessment limit” and helps teachers identify how the anchor will be assessed. Not all of the Eligible Content is assessed on the PSSA each year, but it shows the range of knowledge drawn upon to design the test.

The use of “e.g.” and “i.e.”

Some assessment anchors contain additional information in parentheses. If there is a list inside with an “e.g.,” preceding it, that means the examples included are meant to be just that, examples. This is not an exhaustive list for assessment purposes. However, if the list is preceded by an “i.e.,” the list is to be considered limited to those specific examples, and those items are the only items that are “fair game” for assessment.

The use of “and” and “or”

All of the concepts and skills identified at a given grade level are “fair game” for large-scale assessment purposes. However, conjunctions used throughout this document have specific meaning. The use of the conjunction “or” means that a student can be assessed on all or just some of the elements in a given year. The use of “and” between elements means that the *intent* is to assess each element of the assessment anchor every year. In some situations, “or” is used when students have choices about how they will provide supporting evidence for their responses.

Sample Items

The sample items appear on the bottom half of the page. These are examples of how the Assessment Anchor might appear on the PSSA. Some of the pages may not have any sample items because the development committee only created three examples per Assessment Anchor. We will be continually adding to the sample items as time goes on. For other sample items, teachers should consult the item sampler on the state website.

*NOTE: These features are found in the Assessment Anchors document for each grade, which are located on the PDE website: www.education.state.pa.us. Click on the green check mark, select “Pennsylvania System of School Assessment (PSSA),” and then select “Assessment Anchors and Anchor Toolkit” under “Other Materials” in the yellow box.

Overview of Science Assessment Anchors

**Note that on this overview document, the grade level does not appear in the reporting categories because these occur at both grade levels (4 and 8). However, Grade 4 is used as an example for the Anchors and Benchmark References.*

S.A The Nature of Science	
S.A.1. Reasoning and Analysis	
S4.A.1.1 Identify and explain the pros and cons of applying scientific, environmental, or technological knowledge to possible solutions to problems.	(3.2.4.A) (3.2.4.C) (3.8.4.C)
S4.A.1.2 Recognize and describe change in natural or human-made systems and the possible effects of those changes.	(3.1.4.C) (3.1.4.E) (4.7.4.B) (4.8.4.A) (4.8.4.C)
S.A.2. Processes, Procedures, and Tools of Scientific Investigations	
S4.A.2.1. Apply skills necessary to conduct an experiment or design a solution to solve a problem.	(3.2.4.C)
S4.A.2.2 Identify appropriate instruments for a specific task and describe the information the instrument can provide.	(3.7.4.A) (3.7.4.B)
S.A.3. Systems, Models, and Patterns	
S4.A.3.1 Identify systems and describe relationships among parts of a familiar system (e.g., digestive system, simple machines, water cycle).	(3.1.4.A) (3.6.4.A) (3.6.4.B) (3.6.4.C) (4.4.4.C) (4.6.4.A) (4.6.4.B)
S4.A.3.2 Use models to illustrate simple concepts and compare the models to what they represent.	(3.1.4.B) (4.3.4.C)
S4.A.3.3 Identify and make observations about patterns that regularly occur and reoccur in nature.	(3.1.4.C) (3.2.4.B)

S.B Biological Sciences	
S.B.1. Structure and Function of Organisms	
S4.B.1.1 Identify and describe similarities and differences between living things and their life processes.	(3.3.4.A) (3.3.4.B) (4.3.4.A) (4.3.4.C) (4.6.4.A)
S.B.2. Continuity of Life	
S4.B.2.1 Identify and explain how adaptations help organisms to survive.	(4.7.4.B)
S4.B.2.2 Identify that characteristics are inherited and, thus, offspring closely resemble their parents.	(3.3.4.C) (4.7.4.A) (4.7.4.C)
S.B.3. Ecological Behavior and Systems	
S4.B.3.1 Identify and describe living and nonliving things in the environment or their interaction.	(4.6.4.A)
S4.B.3.2 Describe, explain, and predict change in natural or human-made systems and the possible effects of those changes on the environment.	(4.2.4.C) (4.3.4.C) (4.6.4.C) (3.1.4.E)
S4.B.3.3 Identify or describe human reliance on the environment at the individual or the community level.	(3.8.4.C) (4.3.4.B) (4.4.4.B) (4.5.4.C)

S.C Physical Sciences	
S.C.1. Structure, Properties and Interactions of Matter and Energy	
S4.C.1.1 Describe observable physical properties of matter.	(3.2.4.B) (3.4.4.A)
S.C.2 Forms, Sources, Conversions, and Transfer of Energy	
S4.C.2.1 Recognize basic energy types and sources, or describe how energy can be changed from one form to another.	(3.4.4.B) (3.4.4.C)
S.C.3 Principles of Force and Motion	
S4.C.3.1 Identify and describe different types of force and motion, or the effect of the interaction between force and motion.	(3.2.4.B) (3.4.4.C) (3.6.4.C)

S.D Earth and Space Sciences	
S.D.1 Earth Features and Processes that Change Earth and Its Resources	
S4.D.1.1 Describe basic landforms in Pennsylvania.	(3.5.4.A)
S4.D.1.2 Identify the types and uses of Earth’s resources.	(3.5.4.B) (3.5.4.D) (4.2.4.B) (4.8.4.D)
S4.D.1.3 Describe Earth’s different sources of water or describe changes in the form of water.	(3.5.4.D) (4.1.4.A) (4.1.4.D) (4.1.4.E)
S.D.2 Weather, Climate, and Atmospheric Processes	
S4.D.2.1 Identify basic weather conditions and how they are measured.	(3.5.4.C) (3.7.4.B) (3.2.4.B)
S.D.3 Composition and Structure of the Universe	
S4.D.3.1 Describe Earth’s relationship to the sun and the moon.	(3.4.4.D)

Appendix B:
General Scoring Guidelines

PENNSYLVANIA DEPARTMENT OF EDUCATION

PSSA

General Description of Mathematics Scoring Guidelines

4 – The response demonstrates a *thorough* understanding of the mathematical concepts and procedures required by the task.

The response provides correct answer(s) with clear and complete mathematical procedures shown and a correct explanation, as required by the task. Response may contain a minor “blemish” (e.g., missing \$) or omission in work or explanation that does not detract from demonstrating a *thorough* understanding.

3 – The response demonstrates a *general* understanding of the mathematical concepts and procedures required by the task.

The response and explanation (as required by the task) are mostly complete and correct. The response may have minor errors or omissions that do not detract from demonstrating a *general* understanding.

2 – The response demonstrates a *partial* understanding of the mathematical concepts and procedures required by the task.

The response is somewhat correct with *partial* understanding of the required mathematical concepts and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

1 – The response demonstrates a *minimal* understanding of the mathematical concepts and procedures required by the task.

0 – The response has no correct answer and *insufficient* evidence to demonstrate any understanding of the mathematical concepts and procedures required by the task for that grade level.

Response may show only information copied from the question.

Special Categories within zero reported separately:

BLK (blank) ..Blank, entirely erased, or written refusal to respond

OTOff task

IL.....Illegible

LOEResponse in a language other than English

The Scoring Guideline documents are available on the PDE website.

**PENNSYLVANIA DEPARTMENT OF EDUCATION
PSSA**

General Scoring Guidelines for Short-Answer Reading Items

3 Points

- The response provides a complete answer to the task (e.g., a statement that offers a correct answer as well as text-based support).
- The response provides specific, appropriate and accurate details (e.g., naming, describing, explaining, or comparing) or examples.

2 Points

- The response provides a partial answer to the task (e.g., indicates some awareness of the task and at least one text-based detail).
- The response attempts to provide sufficient, appropriate details (e.g., naming, describing, explaining, or comparing) or examples; may contain minor inaccuracies.

1 Point

- The response provides an incomplete answer to the task (e.g., indicating either a misunderstanding of the task or no text-based details).
- The response provides insufficient or inappropriate details or examples that have a major effect on accuracy.
- The response consists entirely of relevant copied text.

0 Points

- The response provides insufficient material for scoring.
- The response is inaccurate in all aspects.

Categories within zero reported separately:

- **BLK (blank) = no response or written refusal to respond or too brief to determine response.**
- **OT = off task/topic.**
- **LOE = response in a language other than English.**
- **IL = illegible.**

PENNSYLVANIA DEPARTMENT OF EDUCATION
PSSA

General Scoring Guidelines for Open-Ended Reading Items

3 Points

- The response provides a complete answer to the task (e.g., a statement that offers a correct answer as well as text-based support).
- The response provides specific, appropriate and accurate details (e.g., naming, describing, explaining, or comparing) or examples.

2 Points

- The response provides a partial answer to the task (e.g., indicates some awareness of the task and at least one text-based detail).
- The response attempts to provide sufficient, appropriate details (e.g., naming, describing, explaining, or comparing) or examples; may contain minor inaccuracies.

1 Point

- The response provides an incomplete answer to the task (e.g., indicating either a misunderstanding of the task or no text-based details).
- The response provides insufficient or inappropriate details or examples that have a major effect on accuracy.
- The response consists entirely of relevant copied text.

0 Points

- The response provides insufficient material for scoring.
- The response is inaccurate in all aspects.

Categories within zero reported separately:

- **BLK (blank) = no response or written refusal to respond or too brief to determine response.**
- **OT = off task/topic.**
- **LOE = response in a language other than English.**
- **IL = illegible.**

PENNSYLVANIA DEPARTMENT OF EDUCATION
PSSA

General Scoring Guidelines for Open-Ended Science Items

2 – The response demonstrates a *thorough* understanding of the scientific content, concepts, and procedures required by the task/s.

The response provides a clear, complete, and correct response as required by the task/s. Response may contain a minor blemish (e.g., misspelled words) or omission in work or explanation that does not detract from demonstrating a thorough understanding.

1 – The response demonstrates a *partial* understanding of the scientific content, concepts, and procedures required by the task/s.

The response is somewhat correct with partial understanding of the required scientific content, concepts, and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

0 – The response provides *insufficient* evidence to demonstrate any understanding of the scientific content, concepts, and procedures as required by the task/s for that grade level.

Response may show only information copied or rephrased from the question or insufficient correct information to receive a score of 1.

Special Categories within zero reported separately:

BLK – Blank, entirely erased or written refusal to respond

OT – Off Task

IL – Illegible

LOE – Response in a language other than English

PSSA CONVENTIONS SCORING GUIDELINE FOR WRITING

4

Thorough control of sentence formation.

Few errors, if any, are present in grammar, usage, spelling, and punctuation, but the errors that are present do not interfere with meaning.

3

Adequate control of sentence formation.

Some errors may be present in grammar, usage, spelling, and punctuation, but few, if any, of the errors that are present may interfere with meaning.

2

Limited and/or inconsistent control of sentence formation. Some sentences may be awkward or fragmented.

Many errors may be present in grammar, usage, spelling, and punctuation, and some of those errors may interfere with meaning.

1

Minimal control of sentence formation. Many sentences are awkward and fragmented.

Many errors may be present in grammar, usage, spelling, and punctuation, and many of those errors may interfere with meaning.

PSSA INFORMATIONAL SCORING GUIDELINE FOR WRITING

4

FOCUS ■ *Sharp, distinct controlling point made about a single topic with evident awareness of task and audience.*

CONTENT DEVELOPMENT ■ *Substantial, relevant, and illustrative content that demonstrates a clear understanding of the purpose. Thorough elaboration with effectively presented information consistently supported with well-chosen details.*

ORGANIZATION ■ Effective organizational strategies and structures, such as logical order and transitions, which develop a controlling idea.

STYLE ■ Precise control of language, stylistic techniques, and sentence structures that creates a consistent and effective tone.

3

FOCUS ■ Clear controlling point made about a single topic with general awareness of task and audience.

CONTENT DEVELOPMENT ■ Adequate, specific, and/or illustrative content that demonstrates an understanding of the purpose. Sufficient elaboration with clearly presented information supported with well-chosen details.

ORGANIZATION ■ Organizational strategies and structures, such as logical order and transitions, which develop a controlling idea.

STYLE ■ Appropriate control of language, stylistic techniques, and sentence structures that creates a consistent tone.

2

FOCUS ■ Vague evidence of a controlling point made about a single topic with an inconsistent awareness of task and audience.

CONTENT DEVELOPMENT ■ Inadequate, vague content that demonstrates a weak understanding of the purpose. Underdeveloped and/or repetitive elaboration with inconsistently supported information. May be an extended list.

ORGANIZATION ■ Inconsistent organizational strategies and structures, such as logical order and transitions, which ineffectively develop a controlling idea.

STYLE ■ Limited control of language and sentence structures that creates interference with tone.

1

FOCUS ■ Little or no evidence of a controlling point made about a single topic with a minimal awareness of task and audience.

CONTENT DEVELOPMENT ■ Minimal evidence of content that demonstrates a lack of understanding of the purpose. Superficial, undeveloped writing with little or no support. May be a bare list.

ORGANIZATION ■ Little or no evidence of organizational strategies and structures, such as logical order and transitions, which inadequately develop a controlling idea.

STYLE ■ Minimal control of language and sentence structures that creates an inconsistent tone.

PSSA NARRATIVE SCORING GUIDELINE FOR WRITING

4

- FOCUS** ■ Sharp, distinct controlling point or theme with evident awareness of the narrative.
 - CONTENT DEVELOPMENT** ■ Strong story line with illustrative details that addresses a complex idea or examines a complex experience. Thoroughly elaborated narrative sequence that employs narrative elements as appropriate.
 - ORGANIZATION** ■ Skillful narrative pattern with clear and consistent sequencing of events, employing a beginning, a middle, and an end. Minor interruptions to the sequence may occur.
 - STYLE** ■ Precise control of language, literary devices, and sentence structures that creates a consistent and effective point of view and tone.
-

3

- FOCUS** ■ Clear controlling point or theme with general awareness of the narrative.
 - CONTENT DEVELOPMENT** ■ Story line with details that addresses an idea or examines an experience. Sufficiently elaborated narrative sequence that employs narrative elements as appropriate.
 - ORGANIZATION** ■ Narrative pattern with generally consistent sequencing of events, employing a beginning, a middle, and an end. Interruptions to the sequence may occur.
 - STYLE** ■ Appropriate control of language, literary devices, and sentence structures that creates a consistent point of view and tone.
-

2

- FOCUS** ■ Vague evidence of a controlling point or theme with inconsistent awareness of the narrative.
 - CONTENT DEVELOPMENT** ■ Inconsistent story line that inadequately addresses an idea or examines an experience. Insufficiently elaborated narrative sequence that may employ narrative elements.
 - ORGANIZATION** ■ Narrative pattern with generally inconsistent sequencing of events that may employ a beginning, a middle, and an end. Interruptions to the sequence may interfere with meaning.
 - STYLE** ■ Limited control of language and sentence structures that creates interference with point of view and tone.
-

1

- FOCUS** ■ Little or no evidence of a controlling point or theme with minimal awareness of the narrative.
 - CONTENT DEVELOPMENT** ■ Insufficient story line that minimally addresses an idea or examines an experience. Unelaborated narrative that may employ narrative elements.
 - ORGANIZATION** ■ Narrative pattern with little or no sequencing of events. Interruptions to the sequence interfere with meaning.
 - STYLE** ■ Minimal control of language and sentence structures that creates an inconsistent point of view and tone.
-

PSSA PERSUASIVE SCORING GUIDELINE FOR WRITING

4

- FOCUS** ■ Sharp, distinct controlling point presented as a position and made convincing through a clear, thoughtful, and substantiated argument with evident awareness of task and audience.
- CONTENT DEVELOPMENT** ■ Substantial, relevant, and illustrative content that demonstrates a clear understanding of the purpose. Thoroughly elaborated argument that includes a clear position consistently supported with precise and relevant evidence. Rhetorical (persuasive) strategies are evident.
- ORGANIZATION** ■ Effective organizational strategies and structures, such as logical order and transitions, to develop a position supported with a purposeful presentation of content.
- STYLE** ■ Precise control of language, stylistic techniques, and sentence structures that creates a consistent and effective tone.

3

- FOCUS** ■ Clear controlling point presented as a position and made convincing through a credible and substantiated argument with general awareness of task and audience.
- CONTENT DEVELOPMENT** ■ Adequate, specific and/or illustrative content that demonstrates an understanding of the purpose. Sufficiently elaborated argument that includes a clear position supported with some relevant evidence. Rhetorical (persuasive) strategies may be evident.
- ORGANIZATION** ■ Organizational strategies and structures, such as logical order and transitions, to develop a position supported with sufficient presentation of content.
- STYLE** ■ Appropriate control of language, stylistic techniques, and sentence structures that creates a consistent tone.

2

- FOCUS** ■ Vague evidence of a controlling point presented as a position that may lack a credible and/or substantiated argument with an inconsistent awareness of task and audience.
- CONTENT DEVELOPMENT** ■ Inadequate, vague content that demonstrates a weak understanding of the purpose. Insufficiently elaborated argument that includes an underdeveloped position supported with little evidence.
- ORGANIZATION** ■ Inconsistent organizational strategies and structures, such as logical order and transitions, to develop a position with inadequate presentation of content.
- STYLE** ■ Limited control of language and sentence structures that creates interference with tone.

1

- FOCUS** ■ Little or no evidence of a controlling point presented as a position that lacks a credible and/or substantiated argument with minimal awareness of task and audience.
- CONTENT DEVELOPMENT** ■ Minimal evidence of content that demonstrates a lack of understanding of the purpose. Unelaborated argument that includes an undeveloped position supported with minimal or no evidence.
- ORGANIZATION** ■ Little or no evidence of organizational strategies and structures, such as logical order and transitions, to develop a position with insufficient presentation of content.
- STYLE** ■ Minimal control of language and sentence structures that creates an inconsistent tone.

Appendix C:
Tally Sheets

Appendix C: Tally Sheets

Grade 03

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items													
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)									
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total							
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems																					
	1	1	1	Match word to number	2				2		2			2				2				2		2	
	1	1	2	Differentiate between even & odd	2		1		3		3			2		1		3				3		3	
	1	1	3	Compare two whole numbers	2		1		3		3			2		1		3				3		3	
	1	1	4	Order a set of whole numbers	2				2		2			2				2				2		2	
	1	1	5	Match symbolic representation	2				2		2			2				2				2		2	
	1	2	1	Write fraction that corresponds to drawing	2		2		4		4			2		2		4				4		4	
	1	2	2	Draw representation of a fraction	1				1		1			1				1				1		1	
	1	3	1	Count a collection of bills & coins	1		1		2		2			1		1		2				2		2	
	1	3	2	Compare total values of combinations of coins	2		1		3		3			2		1		3				3		3	
	1	3	3	Make change up to \$5.00	1				1		1			1				1				1		1	
	Total For Assessment Anchor A.1					17		6		23		23			17		6		23				23		23
	Understand relationships among and representations of numbers and number systems																								
	2				Understand meanings, uses and relations of operations																				
	2	1	1		Represent multiplication as repeated addition	1				1		1			1				1				1		1
	2	1	2		Demonstrate inverse relationships	2		1		3		3			2		1		3				3		3
	2	1	3		Identify correct operation(s)	2				2		2			2				2				2		2
	Total For Assessment Anchor A.2					5		1		6		6			5		1		6				6		6
	Understand meanings, uses of operations and how they relate to each other																								
	3				Compute accurately/fluently and make reasonable estimates		4			4		4			1				1				1		1
	3	1	1		Solve single- & double-digit addition & subtraction problems	2		1		3		3			2		1		3				3		3
	3	1	2		Solve multiplication problems	2				2		2			2				2				2		2
	3	1	3		Solve triple digit addition & subtraction problems	2				2		2			2				2				2		2
3	2	1		Estimate sums and differences	1		1		2		2			1		1		2				2		2	
Total For Assessment Anchor A.3					7	4	2		9	4	13			7	1	2		9	1			10		10	
Compute accurately and fluently and make reasonable estimates																									
Total For Reporting Category A					29	4	9		38	4	42			29	1	9		38	1			39		39	

Appendix C: Tally Sheets

Grade 03

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total				
												MC	OE	MC	OE	MC	OE	MC	OE	Total
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement		4				4	4			1				1	1	
	1	1	1	Tell/show analog time to the minute	1		1		2		2		1		1			2	2	
	1	1	2	Find elapsed time	1				1		1		1					1	1	
	1	1	3	Identify times as AM or PM			1		1		1				1			1	1	
	1	2	1	Select appropriate unit for measurement	1				1		1		1					1	1	
	1	2	2	Compare and/or order objects by length, area, or weight	2				2		2		2					2	2	
	Total For Assessment Anchor B.1																			
	Understand measurable attributes and units, systems, processes of measurement					5	4	2		7	4	11		5	1	2		7	1	8
	2			Apply techniques, tools & formulas to determine measurements																
	2	1	1	Use a ruler to nearest 1/2 inch																
	2	2	1	Match object with measurement	1		1		2		2		1		1			2		2
Total For Assessment Anchor B.2																				
Apply appropriate techniques, tools and formulas to determine measurements					1		1		2		2		1		1		2		2	
Total For Reporting Category B					6	4	3		9	4	13		6	1	3		9	1	10	

Appendix C: Tally Sheets

Grade 03

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																
	1	1	1	Name/identify/describe 2-D shapes	3		1		4		4		3		1		4		4	
	1	1	2	Name/identify 3-D shapes	3				3		3		3				3		3	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					6		1		7		7		6		1		7		7
	2			Identify and/or apply concepts of transformations or symmetry																
	2	1	1	Identify/draw line of symmetry			1		1		1				1		1		1	1
	2	1	2	Identify symmetrical 2-D shapes	4		1		5		5		4		1		5		5	5
	Total For Assessment Anchor C.2 Identify and/or apply concepts of transformations or symmetry					4		2		6		6		4		2		6		6
	Total For Reporting Category C					10		3		13		13		10		3		13		13

Appendix C: Tally Sheets

Grade 03

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
D: Algebraic Concepts	1			Understand patterns, relations and functions														
	1	1	1	Extend or find a missing element in a pattern	1		1		2		2		1		1		2	2
	1	1	2	Identify/describe rule for a pattern	2		1		3		3		2		1		3	3
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				3		2		5		5		3		2		5	5
	2			Represent/analyze mathematical situations														
	2	1	1	Create or match a story	3				3		3		3				3	3
	2	1	2	Match number sentence to story	2				2		2		2				2	2
	2	2	1	Find a missing number	1				1		1		1				1	1
	2	2	2	Identify the missing symbol	1		1		2		2		1		1		2	2
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs				7		1		8		8		7		1		8	8
Total For Reporting Category D				10		3		13		13		10		3		13	13	

Appendix C: Tally Sheets

Grade 03

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data		4				4	4			1				1	1
	1	1	1	Analyze data shown on tables, charts, or bar graphs	2				2		2	2					2		2
	1	1	2	Describe, interpret and/or answer questions based on data	2				2		2	2					2		2
	1	2	1	Graph data															
	1	2	2	Translate information from one type of display to another	1				1		1	1					1		1
	Total For Assessment Anchor E.1					5	4			5	4	9	5	1			5	1	6
Total For Reporting Category E					5	4			5	4	9	5	1			5	1	6	

Appendix C: Tally Sheets

Grade 04

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems																
	1	1	1	Match drawing to fraction, decimal, mixed number	1		1		2		2		1		1		2		2	
	1	1	2	Create a drawing or set to represent a fraction	2		1		3		3		2		1		3		3	
	1	1	3	Match standard form to word form (decimals)	1				1		1		1				1		1	
	1	1	4	Write in expanded, standard or word form (whole numbers)	1				1		1		1				1		1	
	1	2	1	Locate/identify fractions or decimals on number line	1				1		1		1				1		1	
	1	2	2	Compare/order whole numbers	1				1		1		1				1		1	
	1	3	1	Find/identify/list factors	3		1		4		4		3		1		4		4	
	1	3	2	Find/identify/list multiples	3				3		3		3				3		3	
	Total For Assessment Anchor A.1					13		3		16		16		13		3		16		16
	Understand relationships among and representations of numbers and number systems					13		3		16		16		13		3		16		16
	2				Understand meanings, uses and relations of operations		4			4	4		1				1		1	
	2	1	1		Solve problems involving all operations (whole numbers)	3		1		4	4		3		1		4		4	
	2	1	2		Solve problems with decimals	1		1		2	2		1		1		2		2	
	Total For Assessment Anchor A.2					4	4	2		6	4	10		4	1	2		6	1	7
	Understand meanings, uses of operations and how they relate to each other					4	4	2		6	4	10		4	1	2		6	1	7
	3				Compute accurately/fluently and make reasonable estimates															
	3	1	1		Round whole numbers	3		1		4	4		3		1		4		4	
	3	1	2		Round to nearest dollar	3		2		5	5		3		2		5		5	
	3	1	3		Estimate answers with whole numbers	3				3	3		3				3		3	
3	2	1		Solve addition/subtraction problems involving decimals	1				1	1		1				1		1		
3	2	2		Solve addition/subtraction problems involving fractions	2				2	2		2				2		2		
Total For Assessment Anchor A.3					12		3		15	15		12		3		15		15		
Compute accurately and fluently and make reasonable estimates					12		3		15	15		12		3		15		15		
Total For Reporting Category A					29	4	8		37	4	41		29	1	8		37	1	38	

Appendix C: Tally Sheets

Grade 04

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement															
	1	1	1	Match analog time to digital time	1				1		1			1		1			
	1	1	2	Identify time	2		1		3		3		1		3		3		
	1	1	3	Calculate elapsed time	3				3		3				3		3		
	1	1	4	Determine beginning or ending time	2				2		2				2		2		
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement					8		1		9		9		8		1		9	9
	2			Apply techniques, tools & formulas to determine measurements															
	2	1	1	Use/read ruler to nearest 1/4 inch	2		1		3		3		1		3		3		
	2	2	1	Make reasonable estimates of measurement															
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					2		1		3		3		2		1		3	3
Total For Reporting Category B					10		2		12		12		10		2		12	12	

Appendix C: Tally Sheets

Grade 04

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																
	1	1	1	Identify/classify/compare 2-D figures	1		1		2		2		1		1		2		2	
	1	1	2	Classify 3-D figures, identify characteristics	1				1		1		1				1		1	
	1	2	1	Identify points/lines/segments/rays	1		1		2		2		1		1		2		2	
	1	2	2	Identify parallel/perpendicular lines	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					4		3		7		7		4		3		7		7
	2			Identify and/or apply concepts of transformations and symmetry																
	2	1	1	Identify/draw figures having one, two, or no lines of symmetry	1				1		1		1				1		1	
	Total For Assessment Anchor C.2 Identify and/or apply concepts of transformations and symmetry					1				1		1		1				1		1
	3			Locate points/describe relationships using the coordinate plane		4				4		4			1				1	1
	3	1	1	Match or plot ordered pair	1				1		1		1				1		1	
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					1	4			1	4	5	1	1			1	1	2	
	Total For Reporting Category C					6	4	3		9	4	13	6	1	3		9	1	10	

Appendix C: Tally Sheets

Grade 04

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
D: Algebraic Concepts	1			Understand patterns, relations and functions																
	1	1	1	Extend or find a missing element in a numerical or geometric pattern	1				1		1				1			1		
	1	1	2	Identify/describe rule for numerical or geometric pattern	1		1		2		2		1		1		2		2	
	1	1	3	Create or replicate numerical or geometric pattern	1		1		2		2		1		1		2		2	
	1	2	1	Determine missing elements in function table given the rule	1		1		2		2		1		1		2		2	
	1	2	2	Determine rule given a table	2				2		2		2				2		2	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					6		3		9		9		6		3		9		9
	2			Represent/analyze mathematical situations																
	2	1	1	Correlate story with expression or equation	2				2		2		2				2		2	
	2	2	1	Solve for missing number in equation	1				1		1		1				1		1	
	2	2	2	Identify the missing symbol	1				1		1		1				1		1	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					4				4		4		4			4		4	
	Total For Reporting Category D					10		3		13		13		10		3		13		13

Appendix C: Tally Sheets

Grade 04

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
E: Data Analysis and Probability	1			Formulate questions; organize, display, interpret or analyze data																
	1	1	1	Describe/interpret/answer questions based on data shown	2		1		3		3		2		1		3		3	
	1	2	1	Graph data or complete a graph	1		1		2		2		1		1		2		2	
	1	2	2	Translate data from one type of display to another	1				1		1		1				1		1	
	Total For Assessment Anchor E.1					4		2		6		6		4		2		6		6
	3			Understand and apply basic concepts of probability		4				4	4			1					1	1
	3	1	1	Make a prediction based on data or chance	1				1		1		1				1		1	
	Total For Assessment Anchor E.3					1	4			1	4	5		1	1			1	1	2
	Total For Reporting Category E					5	4	2		7	4	11		5	1	2		7	1	8

Appendix C: Tally Sheets

Grade 05

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems																
	1	1	1	Use expanded notation	1				1		1		1				1		1	
	1	2	1	Read/write decimals	2		1		3		3		2		1		3		3	
	1	2	2	Identify number with place value	1		1		2		2		1		1		2		2	
	1	3	1	Compare whole numbers			1		1		1				1		1		1	
	1	3	2	Compare and/or order decimals	2				2		2		2				2		2	
	1	3	3	Compare proper fractions	1				1		1		1				1		1	
	1	4	1	Identify negative numbers on number line	1				1		1		1				1		1	
	1	4	2	Identify negative numbers on thermometer	2				2		2		2				2		2	
	1	5	1	Model fractions/mixed numbers	2		2		4		4		2		2		4		4	
	1	6	1	Name/identify prime and composite numbers	1		1		2		2		1		1		2		2	
	1	6	2	List/identify factors, multiples	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor A.1					14		7		21		21		14		7		21		21
	Understand relationships among and representations of numbers and number systems					14		7		21		21		14		7		21		21
	2				Understand meanings, uses and relations of operations		4			4	4			1				1		1
	2	1	1		Solve problems involving all operations (whole numbers & decimals)	3		1		4	4		3		1		4		4	
	2	1	2		Solve problems involving addition/subtraction (fractions)	1				1	1		1				1		1	
	2	1	3		Choose correct operation	3				3	3		3				3		3	
	Total For Assessment Anchor A.2					7	4	1		8	4	12		7	1	1		8	1	9
	Understand meanings, uses of operations and how they relate to each other					7	4	1		8	4	12		7	1	1		8	1	9
3				Compute accurately/fluently and make reasonable estimates																
3	1	1		Round whole numbers & decimals	2				2	2		2				2		2		
3	1	2		Estimate to solve	2				2	2		2				2		2		
3	2	1		Compute without calculator	2				2	2		2				2		2		
Total For Assessment Anchor A.3					6				6	6		6				6		6		
Compute accurately and fluently and make reasonable estimates					6				6	6		6				6		6		
Total For Reporting Category A					27	4	8		35	4	39		27	1	8		35	1	36	

Appendix C: Tally Sheets

Grade 05

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement																
	1	1	1	Select appropriate unit	2		1		3		3		2		1		3		3	
	1	2	1	Convert measurements	1				1		1		1				1		1	
	1	2	2	Add/subtract measurements	2				2		2		2				2		2	
	1	3	1	Estimate polygon perimeter/area	1				1		1		1				1		1	
	1	3	2	Estimate area of irregular figure	1				1		1		1				1		1	
	Total For Assessment Anchor B.1																			
	Understand measurable attributes and units, systems, processes of measurement					7		1		8		8		7		1		8		8
	2			Apply techniques, tools & formulas to determine measurements																
	2	1	1	Use a ruler to nearest 1/8 in. or cm	1		1		2		2		1		1		2		2	
	2	2	1	Find perimeter of square or rectangle or labeled figure	1				1		1		1				1		1	
	2	2	2	Find area of square or rectangle	1				1		1		1				1		1	
	2	2	3	Solve measurement problems	2				2		2		2				2		2	
	Total For Assessment Anchor B.2																			
Apply appropriate techniques, tools and formulas to determine measurements					5		1		6		6		5		1		6		6	
Total For Reporting Category B					12		2		14		14		12		2		14		14	

Appendix C: Tally Sheets

Grade 05

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																
	1	1	1	Identify/classify/compare 3-D figures	2				2		2		2				2		2	
	1	1	2	Identify/classify/compare quadrilaterals	2				2		2		2				2		2	
	1	2	1	Identify/draw/label points, lines, segments, rays, planes	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor C.1					6		1		7		7		6		1		7		7
	2			Identify and/or apply concepts of transformations or symmetry																
	2	1	1	Draw or identify translation, reflection, rotation	2		1		3		3		2		1		3		3	
	2	1	2	Draw/identify lines of symmetry	2				2		2		2				2		2	
	Total For Assessment Anchor C.2					4		1		5		5		4		1		5		5
	Total For Reporting Category C					10		2		12		12		10		2		12		12

Appendix C: Tally Sheets

Grade 05

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total					
												MC	OE	MC	OE	MC	OE	MC	OE	Total	
D: Algebraic Concepts	1			Understand patterns, relations and functions		4				4	4					1			1	1	
	1	1	1	Extend or find a missing element in a numerical or geometric pattern	1				1		1	1							1	1	
	1	1	2	Create numerical or geometric pattern	1		1		2		2	1		1					2	2	
	1	2	1	Form/illustrate pattern rule	1		1		2		2	1		1					2	2	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					3	4	2		5	4	9	3	1	2				5	1	6
	2			Represent/analyze mathematical situations																	
	2	1	1	Solve for missing number	1		1		2		2	1		1					2	2	
	2	1	2	Match number sentence to story	2		1		3		3	2		1					3	3	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					3		2		5		5	3		2				5		5
	Total For Reporting Category D					6	4	4		10	4	14	6	1	4				10	1	11

Appendix C: Tally Sheets

Grade 05

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data																
	1	1	1	Interpret/display data	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor E.1				Formulate or answer questions about data and/or organize, display, interpret or analyze data	1		1		2		2		1		1		2		2
	2			Select and/or use appropriate statistical methods to analyze data		4				4	4			1				1	1	
	2	1	1	Determine the mean, median, range	1		1		2		2		1		1		2		2	
	2	1	2	Identify the mode in set of data	1				1		1		1				1		1	
	Total For Assessment Anchor E.2				Select and/or use appropriate statistical methods to analyze data	2	4	1		3	4	7		2	1	1		3	1	4
	3			Understand/apply basic concepts of probability or outcomes																
	3	1	1	Predict/determine likelihood of outcomes	1				1		1		1				1		1	
	3	1	2	Determine probability of outcome	1				1		1		1				1		1	
	Total For Assessment Anchor E.3				Understand and/or apply basic concepts of probability or outcomes	2				2		2		2				2		2
	Total For Reporting Category E					5	4	2		7	4	11		5	1	2		7	1	8

Appendix C: Tally Sheets

Grade 06

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
					MC	OE	MC	OE	MC	OE	Total	Core		EB		MC	OE	Total			
												MC	OE	MC	OE						
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems		4				4	4			1				1	1		
	1	1	1	Represent percents as fractions and/or decimals	1				1		1	1						1	1		
	1	1	2	Convert between fractions and decimals/differentiate between terminating & repeating decimals	1		2		3		3	1		2				3	3		
	1	1	3	Represent number in exponential form	1		1		2		2	1		1				2	2		
	1	1	4	Represent mixed number as an improper fraction	3				3		3	3						3	3		
	1	2	1	Compare/order rational numbers except integers	2				2		2	2						2	2		
	1	3	1	Find GCF of two numbers	1		1		2		2	1		1				2	2		
	1	3	2	Find LCM of two numbers	2				2		2	2						2	2		
	1	3	3	Use divisibility rules for 2, 3, 5 & 10 to solve problems																	
	1	4	1	Model percents	1				1		1	1						1	1		
	Total For Assessment Anchor A.1																				
	Understand relationships among and representations of numbers and number systems					12	4	4		16	4	20	12	1	4				16	1	17
	2				Understand meanings, uses and relations of operations																
	2	1	1		Complete equations by using properties: associative, commutative, distributive, Identity	1		1		2		2	1		1				2	2	
	Total For Assessment Anchor A.2																				
	Select /use operations to solve problems					1		1		2		2	1		1				2	2	
	3				Compute accurately/fluently and make reasonable estimates																
	3	1	1		Estimate to solve	2				2		2	2						2	2	
	3	2	1		Solve problems involving operations	3				3		3	3						3	3	
	Total For Assessment Anchor A.3																				
Compute accurately and fluently and make reasonable estimates					5				5		5	5						5	5		
Total For Reporting Category A					18	4	5		23	4	27	18	1	5				23	1	24	

Appendix C: Tally Sheets

Grade 06

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement														
	1	1	1	Determine/compare elapsed time	2				2		2				2		2	
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement				2				2		2				2		2	
	2			Apply techniques, tools & formulas to determine measurements		4				4	4					1	1	
	2	1	1	Use ruler to nearest 1/16 in. or mm	1		1		2		2		1		1		2	
	2	1	2	Choose precise measurement														
	2	1	3	Measure angles using protractor	1		1		2		2		1		1		2	
	2	2	1	Find perimeter of any polygon	1				1		1		1				1	
	2	3	1	Define/label/identify angles	1		1		2		2		1		1		2	
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements				4	4	3		7	4	11		4	1	3		7	1
Total For Reporting Category B				6	4	3		9	4	13		6	1	3		9	1	

Appendix C: Tally Sheets

Grade 06

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total				
												MC	OE	MC	OE	MC	OE	MC	OE	MC
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																
	1	1	1	Identify, classify, and compare types of polygons	1		1		2		2		1		1		2		2	
	1	1	2	Identify properties of all types of triangles	2				2		2		2				2		2	
	1	1	3	Solve radius/diameter problems	1		1		2		2		1		1		2		2	
	1	1	4	Identify/use polygon/circle degrees	3		1		4		4		3		1		4		4	
	1	2	1	Identify/describe/label parallel, perpendicular, and intersecting lines	2				2		2		2				2		2	
	1	2	2	Identify points, planes, lines, line segments, rays, angles, and vertices	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					10		4		14		14		10		4		14		14
	3			Locate points/describe relationships using the coordinate plane																
	3	1	1	Plot points in Quadrant I & on axes	2				2		2		2				2		2	
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					2				2		2		2				2		2
Total For Reporting Category C					12		4		16		16		12		4		16		16	

Appendix C: Tally Sheets

Grade 06

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
D: Algebraic Concepts	1			Understand patterns, relations and functions																
	1	1	1	Create/extend/complete pattern	3				3		3		3				3	3		
	1	2	1	Determine or illustrate pattern rule	2				2		2		2				2	2		
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					5				5		5		5				5	5	
	2			Represent/analyze mathematical situations		4				4	4		1					1	1	
	2	1	1	Identify inverse operation to solve one step equation	3		1		4		4		3		1			4	4	
	2	1	2	Solve one-step equation	2		1		3		3		2		1			3	3	
	2	2	1	Match one variable, one-step equation/expression to situation	3		1		4		4		3		1			4	4	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					8	4	3		11	4	15		8	1	3		11	1	12
	Total For Reporting Category D					13	4	3		16	4	20		13	1	3		16	1	17

Appendix C: Tally Sheets

Grade 06

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total				
												MC	OE	MC	OE	MC	OE	MC	OE	
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data																
	1	1	1	Analyze data	2				2		2	2				2			2	
	1	1	2	Choose appropriate data representation	1				1		1	1				1			1	
	1	1	3	Display data in graphs, etc.	2				2		2	2				2			2	
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data					5				5		5	5			5			5	
	2			Select/use appropriate statistical methods to analyze data																
	2	1	1	Determine/calculate mean, median, mode, range	2		1		3		3	2		1		3			3	
	Total For Assessment Anchor E.2 Select and/or use appropriate statistical methods to analyze data					2		1		3		3	2		1		3			3
	3			Understand/apply basic concepts of probability or outcomes																
	3	1	1	Define/find probability	2		1		3		3	2		1		3			3	
	3	1	2	Determine/show combinations	2		1		3		3	2		1		3			3	
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes					4		2		6		6	4		2		6			6
	Total For Reporting Category E					11		3		14		14	11		3		14			14

Appendix C: Tally Sheets

Grade 07

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems															
	1	1	1	Convert between fractions, decimals, percents	1				1		1	1					1		1
	1	2	1	Compare/order rational numbers	1		1		2		2	1		1			2		2
	1	2	2	Locate and identify rational numbers on a number line	1				1		1	1					1		1
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems					3		1		4		4	3		1		4		4
	2			Understand meanings, uses and relations of operations		4			4		4		1				1		1
	2	1	1	Use order of operations	1				1		1	1					1		1
	2	2	1	Write ratios to compare quantities	1		1		2		2	1		1			2		2
	2	2	2	Solve for a variable in proportions	2				2		2	2					2		2
	2	2	3	Use proportions to test equivalency															
	2	2	4	Calculate/apply unit rates or unit prices	1				1		1	1					1		1
	2	2	5	Select and use ratios/proportions to solve problems	1		1		2		2	1		1			2		2
	2	2	6	Use proportions to find missing lengths in similar figures	1		1		2		2	1		1			2		2
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other					7	4	3		10	4	14	7	1	3		10	1	11
	3			Compute accurately/fluently and make reasonable estimates															
	3	1	1	Estimate answers involving operations with whole numbers, decimals, fractions and mixed numbers	2				2		2	2					2		2
	3	2	1	Solve problems involving operations with whole numbers, decimals, fractions and mixed numbers	1				1		1	1					1		1
	3	2	2	Solve problems involving addition/subtraction of integers															
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					3				3		3	3				3		3
	Total For Reporting Category A					13	4	4		17	4	21	13	1	4		17	1	18

Appendix C: Tally Sheets

Grade 07

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement		4				4	4			1				1	1	
	1	1	1	Add/subtract/convert measurements	1		1		2		2		1		1			2	2	
	Total For Assessment Anchor B.1				1	4	1		2	4	6		1	1	1			2	1	3
	2			Apply techniques, tools & formulas to determine measurements																
	2	1	1	Find perimeter and/or area of compound figures	1				1		1		1					1		1
	2	1	2	Find circumference/area of circles	1				1		1		1					1		1
	2	1	3	Find area of triangles, parallelograms, trapezoids	1		1		2		2		1		1			2		2
	2	2	1	Interpret and apply scale drawings	1				1		1		1					1		1
	2	2	2	Determine appropriate scale for reduction and enlargement	1				1		1		1					1		1
	Total For Assessment Anchor B.2				5		1		6		6		5		1			6		6
Total For Reporting Category B				6	4	2		8	4	12		6	1	2			8	1	9	

Appendix C: Tally Sheets

Grade 07

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes															
	1	1	1	Identify diameter, radius, chord, circumference in circles	2		1		3		3		2		1		3	3	
	1	1	2	Solve problems using radius/diameter relationship	2		1		3		3		2		1		3	3	
	1	1	3	Identify parallel, perpendicular, and skew lines in a 3-dimensional figure	1				1		1		1				1	1	
	1	2	1	Identify similar/congruent polygons	2				2		2		2				2	2	
	1	2	2	Identify corresponding sides/angles	2		1		3		3		2		1		3	3	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					9		3		12		12		9		3		12	12
	3			Locate points/describe relationships using the coordinate plane															
	3	1	1	Plot/identify ordered pairs	4				4		4		4				4	4	
	3	1	2	Identify Quadrants I, II, III, IV, x- and y- axes, and the origin on the coordinate plane	1		1		2		2		1		1		2	2	
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					5		1		6		6		5		1		6	6
	Total For Reporting Category C					14		4		18		18		14		4		18	18

Appendix C: Tally Sheets

Grade 07

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
D: Algebraic Concepts	1			Understand patterns, relations and functions															
	1	1	1	Describe/extend/complete pattern	3		1		4		4		3		1		4		4
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				3		1		4		4		3		1		4		4
	2			Represent/analyze mathematical situations															
	2	1	1	Solve one-step equations	3		1		4		4		3		1		4		4
	2	1	2	Use substitution of variables to simplify expression	2		1		3		3		2		1		3		3
	2	2	1	Identify mathematical models	3		1		4		4		3		1		4		4
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs				8		3		11		11		8		3		11		11
	3			Analyze change in various contexts		4				4	4			1				1	1
	3	1	1	Solve problems w/ constant rate of change	2				2		2		2				2		2
	3	1	2	Describe or use a rate of change shown on a graph	2		1		3		3		2		1		3		3
	Total For Assessment Anchor D.3 Analyze change in various contexts				4	4	1		5	4	9		4	1	1		5	1	6
	Total For Reporting Category D				15	4	5		20	4	24		15	1	5		20	1	21

Appendix C: Tally Sheets

Grade 07

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data																
	1	1	1	Analyze data	2		2		4		4		2		2		4		4	
	Total For Assessment Anchor E.1					2		2		4		4		2		2		4		4
	2			Select and/or use appropriate statistical methods to analyze data																
	2	1	1	Identify/calculate mean, median, mode, range for a set of data	3				3		3		3				3		3	
	2	1	2	Choose appropriate measure of central tendency for a situation																
	Total For Assessment Anchor E.2					3				3		3		3				3		3
	3			Understand/apply basic concepts of probability or outcomes																
	3	1	1	Find theoretical probability of event	1				1		1		1				1		1	
	3	1	2	Find theoretical probability of event not occurring	2				2		2		2				2		2	
	3	1	3	Find experimental probability	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor E.3					5		1		6		6		5		1		6		6
	4			Develop/evaluate inferences and predictions based on data displays																
	4	1	1	Predict/draw conclusions from displays or probability	2				2		2		2				2		2	
	Total For Assessment Anchor E.4					2				2		2		2				2		2
	Total For Reporting Category E					12		3		15		15		12		3		15		15

Appendix C: Tally Sheets

Grade 08

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems																
	1	1	1	Use scientific notation or exponential forms	3				3		3	3					3		3	
	1	1	2	Find the square/cube/square root	1				1		1	1					1		1	
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems					4				4		4	4				4		4	
	2			Understand meanings, uses and relations of operations																
	2	1	1	Use order of operations to simplify	3				3		3	3					3		3	
	2	2	1	Use ratios, proportions, percents to solve problems	1		1		2		2	1		1		2		2		
	2	2	2	Represent or solve rate problems	2		1		3		3	2		1		3		3		
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other					6		2		8		8	6		2		8		8	
	3			Compute accurately/fluently and make reasonable estimates																
	3	1	1	Explain when to round up or down	1		1		2		2	1		1		2		2		
	3	1	2	Explain when to estimate	2				2		2	2				2		2		
	3	2	1	Estimate percent problems	2				2		2	2				2		2		
	3	3	1	Compute with/without calculator																
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					5		1		6		6	5		1		6		6	
	Total For Reporting Category A					15		3		18		18	15		3		18		18	

Appendix C: Tally Sheets

Grade 08

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement																
	1	1	1	Convert metric measurements	1				1		1		1				1		1	
	1	1	2	Convert customary measurements	1		1		2		2		1		1		2		2	
	1	1	3	Convert time	1				1		1		1				1		1	
	1	1	4	Convert temperature	1				1		1		1				1		1	
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement					4		1		5		5		4		1		5		5
	2			Apply techniques, tools & formulas to determine measurements		4			4	4			1					1	1	
	2	1	1	Determine total degrees of interior angles																
	2	1	2	Determine the measurement of 1 interior angle of a polygon			1		1		1				1		1		1	
	2	1	3	Determine the number of sides of a polygon given total degrees of interior angles	1				1		1		1				1		1	
	2	2	1	Calculate surface area of cubes and rectangular prisms			1		1		1				1		1		1	
	2	2	2	Calculate volume of cubes and rectangular prisms	1				1		1		1				1		1	
	2	2	3	Determine appropriate type of measurement for a given situation	1				1		1		1				1		1	
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					3	4	2		5	4	9		3	1	2		5	1	6
	Total For Reporting Category B					7	4	3		10	4	14		7	1	3		10	1	11

Appendix C: Tally Sheets

Grade 08

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																
	1	1	1	Match the 3-dimensional figure w/ its net	3				3		3		3				3		3	
	1	1	2	Define, identify, and use properties of angles formed by intersecting lines	2		1		3		3		2		1		3		3	
	1	1	3	Define, identify, and use properties of angles formed when parallel lines are cut by a transversal	3				3		3		3				3		3	
	1	2	1	Use the Pythagorean Theorem	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor C.1																			
	Analyze characteristics and properties of two- and three-dimensional geometric shapes					10		2		12		12		10		2		12		12
	3			Locate points/describe relationships using the coordinate plane																
	3	1	1	Plot/locate/identify ordered pairs	3		1		4		4		3		1		4		4	
	Total For Assessment Anchor C.3																			
Locate points or describe relationships using the coordinate plane					3		1		4		4		3		1		4		4	
Total For Reporting Category C					13		3		16		16		13		3		16		16	

Appendix C: Tally Sheets

Grade 08

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total			
D: Algebraic Concepts	1			Understand patterns, relations and functions		4				4	4				1				1	1	
	1	1	1	Continue numeric/algebraic pattern	2				2		2	2							2	2	
	1	1	2	Find missing element in pattern	2				2		2	2							2	2	
	1	1	3	Write/state rule of function	1		1		2		2	1		1					2	2	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					5	4	1		6	4	10	5	1	1				6	1	7
	2			Represent/analyze mathematical situations																	
	2	1	1	Solve equations/inequalities	1		1		2		2	1		1					2	2	
	2	1	2	Use substitution to check solution	3				3		3	3							3	3	
	2	1	3	Simplify/substitute for expression	2				2		2	2							2	2	
	2	2	1	Match written situation to expression, equation, or inequality	1				1		1	1							1	1	
	2	2	2	Write/solve equation for a situation	1		1		2		2	1		1					2	2	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					8		2		10		10	8		2				10		10
	4			Describe/use models to represent quantitative relationships																	
	4	1	1	Graph linear function from x/y table	1		1		2		2	1		1					2	2	
	4	1	2	Match linear graph to x/y table	1				1		1	1							1	1	
	4	1	3	Match linear equation to x/y table	1		1		2		2	1		1					2	2	
	Total For Assessment Anchor D.4 Describe/use models to represent quantitative relationships					3		2		5		5	3		2				5		5
	Total For Reporting Category D					16	4	5		21	4	25	16	1	5				21	1	22

Appendix C: Tally Sheets

Grade 08

Mathematics

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data																
	1	1	1	Choose correct data representation	2		1		3		3		2		1		3		3	
	1	1	2	Display and/or interpret data	2				2		2		2				2		2	
	1	1	3	Interpret stem-and-leaf, box-and-whisker plots	1				1		1		1				1		1	
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data					5		1		6		6		5		1		6		6
	3			Understand/apply basic concepts of probability or outcomes		4				4		4			1				1	1
	3	1	1	Find probability	1		1		2		2		1		1		2		2	
	3	2	1	Calculate show number of permutations/combinations	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes					3	4	2		5	4	9		3	1	2		5	1	6
	4			Develop/evaluate inferences & predictions based on data																
	4	1	1	Fit line to scatter plot; describe correlation																
	4	1	2	Make predictions based on data	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor E.4 Develop/evaluate inferences & predictions or draw conclusions based on data or data displays					1		1		2		2		1		1		2		2
	Total For Reporting Category E					9	4	4		13	4	17		9	1	4		13	1	14

Appendix C: Tally Sheets

Grade 03

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
A: Comprehension and Reading Skills	1	1	1	Identify meaning of multiple-meaning words															
	1	1	2	Identify synonym/antonym	1				1		1					1			1
	1	2	1	Identify meaning of word with an affix/how meaning changes															
	1	2	2	Define words from context clues	2		1		3		3		2	1		3			3
	1	3	1	Make inferences/draw conclusions	4		2		6		6		4	2		6			6
	1	4	1	Identify main ideas/relevant details	5	3	1		6	3	9		5	1	1	6	1		7
	1	5	1	Summarize key details and events of a text as a whole			1		1		1			1		1			1
	1	6	1	Identify author's purpose for writing text	2				2		2		2			2			2
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					14	3	5		19	3	22	14	1	5		19	1	20
	2	1	1	Identify meaning of multiple-meaning words															
	2	1	2	Identify meaning of content-specific words															
	2	2	1	Identify meaning of word with an affix/how meaning changes															
	2	2	2	Define words from context clues	3				3		3		3			3			3
	2	3	1	Make inferences/draw conclusions	2		3		5		5		2	3		5			5
	2	4	1	Identify main ideas/relevant details	5		2		7		7		5	2		7			7
	2	5	1	Summarize major points/processes/events of a text as a whole															
	2	6	1	Identify author's purpose for writing text	1				1		1		1			1			1
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					11		5		16		16	11		5		16		16
Total For Reporting Category A					25	3	10		35	3	38	25	1	10		35	1	36	

Appendix C: Tally Sheets

Grade 03

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total		
												MC	OE	MC	OE	MC	OE	MC
B: Interpretation and Analysis of Fictional and Nonfictional Text	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot	9	3	2		11	3	14	9	1	2		11	1	12
	1	2	1	Connections between texts			2		2		2			2		2		2
	Total For Assessment Anchor B.1 Understand components within and between texts.				9	3	4		13	3	16	9	1	4		13	1	14
	2	1	1	Identify examples of personification	1		1		2		2	1		1		2		2
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				1		1		2		2	1		1		2		2
	3	1	1	Identify fact/opinion	1		1		2		2	1		1		2		2
	3	2	1	Identify exaggeration (bias)														
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	2				2		2	2				2		2
	3	3	2	Use headings to locate information or identify content that fits into a specific section	2				2		2	2				2		2
	3	3	3	Interpret and make connections between graphics/charts/texts														
	3	3	4	Sequence of steps in a list of directions														
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				5		1		6		6	5		1		6		6
	Total For Reporting Category B				15	3	6		21	3	24	15	1	6		21	1	22

Appendix C: Tally Sheets

Grade 04

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Comprehension and Reading Skills	1	1	1	Identify meaning of multiple-meaning words	2		1		3		3		2		1		3		3	
	1	1	2	Identify synonym/antonym																
	1	2	1	Identify meaning of word with an affix/how meaning changes	2				2		2		2				2		2	
	1	2	2	Define words from context clues	1				1		1		1				1		1	
	1	3	1	Make inferences/draw conclusions	5				5		5		5				5		5	
	1	4	1	Identify main ideas/relevant details	2		1		3		3		2		1		3		3	
	1	5	1	Summarize key details and events of a text as a whole	1				1		1		1				1		1	
	1	6	1	Identify author's purpose for writing text	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					15		3		18		18		15		3		18		18
	2	1	1	Identify meaning of multiple-meaning words																
	2	1	2	Identify meaning of content-specific words																
	2	2	1	Identify meaning of word with an affix/how meaning changes	1		2		3		3		1		2		3		3	
	2	2	2	Define words from context clues																
	2	3	1	Make inferences/draw conclusions	6	3	3		9	3	12		6	1	3		9	1	10	
	2	4	1	Identify main ideas/relevant details	6		1		7		7		6		1		7		7	
	2	5	1	Summarize major points/processes/events of a text as a whole		3			3	3	3			1				1	1	
	2	6	1	Identify author's purpose for writing text	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					15	6	7		22	6	28		15	2	7		22	2	24
	Total For Reporting Category A					30	6	10		40	6	46		30	2	10		40	2	42

Appendix C: Tally Sheets

Grade 04

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
B: Interpretation and Analysis of Fictional and Nonfictional Text	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot	3	3	4		7	3	10	3	1	4		7	1	8
	1	2	1	Connections between texts	1	3			1	3	4	1	1			1	1	2
	Total For Assessment Anchor B.1 Understand components within and between texts.				4	6	4		8	6	14	4	2	4		8	2	10
	2	1	1	Identify examples of personification	2				2		2	2				2		2
	2	1	2	Identify examples of similes	1				1		1	1				1		1
	2	1	3	Identify examples of alliteration	1		1		2		2	1		1		2		2
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				4		1		5		5	4		1		5		5
	3	1	1	Identify fact/opinion														
	3	2	1	Identify exaggeration (bias)			1		1		1			1		1		1
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)														
	3	3	2	Use headings to locate information or identify content that fits into a specific section														
	3	3	3	Interpret and make connections between graphics/charts/texts	1				1		1	1				1		1
	3	3	4	Sequence of steps in a list of directions	1				1		1	1				1		1
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				2		1		3		3	2		1		3		3
	Total For Reporting Category B				10	6	6		16	6	22	10	2	6		16	2	18

Appendix C: Tally Sheets

Grade 05

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Core & EB				
												MC	OE	MC	OE	MC	OE	MC	OE	Total
A: Comprehension and Reading Skills	1	1	1	Identify meaning of multiple-meaning words																
	1	1	2	Identify synonym/antonym	1				1		1					1			1	
	1	2	1	Identify meaning of word with an affix/how meaning changes			1		1		1					1			1	
	1	2	2	Define words from context clues	1				1		1					1			1	
	1	3	1	Make inferences/draw conclusions	4		1		5		5		4		1		5		5	
	1	3	2	Cite evidence from text to support generalizations																
	1	4	1	Identify and/or interpret main ideas/relevant details	3		1		4		4		3		1		4		4	
	1	5	1	Summarize key details and events of a text as a whole	1		1		2		2		1		1		2		2	
	1	6	1	Identify author's purpose for writing text	2		1		3		3		2		1		3		3	
	1	6	2	Identify text that supports the author's intended purpose	1				1		1		1				1		1	
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					13		5		18		18		13		5		18		18
	2	1	1	Identify meaning of multiple-meaning words			2		2		2				2		2		2	
	2	1	2	Identify meaning of content-specific words	1				1		1		1				1		1	
	2	2	1	Identify meaning of word with an affix/how meaning changes	2				2		2		2				2		2	
	2	2	2	Define words from context clues	1		1		2		2		1		1		2		2	
	2	3	1	Make inferences/draw conclusions	1	3	1		2	3	5		1	1	1		2	1	3	
	2	3	2	Cite evidence from text to support generalizations	1		1		2		2		1		1		2		2	
	2	4	1	Identify and/or interpret main ideas/relevant details	9		2		11		11		9		2		11		11	
	2	5	1	Summarize major points/processes/events of a text as a whole																
	2	6	1	Identify author's purpose for writing text																
2	6	2	Identify text that supports the author's intended purpose	2				2		2		2				2		2		
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					17	3	7		24	3	27		17	1	7		24	1	25	
Total For Reporting Category A					30	3	12		42	3	45		30	1	12		42	1	43	

Appendix C: Tally Sheets

Grade 05

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items											
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)							
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total						
												MC	OE	MC	OE	MC	OE	MC	OE			
B: Interpretation and Analysis of Fictional and Nonfictional Text	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot, theme	3	6	1		4	6	10	3	2	1		4	2	6				
	1	2	1	Connections between texts	2	3			2	3	5	2	1			2	1	3				
	Total For Assessment Anchor B.1				Understand components within and between texts.				5	9	1		6	9	15	5	3	1		6	3	9
	2	1	1	Identify examples of personification	1				1		1	1				1		1				
	2	1	2	Identify examples of similes																		
	2	1	3	Identify/interpret examples of alliteration																		
	2	1	4	Identify/interpret examples of metaphors																		
	2	2	1	Identify point of view of the narrator as first or third person	1				1		1	1				1		1				
	2	2	2	Describe the effectiveness of the point of view used by the author			1		1		1			1		1		1				
	Total For Assessment Anchor B.2				Understand literary devices in fictional and nonfictional text.				2		1		3		3	2		1		3		3
	3	1	1	Identify fact/opinion	2		1		3		3	2		1		3		3				
	3	2	1	Identify exaggeration (bias)																		
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	1				1		1	1				1		1				
	3	3	2	Use headings to locate information or identify content that fits into a specific section																		
	3	3	3	Interpret and make connections between graphics/charts/texts																		
	3	3	4	Sequence of steps in a list of directions																		
	Total For Assessment Anchor B.3				Understand concepts and organization of nonfictional text.				3		1		4		4	3		1		4		4
	Total For Reporting Category B					10	9	3		13	9	22	10	3	3		13	3	16			

Appendix C: Tally Sheets

Grade 06

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text	1				1		1		1				1		1	
	1	1	2	Identify synonym/antonym			1		1		1			1			1		1	
	1	2	1	Identify meaning of word with an affix/how meaning changes																
	1	2	2	Define words from context clues																
	1	3	1	Make inferences/draw conclusions	2		1		3		3		2		1		3		3	
	1	3	2	Cite evidence from text to support generalizations																
	1	4	1	Identify and/or interpret main ideas/relevant details	6		3		9		9		6		3		9		9	
	1	5	1	Summarize key details and events of a text as a whole			1		1		1				1		1		1	
	1	6	1	Identify author's purpose for writing text																
	1	6	2	Identify text that supports the author's intended purpose	1				1		1		1				1		1	
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					10		6		16		16		10		6		16		16
	2	1	1	Apply meaning of multiple-meaning words in text	1		1		2		2		1		1		2		2	
	2	1	2	Identify meaning of content-specific words																
	2	2	1	Identify meaning of word with an affix/how meaning changes	2				2		2		2				2		2	
	2	2	2	Define words from context clues																
	2	3	1	Make inferences/draw conclusions	7	3	1		8	3	11		7	1	1		8	1	9	
	2	3	2	Cite evidence from text to support generalizations			1		1		1				1		1		1	
	2	4	1	Identify and/or interpret main ideas/relevant details	4		2		6		6		4		2		6		6	
	2	5	1	Summarize major points/processes/events of a text as a whole	1				1		1		1				1		1	
	2	6	1	Identify author's purpose for writing text																
2	6	2	Identify text that supports the author's intended purpose																	
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					15	3	5		20	3	23		15	1	5		20	1	21	
Total For Reporting Category A					25	3	11		36	3	39		25	1	11		36	1	37	

Appendix C: Tally Sheets

Grade 06

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
B: Interpretation and Analysis of Fictional and Nonfictional Text	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot, theme	5	6	2		7	6	13		5	2	2		7	2	9
	1	2	1	Connections between texts	1	3			1	3	4		1	1			1	1	2
	Total For Assessment Anchor B.1 Understand components within and between texts.				6	9	2		8	9	17		6	3	2		8	3	11
	2	1	1	Identify examples of personification															
	2	1	2	Identify examples of similes	1				1		1		1				1		1
	2	1	3	Identify/interpret examples of alliteration			1		1		1				1		1		1
	2	1	4	Identify/interpret examples of metaphors															
	2	2	1	Identify point of view of the narrator as first or third person	1				1		1		1				1		1
	2	2	2	Describe the effectiveness of the point of view used by the author															
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				2		1		3		3		2		1		3		3
	3	1	1	Identify fact/opinion	2		1		3		3		2		1		3		3
	3	2	1	Identify exaggeration (bias)															
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	1				1		1		1				1		1
	3	3	2	Use headings to locate information or identify content that fits into a specific section	1				1		1		1				1		1
	3	3	3	Interpret and make connections between graphics/charts/texts	1		1		2		2		1		1		2		2
	3	3	4	Sequence of steps in a list of directions	2				2		2		2				2		2
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				7		2		9		9		7		2		9		9
	Total For Reporting Category B				15	9	5		20	9	29		15	3	5		20	3	23

Appendix C: Tally Sheets

Grade 07

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text																
	1	1	2	Identify synonym/antonym	1				1		1					1			1	
	1	2	1	Identify meaning of word with an affix/how meaning changes																
	1	2	2	Define words from context clues																
	1	3	1	Make inferences/draw conclusions	5		2		7		7		5		2		7		7	
	1	3	2	Cite evidence from text to support generalizations																
	1	4	1	Identify and/or interpret main ideas/relevant details	4		1		5		5		4		1		5		5	
	1	5	1	Summarize key details and events of a text as a whole																
	1	6	1	Identify author's purpose for writing text	2		1		3		3		2		1		3		3	
	1	6	2	Identify text that supports the author's intended purpose																
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					12		4		16		16		12		4		16		16
	2	1	1	Apply meaning of multiple-meaning words in text																
	2	1	2	Identify meaning of content-specific words	1				1		1		1				1		1	
	2	2	1	Identify meaning of word with an affix/how meaning changes	1				1		1		1				1		1	
	2	2	2	Define words from context clues	1		1		2		2		1		1		2		2	
	2	3	1	Make inferences/draw conclusions	3	3	1		4	3	7		3	1	1		4	1	5	
	2	3	2	Cite evidence from text to support generalizations			1		1		1				1		1		1	
	2	4	1	Identify and/or interpret main ideas/relevant details	3		2		5		5		3		2		5		5	
	2	5	1	Summarize major points/processes/events of a text as a whole																
	2	6	1	Identify author's purpose for writing text																
2	6	2	Identify text that supports the author's intended purpose	2				2		2		2				2		2		
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					11	3	5		16	3	19		11	1	5		16	1	17	
Total For Reporting Category A					23	3	9		32	3	35		23	1	9		32	1	33	

Appendix C: Tally Sheets

Grade 07

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total		
												MC	OE	MC	OE	MC	OE	MC
B: Interpretation and Analysis of Fictional and Nonfictional Text	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot, theme	4	3	3		7	3	10	4	1	3		7	1	8
	1	2	1	Connections between texts	3	6	1		4	6	10	3	2	1		4	2	6
	Total For Assessment Anchor B.1 Understand components within and between texts.				7	9	4		11	9	20	7	3	4		11	3	14
	2	1	1	Interpret/analyze examples of personification, simile, alliteration, metaphor, hyperbole, and imagery	5				5		5	5				5		5
	2	1	2	Identify author's purpose/effectiveness of figurative language														
	2	2	1	Identify point of view of the narrator as first or third person			1		1		1			1		1		1
	2	2	2	Describe the effectiveness of the point of view used by the author														
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				5		1		6		6	5		1		6		6
	3	1	1	Use of facts and opinions to make a point/construct an argument	1				1		1	1				1		1
	3	2	1	Identify bias/propaganda techniques														
	3	3	1	Analyze text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)														
	3	3	2	Identify content that fits into a specific section	2		1		3		3	2		1		3		3
	3	3	3	Interpret and make connections between graphics/charts/texts	1		1		2		2	1		1		2		2
	3	3	4	Sequence of steps in a list of directions	1				1		1	1				1		1
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				5		2		7		7	5		2		7		7
	Total For Reporting Category B				17	9	7		24	9	33	17	3	7		24	3	27

Appendix C: Tally Sheets

Grade 08

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total					
												MC	OE	MC	OE	MC	OE	MC	OE		
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text																	
	1	1	2	Identify synonym/antonym																	
	1	2	1	Identify meaning of word with an affix/how meaning changes			1		1		1			1				1	1		
	1	2	2	Define words from context clues	1				1		1	1					1		1	1	
	1	3	1	Make inferences/draw conclusions	1		2		3		3	1		2		3			3	3	
	1	3	2	Cite evidence from text to support generalizations	1				1		1	1				1			1	1	
	1	4	1	Identify and/or interpret main ideas/relevant details	2				2		2	2				2			2	2	
	1	5	1	Summarize key details and events of a text as a whole																	
	1	6	1	Identify author's purpose for writing text	1		1		2		2	1		1		2			2	2	
	1	6	2	Identify text that supports the author's intended purpose																	
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					6		4		10		10	6		4		10			10	10
	2	1	1	Apply meaning of multiple-meaning words in text																	
	2	1	2	Identify meaning of content-specific words	1				1		1	1				1			1	1	
	2	2	1	Identify meaning of word with an affix/how meaning changes																	
	2	2	2	Define words from context clues	1		1		2		2	1		1		2			2	2	
	2	3	1	Make inferences/draw conclusions	3				3		3	3				3			3	3	
	2	3	2	Cite evidence from text to support generalizations			1		1		1			1		1			1	1	
	2	4	1	Identify and/or interpret main ideas/relevant details	5	3	2		7	3	10	5	1	2		7	1		8	8	
	2	5	1	Summarize major points/processes/events of a text as a whole			1		1		1			1		1			1	1	
2	6	1	Identify author's purpose for writing text	2				2		2	2				2			2	2		
2	6	2	Identify text that supports the author's intended purpose			1		1		1			1		1			1	1		
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					12	3	6		18	3	21	12	1	6		18	1		19	19	
Total For Reporting Category A					18	3	10		28	3	31	18	1	10		28	1		29	29	

Appendix C: Tally Sheets

Grade 08

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
B: Interpretation and Analysis of Fictional and Nonfictional Text	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot, theme	5	3	2		7	3	10		5	1	2		7	1	8
	1	2	1	Connections between texts	4	6			4	6	10		4	2			4	2	6
	Total For Assessment Anchor B.1 Understand components within and between texts.				9	9	2		11	9	20		9	3	2		11	3	14
	2	1	1	Interpret/analyze examples of personification, simile, metaphor, hyperbole, and imagery	5		2		7		7		5		2		7		7
	2	1	2	Identify author's purpose/effectiveness of figurative language	1				1		1		1				1		1
	2	2	1	Identify point of view of the narrator as first or third person	1				1		1		1				1		1
	2	2	2	Analyze the effectiveness of the point of view used by the author															
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				7		2		9		9		7		2		9		9
	3	1	1	Use of facts and opinions to make a point/construct an argument	3		1		4		4		3		1		4		4
	3	2	1	Identify bias/propaganda techniques															
	3	3	1	Analyze text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	1		1		2		2		1		1		2		2
	3	3	2	Identify content that fits into a specific section	1				1		1		1				1		1
	3	3	3	Interpret and make connections between graphics/charts/texts	1				1		1		1				1		1
	3	3	4	Sequence of steps in a list of directions															
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				6		2		8		8		6		2		8		8
	Total For Reporting Category B				22	9	6		28	9	37		22	3	6		28	3	31

Appendix C: Tally Sheets

A: Nature of Science	2	1	3	Observe a natural phenomenon (e.g., weather changes, length of daylight/night, movement of shadows, animal migrations, growth of plants), record observations, and then make a prediction based on those observations.	1				1	1	1				1	1	
	2	1	4	State a conclusion that is consistent with the information/data.	2		1		3	3	2		1		3	3	
	2	2	1	Identify appropriate tools or instruments for specific tasks and describe the information they can provide (e.g., measuring: length - ruler, mass - balance scale, volume - beaker, temperature - thermometer; making observations: hand lens, binoculars, telescope).	1				1	1	1				1	1	
	Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				7		4		11	11	7		4		11	11	
	3	1	1	Categorize systems as either natural or human-made (e.g., ballpoint pens, simple electrical circuits, plant anatomy, water cycle).	1				1	1	1				1	1	
	3	1	2	Explain a relationship between the living and nonliving components in a system (e.g., food web, terrarium).	1	2			1	2	3	1	1		1	1	2
	3	1	3	Categorize the parts of an ecosystem as either living or nonliving and describe their roles in the system.	1				1	1	1				1	1	
	3	1	4	Identify the parts of the food and fiber systems as they relate to agricultural products from the source to the consumer.		2	2		2	2	4		1	2	2	1	3
	3	2	1	Identify what different models represent (e.g., maps show physical features, directions, distances; globes represent Earth; drawings of watersheds depict terrain; dioramas show ecosystems; concept maps show relationships of ideas). Identify what different models represent	2				2	2	2	2			2	2	
	3	2	2	Use models to make observations to explain how systems work (e.g., water cycle, Sun-Earth-Moon system).	1				1	1	1				1	1	

Appendix C: Tally Sheets

3	2	3	Use appropriate, simple modeling tools and techniques to describe or illustrate a system (e.g., two cans and string to model a communications system, terrarium to model an ecosystem).	1				1		1	1				1		1
3	3	1	Identify and describe observable patterns (e.g., growth patterns in plants, weather, water cycle).	2				2		2	2				2		2
3	3	2	Predict future conditions/events based on observable patterns (e.g., day/night, seasons, sunrise/sunset, lunar phases).	1				1		1	1				1		1
Total For Assessment Anchor A.3 Systems, Models, and Patterns				10	4	2		12	4	16	10	2	2		12	2	14
Total For Reporting Category A				28	4	12		40	4	44	28	2	12		40	2	42

Appendix C: Tally Sheets

Grade 04

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
	1	1	1	Identify life processes of living things (e.g., growth, digestion, respiration).															
	1	1	2	Compare similar functions of external characteristics of organisms (e.g., anatomical characteristics: appendages, type of covering, body segments).															
	1	1	3	Describe basic needs of plants and animals (e.g., air, water, food).	1				1		1		1				1		1
	1	1	4	Describe how different parts of a living thing work together to provide what the organism needs (e.g., parts of plants: roots, stems, leaves).		2	1		1	2	3		1	1			1	1	2
	1	1	5	Describe the life cycles of different organisms (e.g., moth, grasshopper, frog, seed-producing plant).															
Total For Assessment Anchor B.1 Structures and Functions of Organisms					1	2	1		2	2	4		1	1	1		2	1	3
	2	1	1	Identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest).	1				1		1		1				1		1
	2	1	2	Explain how specific adaptations can help a living organism survive (e.g., protective coloration, mimicry, leaf sizes and shapes, ability to catch or retain water).															
	2	2	1	Identify physical characteristics (e.g., height, hair color, eye color, attached earlobes, ability to roll tongue) that appear in both parents and could be passed on to offspring.	1				1		1		1				1		1
Total For Assessment Anchor B.2 Continuity of Life					2				2		2		2				2		2

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B: Biological Sciences	3	1	1	Describe the living and nonliving components of a local ecosystem (e.g., lentic and lotic systems, forest, cornfield, grasslands, city park, playground).	1				1	1	1				1	1		
	3	1	2	Describe interactions between living and nonliving components (e.g. plants – water, soil, sunlight, carbon dioxide, temperature; animals – food, water, shelter, oxygen, temperature) of a local ecosystem.	1		1		2	2	1		1		2	2		
	3	2	1	Describe what happens to a living thing when its habitat is changed.	1				1	1	1				1	1		
	3	2	2	Describe and predict how changes in the environment (e.g., fire, pollution, flood, building dams) can affect systems.			2			2	2		1			1	1	
	3	2	3	Explain and predict how changes in seasons affect plants, animals, or daily human life (e.g., food availability, shelter, mobility).	1				1	1	1				1	1		
	3	3	1	Identify everyday human activities (e.g., driving, washing, eating, manufacturing, farming) within a community that depend on the natural environment.	1				1	1	1				1	1		
	3	3	2	Describe the human dependence on the food and fiber systems from production to consumption (e.g., food, clothing, shelter, products).														
	3	3	3	Identify biological pests (e.g., fungi – molds, plants – foxtail, purple loosestrife, Eurasian water milfoil; animals – aphides, ticks, zebra mussels, starlings, mice) that compete with humans for resources.				1		1	1			1		1	1	
	3	3	4	Identify major land uses in the urban, suburban and rural communities (e.g., housing, commercial, recreation).				1		1	1			1		1	1	
	3	3	5	Describe the effects of pollution (e.g., litter) in the community.														
Total For Assessment Anchor B.3 Ecological Behavior and Systems					5	2	3		8	2	10	5	1	3		8	1	9
Total For Reporting Category B					8	4	4		12	4	16	8	2	4		12	2	14

Appendix C: Tally Sheets

Grade 04

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
C: Physical Sciences	1	1	1	Use physical properties [e.g., mass, shape, size, volume, color, texture, magnetism, state to describe matter.	1		1		2		2		1		1		2		2
	1	1	2	Categorize/group objects using physical characteristics.	1	2	1		2	2	4		1	1	1		2	1	3
	Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy				2	2	2		4	2	6		2	1	2		4	1	5
	2	1	1	Identify energy forms, energy transfer, and energy examples (e.g., light, heat, electrical).	1				1		1		1				1		1
	2	1	2	Describe the flow of energy through an object or system (e.g., feeling radiant heat from a light bulb, eating food to get energy, using a battery to light a bulb or run a fan).	1				1		1		1				1		1
	2	1	3	Recognize or illustrate simple direct current series and parallel circuits composed of batteries, light bulbs (or other common loads), wire, and on/off switches.	1				1		1		1				1		1
	2	1	4	Identify characteristics of sound (e.g., pitch, loudness, reflection).	2		1		3		3		2		1		3		3
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transfer of Energy				5		1		6		6		5		1		6		6
	3	1	1	Describe changes in motion caused by forces (e.g., magnetic, pushes or pulls, gravity, friction).	1				1		1		1				1		1
	3	1	2	Compare the relative movement of objects or describe types of motion that are evident (e.g., bouncing ball, moving in a straight line, back and forth, merry-go-round).	1				1		1		1				1		1
	3	1	3	Describe the position of an object by locating it relative to another object or a stationary background (e.g., geographic direction, left, up).	1		1		2		2		1		1		2		2
	Total For Assessment Anchor C.3 Principles of Motion and Force				3		1		4		4		3		1		4		4
	Total For Reporting Category C				10	2	4		14	2	16		10	1	4		14	1	15

Appendix C: Tally Sheets

Grade 04

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	MC	OE	Total
D: Earth and Space Sciences	1	1	1	Describe how prominent Earth features in Pennsylvania (e.g., mountains, valleys, caves, sinkholes, lakes, rivers) were formed.	1				1		1	1					1		1	
	1	1	2	Identify various Earth structures (e.g., mountains, watersheds, peninsulas, lakes, rivers, valleys) through the use of models.	1				1		1	1					1		1	
	1	1	3	Describe the composition of soil as weathered rock and decomposed organic remains.	1				1		1	1					1		1	
	1	2	1	Identify products and by-products of plants and animals for human use (e.g., food, clothing, building materials, paper products).	1				1		1	1					1		1	
	1	2	2	Identify the types and uses of Earth materials for renewable, nonrenewable, and reusable products (e.g., human-made products: concrete, paper, plastics, fabrics).																
	1	2	3	Recognize ways that humans benefit from the use of water resources (e.g., agriculture, energy, recreation).	1		1		2		2	1		1			2		2	
	1	3	1	Describe types of freshwater and saltwater bodies (e.g., lakes, rivers, wetlands, oceans).	1		1		2		2	1		1			2		2	
	1	3	2	Explain how water goes through phase changes (i.e., evaporation, condensation, freezing, and melting).	1				1		1	1					1		1	
	1	3	3	Describe or compare lentic systems (i.e., ponds, lakes, and bays) and lotic systems (i.e., streams, creeks, and rivers).	1				1		1	1					1		1	
	1	3	4	Explain the role and relationship of a watershed or a wetland on water sources (e.g., water storage, groundwater recharge, water filtration, water source, water cycle).	1				1		1	1					1		1	
Total For Assessment Anchor D.1 Earth Features and Processes that Change Earth and its Resources					9		2		11		11	9		2		11		11		

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2	1	1	Identify basic cloud types (i.e., cirrus, cumulus, stratus, and cumulonimbus) and make connections to basic elements of weather (e.g., changes in temperature, precipitation).	1			1	1	1			1	1
2	1	2	Identify weather patterns from data charts or graphs of the data (e.g., temperature, wind direction, wind speed, cloud types, precipitation).	1		1	2	2	1		1	2	2
2	1	3	Identify appropriate instruments (i.e., thermometer, rain gauge, weather vane, anemometer, and barometer) to study weather and what they measure.			1	1	1			1	1	1
Total For Assessment Anchor D.2 Weather, Climate, and Atmospheric Processes				2		2	4	4	2		2	4	4
3	1	1	Describe motions of the Sun - Earth - Moon system.										
3	1	2	Explain how the motion of the Sun - Earth - Moon system relates to time (e.g., days, months, years).	1			1	1	1			1	1
3	1	3	Describe the causes of seasonal change as they relate to the revolution of Earth and the tilt of Earth's axis.										
Total For Assessment Anchor D.3 Composition and Structure of the Universe				1			1	1	1			1	1
Total For Reporting Category D				12		4	16	16	12		4	16	16

Appendix C: Tally Sheets

Grade 08

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
	1	1	1	Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices	1				1		1	1					1		1
	1	1	2	Explain how certain questions can be answered through scientific inquiry and/or technological design.	2				2		2	2					2		2
	1	1	3	Use evidence, such as observations or experimental results, to support inferences about a relationship.	1		2		3		3	1		2			3		3
	1	1	4	Develop descriptions, explanations, predictions, and models using evidence.	2				2		2	2					2		2
	1	2	1	Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).	1		1		2		2	1		1			2		2
	1	2	2	Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).															
	1	2	3	Describe fundamental scientific or technological concepts that could solve practical problems (e.g., Newton's laws of motion, Mendelian genetics).			2		2		2			2			2		2
	1	2	4	Explain society's standard of living in terms of technological advancements and how these advancements impact on agriculture (e.g., transportation, processing, production, storage).	1				1		1	1					1		1
	1	3	1	Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).	1				1		1	1					1		1

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A: Nature of Science	1	3	2	Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.	1				1	1	1				1	1	
	1	3	3	Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.													
	1	3	4	Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems.													
	Total For Assessment Anchor A.1 Reasoning and Analysis				10		5		15		15	10		5		15	15
	2	1	1	Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships.	1		1		2		2	1		1		2	2
	2	1	2	Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.	1				1		1	1				1	1
	2	1	3	Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.													
	2	1	4	Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.	1		1		2		2	1		1		2	2
	2	1	5	Use evidence from investigations to clearly communicate and support conclusions.	2				2		2	2				2	2
	2	1	6	Identify a design flaw in a simple technological system and devise possible working solutions.	1		1		2		2	1		1		2	2
2	2	1	Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.	1		2		1		2	3	1		1	1	1	2

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2	2	2	Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.	1	1	2	2	1	1	2	2				
2	2	3	Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes.	2		2	2	2		2	2				
Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				10	2	4	14	2	16	10	1	4	14	1	15
3	1	1	Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.	2		2	2	2		2	2				
3	1	2	Explain the concept of order in a system [e.g., (first to last: manufacturing steps, trophic levels); (simple to complex: cell, tissue, organ, organ system)].	1	1	2	2	1	1	2	2				
3	1	3	Distinguish between system inputs, system processes, system outputs, and feedback (e.g., physical, ecological, biological, informational).												
3	1	4	Distinguish between open loop (e.g., energy flow, food web) and closed loop (e.g., materials in the nitrogen and carbon cycles, closed-switch) systems.	1		1	1	1		1	1				
3	1	5	Explain how components of natural and human-made systems play different roles in a working system.	1	1	2	2	1	1	2	2				
3	2	1	Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system).	1	2	1	2	3	1	1	1	1	2		
3	2	2	Describe how engineers use models to develop new and improved technologies to solve problems.	1		1	1	1		1	1				
3	2	3	Given a model showing simple cause- and-effect relationships in a natural system, predict results that can be used to test the assumptions in the model (e.g., photosynthesis, water cycle, diffusion, infiltration).												

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3	3	1	Identify and describe patterns as repeated processes or recurring elements in human-made systems (e.g., trusses, hub-and-spoke system in communications and transportation systems, feedback controls in regulated systems).	1				1		1				1		1		
3	3	2	Describe repeating structure patterns in nature(e.g., veins in a leaf, tree rings, crystals, water waves) or periodic patterns (e.g., daily, monthly, annually).	1		1		2		2		1		1		2	2	
Total For Assessment Anchor A.3 Systems, Models, and Patterns				9	2	3		12	2	14		9	1	3		12	1	13
Total For Reporting Category A				29	4	12		41	4	45		29	2	12		41	2	43

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Grade 08

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
	1	1	1	Describe the structures of living things that help them function effectively in specific ways (e.g., adaptations, characteristics).	1				1		1		1				1		1
	1	1	2	Compare similarities and differences in internal structures of organisms (e.g., invertebrate/vertebrate, vascular/nonvascular, single-celled/multi-celled) and external structures (e.g., appendages, body segments, type of covering, size, shape).		2				2	2		1					1	1
	1	1	3	Apply knowledge of characteristic structures to identify or categorize organisms (i.e., plants, animals, fungi, bacteria, and protista).			1		1		1			1			1		1
	1	1	4	Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.			1		1		1			1			1		1
Total For Assessment Anchor B.1 Structures and Functions of Organisms					1	2	2		3	2	5		1	1	2		3	1	4
	2	1	1	Explain how inherited structures or behaviors help organisms survive and reproduce in different environments.															
	2	1	2	Explain how different adaptations in individuals of the same species may affect survivability or reproduction success.	1				1		1		1				1		1
	2	1	3	Explain that mutations can alter a gene and are the original source of new variations.															
	2	1	4	Describe how selective breeding or biotechnology can change the genetic makeup of organisms.	1				1		1		1				1		1
	2	1	5	Explain that adaptations are developed over long periods of time and are passed from one generation to another	1				1		1		1				1		1

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B: Biological Sciences	2	2	1	Identify and explain differences between inherited and acquired traits.		2				2	2		1				1	1	
	2	2	2	Recognize that the gene is the basic unit of inheritance, that there are dominant and recessive genes, and that traits are inherited.	2				2	2	2						2	2	
	Total For Assessment Anchor B.2 Continuity of Life				5	2			5	2	7	5	1				5	1	6
	3	1	1	Explain the flow of energy through an ecosystem (e.g., food chains, food webs).															
	3	1	2	Identify major biomes and describe abiotic and biotic components (e.g., abiotic: different soil types, air, water sunlight; biotic: soil microbes, decomposers).	1				1	1	1						1	1	
	3	1	3	Explain relationships among organisms (e.g., producers/consumers, predator/prey) in an ecosystem.			1		1	1			1				1	1	
	3	2	1	Use evidence to explain factors that affect changes in populations (e.g., deforestation, disease, land use, natural disaster, invasive species).	1				1	1	1						1	1	
	3	2	2	Use evidence to explain how diversity affects the ecological integrity of natural systems															
	3	2	3	Describe the response of organisms to environmental changes (e.g., changes in climate, hibernation, migration, coloration) and how those changes affect survival.															
	3	3	1	Explain how human activities may affect local, regional, and global environments.			1		1	1				1			1	1	
	3	3	2	Explain how renewable and nonrenewable resources provide for human needs (i.e., energy, food, water, clothing, and shelter).															
	3	3	3	Describe how waste management affects the environment (e.g., recycling, composting, landfills, incineration, sewage treatment).															

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3	3	4	Explain the long-term effects of using integrated pest management (e.g., herbicides, natural predators, biogenetics) on the environment.														
Total For Assessment Anchor B.3 Ecological Behavior and Systems				2	2	4	4	2	2	4	4						
Total For Reporting Category B				8	4	4	12	4	16	8	2	4	12	2	14		

Appendix C: Tally Sheets

Grade 08

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
C: Physical Sciences	1	1	1	Explain the differences among elements, compounds, and mixtures.	2				2		2		2				2		2	
	1	1	2	Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).																
	1	1	3	Identify and describe reactants and products of simple chemical reactions.	1				1		1		1				1		1	
	Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy					3				3		3		3				3		3
	2	1	1	Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)	2				2		2		2				2		2	
	2	1	2	Explain how energy is transferred from one place to another through convection, conduction, or radiation.			2		2		2		2		2		2		2	
	2	1	3	Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.	1				1		1		1				1		1	
	2	2	1	Describe the Sun as the major source of energy that impacts the environment.	1		1		2		2		1		1		2		2	
	2	2	2	Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.	2				2		2		2				2		2	
	2	2	3	Describe the waste (i.e., kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment.	1				1		1		1				1		1	
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transfer of Energy					7		3		10		10		7		3		10		10
	3	1	1	Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced).	1				1		1		1				1		1	
	3	1	2	Distinguish between kinetic and potential energy.			1		1		1		1		1		1		1	

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3	1	3	Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).												
Total For Assessment Anchor C.3 Principles of Motion and Force				1	1	2	2	1	1	2	2				
Total For Reporting Category C				11	4	15	15	11	4	15	15				

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D: Earth and Space Sciences	1	3	1	Describe the water cycle and the physical processes on which it depends (i.e., evaporation, condensation, precipitation, transpiration, runoff, infiltration, energy inputs, and phase changes).	1				1	1	1					1	1	
	1	3	2	Compare and contrast characteristics of freshwater and saltwater systems on the basis of their physical characteristics (i.e., composition, density, and electrical conductivity) and their use as natural resources.	1				1	1	1					1	1	
	1	3	3	Distinguish among different water systems (e.g., wetland systems, ocean systems, river systems, watersheds) and describe their relationships to each other as well as to landforms.														
	1	3	4	Identify the physical characteristics of a stream and how these characteristics determine the types of organisms found within the stream environment (e.g., biological diversity, water quality, flow rate, tributaries, surrounding watershed).	1				1	1	1					1	1	
	Total For Assessment Anchor D.1 Earth Features and Processes that Change Earth and its Resources				5	2	3		8	2	10	5	1	3		8	1	9
	2	1	1	Explain the impact of water systems on the local weather or the climate of a region (e.g., lake effect snow, land/ocean breezes).	1				1	1	1					1	1	
	2	1	2	Identify how global patterns of atmospheric movement influence regional weather and climate.	1				1	1	1					1	1	
	2	1	3	Identify how cloud types, wind directions, and barometric pressure changes are associated with weather patterns in different regions of the country.														
	Total For Assessment Anchor D.2 Weather, Climate, and Atmospheric Processes				2				2		2	2				2		2
	3	1	1	Describe patterns of Earth's movements (i.e., rotation and revolution) and the Moon's movements (i.e., phases, eclipses, and tides) in relation to the Sun.														
3	1	2	Describe the role of gravity as the force that governs the movement of the solar system and universe.	1				1	1	1					1	1		

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3	1	3	Compare and contrast characteristics of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets).	2	1	3	3	2	1	3	3				
Total For Assessment Anchor D.3 Composition and Structure of the Universe				3	1	4	4	3	1	4	4				
Total For Reporting Category D				8	2	4	12	2	14	8	1	4	12	1	13

Appendix C: Tally Sheets

Grade 05

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total					
												MC	OE	MC	OE	MC	OE	MC	OE	Total	
A: Composition	1			Narrative		4				4	4			1					1	1	
	Total For Assessment Anchor A.1 A.S. 1.4 -- Types of Writing					4				4	4			1						1	1
	2			Informational		4				4	4			1					1	1	
	Total For Assessment Anchor A.2 A.S. 1.4 -- Types of Writing					4				4	4			1						1	1
	3			Persuasive																	
	Total For Assessment Anchor A.3 A.S. 1.4 -- Types of Writing																				
Total For Reporting Category A					8				8	8			2						2	2	

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Grade 05

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
B: Revising and Editing	5			Editing	6				6		6		6			6		6
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing				6				6		6		6			6		6
	6			Revising	6				6		6		6			6		6
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing				6				6		6		6			6		6
	Total For Reporting Category B				12				12		12		12			12		12

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Grade 08

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total				
												MC	OE	MC	OE	MC	OE	MC	OE	
A: Composition	1			Narrative																
	Total For Assessment Anchor A.1 A.S. 1.4 -- Types of Writing																			
	2			Informational		4				4	4		1					1	1	
	Total For Assessment Anchor A.2 A.S. 1.4 -- Types of Writing					4				4	4		1						1	1
	3			Persuasive		4				4	4		1						1	1
	Total For Assessment Anchor A.3 A.S. 1.4 -- Types of Writing					4				4	4		1						1	1
	Total For Reporting Category A					8				8	8		2						2	2

Appendix C: Tally Sheets

Grade 08

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)		
											Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE
B: Revising and Edit	5			Editing	7				7		7			7			7
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing				7				7		7			7			7
	6			Revising	5				5		5			5			5
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing				5				5		5			5			5
	Total For Reporting Category B				12				12		12			12			12

Appendix D:
Item and Test Development Process

Item and Test Development Process for the PSSA

Step	Description
1. Review Guiding Documentation	Each year item and test development specialists meet internally to review all guiding documentation related to the PSSA. Documentation reviewed includes the test design blueprints, the Pennsylvania Assessment Anchors and Eligible Content [or in the case of Writing, the Pennsylvania Academic Standards], the test item specifications, the test style specifications (style guide), and all test content descriptions.
2. Meet with PDE to Confirm Understanding of Program	The goal of the meeting each year is to ensure that item and test development teams have a clear understanding of PDE’s vision for test development. A successful development cycle requires a clear understanding of Pennsylvania’s content-area test specifications and of any unique interpretations of the Pennsylvania Assessment Anchors (if any).
3. Create Preliminary Test Item Development Plan	Item and test development specialists generate a preliminary development plan which includes an overview of the program, the internal and external (PDE) review and approval processes, a projected schedule for development of test items—including the number of test items to be developed for review by PDE and subsequent review by the committees of Pennsylvania educators. Item and test development specialists also generate strategies for securing passages and developing writing prompts, science scenarios, and passage-based items, etc.
4. Meet with PDE to Finalize Test Item Development Plan	Over the course of the meeting, item and test development specialists verify all steps in the development process including timelines and schedules for test item/test development.
5. Analyze Item Bank	Existing test items in the current PSSA Item Bank are reviewed for technical psychometric quality as well as for their match to the Assessment Anchors. During this phase, test development specialists also make a tally of the test items by Assessment Anchor—including test development specialists’ best thinking regarding the number of usable test items in the existing item bank. A tally is also made of the number of usable passages, as well as other stimulus prompts in the bank, including science scenarios.
6. Refine Test Item Development Plan to Include Writers and Subcontractors	Item and test development specialists identify the writers who will write the test items (test development specialists or other professional item writers, subcontractors, etc.), the estimated number of writers needed, the qualifications of writers, and the approximate number of test items to be submitted by each source.
7. Train Item Writers	Item and test development specialists train item writers, as needed. Item writers who have written for the PSSA in the past receive updated information, as needed.

Item and Test Development Process for the PSSA

Step	Description
8. Write and Review Items	Test items are written by item writers after training is complete, and feedback is provided by the item and test development specialists to item writers on a regular basis. As test items are written, they are reviewed and edited in a series of internal reviews. Item and test development specialists review and edit items to include, but not limited to, the following: match to Assessment Anchor/Eligible Content, relevance to purpose, accuracy of content, item difficulty, interest level, grade appropriateness, depth of knowledge and cognitive complexity, adherence to the principles of Universal Design, and freedom from issues of bias/fairness/sensitivity. At the same time, the process of procuring permissions also begins, including securing permissions for passages, art, prompts, etc.
9. Enter Test Items into Database	Upon acceptance from item writers, test items are entered into the item management system, IDEAS (<i>Item Development and Educational Assessment System</i>). Item data stored in the system database includes, but is not limited to, the following: readability, cognitive level, estimated level of difficulty, alignment to assessment anchors, and correlation to stimulus prompts and passages.
10. Prepare Item Set for Sample Item Review by PDE	Item and test development specialists prepare a subset of the items for review by PDE.
11. PDE Conducts Sample Item Review	After a subset of the items is submitted to PDE for review, PDE reviews the items and provides feedback to item and test development teams via a conference call. Items are revised per PDE feedback.
12. Continue to Write and Review Items	The remaining items are written, and feedback is provided by the item and test development specialists to item writers on a regular basis. Items are entered into the item management system, IDEAS (<i>Item Development and Educational Assessment System</i>) (See step 8 and step 9).
13. Review Items Prior to Test Item Review and Validation Sessions	Prior to New Item Content Review, all items are submitted to PDE for review. Item and test development specialists incorporate all PDE feedback, and PDE-requested edits to items are made.
14. Prepare for Test Item Review Sessions (the New Item Content Review and the Bias, Fairness, and Sensitivity Review)	Item and test development specialists prepare all items and stimulus passages for review by the New Item Content Review Committee (consisting of Pennsylvania educators) and by the separate Bias, Fairness, and Sensitivity Committee (consisting of a panel of experts). Item and test development specialists also prepare training materials needed for training committee members to review items for content or for bias, fairness, and sensitivity issues. All training materials and other ancillary materials (e.g. agendas, presentations, etc.) are also developed and then submitted to PDE for review and approval. Invitations are also sent to Pennsylvania educators and national experts from PDE-approved committee lists.

Item and Test Development Process for the PSSA

Step	Description
<p>15. Conduct Test Item Review Sessions (the New Item Content Review and the Bias, Fairness, and Sensitivity Review)</p>	<p>Committees of Pennsylvania educators and national experts review items in two meetings: one addressing item content and quality, the other addressing bias, fairness, and sensitivity. PDE, with support from item and test development specialists, presents training on how to review new test items for content considerations or bias/fairness/sensitivity issues. At the New Item Content Review, suggested edits to test items are made and/or replacement test items are written during the actual item review so that both the committee and the PDE are able to observe changes to the test items and approve the test items during the committee review process. At the Bias, Fairness, and Sensitivity Review, experts in bias, fairness, and sensitivity review all test items and passages and come to a consensus about any issues that are noted. At both meetings the results are carefully documented.</p>
<p>16. Conduct Item Review Resolution and Cleanup</p>	<p>Following the conclusion of the New Item Content Review Committee meetings, PDE re-examines the consensus changes suggested by the committee members during the New Item Content Review Committee meetings. DRC item and test development specialists then record all of PDE’s follow-up decisions and changes. During this cleanup process, PDE either accepts the changes as requested by the committee or rejects the decision of the committee. If a committee decision is rejected, PDE provides an alternate decision for DRC to implement. During this cleanup process, PDE also interprets the report from the Bias, Fairness, and Sensitivity Committee meetings and subsequently applies changes to test items and passages. DRC item and test development specialists then apply the changes to the test items and passages per PDE’s decisions.</p>
<p>17. Submit Field Test Items for Final Sign-Off</p>	<p>PDE-approved changes are applied to the items, scenarios, non-permissioned passages, prompts, etc. (Changes reflect PDE’s arbitration of the committee decisions.) Once all revisions to the items, non-permissioned passage text, and/or the art used by test items and passages are completed, the test items are submitted to PDE for final review and sign-off. (Changes requested to permissioned passages are sought from the publisher of record, and, if approved by the copyright holders, changes are implemented.) [PDE’s approval process for field test items generally occurs simultaneously with PDE’s approval of the core test forms. See step 25.]</p>
<p style="text-align: center;"><i>To follow the path for new field test items, skip to step 22.</i></p> <p style="text-align: center;"><i>OR</i></p> <p style="text-align: center;"><i>To follow the chronological test development path, continue with step 18.</i></p>	

Item and Test Development Process for the PSSA

Step	Description
18. Review Results of the Field Test	<p>Following the administration of a field test form and the subsequent ranging and field test scoring processes for field test items, performance data for all field test items are analyzed by DRC psychometricians and test development specialists. Test item performance data that meet certain triggering criteria are flagged for additional reviews by test development specialists. Flagged field-test items with extreme performance data are considered psychometrically unusable and are removed from future operational consideration. Field-test items with marginal performance data are prepared for the Field Test Item Data Review meeting.</p>
19. Prepare for Field Test Item Data Review	<p>Test development specialists prepare the items and stimulus passages for review by the Field Test Item Data Review Committee (which consists of Pennsylvania educators). Psychometricians also prepare training materials needed for training committee members to review items for their performance. All training materials and other ancillary materials (e.g. agendas, presentations, etc.) are submitted to PDE for review and approval. Invitations are also sent to Pennsylvania educators from PDE-approved committee lists.</p>
20. Conduct Field Test Item Data Review	<p>Committees of Pennsylvania educators review the performance data of flagged field-test items. Psychometricians present training on how to review field-test items based on their performance data. At the Item Data Review, committee members examine the performance of the items and determine whether each field-test item is technically sound and appropriate for use on an operational PSSA test. Since test items cannot be modified at the Field Test Item Data Review, the committee can either accept an item as is, or the committee can reject the item.</p>
21. Conduct Field Test Item Data Review Reconciliation	<p>Following the conclusion of the Field Test Item Data Review Committee meetings, PDE re-examines the consensus decisions (accept or reject) suggested by the committee members during the Field Test Item Data Review Committee meetings. Test development specialists record all of PDE's follow-up decisions and changes. During this cleanup process, PDE either accepts the decisions of the data review committee, or PDE rejects the decisions of the data review committee. If a committee decision is not accepted, PDE provides an alternate decision for test development specialists to implement. All PDE-approved changes to the test items status (accepted or rejected) are incorporated into the <i>Item Development and Educational Assessment System, IDEAS</i>.</p>
22. Select Items to Fill Core, Field Test, and Equating Block Positions in Core and Field Test Forms	<p>After the PDE-approved changes to the new field-test items is completed AND the results of the prior field test have been finalized following data review, test development specialists collaborate with psychometricians to follow the Test Design Blueprints and build requirements to make the initial selection of items for core, field-test, and equating block positions for all test forms.</p>

Item and Test Development Process for the PSSA

Step	Description
23. Review Core and Equating Block Selections	After test content and psychometric requirements have been achieved for core and equating block positions, the core and equating block items are provided to PDE for review and approval. Any changes to the content of the core or equating block requested by PDE are balanced with psychometric requirements until all core and equating block positions are approved by PDE, test development specialists, and psychometricians. Test development specialists work with psychometricians and PDE staff to create scrambled versions of the core items that will appear across forms.
24. Construct Test Forms	Items, passages, and test components are assembled into forms using the form construction and typesetting function of DRC's <i>Item Development and Educational Assessment System</i> , IDEAS. Forms are reviewed internally for style and formatting requirements.
25. Review Typeset Forms	After forms are constructed in IDEAS, draft hard copies of the forms are produced and presented to PDE for review and approval. Any changes to the content of the core or equating block requested by PDE are balanced with psychometric requirements until all core and equating block positions are approved by PDE, test development specialists, and psychometricians. PDE also re-reviews all field-test items appearing in the test forms. DRC applies changes to the field-test items as required.
26. Print Test Forms	Following PDE's approval of the test forms, DRC completes a series of final proofing of all test forms. Final forms (along with ancillary materials) are then approved for printing.
27. Assemble Documentation of Test Materials	Metadata for each test item and form is documented and proofed, including: grade, form, session/section, item sequence, reporting category, Assessment Anchor, descriptor (sub-anchor), Eligible Content, number of points, item type, number of answer options, item usage, stimulus ID, etc.
<i>To follow the path for new field test items, return to step 18.</i>	

NOTE: As discussed in Chapter 3, the development for PSSA field test items in 2008 did not include reading and mathematics items or writing multiple-choice items. The items for the 2009 field test were selected from the item bank and had been developed prior to the 2008 development cycle.

Appendix D: Item and Test Development Process

Appendix E:
Item Review Cards

Appendix E: Item Review Cards

PA - Data Card continued

Administration

Name	Use Function	Rptg Flag	Seq	Period	Year	Day	Session	Calc	Model/Ext	Grade
08	FT							No		

Traditional Statistics

# In group	P-Value	Item Mean	Item/Tot Corr
14185	0.68		0.31

Fit Statistics

Outfit t	Infit t	Deg Free	Chi-sq/df	Fit
7.3	9.7			

IRT Statistics

Label	Final	Final S.E.	Preliminary	Preliminary S.E.
Location	0.08	0.02		

Distractor/Step Specific

Label	Proportion	Correlation	Avg Meas	Step Logit
A	0.16	-0.26		
B	0.13	-0.22		
C*	0.68	0.31		
D	0.03	-0.28		
OMITS	0.00			

DIF Analysis

Category	Bias Code	Num Value	N - Ref	N - Focal
MALEFEMALE	A+	0.05	7231	6948
WHITEBLACK	A-	-0.70	10419	2145

Appendix E: Item Review Cards

Appendix F:
Item Rating Sheet and Criteria Guidelines

Item Review Criteria Guidelines

The purpose of this form is to provide guidelines to the item review process in terms of item characteristics that are essential in building a fair and balanced assessment. Use these guidelines in conjunction with the Item Rating Sheet when recording your feedback on individual items.

Content Alignment		Options
Standards, Anchors, Eligible Content	Does the content of the item align with the Standard/Anchor/Eligible Content? Each item was written to assess a particular Standard/Anchor/ Eligible Content statement which is indicated on the individual Item Card. Consider the degree to which the item is, in fact, aligned with the indicated eligible content. In making this judgment, it is important to consider whether the content is aligned (e.g., do the eligible content and the item both deal with fractions) and whether the required performance is aligned (e.g., if the eligible content calls for a comparison to be made, is this reflected in the item).	HIGHER —Aligns to the higher level of the EC LOWER —Aligns to the lower level of the EC NONE —No alignment with EC

Rigor Level Alignment		Options
Grade	Is the item grade-level appropriate? Is the content consistent with the experiences of a student at the grade level assessed? Is the challenge level appropriate for the grade?	ABOVE Grade Level AT Grade Level BELOW Grade Level
Difficulty	Do you agree with the item's difficulty rating? Item Difficulty is indicated as Easy, Medium, and Hard? Is your rating in agreement with the difficulty rating on the Item Form?	HARD MEDIUM EASY
Depth of Knowledge	Depth of Knowledge is based on the alignment work of Norman Webb. Rate each item based on the cognitive demand, using the following levels: <ol style="list-style-type: none"> 1. Recall – Recall of a fact, information, or procedure. 2. Basic Application of Skill or Concept – Use of information, conceptual knowledge, procedures, two or more steps, etc. 3. Strategic Thinking – Requires reasoning, developing a plan or sequence of steps; has some complexity; more than one possible answer. 4. Extended Thinking – Requires an investigation, time to think and process multiple conditions of the problem or task, and more than 10 minutes to do non-routine manipulations. (This level is generally not assessed in on-demand assessments.) 	4 = Extended Thinking 3 = Strategic Thinking 2 = Basic Application 1 = Recall

Appendix F: Item Rating Sheet and Criteria Guidelines

Source of Challenge	<p>Is the source of challenge appropriately targeted to the content? The hardest part of the item (i.e., source of challenge) should be the content that is targeted. For example, in mathematics, the mathematics should be the major source of challenge rather than the wording or graphic. Students should not give an incorrect answer to a mathematics item because the reading level is too high or a graphic is flawed. Conversely, students should not give correct answers for reasons such as prior knowledge that make the answer to the question obvious (e.g., if the question asks which country has the largest population and students are to read a graph that includes China, there is no need to read the graph to answer the question).</p>	<p>Y = Yes N = No</p>
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Technical Design		Options
Correct Answer	Is there one clear, correct answer? There should be no other answer that “could” be correct. CAUTION: This does not mean that “good” distractors are unfair.	<p>Y = Yes N = No</p>
Distractors	Are distractors fair and appropriate? Distractors that are appropriate offer students reasonable choices that can be arrived at by making common errors. There should be no distractors that make no sense at all. It should be possible to examine each option and to reason how a student with some deficiency in knowledge or skill could choose it. The distractors should be formatted according to acceptable standards of test construction (e.g., a phrase that is common to each distractor should be placed in the stem).	<p>Y = Yes N = No</p>
Graphics	Are the graphics clear and accurate?	<p>Y = Yes N = No</p>

Universal Design		Options
Language Demand	Is language clear, well-formatted, and precise? Does the item use correct terminology for the content area? In order for all students to enter into the questions of the assessment, they must be able to understand them. If the items are formatted poorly, use unnecessarily complex words or phrases, or use figures or layouts that are difficult to understand, some students will give incorrect answers due to these factors rather than the content that is being assessed.	<p>Y = Yes N = No</p>
Bias	Is the item free of bias? All students will not be able to enter into the assessment if bias considerations are not resolved. Does the item contain clear bias problems? <i>A thorough, independent bias review</i> (separate from this meeting) <i>will be completed for all items.</i>	<p>Y = Yes N = No</p>

Status		Options
Acceptance Status	This is an overall judgment about the item. Based on the consensus of the committee, indicate whether the item was approved without revision to the content of the item or whether the item was accepted by the committee after revision of the content of the item. If there is a dissenting view (opposed to the committee consensus), record a brief explanation of the dissenting view on the back of the Item Rating Sheet.	<p>—Approved as is —Accepted with suggested revisions —Dissenting View</p>

Appendix F: Item Rating Sheet and Criteria Guidelines

NOTES:

- € If you leave a box blank on the Item Rating Sheet, it will be recorded to indicate that you did not have any specific feedback for that item or issue.
- € If you object to the consensus of the committee, please note this on the item rating sheet and then record a brief explanation of the dissenting view on the back of the Item Rating Sheet.
- € **Do NOT remove any items from the item binder at any time.**
- € You must sign your Item Rating Sheet.

Appendix G:

Item Statistics

Column Heading	Definition
PubID	Public ID
Form	Form
Std	Standard
DOK	Depth of knowledge
N	N
PVal	P-Value
P()	Proportion selecting given response (-=blank)
PtBis	Point biserial
PT()	Point biserial of repsonse
Meas	Rasch item measure
MeasSE	Rasch item measure standard error
t	t fit statistic
MS	Mean square fit statistic
M/F	Male/female DIF statistic
W/B	White/black DIF statistic

Appendix G: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	PubID	Form	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B	W/H
MATH	3	360819	0	B.1.2.2	2	126454	0.87	0.03	0.05	0.87	0.04	0.01	0.47	-0.29	-0.23	0.47	-0.25	0.2290	0.0092	-9.9	0.9	-1.5	1.0			
MATH	3	677403	0	A.1.2.1	1	126454	0.84	0.84	0.09	0.06	0.01	0.00	0.37	0.37	-0.13	-0.34	-0.16	0.5595	0.0085	9.9	1.1	7.3	1.1			
MATH	3	628439	0	A.1.1.2	1	126454	0.87	0.87	0.04	0.04	0.04	0.00	0.43	0.43	-0.22	-0.23	-0.25	0.2081	0.0093	-1.5	1.0	-9.9	0.8			
MATH	3	189908	0	A.2.1.2	1	126454	0.83	0.08	0.83	0.05	0.04	0.00	0.47	-0.28	0.47	-0.25	-0.23	0.5759	0.0085	-6.6	1.0	-9.9	0.8			
MATH	3	995654	0	A.3.1.2	2	126454	0.77	0.17	0.02	0.77	0.03	0.01	0.60	-0.53	-0.17	0.60	-0.14	1.1730	0.0075	-9.9	0.8	-9.9	0.7			
MATH	3	470154	0	D.2.1.1	2	126454	0.88	0.88	0.06	0.03	0.02	0.01	0.46	0.46	-0.28	-0.25	-0.24	0.0531	0.0097	-6.2	1.0	-9.9	0.8			
MATH	3	119254	0	A.1.2.2	1	126454	0.71	0.09	0.71	0.04	0.15	0.00	0.39	-0.31	0.39	-0.09	-0.18	1.3951	0.0072	9.9	1.2	9.9	1.2			
MATH	3	848920	0	A.2.1.3	1	126454	0.69	0.08	0.06	0.69	0.16	0.01	0.55	-0.31	-0.17	0.55	-0.33	1.5742	0.0071	-9.9	0.9	-9.9	0.8			
MATH	3	626900	0	A.1.1.1	1	126454	0.89	0.03	0.04	0.89	0.03	0.00	0.49	-0.31	-0.28	0.49	-0.23	-0.0677	0.0100	-9.9	0.9	-9.9	0.8			
MATH	3	479020	0	D.1.1.1	2	126454	0.86	0.03	0.02	0.86	0.09	0.00	0.33	-0.17	-0.14	0.33	-0.22	0.2647	0.0091	9.9	1.2	9.9	1.3			
MATH	3	589935	0	A.1.1.2	1	126454	0.82	0.06	0.05	0.06	0.82	0.00	0.54	-0.27	-0.32	-0.28	0.54	0.6778	0.0083	-9.9	0.9	-9.9	0.7			
MATH	3	862812	0	A.2.1.2	1	126454	0.85	0.09	0.85	0.01	0.03	0.01	0.39	-0.27	0.39	-0.15	-0.23	0.2944	0.0091	9.9	1.1	4.5	1.1			
MATH	3	351133	0	D.1.1.2	2	126454	0.78	0.08	0.11	0.78	0.03	0.01	0.49	-0.25	-0.27	0.49	-0.28	1.0711	0.0076	-9.9	1.0	-9.9	0.8			
MATH	3	917704	0	A.1.1.3	1	126454	0.86	0.86	0.03	0.08	0.01	0.01	0.42	0.42	-0.16	-0.31	-0.23	0.3047	0.0091	-1.5	1.0	1.4	1.0			
MATH	3	420118	0	A.2.1.3	2	126454	0.77	0.09	0.06	0.08	0.77	0.01	0.54	-0.36	-0.26	-0.22	0.54	1.1374	0.0076	-9.9	0.9	-9.9	0.8			
MATH	3	797010	0	A.3.1.1	1	126454	0.75	0.75	0.16	0.05	0.03	0.01	0.46	0.46	-0.32	-0.21	-0.18	1.2152	0.0075	4.0	1.0	4.2	1.0			
MATH	3	576986	0	D.2.2.1	1	126454	0.90	0.04	0.90	0.03	0.02	0.01	0.48	-0.28	0.48	-0.26	-0.28	-0.0299	0.0099	-9.9	0.9	-9.9	0.6			
MATH	3	726789	0	B.1.1.1	1	126454	0.84	0.84	0.04	0.04	0.07	0.00	0.51	0.51	-0.25	-0.38	-0.21	0.4567	0.0087	-9.9	0.9	-9.9	0.8			
MATH	3	806147	0	B.1.2.1	1	126454	0.72	0.06	0.72	0.02	0.20	0.00	0.24	-0.14	0.24	-0.22	-0.10	1.3169	0.0073	9.9	1.3	9.9	1.6			
MATH	3	490727	0	C.1.1.2	1	126454	0.94	0.02	0.02	0.01	0.94	0.00	0.36	-0.22	-0.21	-0.18	0.36	-0.9646	0.0134	3.7	1.0	-3.9	0.9			
MATH	3	889503	0	C.1.1.2	1	126454	0.88	0.02	0.01	0.88	0.09	0.00	0.23	-0.14	-0.18	0.23	-0.12	0.0483	0.0097	9.9	1.2	9.9	1.7			
MATH	3	901152	0	C.1.1.1	1	126454	0.69	0.14	0.08	0.69	0.08	0.01	0.42	-0.19	-0.21	0.42	-0.25	1.5655	0.0071	9.9	1.1	9.9	1.1			
MATH	3	788651	0	E.1.2.2	2	126454	0.82	0.07	0.82	0.07	0.03	0.00	0.51	-0.36	0.51	-0.25	-0.21	0.6721	0.0083	-9.9	0.9	-9.9	0.8			
MATH	3	889604	0	D.2.1.1	2	126454	0.55	0.19	0.06	0.55	0.21	0.00	0.39	-0.24	-0.24	0.39	-0.10	2.4967	0.0065	9.9	1.1	9.9	1.1			
MATH	3	137602	0	C.2.1.2	1	126454	0.78	0.07	0.78	0.07	0.06	0.00	0.40	-0.22	0.40	-0.22	-0.19	0.8930	0.0079	9.9	1.1	9.9	1.1			
MATH	3	120420	0	C.2.1.2	1	126454	0.84	0.06	0.84	0.08	0.02	0.00	0.43	-0.30	0.43	-0.22	-0.19	0.5347	0.0086	3.2	1.0	-5.1	0.9			
MATH	3	189378	0	A.3.2.1	2	126454	0.73	0.05	0.13	0.73	0.09	0.00	0.48	-0.27	-0.29	0.48	-0.20	1.3434	0.0073	-3.5	1.0	-4.0	1.0			
MATH	3	165929	0	D.2.2.2	1	126454	0.64	0.23	0.64	0.06	0.07	0.01	0.41	-0.33	0.41	-0.13	-0.11	1.8969	0.0068	9.9	1.1	9.9	1.1			
MATH	3	100335	0	A.1.3.2	2	126454	0.82	0.09	0.05	0.04	0.82	0.00	0.58	-0.44	-0.28	-0.18	0.58	0.7200	0.0082	-9.9	0.8	-9.9	0.7			
MATH	3	140556	0	B.1.1.2	2	126454	0.64	0.04	0.64	0.04	0.27	0.01	0.43	-0.23	0.43	-0.22	-0.26	2.0963	0.0067	-1.3	1.0	-0.4	1.0			
MATH	3	819274	0	E.1.1.1	2	126454	0.51	0.51	0.11	0.22	0.16	0.00	0.37	0.37	-0.37	-0.09	-0.08	2.6652	0.0065	9.9	1.1	9.9	1.2			
MATH	3	584563	0	E.1.1.1	2	126454	0.93	0.05	0.93	0.01	0.01	0.00	0.43	-0.38	0.43	-0.13	-0.14	-0.6179	0.0119	-9.9	0.9	-8.2	0.8			
MATH	3	958343	0	A.1.3.3	2	126454	0.66	0.19	0.08	0.07	0.66	0.00	0.45	-0.24	-0.23	-0.24	0.45	1.8764	0.0068	-6.8	1.0	-9.9	0.9			
MATH	3	875088	0	C.2.1.2	2	126454	0.90	0.90	0.02	0.04	0.03	0.00	0.38	0.38	-0.19	-0.21	-0.22	-0.2290	0.0105	3.0	1.0	-3.9	0.9			
MATH	3	768892	0	C.2.1.2	2	126454	0.93	0.03	0.01	0.03	0.93	0.00	0.35	-0.25	-0.13	-0.19	0.35	-0.5020	0.0114	-4.5	1.0	-9.3	0.8			
MATH	3	908301	0	E.1.1.2	1	126454	0.75	0.08	0.75	0.04	0.13	0.00	0.45	-0.28	0.45	-0.21	-0.23	1.2524	0.0074	1.1	1.0	-9.9	0.9			
MATH	3	811407	0	E.1.1.2	2	126454	0.89	0.89	0.01	0.06	0.03	0.00	0.42	0.42	-0.14	-0.35	-0.18	0.0330	0.0097	-9.9	0.9	-7.1	0.9			
MATH	3	335878	0	A.3.1.1	2	126454	0.91	0.01	0.02	0.06	0.91	0.00	0.42	-0.14	-0.24	-0.30	0.42	-0.2412	0.0105	-9.9	0.9	-9.9	0.8			
MATH	3	678865	0	B.2.2.1	1	126454	0.85	0.85	0.07	0.02	0.05	0.01	0.43	0.43	-0.32	-0.23	-0.17	0.4077	0.0088	3.5	1.0	8.8	1.1			
MATH	3	690058	0	A.3.1.2	2	126454	0.83	0.01	0.12	0.03	0.83	0.01	0.54	-0.20	-0.45	-0.17	0.54	0.5421	0.0085	-9.9	0.9	-9.9	0.7			
MATH	3	209871	0	A.1.1.5	1	126454	0.95	0.01	0.02	0.02	0.95	0.00	0.40	-0.25	-0.22	-0.22	0.40	-0.9291	0.0132	-9.9	0.9	-9.9	0.7			
MATH	3	301157	0	C.1.1.1	1	126454	0.63	0.00	0.63	0.11	0.25	0.00	0.41	-0.16	0.41	-0.20	-0.28	2.0410	0.0067	9.9	1.1	9.9	1.1			
MATH	3	549331	0	A.1.1.4	1	126454	0.94	0.94	0.02	0.02	0.02	0.00	0.47	0.47	-0.24	-0.25	-0.31	-0.9033	0.0131	-5.8	0.9	-9.9	0.7			
MATH	3	145198	0	A.1.1.4	1	126454	0.90	0.02	0.04	0.04	0.90	0.00	0.48	-0.26	-0.26	-0.28	0.48	-0.1137	0.0101	-9.9	0.9	-9.9	0.8			
MATH	3	964044	0	A.1.1.1	1	126454	0.94	0.94	0.01	0.02	0.02	0.01	0.39	0.39	-0.21	-0.23	-0.24	-0.8221	0.0127	-9.9	0.9	-8.2	0.8			
MATH	3	560007	0	A.2.1.1	1	126454	0.84	0.06	0.04	0.06	0.84	0.01	0.54	-0.40	-0.22	-0.26	0.54	0.5562	0.0085	-9.9	0.9	-9.9	0.7			
MATH	3	806883	0	A.1.2.1	1	126454	0.86	0.00	0.86	0.03	0.10	0.00	0.47	-0.14	0.47	-0.16	-0.41	0.3206	0.0090	-9.9	1.0	-9.9	0.8			

Appendix G: Item Statistics Multiple Choice

MATH	3	444204	0	C.1.1.2	1	126454	0.94	0.02	0.02	0.94	0.03	0.00	0.36	-0.23	-0.22	0.36	-0.18	-0.6619	0.0120	-8.6	0.9	-5.1	0.9				
MATH	3	995660	0	A.1.1.3	1	126454	0.80	0.09	0.04	0.80	0.06	0.01	0.48	-0.29	-0.24	0.48	-0.24	0.8992	0.0079	-9.9	0.9	-9.9	0.8				
MATH	3	470291	0	B.1.2.2	1	126454	0.91	0.03	0.91	0.02	0.04	0.00	0.46	-0.30	0.46	-0.23	-0.24	-0.3133	0.0108	-5.8	1.0	-6.7	0.9				
MATH	3	533007	0	A.3.1.3	2	126454	0.87	0.03	0.04	0.05	0.87	0.01	0.42	-0.26	-0.20	-0.25	0.42	0.2280	0.0092	-3.6	1.0	-8.2	0.9				
MATH	3	135305	0	A.3.1.3	2	126454	0.94	0.02	0.94	0.02	0.02	0.01	0.40	-0.22	0.40	-0.21	-0.25	-0.8555	0.0129	-6.2	0.9	-9.7	0.8				
MATH	3	829523	0	D.2.1.1	2	126454	0.91	0.03	0.91	0.03	0.02	0.01	0.48	-0.31	0.48	-0.26	-0.23	-0.5164	0.0115	6.6	1.1	-7.4	0.9				
MATH	3	868562	0	A.1.1.5	1	126454	0.95	0.02	0.95	0.01	0.01	0.00	0.41	-0.22	0.41	-0.24	-0.26	-0.9365	0.0133	-9.9	0.9	-7.2	0.8				
MATH	3	994658	0	A.1.3.2	1	126454	0.61	0.26	0.61	0.04	0.08	0.01	0.44	-0.12	0.44	-0.29	-0.37	2.1691	0.0066	4.5	1.0	5.9	1.0				
MATH	3	174318	0	A.1.3.1	1	126454	0.93	0.01	0.04	0.93	0.02	0.00	0.47	-0.25	-0.28	0.47	-0.26	-0.5995	0.0118	-9.9	0.8	-9.9	0.6				
MATH	3	101515	0	D.2.1.2	2	126454	0.87	0.03	0.87	0.03	0.06	0.01	0.50	-0.23	0.50	-0.27	-0.32	0.0956	0.0096	-5.2	1.0	-9.9	0.8				
MATH	3	810701	0	D.2.1.2	2	126454	0.93	0.01	0.04	0.93	0.02	0.00	0.32	-0.17	-0.23	0.32	-0.14	-0.7415	0.0124	3.9	1.0	7.0	1.2				
MATH	3	495505	0	C.1.1.1	1	126454	0.71	0.00	0.25	0.71	0.04	0.00	0.41	-0.12	-0.35	0.41	-0.14	1.5162	0.0071	9.9	1.1	9.9	1.1				
MATH	3	466481	0	D.1.1.2	2	126454	0.88	0.88	0.03	0.04	0.04	0.00	0.51	0.51	-0.34	-0.27	-0.25	0.0088	0.0098	-9.9	0.9	-9.9	0.7				
MATH	3	178999	1	A.1.1.3	1	12846	0.90	0.05	0.02	0.90	0.01	0.01	0.43	-0.29	-0.25	0.43	-0.22	-0.2903	0.0328	-2.4	1.0	-2.1	0.9				
MATH	3	421694	1	D.1.1.2	2	12880	0.88	0.05	0.88	0.02	0.02	0.02	0.53	-0.33	0.53	-0.28	-0.31	-0.0255	0.0303	-7.5	0.9	-3.4	0.8				
MATH	3	626258	1	B-O.3.1	2	6564	0.52	0.16	0.52	0.13	0.18	0.01	0.44	-0.24	0.44	-0.08	-0.27	2.5072	0.0288	1.2	1.0	4.1	1.1	A+	A-	A-	
MATH	3	626928	1	D-M.3.1	1	6564	0.89	0.04	0.03	0.89	0.03	0.00	0.28	-0.20	-0.11	0.28	-0.13	-0.1433	0.0429	5.0	1.1	5.2	1.5	A+	A-	A-	
MATH	3	100288	1	B-O.3.1	2	6564	0.72	0.72	0.11	0.07	0.09	0.01	0.37	0.37	-0.11	-0.19	-0.28	1.3024	0.0317	8.8	1.2	6.8	1.3	A+	A-	A-	
MATH	3	372027	1	D-M.1.3	2	6564	0.51	0.51	0.08	0.11	0.29	0.00	0.42	0.42	-0.13	-0.15	-0.28	2.5519	0.0287	1.1	1.0	6.8	1.2	A+	A+	A-	
MATH	3	404868	1	A-F.1.1	1	6564	0.10	0.12	0.10	0.61	0.17	0.01	0.23	-0.04	0.23	-0.21	0.13	5.5423	0.0459	-2.4	0.9	9.9	2.2	B-	B-	A-	
MATH	3	248473	1	A-T.1.1	2	6564	0.61	0.12	0.11	0.61	0.15	0.01	0.39	-0.10	-0.12	0.39	-0.32	1.9797	0.0294	9.6	1.1	8.3	1.2	A-	A-	A-	
MATH	3	345084	1	C-G.1.1	1	6564	0.43	0.43	0.12	0.15	0.28	0.01	0.23	0.23	-0.19	-0.16	0.02	2.9872	0.0289	9.9	1.3	9.9	1.7	A-	A-	A-	
MATH	3	625403	1	A-T.1.1	2	6564	0.37	0.12	0.38	0.12	0.37	0.00	0.33	-0.21	-0.09	-0.13	0.33	3.3305	0.0295	3.1	1.0	9.9	1.5	A+	A+	A+	
MATH	3	270599	1	B-O.1.2	1	6564	0.72	0.16	0.06	0.72	0.05	0.01	0.57	-0.53	-0.15	0.57	-0.09	1.3504	0.0315	-8.0	0.9	-5.3	0.8	A+	A+	A-	
MATH	3	708759	1	D-M.1.1	2	6564	0.69	0.06	0.10	0.15	0.69	0.01	0.48	-0.34	-0.30	-0.14	0.48	1.5014	0.0309	0.5	1.0	-1.9	0.9	A-	A-	A-	
MATH	3	453466	2	A.1.1.2	1	12729	0.76	0.11	0.76	0.06	0.06	0.01	0.56	-0.32	0.56	-0.26	-0.32	1.1529	0.0236	-9.9	0.9	-9.9	0.8				
MATH	3	950572	2	C.1.1.1	1	12687	0.81	0.08	0.07	0.81	0.03	0.01	0.34	-0.11	-0.22	0.34	-0.25	0.7002	0.0258	9.5	1.2	4.7	1.2				
MATH	3	127101	2	D-M.1.2	1	6378	0.74	0.74	0.16	0.07	0.02	0.01	0.28	0.28	-0.19	-0.03	-0.29	1.2596	0.0325	9.9	1.3	9.9	1.5	A-	A-	A-	
MATH	3	232852	2	D-M.2.1	2	6378	0.47	0.13	0.24	0.16	0.47	0.00	0.36	-0.25	-0.07	-0.17	0.36	2.8078	0.0287	6.6	1.1	9.1	1.2	A+	A-	A-	
MATH	3	661527	2	D-M.1.3	1	6378	0.70	0.03	0.07	0.70	0.20	0.00	0.47	-0.20	-0.35	0.47	-0.23	1.5187	0.0313	0.5	1.0	-0.7	1.0	A-	B-	B-	
MATH	3	609636	2	A-F.1.1	1	6378	0.89	0.08	0.89	0.01	0.02	0.00	0.45	-0.40	0.45	-0.12	-0.17	-0.0349	0.0433	-2.6	0.9	-1.4	0.9	A+	A-	A+	
MATH	3	144821	2	B-O.2.1	1	6378	0.53	0.20	0.10	0.15	0.53	0.00	0.35	-0.31	-0.07	-0.08	0.35	2.4761	0.0288	9.2	1.1	9.4	1.2	A-	A-	A-	
MATH	3	913778	2	B-O.3.1	2	6378	0.28	0.28	0.26	0.17	0.28	0.01	0.00	0.12	0.02	-0.16	0.00	3.8543	0.0309	9.9	1.5	9.9	2.6	A-	A-	A-	
MATH	3	233857	2	B-O.3.1	2	6378	0.56	0.17	0.56	0.16	0.10	0.01	0.42	-0.21	0.42	-0.22	-0.14	2.3497	0.0290	2.6	1.0	2.9	1.1	A-	A-	A-	
MATH	3	543203	2	A-T.1.1	2	6378	0.06	0.63	0.10	0.06	0.21	0.00	-0.05	0.25	0.07	-0.05	-0.32	5.9789	0.0542	3.0	1.1	9.9	6.3	A-	A+	A+	
MATH	3	379100	2	C-G.1.1	2	6378	0.18	0.60	0.11	0.18	0.11	0.00	0.16	-0.07	0.00	0.16	-0.08	4.6213	0.0357	5.8	1.1	9.9	2.1	A-	A-	A-	
MATH	3	302708	2	A-T.1.1	2	6378	0.36	0.16	0.36	0.36	0.11	0.01	0.36	-0.18	0.36	-0.09	-0.19	3.4207	0.0295	-1.1	1.0	9.9	1.3	A+	A-	A-	
MATH	3	194241	3	A.1.2.1	1	18959	0.92	0.92	0.07	0.00	0.01	0.00	0.35	0.35	-0.30	-0.13	-0.13	-0.4381	0.0289	1.5	1.0	1.8	1.1				
MATH	3	118310	3	D.1.1.1	2	12640	0.89	0.05	0.89	0.03	0.02	0.01	0.46	-0.29	0.46	-0.23	-0.25	-0.0710	0.0317	-3.3	0.9	-3.8	0.8				
MATH	3	991230	3	B-O.3.1	2	6315	0.52	0.30	0.52	0.12	0.04	0.01	0.15	0.03	0.15	-0.08	-0.28	2.5784	0.0290	9.9	1.4	9.9	1.6	A+	A-	A-	
MATH	3	767532	3	D-M.1.3	1	6315	0.56	0.29	0.09	0.56	0.05	0.00	0.40	-0.04	-0.36	0.40	-0.35	2.3687	0.0292	4.5	1.1	5.5	1.1	B-	A-	A-	
MATH	3	609706	3	B-O.3.1	2	6315	0.73	0.12	0.05	0.09	0.73	0.01	0.42	-0.24	-0.17	-0.24	0.42	1.3557	0.0323	3.9	1.1	1.3	1.0	A-	A+	A+	
MATH	3	325431	3	D-M.2.1	2	6315	0.92	0.92	0.03	0.02	0.03	0.01	0.41	0.41	-0.23	-0.18	-0.29	-0.4554	0.0497	-2.0	0.9	-0.7	0.9	A+	A-	A-	
MATH	3	922952	3	A-F.1.1	1	6315	0.41	0.10	0.15	0.33	0.41	0.01	0.25	-0.25	-0.14	0.03	0.25	3.1878	0.0293	9.9	1.2	9.9	1.6	A-	A-	A+	
MATH	3	138465	3	D-M.1.1	2	6315	0.74	0.07	0.04	0.74	0.15	0.00	0.43	-0.26	-0.18	0.43	-0.24	1.3017	0.0326	2.6	1.1	-0.2	1.0	A-	B-	A-	
MATH	3	810292	3	A-T.1.1	2	6315	0.51	0.12	0.51	0.18	0.18	0.00	0.41	-0.18	0.41	-0.19	-0.19	2.6314	0.0290	3.1	1.0	6.4	1.1	A-	A-	A-	
MATH	3	954321	3	B-O.1.2	2	6315	0.48	0.26	0.14	0.48	0.11	0.00	0.32	-0.01	-0.31	0.32	-0.14	2.7962	0.0289	9.8	1.1	9.9	1.3	A+	A-	A+	
MATH	3	675990	3	A-T.1.1	2	6315	0.52	0.07	0.52	0.33	0.07	0.01	0.35	-0.27	0.35	-0.16	-0.11	2.5843	0.0290	7.4	1.1	9.9	1.3	A-	A-	A-	
MATH	3	570355	3	C-G.1.1	1	6315	0.43	0.12	0.43	0.23	0.22	0.01	0.28	-0.15	0.28	0.05	-0.27	3.0868	0.0291	9.9	1.2	9.9	1.5	A+	A-	A-	
MATH	3	477222	4	A.2.1.2	1	12606	0.85	0.07	0.85	0.03	0.05	0.00	0.46	-0.27	0.46	-0.23	-0.26	0.4059	0.0278	-1.2	1.0	-5.8	0.8				
MATH	3	684367	4	B-O.2.2	1	6309	0.58	0.10	0.58	0.23	0.07	0.01	0.43	-0.27	0.43	-0.26	-0.09	2.2272	0.0294	0.9	1.0	1.2	1.0	A-	A+	A-	

Appendix G: Item Statistics Multiple Choice

MATH	3	591630	4	A-F.1.1	1	6309	0.29	0.04	0.18	0.29	0.49	0.00	0.28	-0.04	0.12	0.28	-0.33	3.8378	0.0311	2.1	1.0	9.9	1.4	A-	A-	A-
MATH	3	921534	4	B-O.3.1	2	6309	0.13	0.19	0.58	0.13	0.09	0.01	-0.09	-0.23	0.33	-0.09	-0.12	5.0197	0.0401	9.9	1.4	9.9	4.4	A-	A+	A+
MATH	3	182111	4	D-M.2.1	2	6309	0.31	0.35	0.31	0.27	0.05	0.01	0.25	-0.26	0.25	0.15	-0.23	3.6772	0.0305	9.9	1.1	9.9	1.4	A+	A-	A-
MATH	3	731663	4	B-O.1.1	1	6309	0.66	0.24	0.66	0.05	0.04	0.01	0.53	-0.46	0.53	-0.09	-0.15	1.7589	0.0307	-6.1	0.9	-5.8	0.9	A-	A-	A-
MATH	3	580993	4	C-G.1.1	1	6309	0.43	0.09	0.43	0.01	0.47	0.00	0.20	-0.13	0.20	-0.19	-0.08	3.0362	0.0290	9.9	1.2	9.9	1.7	A-	A-	A-
MATH	3	301855	4	D-M.3.1	2	6309	0.31	0.31	0.15	0.22	0.31	0.00	0.16	-0.06	-0.10	-0.01	0.16	3.6958	0.0305	9.9	1.2	9.9	2.1	A-	A+	A+
MATH	3	516028	4	D-M.1.2	2	6309	0.48	0.04	0.03	0.48	0.45	0.00	0.27	-0.24	-0.16	0.27	-0.11	2.7916	0.0289	9.9	1.2	9.9	1.4	A-	A-	A-
MATH	3	828024	4	D-M.1.2	1	6309	0.27	0.15	0.31	0.26	0.27	0.01	0.16	-0.23	-0.10	0.13	0.16	3.9373	0.0316	9.9	1.2	9.9	2.0	A-	A-	A-
MATH	3	141937	4	A-T.1.1	2	6309	0.56	0.13	0.07	0.24	0.56	0.00	0.44	-0.17	-0.10	-0.32	0.44	2.3696	0.0292	-0.9	1.0	3.4	1.1	A-	A-	A-
MATH	3	810070	5	A.3.2.1	2	12616	0.82	0.04	0.09	0.82	0.04	0.01	0.56	-0.31	-0.34	0.56	-0.25	0.7088	0.0261	-8.9	0.9	-8.9	0.7			
MATH	3	809659	5	A.1.3.2	2	18896	0.65	0.11	0.11	0.13	0.65	0.00	0.41	-0.21	-0.31	-0.10	0.41	1.8715	0.0176	7.9	1.1	8.2	1.1			
MATH	3	314664	5	B-O.1.2	1	6334	0.61	0.16	0.08	0.61	0.15	0.00	0.42	-0.20	-0.06	0.42	-0.33	2.0675	0.0299	3.5	1.1	1.7	1.0	A+	A-	A-
MATH	3	942821	5	D-M.1.1	2	6334	0.63	0.13	0.63	0.13	0.11	0.00	0.39	-0.33	0.39	-0.10	-0.14	1.9791	0.0301	7.0	1.1	3.6	1.1	A-	A-	A-
MATH	3	184818	5	D-M.2.1	2	6334	0.33	0.21	0.33	0.22	0.23	0.00	0.25	-0.05	0.25	0.02	-0.24	3.6260	0.0305	9.9	1.2	9.9	1.6	A-	B-	A-
MATH	3	149472	5	A-F.1.1	1	6334	0.78	0.11	0.04	0.78	0.04	0.02	0.31	-0.11	-0.27	0.31	-0.18	0.9718	0.0347	9.0	1.2	9.2	1.4	A+	A-	A-
MATH	3	822521	5	B-O.3.1	2	6334	0.16	0.30	0.16	0.12	0.41	0.00	0.13	0.02	0.13	-0.02	-0.10	4.8157	0.0378	4.9	1.1	9.9	2.7	A-	A-	A-
MATH	3	112754	5	C-G.1.1	1	6334	0.52	0.17	0.25	0.05	0.52	0.01	0.39	-0.14	-0.25	-0.12	0.39	2.5991	0.0291	3.9	1.1	6.2	1.1	A+	A-	A-
MATH	3	668953	5	A-T.1.1	1	6334	0.49	0.20	0.49	0.14	0.16	0.01	0.44	-0.17	0.44	-0.14	-0.27	2.7436	0.0291	-4.2	1.0	2.2	1.1	A-	A-	B-
MATH	3	241634	5	B-O.2.1	1	6334	0.75	0.05	0.08	0.75	0.11	0.01	0.39	-0.25	-0.29	0.39	-0.10	1.2292	0.0332	5.3	1.1	1.7	1.1	A-	A-	A+
MATH	3	976806	5	D-M.4.1	2	6334	0.34	0.18	0.16	0.33	0.34	0.01	0.30	-0.09	-0.07	-0.17	0.30	3.5999	0.0304	3.5	1.1	9.9	1.5	A-	A-	A-
MATH	3	326026	5	C-G.1.1	1	6334	0.69	0.69	0.13	0.10	0.08	0.00	0.31	0.31	-0.09	-0.19	-0.19	1.5930	0.0314	9.9	1.2	9.5	1.3	A+	A-	A-
MATH	3	733036	6	D.2.2.2	1	18946	0.88	0.07	0.02	0.88	0.01	0.02	0.35	-0.22	-0.21	0.35	-0.16	0.0669	0.0252	4.4	1.1	2.6	1.1			
MATH	3	834966	6	B-O.1.1	1	6350	0.56	0.10	0.13	0.21	0.56	0.01	0.39	-0.29	-0.21	-0.08	0.39	2.4336	0.0293	5.0	1.1	6.1	1.1	A-	A+	A+
MATH	3	336905	6	A-T.1.1	1	6350	0.81	0.09	0.04	0.81	0.05	0.00	0.50	-0.31	-0.26	0.50	-0.24	0.7573	0.0367	-2.9	0.9	-2.2	0.9	A-	B-	A-
MATH	3	406186	6	C-G.1.1	1	6350	0.45	0.28	0.45	0.05	0.20	0.01	0.27	-0.06	0.27	-0.21	-0.14	2.9955	0.0291	9.9	1.2	9.9	1.5	A-	A+	A+
MATH	3	812653	6	A-T.1.1	1	6350	0.68	0.08	0.05	0.68	0.14	0.05	0.52	-0.22	-0.20	0.52	-0.34	1.7475	0.0310	-5.0	0.9	-5.0	0.9	A-	A-	A-
MATH	3	920784	6	B-O.3.1	2	6350	0.45	0.43	0.45	0.06	0.05	0.01	0.36	-0.16	0.36	-0.18	-0.24	2.9929	0.0291	2.8	1.0	9.9	1.3	A-	A-	A-
MATH	3	447874	6	D-M.1.3	2	6350	0.64	0.16	0.64	0.11	0.08	0.01	0.54	-0.36	0.54	-0.10	-0.33	1.9643	0.0303	-7.9	0.9	-6.0	0.9	A-	A-	A-
MATH	3	387916	6	B-O.3.1	2	6350	0.21	0.18	0.31	0.30	0.21	0.00	0.11	-0.10	-0.06	0.06	0.11	4.4526	0.0343	9.9	1.3	9.9	2.6	A-	A+	A+
MATH	3	852972	6	D-M.3.1	1	6350	0.92	0.02	0.03	0.02	0.92	0.00	0.28	-0.22	-0.13	-0.14	0.28	-0.4615	0.0507	2.1	1.1	3.8	1.4	A-	A-	A-
MATH	3	852872	6	D-M.1.1	2	6350	0.74	0.10	0.74	0.10	0.06	0.01	0.51	-0.30	0.51	-0.33	-0.14	1.3557	0.0328	-3.5	0.9	-4.8	0.8	A-	A-	A-
MATH	3	407804	6	A-F.1.1	2	6350	0.15	0.58	0.15	0.10	0.17	0.01	0.05	0.15	0.05	-0.09	-0.16	5.0042	0.0390	8.6	1.2	9.9	3.7	A-	A-	A+
MATH	3	737290	7	D-M.2.1	2	6282	0.73	0.73	0.25	0.01	0.01	0.00	0.56	0.56	-0.49	-0.18	-0.15	1.4178	0.0326	-6.9	0.9	-4.8	0.9	A+	B-	A-
MATH	3	584894	7	A-T.1.1	1	6282	0.51	0.51	0.16	0.09	0.23	0.01	0.48	0.48	-0.10	-0.15	-0.38	2.6661	0.0292	-9.7	0.9	-1.3	1.0	A-	A-	A-
MATH	3	578346	7	B-O.1.1	2	6282	0.61	0.11	0.61	0.10	0.17	0.01	0.46	-0.30	0.46	-0.12	-0.24	2.1239	0.0300	-2.5	1.0	-1.2	1.0	A-	A-	A-
MATH	3	537002	7	A-F.1.1	1	6282	0.33	0.33	0.14	0.05	0.46	0.01	0.32	0.32	0.08	-0.06	-0.33	3.6596	0.0305	0.6	1.0	9.9	1.3	A-	A-	A-
MATH	3	696846	7	B-O.2.1	1	6282	0.62	0.15	0.09	0.12	0.62	0.01	0.33	-0.20	-0.12	-0.15	0.33	2.0613	0.0301	9.9	1.2	9.9	1.3	A+	A+	A-
MATH	3	275816	7	C-G.1.1	1	6282	0.49	0.49	0.17	0.04	0.29	0.00	0.23	0.23	-0.26	-0.09	0.00	2.7618	0.0292	9.9	1.2	9.9	1.5	A+	A+	A-
MATH	3	349253	7	D-M.3.1	2	6282	0.17	0.63	0.12	0.17	0.08	0.00	0.06	0.20	-0.18	0.06	-0.22	4.7806	0.0371	9.4	1.2	9.9	3.3	A-	A+	A-
MATH	3	729249	7	B-O.3.1	2	6282	0.30	0.47	0.30	0.09	0.13	0.01	0.28	-0.04	0.28	-0.08	-0.23	3.8628	0.0312	4.8	1.1	9.9	1.5	A+	B-	A-
MATH	3	365512	7	C-G.1.1	1	6282	0.25	0.49	0.09	0.16	0.25	0.00	0.21	-0.12	0.00	-0.07	0.21	4.1716	0.0327	8.1	1.1	9.9	1.8	A-	A+	A-
MATH	3	730062	7	D-M.1.2	1	6282	0.34	0.19	0.29	0.34	0.16	0.01	0.27	-0.15	-0.15	0.27	0.01	3.5773	0.0302	9.9	1.1	9.9	1.6	A-	B-	A-
MATH	3	298664	8	B.1.1.3	1	12613	0.78	0.09	0.78	0.07	0.05	0.01	0.38	-0.23	0.38	-0.19	-0.18	1.0633	0.0243	6.2	1.1	4.2	1.1			
MATH	3	660173	8	C.2.1.1	1	12631	0.92	0.01	0.02	0.92	0.05	0.00	0.34	-0.19	-0.18	0.34	-0.21	-0.3608	0.0350	1.9	1.1	-0.2	1.0			
MATH	3	583606	8	D-M.1.3	2	6306	0.61	0.11	0.61	0.17	0.10	0.01	0.46	-0.20	0.46	-0.26	-0.19	2.0990	0.0296	-2.0	1.0	-1.3	1.0	A-	A-	A-
MATH	3	996147	8	B-O.3.1	2	6306	0.65	0.16	0.10	0.09	0.65	0.00	0.44	-0.27	-0.17	-0.20	0.44	1.8707	0.0302	1.2	1.0	0.5	1.0	A+	A+	A+
MATH	3	648873	8	B-O.3.1	2	6306	0.55	0.26	0.55	0.10	0.08	0.01	0.39	-0.12	0.39	-0.20	-0.28	2.4488	0.0289	2.6	1.0	5.2	1.1	A-	A-	A-
MATH	3	859758	8	A-F.1.1	1	6306	0.41	0.06	0.42	0.41	0.10	0.01	0.18	-0.18	0.04	0.18	-0.20	3.1437	0.0290	9.9	1.3	9.9	1.6	A-	A-	A-
MATH	3	354531	8	D-M.2.1	2	6306	0.46	0.15	0.15	0.24	0.46	0.00	-0.13	0.04	0.02	0.10	-0.13	2.9028	0.0287	9.9	1.7	9.9	2.4	A+	A+	A+
MATH	3	590731	8	B-O.1.2	2	6306	0.42	0.08	0.42	0.18	0.31	0.01	0.37	-0.11	0.37	-0.33	-0.05	3.1001	0.0289	-1.2	1.0	6.3	1.1	A+	B-	A-
MATH	3	634933	8	D-M.1.1	2	6306	0.60	0.12	0.60	0.16	0.11	0.00	0.43	-0.15	0.43	-0.18	-0.29	2.1601	0.0294	-0.3	1.0	-0.1	1.0	B-	A-	A-

Appendix G: Item Statistics Multiple Choice

MATH	3	765048	8	A-T.1.1	1	6306	0.80	0.09	0.04	0.05	0.80	0.01	0.50	-0.33	-0.25	-0.22	0.50	0.8548	0.0357	-3.6	0.9	-3.6	0.9	A-	A-	A-
MATH	3	460802	8	A-T.1.1	1	6306	0.33	0.08	0.13	0.33	0.45	0.01	0.11	0.12	0.10	0.11	-0.24	3.5848	0.0300	9.9	1.3	9.9	1.9	A+	A-	A-
MATH	3	361194	8	C-G.1.1	1	6306	0.22	0.14	0.42	0.22	0.21	0.01	-0.10	-0.17	0.18	-0.10	0.04	4.2969	0.0335	9.9	1.5	9.9	3.3	A+	A+	A+
MATH	3	612936	9	A.3.1.1	2	12579	0.90	0.04	0.90	0.02	0.03	0.01	0.41	-0.17	0.41	-0.19	-0.33	-0.1014	0.0323	-0.7	1.0	1.0	1.1			
MATH	3	195514	9	A.1.3.1	1	12592	0.93	0.01	0.03	0.93	0.02	0.00	0.48	-0.25	-0.31	0.48	-0.26	-0.6414	0.0385	-5.0	0.9	-7.6	0.6			
MATH	3	519636	9	D-M.2.1	2	6285	0.89	0.89	0.04	0.04	0.04	0.00	0.53	0.53	-0.26	-0.28	-0.34	0.0546	0.0438	-5.2	0.9	-6.7	0.6	A+	B-	A-
MATH	3	512403	9	B-O.1.1	2	6285	0.68	0.04	0.09	0.18	0.68	0.01	0.46	-0.34	-0.33	-0.12	0.46	1.6876	0.0312	-0.3	1.0	-1.3	1.0	A+	A+	A+
MATH	3	559166	9	D-M.3.1	2	6285	0.30	0.19	0.46	0.30	0.05	0.00	0.00	-0.21	0.24	0.00	-0.13	3.7945	0.0308	9.9	1.5	9.9	2.5	A+	A+	A+
MATH	3	432017	9	D-M.1.2	1	6285	0.80	0.04	0.06	0.09	0.80	0.00	0.42	-0.29	-0.22	-0.17	0.42	0.8642	0.0359	1.9	1.0	2.0	1.1	B+	A-	A+
MATH	3	189461	9	C-G.1.1	1	6285	0.82	0.07	0.06	0.04	0.82	0.01	0.22	-0.18	-0.10	-0.04	0.22	0.7114	0.0372	9.9	1.3	7.5	1.4	A+	A-	A-
MATH	3	833050	9	C-G.1.1	1	6285	0.51	0.51	0.24	0.12	0.12	0.01	0.33	0.33	-0.10	-0.26	-0.09	2.6725	0.0289	8.5	1.1	9.9	1.3	A+	A-	A-
MATH	3	793369	9	A-T.1.1	1	6285	0.82	0.04	0.05	0.09	0.82	0.00	0.35	-0.21	-0.21	-0.16	0.35	0.7445	0.0369	4.9	1.1	8.7	1.5	A+	A-	A-
MATH	3	893787	9	B-O.2.2	2	6285	0.54	0.29	0.54	0.12	0.05	0.01	0.37	-0.21	0.37	-0.15	-0.17	2.5144	0.0290	5.6	1.1	7.7	1.2	A-	A+	A-
MATH	3	660127	9	A-F.1.1	2	6285	0.24	0.32	0.22	0.24	0.21	0.01	0.09	0.05	-0.06	0.09	-0.08	4.1764	0.0327	9.9	1.2	9.9	2.6	A-	A+	A-
MATH	3	926405	9	B-O.3.1	1	6285	0.38	0.11	0.38	0.40	0.10	0.01	0.08	-0.32	0.08	0.24	-0.17	3.3647	0.0295	9.9	1.4	9.9	2.0	A-	A-	A-
MATH	3	475865	10	B.2.2.1	1	18845	0.92	0.92	0.05	0.01	0.01	0.01	0.38	0.38	-0.25	-0.19	-0.22	-0.3910	0.0285	-0.5	1.0	-1.0	1.0			
MATH	3	877363	10	C.2.1.2	1	12607	0.89	0.08	0.89	0.01	0.01	0.00	0.45	-0.35	0.45	-0.19	-0.20	-0.0604	0.0318	-2.5	1.0	-3.3	0.8			
MATH	3	847052	10	A-T.1.1	1	6291	0.61	0.27	0.05	0.61	0.07	0.00	0.59	-0.48	-0.18	0.59	-0.15	2.1182	0.0301	-9.9	0.8	-9.9	0.7	A-	A-	A-
MATH	3	963736	10	B-O.2.1	1	6291	0.58	0.21	0.58	0.13	0.07	0.01	0.31	-0.19	0.31	-0.12	-0.11	2.2974	0.0298	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	3	669651	10	D-M.4.1	1	6291	0.59	0.35	0.59	0.04	0.01	0.00	0.39	-0.33	0.39	-0.06	-0.18	2.2151	0.0299	7.6	1.1	5.9	1.2	A-	A-	A-
MATH	3	872052	10	B-O.1.1	2	6291	0.51	0.14	0.22	0.51	0.11	0.01	0.31	-0.15	-0.09	0.31	-0.18	2.6552	0.0294	9.9	1.2	9.9	1.4	A-	A+	A-
MATH	3	543937	10	C-G.1.1	2	6291	0.54	0.11	0.17	0.17	0.54	0.00	0.35	-0.22	-0.16	-0.13	0.35	2.5116	0.0295	9.9	1.1	9.3	1.2	A+	A+	A-
MATH	3	706941	10	D-M.1.2	2	6291	0.11	0.56	0.21	0.11	0.11	0.00	0.15	-0.14	0.03	0.02	0.15	5.4026	0.0438	1.3	1.0	9.9	3.0	A+	A+	A+
MATH	3	938967	10	C-G.1.1	1	6291	0.93	0.93	0.03	0.01	0.02	0.01	0.35	0.35	-0.23	-0.20	-0.16	-0.5450	0.0520	-0.3	1.0	0.1	1.0	A+	A-	A+
MATH	3	268212	10	A-F.1.1	2	6291	0.14	0.41	0.22	0.14	0.23	0.00	0.21	0.12	-0.22	0.21	-0.09	5.1067	0.0404	-1.9	1.0	9.9	2.4	B-	A-	A-
MATH	3	405547	10	D-M.2.1	2	6291	0.64	0.17	0.64	0.13	0.05	0.00	0.47	-0.32	0.47	-0.15	-0.22	1.9548	0.0306	-0.3	1.0	1.3	1.0	A-	A-	A-
MATH	3	121315	10	B-O.3.1	2	6291	0.41	0.18	0.28	0.12	0.41	0.00	0.24	-0.06	-0.11	-0.14	0.24	3.2249	0.0297	9.9	1.2	9.9	1.6	A-	A-	A-
MATH	3	836818	11	A.1.2.1	1	12588	0.71	0.21	0.71	0.04	0.04	0.00	0.46	-0.25	0.46	-0.30	-0.24	1.5463	0.0226	0.9	1.0	-1.8	1.0			
MATH	3	534668	11	B-O.3.1	1	6308	0.86	0.04	0.04	0.05	0.86	0.01	0.41	-0.26	-0.22	-0.22	0.41	0.3437	0.0401	1.0	1.0	-0.6	1.0	A-	A-	A-
MATH	3	141722	11	D-M.2.1	2	6308	0.71	0.08	0.08	0.13	0.71	0.00	0.35	-0.17	-0.21	-0.18	0.35	1.4780	0.0322	8.2	1.1	4.0	1.1	A+	A-	A-
MATH	3	137823	11	C-G.1.1	1	6308	0.60	0.60	0.27	0.03	0.10	0.01	0.40	0.40	-0.10	-0.21	-0.36	2.1826	0.0299	6.7	1.1	6.1	1.2	A-	A-	A-
MATH	3	989527	11	A-F.1.1	1	6308	0.23	0.36	0.35	0.23	0.05	0.01	0.26	-0.15	-0.03	0.26	-0.12	4.2862	0.0336	0.0	1.0	9.9	1.9	A-	A-	A-
MATH	3	230070	11	B-O.1.1	1	6308	0.66	0.26	0.05	0.66	0.02	0.01	0.60	-0.51	-0.10	0.60	-0.21	1.8262	0.0308	-9.9	0.8	-9.9	0.7	A-	A-	B-
MATH	3	282637	11	C-G.1.1	1	6308	0.69	0.24	0.03	0.69	0.03	0.00	0.40	-0.31	-0.25	0.40	-0.08	1.5955	0.0317	6.5	1.1	6.0	1.2	A+	A-	A-
MATH	3	340500	11	D-M.3.1	1	6308	0.20	0.29	0.47	0.20	0.04	0.00	0.06	-0.25	0.23	0.06	-0.12	4.5217	0.0352	9.9	1.3	9.9	2.9	A+	A+	A-
MATH	3	435567	11	A-T.1.1	2	6308	0.21	0.10	0.21	0.24	0.44	0.01	0.26	-0.23	0.26	0.01	-0.07	4.4196	0.0344	1.8	1.0	9.9	1.9	A-	A-	A-
MATH	3	879152	11	B-O.2.1	2	6308	0.69	0.16	0.69	0.05	0.10	0.00	0.40	-0.30	0.40	-0.16	-0.13	1.6245	0.0315	5.9	1.1	2.8	1.1	A-	A-	A-
MATH	3	437285	11	D-M.1.2	1	6308	0.65	0.65	0.10	0.06	0.18	0.00	0.53	0.53	-0.16	-0.13	-0.44	1.8632	0.0307	-6.5	0.9	-6.0	0.9	A-	A-	A-
MATH	3	293773	12	A-T.1.1	2	6325	0.35	0.35	0.35	0.18	0.12	0.00	0.34	0.34	-0.06	-0.07	-0.32	3.5878	0.0300	1.1	1.0	9.9	1.3	A+	A-	A-
MATH	3	444742	12	B-O.1.2	1	6325	0.76	0.17	0.76	0.05	0.02	0.01	0.40	-0.22	0.40	-0.31	-0.15	1.2476	0.0335	4.4	1.1	1.8	1.1	A+	A+	A-
MATH	3	769470	12	A-T.1.1	1	6325	0.85	0.05	0.07	0.85	0.03	0.00	0.56	-0.30	-0.33	0.56	-0.29	0.4376	0.0397	-6.5	0.9	-6.8	0.7	A-	A-	B-
MATH	3	222839	12	C-G.1.1	1	6325	0.66	0.13	0.66	0.08	0.12	0.02	0.32	-0.14	0.32	-0.17	-0.16	1.8714	0.0306	9.9	1.2	9.6	1.3	A+	A-	A-
MATH	3	891002	12	B-O.3.1	2	6325	0.51	0.14	0.51	0.13	0.19	0.03	0.37	0.00	0.37	-0.31	-0.16	2.6935	0.0290	5.5	1.1	7.1	1.2	A+	B-	A-
MATH	3	753719	12	D-M.2.1	2	6325	0.65	0.27	0.65	0.04	0.04	0.00	0.41	-0.25	0.41	-0.21	-0.24	1.9220	0.0305	4.9	1.1	4.8	1.1	A+	A-	A-
MATH	3	302783	12	D-M.1.1	2	6325	0.66	0.07	0.09	0.18	0.66	0.01	0.46	-0.15	-0.19	-0.32	0.46	1.8809	0.0306	0.2	1.0	0.5	1.0	A-	A-	A-
MATH	3	760851	12	D-M.1.3	2	6325	0.62	0.14	0.62	0.10	0.13	0.01	0.50	-0.34	0.50	-0.22	-0.16	2.0922	0.0300	-5.5	0.9	-5.0	0.9	A-	A-	A-
MATH	3	119423	12	A-F.1.1	2	6325	0.78	0.78	0.14	0.05	0.03	0.00	0.25	0.25	-0.10	-0.19	-0.17	1.0663	0.0346	9.9	1.3	9.9	1.5	A+	A-	A+
MATH	3	952513	12	B-O.3.1	2	6325	0.31	0.09	0.11	0.31	0.49	0.00	0.06	-0.24	-0.31	0.06	0.27	3.7969	0.0307	9.9	1.5	9.9	2.2	A+	A-	A-
MATH	3	271524	13	D-M.1.1	1	6280	0.38	0.45	0.38	0.06	0.10	0.01	0.37	-0.20	0.37	-0.32	0.00	3.4115	0.0297	2.8	1.0	6.0	1.2	A+	A-	A-
MATH	3	618837	13	B-O.1.2	1	6280	0.82	0.13	0.82	0.02	0.01	0.01	0.56	-0.48	0.56	-0.15	-0.20	0.7663	0.0369	-6.9	0.9	-6.7	0.7	A+	A-	A-
MATH	3	850793	13	A-F.1.1	1	6280	0.83	0.12	0.01	0.03	0.83	0.01	0.40	-0.33	-0.13	-0.19	0.40	0.6253	0.0381	1.6	1.0	-2.0	0.9	A+	A-	A-

Appendix G: Item Statistics Multiple Choice

MATH	3	124834	13	C-G.1.1	1	6280	0.53	0.53	0.09	0.21	0.16	0.00	0.20	0.20	-0.22	0.00	-0.09	2.5747	0.0292	9.9	1.3	9.9	1.6	A+	A+	A-
MATH	3	426738	13	A-F.1.1	1	6280	0.82	0.05	0.82	0.08	0.05	0.00	0.38	-0.22	0.38	-0.23	-0.17	0.7320	0.0372	3.1	1.1	2.4	1.1	A+	A-	A-
MATH	3	815199	13	B-O.3.1	1	6280	0.33	0.33	0.23	0.30	0.12	0.01	0.22	0.22	-0.15	0.08	-0.22	3.6730	0.0304	9.9	1.2	9.9	1.7	A+	A-	A-
MATH	3	428165	13	A-T.1.1	1	6280	0.38	0.38	0.24	0.24	0.13	0.01	0.17	0.17	0.01	-0.10	-0.11	3.4151	0.0297	9.9	1.3	9.9	1.8	A-	A-	A-
MATH	3	990312	13	D-M.1.3	2	6280	0.68	0.18	0.08	0.06	0.68	0.00	0.56	-0.47	-0.20	-0.12	0.56	1.7780	0.0310	-9.2	0.9	-8.0	0.8	A-	A+	A-
MATH	3	417414	13	B-O.2.2	2	6280	0.60	0.09	0.07	0.60	0.23	0.00	0.41	-0.21	-0.19	0.41	-0.23	2.2359	0.0297	3.2	1.0	2.3	1.1	A+	A+	A-
MATH	3	923035	13	D-M.2.1	2	6280	0.60	0.36	0.01	0.02	0.60	0.00	0.52	-0.47	-0.17	-0.07	0.52	2.1996	0.0298	-6.8	0.9	-4.9	0.9	A+	B-	B-
MATH	3	819789	14	D-M.2.1	2	6307	0.61	0.01	0.26	0.10	0.61	0.01	0.41	-0.11	-0.12	-0.44	0.41	2.1552	0.0297	2.7	1.0	4.6	1.1	A+	B-	A-
MATH	3	547361	14	A-F.1.1	1	6307	0.55	0.34	0.55	0.04	0.06	0.00	0.43	-0.26	0.43	-0.26	-0.15	2.4586	0.0292	1.3	1.0	3.0	1.1	A-	A-	A-
MATH	3	584544	14	D-M.1.2	1	6307	0.70	0.70	0.11	0.09	0.10	0.01	0.51	0.51	-0.19	-0.25	-0.34	1.6209	0.0315	-4.6	0.9	-4.8	0.9	A-	A-	B-
MATH	3	466551	14	C-G.1.1	1	6307	0.97	0.97	0.00	0.01	0.01	0.00	0.21	0.21	-0.13	-0.10	-0.14	-1.7337	0.0826	0.1	1.0	1.9	1.4	A+	B-	A-
MATH	3	776300	14	B-O.3.1	2	6307	0.24	0.34	0.21	0.24	0.20	0.01	0.06	-0.06	-0.05	0.06	0.07	4.2009	0.0327	9.9	1.3	9.9	2.6	A-	A+	A+
MATH	3	926764	14	A-T.1.1	2	6307	0.09	0.20	0.09	0.46	0.23	0.01	0.00	-0.02	0.00	0.01	0.01	5.5719	0.0465	5.1	1.2	9.9	4.6	A-	A-	A+
MATH	3	263441	14	B-O.2.1	1	6307	0.73	0.07	0.10	0.73	0.08	0.01	0.26	-0.33	0.00	0.26	-0.08	1.3928	0.0326	9.9	1.3	9.9	1.5	A-	A-	A-
MATH	3	854469	14	C-G.1.1	2	6307	0.34	0.26	0.10	0.30	0.34	0.00	0.29	-0.33	-0.17	0.13	0.29	3.5808	0.0301	9.3	1.1	9.9	1.4	A+	A-	A-
MATH	3	939542	14	A-T.1.1	1	6307	0.88	0.04	0.04	0.03	0.88	0.00	0.49	-0.27	-0.34	-0.21	0.49	0.1014	0.0434	-4.3	0.9	-2.9	0.8	A-	A-	A-
MATH	3	508597	14	D-M.3.1	1	6307	0.75	0.20	0.75	0.02	0.03	0.00	0.21	-0.12	0.21	-0.11	-0.13	1.3120	0.0330	9.9	1.3	9.9	1.5	A-	A-	A-
MATH	3	231533	15	D-M.1.3	2	6316	0.62	0.12	0.13	0.12	0.62	0.01	0.40	-0.18	-0.25	-0.15	0.40	2.0589	0.0298	3.3	1.0	3.0	1.1	A-	A+	A+
MATH	3	971556	15	C-G.1.1	1	6316	0.67	0.67	0.06	0.06	0.20	0.00	0.36	0.36	-0.19	-0.16	-0.20	1.7652	0.0307	8.2	1.1	5.7	1.2	A+	A+	A-
MATH	3	932885	15	A-F.1.1	1	6316	0.78	0.78	0.12	0.05	0.05	0.01	0.24	0.24	-0.04	-0.23	-0.16	1.0622	0.0343	9.9	1.3	9.9	1.6	A+	A-	A-
MATH	3	967697	15	D-M.3.1	2	6316	0.25	0.25	0.15	0.31	0.29	0.00	0.10	0.10	-0.04	0.06	-0.13	4.0960	0.0323	9.9	1.3	9.9	2.3	A+	A-	A-
MATH	3	661414	15	B-O.3.1	2	6316	0.47	0.47	0.24	0.23	0.05	0.01	0.20	0.20	-0.06	-0.10	-0.13	2.8580	0.0289	9.9	1.3	9.9	1.6	A+	A+	A+
MATH	3	787746	15	B-O.1.2	2	6316	0.72	0.06	0.72	0.07	0.14	0.01	0.40	-0.34	0.40	-0.18	-0.15	1.4562	0.0320	4.5	1.1	2.7	1.1	A-	A-	A-
MATH	3	843946	15	B-O.2.2	1	6316	0.58	0.10	0.10	0.58	0.20	0.01	0.37	-0.22	-0.15	0.37	-0.18	2.2576	0.0293	6.3	1.1	5.5	1.1	A+	A+	A+
MATH	3	827314	15	A-T.1.1	2	6316	0.36	0.16	0.36	0.37	0.11	0.00	0.25	-0.24	0.25	0.06	-0.20	3.4663	0.0298	8.4	1.1	9.9	1.5	A-	A-	A-
MATH	3	204927	15	A-F.1.1	1	6316	0.44	0.20	0.21	0.14	0.44	0.01	0.24	-0.09	-0.12	-0.10	0.24	3.0207	0.0290	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	3	533101	15	D-M.1.1	2	6316	0.45	0.10	0.20	0.45	0.25	0.01	0.31	-0.27	-0.13	0.31	-0.05	2.9694	0.0289	7.6	1.1	9.9	1.3	A-	A-	A-
MATH	3	424287	16	A-T.1.1	2	6316	0.48	0.48	0.18	0.10	0.22	0.02	0.44	0.44	-0.07	-0.27	-0.25	2.7802	0.0288	-5.2	0.9	2.4	1.1	A+	A-	A-
MATH	3	883508	16	C-G.1.1	1	6316	0.92	0.92	0.04	0.01	0.02	0.01	0.36	0.36	-0.28	-0.12	-0.17	-0.4584	0.0506	-0.4	1.0	-0.9	0.9	A+	A-	A-
MATH	3	790342	16	B-O.3.1	2	6316	0.28	0.50	0.28	0.16	0.06	0.00	-0.05	0.20	-0.05	-0.09	-0.18	3.9176	0.0313	9.9	1.5	9.9	2.9	A-	A-	A+
MATH	3	429594	16	C-G.1.1	1	6316	0.49	0.49	0.29	0.09	0.13	0.00	0.27	0.27	-0.17	-0.09	-0.09	2.7503	0.0288	9.9	1.2	9.9	1.4	A-	A-	A-
MATH	3	540773	16	D-M.2.1	2	6316	0.56	0.39	0.02	0.03	0.56	0.00	0.52	-0.42	-0.17	-0.15	0.52	2.3817	0.0291	-8.5	0.9	-6.0	0.9	A-	B-	A-
MATH	3	670963	16	A-F.1.1	2	6316	0.40	0.40	0.18	0.20	0.22	0.01	0.22	0.22	-0.13	-0.09	-0.03	3.2420	0.0292	9.9	1.2	9.9	1.6	A-	A-	A-
MATH	3	138011	16	B-O.2.1	2	6316	0.38	0.19	0.18	0.38	0.24	0.00	0.26	-0.22	-0.13	0.26	0.03	3.3425	0.0294	9.9	1.2	9.9	1.5	A-	A+	A+
MATH	3	662062	16	D-M.1.2	1	6316	0.42	0.18	0.13	0.42	0.25	0.01	0.09	-0.14	0.01	0.09	0.02	3.0961	0.0290	9.9	1.4	9.9	1.9	A+	A-	A-
MATH	3	301105	16	A-T.1.1	2	6316	0.43	0.30	0.12	0.15	0.43	0.00	0.41	-0.29	-0.15	-0.06	0.41	3.0684	0.0289	-5.5	0.9	6.9	1.2	A-	A-	A+
MATH	3	655621	16	D-M.3.1	2	6316	0.27	0.25	0.27	0.16	0.31	0.01	0.11	0.19	0.11	-0.17	-0.14	4.0041	0.0317	9.9	1.3	9.9	2.2	A-	A-	A+
MATH	3	202678	17	B.1.1.1	1	12648	0.77	0.17	0.01	0.77	0.04	0.00	0.40	-0.22	-0.15	0.40	-0.34	1.0920	0.0241	5.6	1.1	6.5	1.2			
MATH	3	636678	17	B-O.1.1	2	6351	0.48	0.30	0.48	0.10	0.11	0.01	0.36	-0.19	0.36	-0.12	-0.17	2.8198	0.0288	4.6	1.1	8.9	1.2	A-	A+	A-
MATH	3	588733	17	D-M.1.2	2	6351	0.82	0.05	0.02	0.82	0.11	0.00	0.39	-0.21	-0.21	0.39	-0.24	0.7585	0.0366	2.4	1.1	1.6	1.1	A-	B-	A-
MATH	3	570727	17	D-M.4.1	2	6351	0.40	0.40	0.40	0.09	0.11	0.00	0.32	-0.12	0.32	-0.17	-0.15	3.2806	0.0292	4.5	1.1	9.9	1.3	A-	A+	A-
MATH	3	172509	17	A-F.1.1	1	6351	0.67	0.67	0.10	0.05	0.16	0.02	0.26	0.26	-0.04	-0.11	-0.22	1.7930	0.0306	9.9	1.3	9.9	1.4	A+	A-	A+
MATH	3	202459	17	C-G.1.1	1	6351	0.73	0.04	0.04	0.19	0.73	0.00	0.26	-0.22	-0.15	-0.11	0.26	1.4368	0.0322	9.9	1.3	9.9	1.5	A+	A-	A-
MATH	3	212578	17	C-G.1.1	1	6351	0.73	0.05	0.06	0.15	0.73	0.01	0.31	-0.12	-0.17	-0.18	0.31	1.4295	0.0322	9.9	1.2	6.4	1.2	A+	A+	A-
MATH	3	640211	17	A-T.1.1	2	6351	0.50	0.12	0.50	0.26	0.11	0.01	0.41	-0.21	0.41	-0.10	-0.29	2.7364	0.0288	-1.6	1.0	4.2	1.1	A-	A-	A-
MATH	3	129267	17	B-O.2.1	2	6351	0.36	0.36	0.25	0.18	0.21	0.00	0.05	0.05	-0.05	-0.07	0.07	3.4852	0.0297	9.9	1.4	9.9	2.2	A-	A-	A-
MATH	3	652875	17	D-M.2.1	2	6351	0.59	0.25	0.10	0.06	0.59	0.00	0.39	-0.04	-0.30	-0.36	0.39	2.2655	0.0293	5.1	1.1	7.0	1.2	A-	A-	A-
MATH	3	617185	17	B-O.3.1	1	6351	0.23	0.05	0.17	0.23	0.54	0.01	0.11	-0.29	-0.14	0.11	0.15	4.2934	0.0332	9.9	1.3	9.9	2.3	A+	A-	A-
MATH	3	461775	18	D-M.1.2	1	6297	0.53	0.11	0.53	0.12	0.24	0.01	0.18	-0.26	0.18	-0.07	0.04	2.5279	0.0292	9.9	1.4	9.9	1.7	A-	A-	A-
MATH	3	673350	18	D-M.3.1	1	6297	0.90	0.02	0.02	0.05	0.90	0.01	0.34	-0.19	-0.19	-0.21	0.34	-0.1609	0.0458	1.0	1.0	1.3	1.1	A+	B-	A-
MATH	3	814792	18	B-O.3.1	1	6297	0.62	0.25	0.07	0.62	0.05	0.01	0.52	-0.35	-0.26	0.52	-0.14	2.0294	0.0300	-7.1	0.9	-6.0	0.9	A+	A+	A-

Appendix G: Item Statistics Multiple Choice

MATH	3	155451	18	A-F.1.1.	2	6297	0.62	0.62	0.20	0.11	0.07	0.00	0.19	0.19	-0.14	-0.05	-0.07	2.0357	0.0300	9.9	1.4	9.9	1.5	A+	A-	A+
MATH	3	465337	18	B-O.3.1	2	6297	0.56	0.56	0.31	0.05	0.06	0.01	0.24	0.24	-0.05	-0.19	-0.21	2.3527	0.0294	9.9	1.3	9.9	1.4	A+	A-	A-
MATH	3	760429	18	C-G.1.1	1	6297	0.39	0.19	0.21	0.39	0.20	0.01	0.26	-0.08	-0.09	0.26	-0.14	3.2903	0.0297	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	3	888257	18	A-T.1.1	2	6297	0.33	0.28	0.24	0.14	0.33	0.01	0.25	-0.23	0.01	-0.05	0.25	3.6173	0.0306	9.9	1.2	9.9	1.7	A+	A-	A+
MATH	3	735975	18	D-M.1.3	2	6297	0.63	0.14	0.63	0.12	0.12	0.00	0.43	-0.21	0.43	-0.33	-0.10	1.9596	0.0301	2.7	1.0	1.9	1.1	A-	A-	A-
MATH	3	255596	18	B-O.1.2	2	6297	0.42	0.37	0.15	0.42	0.06	0.00	0.31	-0.08	-0.20	0.31	-0.17	3.1302	0.0294	7.0	1.1	9.9	1.3	A-	A-	A-
MATH	3	805178	18	A-F.1.1.	2	6297	0.10	0.71	0.10	0.08	0.10	0.01	0.16	-0.07	-0.06	0.01	0.16	5.5019	0.0463	-0.8	1.0	9.9	3.0	B-	A-	A-
MATH	3	100850	19	B-O.3.1	2	6294	0.12	0.52	0.21	0.14	0.12	0.01	-0.03	0.09	0.15	-0.27	-0.03	5.2463	0.0422	9.9	1.3	9.9	4.1	A+	A+	A+
MATH	3	494620	19	A-F.1.1.	1	6294	0.40	0.18	0.26	0.40	0.15	0.00	0.29	-0.11	-0.19	0.29	-0.04	3.2338	0.0294	9.5	1.1	9.9	1.4	A-	A-	A-
MATH	3	215580	19	A-T.1.1	2	6294	0.66	0.04	0.06	0.24	0.66	0.00	0.48	-0.18	-0.30	-0.28	0.48	1.8497	0.0306	-3.1	1.0	-1.6	1.0	A-	A-	A-
MATH	3	177221	19	D-M.2.1	2	6294	0.62	0.03	0.62	0.33	0.02	0.00	0.53	-0.19	0.53	-0.40	-0.24	2.0655	0.0299	-7.2	0.9	-5.5	0.9	A+	B-	A-
MATH	3	498284	19	A-T.1.1	2	6294	0.38	0.07	0.38	0.17	0.37	0.01	0.39	-0.27	0.39	-0.12	-0.15	3.3534	0.0296	-0.1	1.0	5.0	1.1	A-	A-	A+
MATH	3	864834	19	B-O.1.2	2	6294	0.33	0.42	0.13	0.11	0.33	0.01	0.11	0.03	-0.05	-0.17	0.11	3.6241	0.0303	9.9	1.2	9.9	2.3	A+	A-	A-
MATH	3	229358	19	D-M.4.1	2	6294	0.16	0.16	0.27	0.19	0.37	0.01	-0.02	-0.02	-0.03	-0.06	0.10	4.8354	0.0377	9.9	1.3	9.9	4.1	A+	A-	A+
MATH	3	119670	19	C-G.1.1	1	6294	0.53	0.30	0.04	0.53	0.11	0.01	0.36	-0.19	-0.13	0.36	-0.20	2.5338	0.0291	9.4	1.1	8.0	1.2	A-	A-	A-
MATH	3	750907	19	D-M.1.3	2	6294	0.48	0.07	0.48	0.17	0.26	0.01	0.45	-0.14	0.45	-0.04	-0.39	2.8185	0.0290	-6.1	0.9	-0.8	1.0	A-	A-	A-
MATH	3	114039	19	B-O.3.1	2	6294	0.31	0.41	0.16	0.31	0.12	0.00	0.16	0.00	-0.12	0.16	-0.10	3.7846	0.0309	9.9	1.2	9.9	2.0	A-	A-	A-
MATH	3	946576	20	D-M.1.1	2	6246	0.50	0.50	0.13	0.13	0.24	0.00	0.38	0.38	-0.10	-0.09	-0.29	2.7225	0.0292	2.3	1.0	6.5	1.1	A-	A+	A+
MATH	3	779360	20	B-O.3.1	1	6246	0.21	0.08	0.21	0.63	0.08	0.00	-0.01	-0.30	-0.01	0.35	-0.31	4.4005	0.0344	9.9	1.4	9.9	3.1	A+	A-	A+
MATH	3	499506	20	D-M.1.2	2	6246	0.28	0.12	0.28	0.49	0.12	0.00	0.16	-0.18	0.16	0.05	-0.11	3.9496	0.0318	9.9	1.2	9.9	2.1	A-	A-	A-
MATH	3	287477	20	A-F.1.1.	2	6246	0.17	0.04	0.17	0.22	0.56	0.01	0.10	-0.25	0.10	-0.23	0.22	4.7170	0.0369	5.4	1.1	9.9	2.7	A-	A-	A-
MATH	3	321901	20	C-G.1.1	1	6246	0.34	0.26	0.34	0.27	0.12	0.01	0.16	-0.30	0.16	0.16	-0.03	3.5644	0.0303	9.9	1.3	9.9	1.8	A+	A-	A-
MATH	3	565463	20	A-T.1.1	2	6246	0.46	0.29	0.14	0.46	0.10	0.01	0.43	-0.27	-0.14	0.43	-0.13	2.9358	0.0292	-5.8	0.9	1.7	1.0	A-	A-	A-
MATH	3	795596	20	B-O.2.1	2	6246	0.57	0.15	0.07	0.21	0.57	0.01	0.39	-0.25	-0.20	-0.11	0.39	2.3408	0.0295	6.5	1.1	5.4	1.1	A-	A+	A+
MATH	3	643867	20	C-G.1.1	1	6246	0.30	0.12	0.45	0.11	0.30	0.01	0.22	-0.14	-0.01	-0.14	0.22	3.7998	0.0311	9.9	1.2	9.9	1.7	A-	A-	A-
MATH	3	166814	20	D-M.2.1	2	6246	0.56	0.16	0.13	0.56	0.15	0.00	0.48	-0.25	-0.15	0.48	-0.27	2.3730	0.0294	-3.1	1.0	-2.0	1.0	A+	A-	A-
MATH	3	508368	20	B-O.1.1	2	6246	0.49	0.35	0.05	0.49	0.09	0.02	0.37	-0.11	-0.33	0.37	-0.21	2.7660	0.0291	4.8	1.1	6.1	1.1	A-	A+	A+
MATH	4	473271	0	A.1.3.2	2	126311	0.70	0.12	0.09	0.08	0.70	0.00	0.49	-0.31	-0.22	-0.21	0.49	0.2434	0.0068	-9.9	0.9	-9.9	0.9			
MATH	4	802821	0	A.3.1.2	1	126311	0.52	0.05	0.52	0.12	0.30	0.00	0.38	-0.20	0.38	-0.20	-0.18	1.2301	0.0064	9.9	1.1	9.9	1.1			
MATH	4	858067	0	A.1.1.2	2	126311	0.49	0.46	0.49	0.03	0.02	0.00	0.44	-0.36	0.44	-0.09	-0.14	1.4295	0.0064	-4.3	1.0	5.5	1.0			
MATH	4	935742	0	A.1.3.1	2	126311	0.76	0.03	0.03	0.76	0.18	0.00	0.53	-0.23	-0.22	0.53	-0.39	-0.1523	0.0073	-9.9	0.9	-9.9	0.7			
MATH	4	942067	0	A.2.1.1	2	126311	0.61	0.01	0.07	0.61	0.31	0.00	0.38	-0.17	-0.39	0.38	-0.15	0.7256	0.0065	9.9	1.1	9.9	1.1			
MATH	4	254917	0	A.3.1.1	1	126311	0.70	0.11	0.07	0.11	0.70	0.00	0.50	-0.22	-0.20	-0.32	0.50	0.2178	0.0069	-9.9	0.9	-9.9	0.9			
MATH	4	563206	0	D.2.2.2	1	126311	0.84	0.09	0.04	0.84	0.03	0.00	0.31	-0.16	-0.19	0.31	-0.18	-0.6608	0.0081	-1.8	1.0	9.9	1.1			
MATH	4	807624	0	A.1.3.1		126311	0.54	0.06	0.54	0.32	0.06	0.00	0.38	-0.20	0.38	-0.21	-0.16	1.0792	0.0064	9.9	1.1	9.9	1.1			
MATH	4	308619	0	A.2.1.2	1	126311	0.71	0.15	0.71	0.07	0.07	0.00	0.47	-0.21	0.47	-0.23	-0.31	0.0379	0.0070	-1.7	1.0	-5.1	1.0			
MATH	4	706555	0	A.3.1.3	2	126311	0.74	0.08	0.13	0.74	0.06	0.00	0.51	-0.32	-0.25	0.51	-0.23	-0.0410	0.0071	-9.9	0.9	-9.9	0.9			
MATH	4	449831	0	B.1.1.2	1	126311	0.67	0.08	0.04	0.21	0.67	0.00	0.47	-0.17	-0.17	-0.35	0.47	0.4688	0.0067	-9.9	1.0	-9.9	0.9			
MATH	4	585495	0	B.1.1.3	1	126311	0.70	0.05	0.09	0.70	0.16	0.00	0.49	-0.21	-0.24	0.49	-0.29	0.2820	0.0068	-9.9	0.9	-9.9	0.9			
MATH	4	806253	0	D.1.1.2	2	126311	0.77	0.04	0.77	0.12	0.07	0.00	0.38	-0.23	0.38	-0.16	-0.25	-0.2569	0.0074	8.0	1.0	-2.0	1.0			
MATH	4	910977	0	D.1.2.2	2	126311	0.79	0.09	0.05	0.79	0.06	0.00	0.44	-0.22	-0.29	0.44	-0.21	-0.4444	0.0077	-9.4	1.0	-7.5	0.9			
MATH	4	393169	0	D.1.2.2		126311	0.60	0.07	0.04	0.29	0.60	0.00	0.30	-0.27	-0.24	-0.07	0.30	0.7584	0.0065	9.9	1.2	9.9	1.3			
MATH	4	120946	0	B.1.1.2	1	126311	0.71	0.07	0.16	0.05	0.71	0.00	0.46	-0.25	-0.31	-0.13	0.46	0.1211	0.0070	-9.9	1.0	-9.9	0.9			
MATH	4	988137	0	A.1.1.3	1	126311	0.74	0.05	0.12	0.08	0.74	0.00	0.45	-0.29	-0.19	-0.25	0.45	-0.0507	0.0072	-9.9	1.0	-9.9	0.9			
MATH	4	127785	0	B.1.1.4	1	126311	0.75	0.04	0.07	0.14	0.75	0.00	0.41	-0.08	-0.25	-0.29	0.41	-0.0504	0.0071	-2.5	1.0	5.9	1.0			
MATH	4	224096	0	D.2.1.1	1	126311	0.68	0.22	0.04	0.68	0.05	0.00	0.57	-0.43	-0.23	0.57	-0.17	0.3065	0.0068	-9.9	0.9	-9.9	0.8			
MATH	4	222967	0	B.2.1.1	1	126311	0.61	0.03	0.05	0.61	0.30	0.00	0.32	-0.14	-0.20	0.32	-0.19	0.7574	0.0065	9.9	1.1	9.9	1.2			
MATH	4	292644	0	E.1.1.1	2	126311	0.85	0.07	0.03	0.85	0.05	0.00	0.49	-0.37	-0.19	0.49	-0.21	-0.8657	0.0085	-9.9	0.8	-9.9	0.7			
MATH	4	453086	0	A.1.1.4	1	126311	0.86	0.07	0.03	0.86	0.04	0.00	0.40	-0.29	-0.14	0.40	-0.20	-1.0055	0.0088	-8.6	1.0	-7.4	0.9			
MATH	4	761338	0	A.3.1.1	1	126311	0.61	0.05	0.61	0.25	0.10	0.00	0.48	-0.16	0.48	-0.26	-0.30	0.7902	0.0065	-9.9	1.0	-9.9	0.9			
MATH	4	204844	0	A.3.1.2	1	126311	0.56	0.23	0.56	0.08	0.12	0.00	0.38	-0.15	0.38	-0.18	-0.24	0.9776	0.0064	9.9	1.1	9.9	1.1			

Appendix G: Item Statistics Multiple Choice

MATH	4	478643	2	B-O.3.1	2	6301	0.63	0.07	0.20	0.10	0.63	0.00	0.47	-0.21	-0.24	-0.25	0.47	0.5634	0.0294	-2.0	1.0	-2.9	0.9	A+	A+	A+
MATH	4	651955	2	A-F.1.1	2	6301	0.34	0.34	0.27	0.27	0.12	0.00	0.24	0.24	0.08	-0.22	-0.15	2.1079	0.0299	9.9	1.2	9.9	1.5	A-	A+	A-
MATH	4	950331	2	D-M.2.1	2	6301	0.41	0.21	0.41	0.26	0.12	0.00	0.20	-0.10	0.20	-0.04	-0.11	1.7555	0.0290	9.9	1.3	9.9	1.5	A-	A-	A-
MATH	4	794694	2	A-F.2.1	1	6301	0.52	0.07	0.26	0.52	0.14	0.00	0.13	-0.05	0.06	0.13	-0.22	1.1350	0.0286	9.9	1.4	9.9	1.6	A+	A-	A+
MATH	4	176519	2	B-O.1.1	2	6301	0.50	0.18	0.12	0.50	0.20	0.00	0.39	-0.22	-0.24	0.39	-0.09	1.2789	0.0285	3.7	1.0	4.9	1.1	A-	A+	A-
MATH	4	755742	2	C-G.1.1	2	6301	0.41	0.35	0.13	0.10	0.41	0.00	0.18	0.05	-0.20	-0.15	0.18	1.7320	0.0289	9.9	1.3	9.9	1.5	A-	A-	A-
MATH	4	305450	2	D-M.1.1	2	6301	0.25	0.23	0.37	0.15	0.25	0.00	0.39	-0.43	0.03	-0.01	0.39	2.7043	0.0325	-5.3	0.9	2.6	1.1	A+	A-	B-
MATH	4	661509	2	B-O.1.1	1	6301	0.34	0.04	0.34	0.57	0.05	0.00	0.42	-0.19	0.42	-0.25	-0.19	2.1079	0.0299	-2.1	1.0	1.4	1.0	A+	A+	A-
MATH	4	539052	2	A-F.3.1	1	6301	0.25	0.61	0.11	0.25	0.03	0.00	0.22	-0.05	-0.14	0.22	-0.15	2.7001	0.0325	4.4	1.1	9.9	1.7	A-	A-	A-
MATH	4	960494	3	E.1.2.1	2	12650	0.78	0.05	0.78	0.05	0.12	0.00	0.51	-0.23	0.51	-0.21	-0.35	-0.3237	0.0236	-9.3	0.9	-7.9	0.8			
MATH	4	428718	3	A.1.3.1	1	12601	0.77	0.77	0.08	0.09	0.06	0.00	0.50	0.50	-0.23	-0.27	-0.30	-0.2379	0.0234	-8.0	0.9	-7.6	0.8			
MATH	4	978368	3	A-F.2.1	2	6333	0.41	0.09	0.41	0.43	0.07	0.00	0.33	-0.10	0.33	-0.18	-0.17	1.7214	0.0289	6.6	1.1	9.9	1.3	A-	A-	A-
MATH	4	124273	3	D-M.1.1	1	6333	0.59	0.15	0.15	0.59	0.09	0.01	0.49	-0.16	-0.35	0.49	-0.18	0.8109	0.0289	-3.4	1.0	-2.4	1.0	A-	A-	A-
MATH	4	270938	3	B-O.3.1	2	6333	0.71	0.09	0.71	0.10	0.10	0.00	0.50	-0.34	0.50	-0.22	-0.20	0.1030	0.0309	-4.8	0.9	-3.9	0.9	A-	A+	A-
MATH	4	131417	3	A-F.1.1	1	6333	0.28	0.28	0.31	0.13	0.28	0.00	0.45	-0.50	0.06	-0.01	0.45	2.4927	0.0313	-8.2	0.9	-2.8	0.9	A-	A-	A-
MATH	4	351963	3	B-O.1.1	2	6333	0.30	0.23	0.11	0.36	0.30	0.00	0.23	-0.12	-0.19	0.02	0.23	2.3795	0.0308	9.9	1.2	9.9	1.5	A-	A-	A+
MATH	4	723277	3	B-O.1.1	1	6333	0.35	0.05	0.09	0.51	0.35	0.00	0.25	-0.23	-0.29	0.04	0.25	2.0771	0.0297	9.9	1.2	9.9	1.4	A-	A-	A-
MATH	4	540220	3	D-M.2.1	2	6333	0.41	0.15	0.22	0.41	0.22	0.00	0.24	-0.18	-0.09	0.24	-0.04	1.7248	0.0289	9.9	1.2	9.9	1.4	A+	A-	A+
MATH	4	858563	3	C-G.1.1	2	6333	0.33	0.26	0.30	0.33	0.11	0.00	0.15	0.03	-0.11	0.15	-0.11	2.1593	0.0300	9.9	1.3	9.9	1.7	A-	A-	A-
MATH	4	509289	3	A-F.2.1	2	6333	0.49	0.11	0.49	0.14	0.26	0.00	0.48	-0.15	0.48	-0.20	-0.28	1.3020	0.0285	-4.3	1.0	-3.4	0.9	A-	A-	A-
MATH	4	911269	3	A-T.1.1	2	6333	0.57	0.09	0.05	0.57	0.29	0.00	0.19	-0.15	-0.18	0.19	-0.02	0.9091	0.0287	9.9	1.3	9.9	1.5	A+	A-	A-
MATH	4	583449	4	D.1.1.3	2	18886	0.79	0.05	0.06	0.79	0.10	0.00	0.56	-0.22	-0.25	0.56	-0.40	-0.3560	0.0196	-9.9	0.8	-9.9	0.7			
MATH	4	740197	4	B-O.2.1	2	6319	0.24	0.44	0.16	0.16	0.24	0.00	0.16	0.11	-0.23	-0.09	0.16	2.8021	0.0330	9.9	1.2	9.9	1.9	A+	A+	A-
MATH	4	114993	4	A-F.2.1	1	6319	0.83	0.06	0.83	0.06	0.05	0.00	0.38	-0.23	0.38	-0.17	-0.22	-0.7198	0.0367	-0.4	1.0	1.3	1.1	A+	A+	A+
MATH	4	973284	4	A-F.3.1	1	6319	0.62	0.16	0.62	0.05	0.17	0.00	0.40	-0.18	0.40	-0.22	-0.21	0.6509	0.0294	4.5	1.1	3.5	1.1	A-	A-	A-
MATH	4	790134	4	B-O.3.1	2	6319	0.32	0.25	0.26	0.32	0.17	0.00	0.17	-0.08	-0.05	0.17	-0.06	2.2652	0.0304	9.9	1.2	9.9	1.7	A-	A-	A+
MATH	4	852303	4	D-M.2.1	2	6319	0.83	0.83	0.08	0.03	0.06	0.00	0.52	0.52	-0.41	-0.24	-0.18	-0.6983	0.0365	-7.8	0.8	-5.5	0.8	A+	A-	A+
MATH	4	613429	4	B-O.1.1	2	6319	0.53	0.17	0.15	0.53	0.14	0.00	0.40	-0.26	-0.18	0.40	-0.11	1.1402	0.0287	3.6	1.0	3.3	1.1	A-	A-	A+
MATH	4	335263	4	A-T.1.1	1	6319	0.55	0.05	0.55	0.11	0.29	0.00	0.51	-0.12	0.51	-0.18	-0.37	1.0292	0.0288	-5.9	0.9	-3.9	0.9	A-	A-	A-
MATH	4	489356	4	C-G.1.1	2	6319	0.33	0.47	0.14	0.33	0.07	0.00	0.27	-0.07	-0.14	0.27	-0.18	2.2274	0.0303	8.4	1.1	9.9	1.5	A-	A-	A+
MATH	4	321307	4	A-T.2.1	1	6319	0.63	0.63	0.17	0.12	0.08	0.00	0.46	0.46	-0.12	-0.34	-0.24	0.6291	0.0295	-1.1	1.0	-1.8	1.0	A-	A-	A-
MATH	4	486171	4	D-M.1.1	2	6319	0.46	0.22	0.46	0.13	0.18	0.00	0.39	-0.12	0.39	-0.15	-0.24	1.4924	0.0287	4.0	1.1	5.6	1.1	A-	A-	A+
MATH	4	545059	5	A.3.1.2	1	12606	0.74	0.06	0.74	0.17	0.03	0.00	0.35	-0.16	0.35	-0.20	-0.25	-0.0695	0.0226	6.4	1.1	9.2	1.2			
MATH	4	666065	5	D.1.2.1	2	12587	0.84	0.04	0.07	0.84	0.04	0.00	0.42	-0.25	-0.21	0.42	-0.23	-0.8278	0.0266	-3.2	1.0	-5.1	0.8			
MATH	4	220221	5	A-F.1.1	2	6314	0.27	0.33	0.15	0.24	0.27	0.00	0.17	-0.05	-0.13	-0.01	0.17	2.4884	0.0315	9.9	1.2	9.9	1.7	A-	A+	A-
MATH	4	564663	5	B-O.3.1	2	6314	0.34	0.51	0.08	0.34	0.05	0.01	0.11	0.11	-0.20	0.11	-0.22	2.1022	0.0299	9.9	1.3	9.9	1.8	A+	A+	A+
MATH	4	202759	5	C-G.1.1	2	6314	0.40	0.34	0.08	0.17	0.40	0.00	0.28	-0.11	-0.13	-0.13	0.28	1.7489	0.0290	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	4	495240	5	D-M.2.1	2	6314	0.11	0.68	0.15	0.11	0.06	0.00	0.02	0.14	-0.10	0.02	-0.15	3.8117	0.0429	5.5	1.2	9.9	3.2	A-	A-	A+
MATH	4	143726	5	B-O.1.1	1	6314	0.41	0.05	0.50	0.03	0.41	0.00	0.40	-0.25	-0.23	-0.15	0.40	1.6918	0.0289	1.0	1.0	4.6	1.1	A+	A+	A-
MATH	4	938236	5	D-M.1.1	1	6314	0.56	0.11	0.56	0.16	0.17	0.00	0.31	-0.36	0.31	0.02	-0.13	0.9460	0.0287	9.9	1.2	8.8	1.2	A+	A-	A-
MATH	4	622074	5	B-O.1.1	2	6314	0.70	0.08	0.70	0.10	0.12	0.00	0.47	-0.28	0.47	-0.24	-0.20	0.1909	0.0306	-3.4	1.0	-2.9	0.9	A+	A-	A-
MATH	4	959675	5	A-T.2.1	1	6314	0.70	0.08	0.70	0.10	0.11	0.00	0.45	-0.25	0.45	-0.21	-0.23	0.1664	0.0307	-2.0	1.0	-3.2	0.9	A+	A+	A-
MATH	4	168975	5	A-T.1.1	2	6314	0.34	0.12	0.13	0.34	0.41	0.00	0.16	-0.02	-0.13	0.16	-0.05	2.0817	0.0298	9.9	1.3	9.9	1.6	A-	A-	A+
MATH	4	709490	5	A-F.3.1	2	6314	0.35	0.35	0.11	0.41	0.13	0.00	0.26	0.26	-0.15	-0.07	-0.12	2.0409	0.0297	9.4	1.1	9.9	1.4	A-	A+	A-
MATH	4	621134	6	A.1.1.1	1	12610	0.75	0.16	0.03	0.75	0.05	0.00	0.46	-0.39	-0.10	0.46	-0.17	-0.1294	0.0230	-4.0	1.0	-6.9	0.9			
MATH	4	985104	6	A-T.1.1	1	6292	0.42	0.25	0.42	0.20	0.13	0.00	0.28	-0.12	0.28	-0.11	-0.11	1.7208	0.0288	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	4	480466	6	A-F.2.1	1	6292	0.85	0.10	0.02	0.85	0.03	0.00	0.37	-0.30	-0.16	0.37	-0.11	-0.8438	0.0380	-0.6	1.0	-1.8	0.9	A+	A-	A+
MATH	4	602752	6	C-G.1.1	2	6292	0.10	0.10	0.47	0.20	0.23	0.00	-0.08	-0.08	0.16	0.09	-0.21	3.9749	0.0446	8.3	1.3	9.9	3.7	A-	A-	A+
MATH	4	940300	6	D-M.3.1	1	6292	0.36	0.23	0.16	0.36	0.25	0.00	0.17	0.00	-0.17	0.17	-0.04	2.0362	0.0295	9.9	1.3	9.9	1.6	A-	A-	A+
MATH	4	643585	6	C-G.1.1	2	6292	0.30	0.23	0.30	0.16	0.30	0.00	0.22	-0.32	0.03	0.05	0.22	2.3494	0.0305	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	4	658317	6	B-O.1.1	2	6292	0.10	0.10	0.11	0.19	0.59	0.00	0.02	0.02	-0.26	-0.31	0.40	3.9473	0.0442	3.2	1.1	9.9	3.3	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

MATH	4	264183	6	A-T.2.1	1	6292	0.88	0.04	0.04	0.88	0.03	0.00	0.45	-0.27	-0.25	0.45	-0.23	-1.1762	0.0417	-4.9	0.9	-5.1	0.7	A+	A-	A-
MATH	4	410986	6	A-F.2.1	2	6292	0.65	0.65	0.22	0.08	0.04	0.01	0.29	0.29	-0.07	-0.21	-0.23	0.5044	0.0298	9.9	1.2	9.9	1.3	A+	A+	A+
MATH	4	176327	6	B-O.2.1	2	6292	0.75	0.06	0.75	0.08	0.12	0.00	0.51	-0.21	0.51	-0.24	-0.34	-0.0907	0.0323	-6.7	0.9	-7.0	0.8	A+	A+	A+
MATH	4	308761	6	D-M.1.1	2	6292	0.18	0.28	0.18	0.19	0.35	0.00	0.02	0.18	0.02	-0.05	-0.14	3.1631	0.0355	9.9	1.3	9.9	2.5	A-	A-	A-
MATH	4	169690	7	B.2.1.1	1	12627	0.72	0.05	0.10	0.72	0.13	0.00	0.41	-0.15	-0.28	0.41	-0.20	0.1397	0.0220	1.3	1.0	1.5	1.0			
MATH	4	527723	7	B.1.1.2	1	12643	0.59	0.07	0.10	0.59	0.25	0.00	0.40	-0.17	-0.22	0.40	-0.20	0.8575	0.0204	5.1	1.0	4.7	1.1			
MATH	4	209350	7	A-T.1.1	1	6322	0.21	0.41	0.20	0.17	0.21	0.00	0.22	0.05	-0.22	-0.06	0.22	2.9552	0.0338	1.9	1.0	9.9	1.8	A-	A+	A+
MATH	4	426616	7	C-G.1.1	1	6322	0.83	0.09	0.83	0.05	0.02	0.01	0.38	-0.23	0.38	-0.22	-0.18	-0.6992	0.0366	-0.9	1.0	-1.4	0.9	A+	B-	B-
MATH	4	607944	7	D-M.2.1	2	6322	0.25	0.25	0.44	0.21	0.09	0.00	0.22	0.22	0.08	-0.23	-0.13	2.6596	0.0320	4.1	1.1	9.9	1.7	A-	A+	A+
MATH	4	325224	7	C-G.1.1	2	6322	0.63	0.07	0.63	0.25	0.05	0.00	0.31	-0.03	0.31	-0.24	-0.16	0.6320	0.0293	9.9	1.1	7.8	1.2	A-	A-	A-
MATH	4	130391	7	A-F.2.1	2	6322	0.63	0.07	0.25	0.06	0.63	0.00	0.34	-0.26	-0.11	-0.22	0.34	0.6526	0.0292	8.1	1.1	6.2	1.1	A+	A-	A-
MATH	4	531576	7	D-M.1.1	2	6322	0.38	0.22	0.38	0.24	0.16	0.00	0.09	-0.14	0.09	0.00	0.04	1.9358	0.0291	9.9	1.4	9.9	1.7	A-	A-	A-
MATH	4	511562	7	B-O.2.1	2	6322	0.21	0.21	0.47	0.19	0.13	0.00	0.00	0.00	0.03	0.02	-0.07	2.9656	0.0339	9.9	1.3	9.9	2.4	A-	A-	A+
MATH	4	716413	7	A-F.2.1	1	6322	0.34	0.46	0.04	0.34	0.16	0.00	0.08	0.10	-0.11	0.08	-0.18	2.1531	0.0298	9.9	1.4	9.9	1.7	A+	A-	A-
MATH	4	622801	7	B-O.1.1	2	6322	0.60	0.16	0.18	0.60	0.05	0.00	0.50	-0.34	-0.18	0.50	-0.20	0.7645	0.0290	-6.2	0.9	-6.0	0.9	A+	A+	A-
MATH	4	526639	7	A-T.2.1	1	6322	0.77	0.77	0.07	0.06	0.11	0.00	0.55	0.55	-0.24	-0.23	-0.38	-0.2064	0.0329	-9.9	0.8	-8.9	0.7	A+	A-	A-
MATH	4	646996	8	A.3.1.1	1	18896	0.79	0.79	0.14	0.03	0.04	0.00	0.46	0.46	-0.29	-0.23	-0.25	-0.3526	0.0196	-6.1	0.9	-5.6	0.9			
MATH	4	825446	8	B-O.2.1	1	6273	0.71	0.13	0.10	0.06	0.71	0.00	0.49	-0.25	-0.29	-0.22	0.49	0.1753	0.0311	-4.2	0.9	-5.8	0.8	A+	A+	A+
MATH	4	443004	8	A-F.3.1	1	6273	0.66	0.12	0.66	0.03	0.19	0.00	0.39	-0.08	0.39	-0.14	-0.34	0.4641	0.0301	4.5	1.1	2.6	1.1	A+	A+	A-
MATH	4	905714	8	A-F.2.1	1	6273	0.77	0.10	0.10	0.03	0.77	0.00	0.37	-0.18	-0.27	-0.12	0.37	-0.2507	0.0334	2.3	1.0	1.4	1.1	A+	A-	A-
MATH	4	656602	8	D-M.2.1	2	6273	0.47	0.21	0.47	0.14	0.18	0.00	0.31	-0.21	0.31	-0.11	-0.07	1.4822	0.0288	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	4	470420	8	A-F.1.1	1	6273	0.29	0.42	0.18	0.29	0.11	0.00	0.25	-0.28	0.08	0.25	-0.01	2.4478	0.0311	8.9	1.1	9.9	1.5	A+	A-	A-
MATH	4	651087	8	B-O.1.1	2	6273	0.53	0.53	0.06	0.06	0.35	0.00	0.44	0.44	-0.21	-0.33	-0.18	1.1795	0.0288	-0.1	1.0	1.9	1.0	A-	A-	B-
MATH	4	197708	8	A-T.1.1	1	6273	0.65	0.05	0.22	0.65	0.08	0.00	0.45	-0.23	-0.34	0.45	-0.09	0.4904	0.0300	-1.0	1.0	-0.8	1.0	A-	A-	A-
MATH	4	186956	8	C-G.1.1	2	6273	0.69	0.08	0.69	0.19	0.04	0.00	0.35	-0.31	0.35	-0.10	-0.19	0.2997	0.0306	7.2	1.1	6.8	1.2	A+	A-	A-
MATH	4	341835	8	D-M.1.1	2	6273	0.10	0.14	0.34	0.43	0.10	0.00	0.19	-0.14	-0.19	0.17	0.19	4.0533	0.0452	-0.1	1.0	9.9	2.2	A-	A-	B-
MATH	4	819434	8	B-O.3.1	2	6273	0.52	0.52	0.07	0.32	0.08	0.01	0.31	0.31	-0.22	-0.02	-0.34	1.2286	0.0288	9.9	1.2	9.9	1.3	A+	A-	A+
MATH	4	538975	9	A.1.1.2	2	12617	0.81	0.05	0.06	0.81	0.08	0.00	0.48	-0.26	-0.20	0.48	-0.30	-0.5087	0.0249	-7.1	0.9	-7.5	0.8			
MATH	4	761734	9	A.3.1.2	1	12598	0.66	0.17	0.10	0.66	0.06	0.01	0.46	-0.24	-0.23	0.46	-0.25	0.4906	0.0211	-3.1	1.0	-5.0	0.9			
MATH	4	561047	9	A-F.1.1	1	6325	0.47	0.19	0.47	0.22	0.13	0.00	0.46	-0.32	0.46	-0.22	-0.03	1.5049	0.0285	-5.4	0.9	-1.9	1.0	A-	A-	A-
MATH	4	866237	9	B-O.1.1	1	6325	0.78	0.13	0.78	0.05	0.05	0.00	0.50	-0.37	0.50	-0.19	-0.20	-0.2595	0.0335	-6.0	0.9	-6.5	0.8	A+	A-	A-
MATH	4	636039	9	B-O.1.1	2	6325	0.49	0.07	0.28	0.16	0.49	0.00	0.26	-0.15	-0.17	-0.05	0.26	1.3812	0.0285	9.9	1.2	9.9	1.3	A+	A+	A-
MATH	4	268224	9	C-G.1.1	1	6325	0.55	0.10	0.19	0.16	0.55	0.00	0.47	-0.25	-0.18	-0.24	0.47	1.1088	0.0286	-3.8	1.0	-3.0	1.0	A-	A-	A-
MATH	4	891850	9	A-T.1.1	2	6325	0.69	0.69	0.14	0.09	0.08	0.00	0.32	0.32	-0.13	-0.17	-0.20	0.3315	0.0304	8.8	1.1	8.7	1.2	A+	A-	A-
MATH	4	164552	9	A-F.3.1	1	6325	0.73	0.05	0.73	0.15	0.08	0.00	0.36	-0.09	0.36	-0.24	-0.21	0.0922	0.0315	4.4	1.1	2.8	1.1	A+	A+	A-
MATH	4	745707	9	D-M.1.1	1	6325	0.64	0.07	0.11	0.18	0.64	0.00	0.49	-0.17	-0.39	-0.19	0.49	0.5841	0.0296	-5.2	0.9	-3.2	0.9	A-	A-	A-
MATH	4	907226	9	A-F.2.1	2	6325	0.17	0.14	0.59	0.17	0.10	0.00	-0.23	-0.11	0.39	-0.23	-0.24	3.3389	0.0365	9.9	1.6	9.9	3.8	A+	A+	A+
MATH	4	249594	9	B-O.3.1	2	6325	0.74	0.74	0.09	0.07	0.10	0.00	0.45	0.45	-0.28	-0.27	-0.18	0.0116	0.0319	-2.5	1.0	-2.2	0.9	A+	A-	A+
MATH	4	622320	9	C-G.1.1	2	6325	0.33	0.08	0.47	0.13	0.33	0.00	0.06	-0.01	-0.02	-0.03	0.06	2.2596	0.0300	9.9	1.4	9.9	1.9	A-	A-	A+
MATH	4	269221	10	C.1.2.1	1	18832	0.70	0.07	0.17	0.05	0.70	0.00	0.39	-0.19	-0.24	-0.17	0.39	0.2127	0.0179	5.8	1.1	2.6	1.0			
MATH	4	670025	10	D-M.1.1	1	6275	0.40	0.40	0.08	0.17	0.35	0.00	0.35	0.35	-0.08	-0.08	-0.25	1.8539	0.0293	6.1	1.1	7.2	1.2	A+	A+	A-
MATH	4	220965	10	A-F.2.1	1	6275	0.68	0.03	0.11	0.17	0.68	0.00	0.35	-0.21	-0.16	-0.19	0.35	0.3297	0.0305	7.3	1.1	4.6	1.1	A+	A-	A-
MATH	4	614910	10	B-O.3.1	2	6275	0.46	0.18	0.24	0.46	0.11	0.01	0.25	-0.16	-0.03	0.25	-0.16	1.5053	0.0288	9.9	1.2	9.9	1.4	A-	A+	A-
MATH	4	194199	10	C-G.1.1	2	6275	0.29	0.49	0.29	0.10	0.12	0.00	0.16	-0.20	0.16	0.01	0.09	2.4920	0.0314	9.9	1.2	9.9	1.8	A-	A-	A-
MATH	4	500815	10	B-O.2.1	1	6275	0.69	0.69	0.04	0.05	0.21	0.00	0.46	0.46	-0.24	-0.27	-0.25	0.2846	0.0307	-1.8	1.0	-3.9	0.9	A+	A-	A-
MATH	4	483699	10	A-F.3.1	1	6275	0.22	0.50	0.25	0.22	0.02	0.00	0.32	-0.24	0.02	0.32	-0.12	2.9421	0.0339	-1.6	1.0	8.4	1.3	A-	A-	A-
MATH	4	644650	10	B-O.1.1	2	6275	0.55	0.55	0.09	0.09	0.26	0.00	0.52	0.52	-0.23	-0.42	-0.16	1.0332	0.0289	-8.3	0.9	-6.9	0.9	A-	A-	C-
MATH	4	127415	10	A-T.1.1	1	6275	0.59	0.15	0.59	0.09	0.18	0.00	0.39	-0.11	0.39	-0.26	-0.21	0.8586	0.0291	5.5	1.1	5.0	1.1	A-	A-	A-
MATH	4	194666	10	D-M.2.1	2	6275	0.93	0.01	0.02	0.03	0.93	0.00	0.37	-0.19	-0.20	-0.23	0.37	-1.9148	0.0535	-2.7	0.9	-4.1	0.7	A+	A-	A+
MATH	4	191645	10	A-F.3.1	1	6275	0.61	0.06	0.61	0.13	0.20	0.00	0.34	-0.21	0.34	-0.21	-0.11	0.7300	0.0294	9.1	1.1	5.3	1.1	A+	A+	A-
MATH	4	412674	11	A-T.1.1	1	6305	0.91	0.91	0.03	0.04	0.02	0.00	0.36	0.36	-0.23	-0.19	-0.20	-1.4778	0.0460	-2.1	0.9	-2.2	0.9	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

MATH	4	625687	11	D-M.1.1	1	6305	0.47	0.27	0.47	0.15	0.10	0.00	0.40	-0.19	0.40	-0.15	-0.19	1.4619	0.0286	1.2	1.0	4.0	1.1	A-	A-	A-
MATH	4	577641	11	D-M.2.1	2	6305	0.35	0.28	0.21	0.35	0.16	0.00	0.24	-0.06	-0.10	0.24	-0.13	2.1320	0.0298	9.9	1.2	9.9	1.4	A-	A+	A-
MATH	4	517753	11	A-T.2.1	2	6305	0.52	0.10	0.52	0.26	0.11	0.00	0.35	-0.07	0.35	-0.18	-0.22	1.2194	0.0286	7.1	1.1	7.1	1.1	A+	A-	A-
MATH	4	321292	11	D-M.3.1	2	6305	0.56	0.56	0.15	0.23	0.07	0.00	0.25	0.25	-0.10	-0.12	-0.15	1.0227	0.0287	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	4	481641	11	B-O.3.1	1	6305	0.58	0.21	0.13	0.58	0.08	0.00	0.43	-0.38	-0.10	0.43	-0.08	0.9028	0.0289	1.6	1.0	1.8	1.0	A+	A-	A-
MATH	4	570901	11	A-F.2.1	1	6305	0.38	0.17	0.37	0.38	0.07	0.00	0.14	-0.15	0.07	0.14	-0.15	1.9399	0.0293	9.9	1.3	9.9	1.6	A-	A-	A+
MATH	4	797799	11	C-G.1.1	1	6305	0.76	0.15	0.76	0.06	0.03	0.00	0.36	-0.21	0.36	-0.18	-0.21	-0.1303	0.0326	3.2	1.1	2.9	1.1	A+	A-	A+
MATH	4	694950	11	A-T.2.1	1	6305	0.56	0.15	0.11	0.18	0.56	0.00	0.35	-0.22	-0.15	-0.12	0.35	1.0144	0.0287	9.2	1.1	7.3	1.1	A+	A+	A-
MATH	4	896207	11	B-O.1.1	2	6305	0.58	0.13	0.20	0.08	0.58	0.01	0.55	-0.35	-0.25	-0.21	0.55	0.9246	0.0289	-9.9	0.9	-9.9	0.8	A-	A+	A-
MATH	4	425910	12	E.1.1.1	2	12584	0.79	0.07	0.79	0.05	0.09	0.00	0.48	-0.20	0.48	-0.08	-0.43	-0.4127	0.0243	-7.0	0.9	-1.1	1.0			
MATH	4	619132	12	A.2.1.2	2	12633	0.78	0.78	0.08	0.08	0.06	0.00	0.45	0.45	-0.20	-0.21	-0.32	-0.3060	0.0237	-4.6	0.9	-4.2	0.9			
MATH	4	573293	12	D-M.2.1	2	6316	0.63	0.63	0.14	0.13	0.10	0.01	0.34	0.34	-0.14	-0.17	-0.18	0.6192	0.0294	9.2	1.1	5.3	1.1	A+	A-	A-
MATH	4	825426	12	A-T.1.1	1	6316	0.83	0.08	0.06	0.83	0.03	0.00	0.43	-0.24	-0.23	0.43	-0.23	-0.6672	0.0363	-2.9	0.9	-2.1	0.9	A+	A-	A-
MATH	4	111153	12	B-O.3.1	2	6316	0.46	0.09	0.06	0.46	0.39	0.00	0.28	-0.14	-0.14	0.28	-0.13	1.5250	0.0287	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	4	468749	12	B-O.1.1	2	6316	0.52	0.22	0.17	0.52	0.09	0.00	0.47	-0.33	-0.17	0.47	-0.11	1.2014	0.0286	-3.8	1.0	-1.4	1.0	A-	A+	A-
MATH	4	532660	12	A-T.2.1	2	6316	0.51	0.11	0.51	0.22	0.16	0.00	0.46	-0.06	0.46	-0.39	-0.15	1.2702	0.0286	-4.1	1.0	-2.4	1.0	A+	A-	A-
MATH	4	194780	12	C-G.1.1	2	6316	0.54	0.54	0.08	0.10	0.28	0.00	0.33	0.33	-0.21	-0.10	-0.17	1.0879	0.0287	9.9	1.1	8.6	1.2	A-	A-	A-
MATH	4	591563	12	A-F.3.1	1	6316	0.67	0.07	0.67	0.18	0.07	0.00	0.30	-0.11	0.30	-0.14	-0.21	0.3689	0.0301	9.9	1.2	7.6	1.2	A+	A+	A-
MATH	4	303643	12	C-G.1.1	2	6316	0.31	0.26	0.31	0.24	0.19	0.00	0.18	-0.08	0.18	0.05	-0.17	2.3377	0.0306	9.9	1.3	9.9	1.6	A-	A+	A+
MATH	4	764818	12	A-F.2.1	1	6316	0.71	0.03	0.12	0.13	0.71	0.00	0.34	-0.22	-0.13	-0.21	0.34	0.1430	0.0310	6.3	1.1	5.6	1.2	A+	A+	A-
MATH	4	415679	12	D-M.3.1	1	6316	0.38	0.18	0.20	0.38	0.24	0.00	0.15	-0.03	-0.16	0.15	0.01	1.9610	0.0294	9.9	1.3	9.9	1.6	A-	A+	A+
MATH	4	354935	13	B-O.3.1	2	6297	0.57	0.13	0.17	0.13	0.57	0.00	0.50	-0.30	-0.17	-0.23	0.50	0.9742	0.0287	-6.3	0.9	-4.8	0.9	B-	A-	A-
MATH	4	365955	13	A-F.2.1	1	6297	0.38	0.11	0.45	0.06	0.38	0.00	0.08	-0.21	0.16	-0.22	0.08	1.9249	0.0291	9.9	1.4	9.9	1.7	A+	A-	A+
MATH	4	265263	13	A-T.1.1	2	6297	0.78	0.04	0.78	0.12	0.05	0.01	0.43	-0.24	0.43	-0.21	-0.29	-0.2904	0.0336	-1.9	1.0	-0.9	1.0	A-	A-	A+
MATH	4	541148	13	D-M.2.1	2	6297	0.71	0.06	0.71	0.06	0.17	0.00	0.31	-0.17	0.31	-0.19	-0.14	0.1996	0.0309	8.4	1.1	7.1	1.2	A+	A+	A+
MATH	4	704153	13	D-M.3.1	2	6297	0.43	0.27	0.19	0.43	0.10	0.00	0.23	-0.07	-0.08	0.23	-0.16	1.6580	0.0287	9.9	1.2	9.9	1.4	A+	A-	A-
MATH	4	783476	13	A-F.2.1	1	6297	0.56	0.09	0.31	0.56	0.04	0.00	0.15	-0.17	0.04	0.15	-0.22	1.0073	0.0287	9.9	1.3	9.9	1.4	A+	A+	A+
MATH	4	797364	13	C-G.1.1	2	6297	0.58	0.58	0.20	0.09	0.13	0.00	0.39	0.39	-0.13	-0.08	-0.35	0.9219	0.0288	4.6	1.1	4.4	1.1	A+	A-	A-
MATH	4	580620	13	C-G.1.1	2	6297	0.63	0.12	0.63	0.11	0.14	0.00	0.21	-0.13	0.21	-0.19	0.01	0.6104	0.0294	9.9	1.3	9.9	1.4	A+	A-	A-
MATH	4	995590	13	B-O.1.1	2	6297	0.55	0.18	0.14	0.55	0.13	0.00	0.51	-0.35	-0.17	0.51	-0.17	1.0747	0.0286	-8.4	0.9	-7.1	0.9	A+	A+	A-
MATH	4	185579	13	A-T.2.1	2	6297	0.45	0.19	0.45	0.22	0.12	0.00	0.21	0.01	0.21	-0.08	-0.22	1.5521	0.0286	9.9	1.3	9.9	1.4	A+	A-	A-
MATH	4	247652	14	A-F.2.1	1	6292	0.64	0.08	0.64	0.09	0.19	0.00	0.45	-0.20	0.45	-0.24	-0.25	0.5573	0.0297	-1.4	1.0	-0.7	1.0	A-	A-	A-
MATH	4	738969	14	B-O.3.1	1	6292	0.84	0.07	0.84	0.04	0.04	0.00	0.46	-0.31	0.46	-0.20	-0.22	-0.7478	0.0371	-4.8	0.9	-3.7	0.8	A+	A-	A-
MATH	4	364672	14	D-M.1.1	1	6292	0.84	0.84	0.06	0.05	0.04	0.00	0.46	0.46	-0.27	-0.20	-0.29	-0.8040	0.0377	-4.6	0.9	-6.0	0.7	A-	A-	A-
MATH	4	582169	14	A-T.1.1	2	6292	0.37	0.22	0.37	0.17	0.24	0.00	0.22	-0.05	0.22	-0.17	-0.05	1.9743	0.0295	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	4	386784	14	A-F.2.1	1	6292	0.42	0.04	0.51	0.42	0.02	0.00	0.45	-0.20	-0.31	0.45	-0.17	1.7247	0.0290	-6.2	0.9	-0.3	1.0	A-	A-	A-
MATH	4	592930	14	B-O.1.1	2	6292	0.35	0.35	0.18	0.13	0.35	0.00	0.23	0.23	-0.28	-0.22	0.15	2.1341	0.0299	9.9	1.2	9.9	1.5	A+	A-	A-
MATH	4	366435	14	D-M.2.1	2	6292	0.44	0.23	0.44	0.19	0.15	0.00	0.35	-0.02	0.35	-0.21	-0.23	1.6334	0.0288	5.9	1.1	9.0	1.2	A-	A-	A-
MATH	4	742112	14	C-G.1.1	2	6292	0.54	0.54	0.22	0.09	0.15	0.00	0.20	0.20	-0.05	-0.11	-0.12	1.0913	0.0287	9.9	1.3	9.9	1.4	A-	A-	A+
MATH	4	180058	14	D-M.3.1	1	6292	0.42	0.42	0.34	0.14	0.09	0.01	0.16	0.16	-0.05	-0.07	-0.09	1.7466	0.0290	9.9	1.3	9.9	1.6	A+	A-	A-
MATH	4	423872	14	A-T.2.1	1	6292	0.82	0.06	0.05	0.06	0.82	0.00	0.42	-0.28	-0.26	-0.14	0.42	-0.6035	0.0359	-2.6	1.0	-2.3	0.9	A+	A+	A+
MATH	4	717467	15	A-F.3.1	2	6260	0.26	0.38	0.28	0.08	0.26	0.00	0.25	-0.16	-0.01	-0.10	0.25	2.6953	0.0324	4.5	1.1	9.9	1.6	A-	A+	A+
MATH	4	814364	15	D-M.3.1	1	6260	0.36	0.36	0.38	0.19	0.07	0.00	0.19	0.19	-0.07	-0.04	-0.14	2.0972	0.0300	9.9	1.3	9.9	1.6	A+	A-	A+
MATH	4	840141	15	D-M.1.1	2	6260	0.09	0.53	0.19	0.09	0.19	0.00	-0.01	0.16	-0.17	-0.01	-0.02	4.2023	0.0471	5.3	1.2	9.9	4.1	A+	A-	A+
MATH	4	351297	15	A-F.2.1	2	6260	0.35	0.27	0.35	0.25	0.12	0.01	0.38	-0.12	0.38	-0.17	-0.15	2.1451	0.0301	-1.4	1.0	6.4	1.2	A-	A+	A+
MATH	4	880089	15	A-T.2.1	1	6260	0.76	0.76	0.11	0.05	0.07	0.00	0.50	0.50	-0.22	-0.26	-0.33	-0.1741	0.0331	-5.9	0.9	-6.8	0.8	A+	A+	A+
MATH	4	339856	15	B-O.2.1	1	6260	0.14	0.25	0.27	0.33	0.14	0.00	0.16	-0.21	-0.02	0.10	0.16	3.6235	0.0397	4.1	1.1	9.9	2.1	A-	A+	A-
MATH	4	869733	15	B-O.1.1	2	6260	0.36	0.12	0.36	0.37	0.15	0.00	0.40	-0.09	0.40	-0.29	-0.06	2.0855	0.0299	-0.9	1.0	5.1	1.1	A-	A-	A-
MATH	4	700634	15	C-G.1.1	2	6260	0.68	0.08	0.19	0.68	0.05	0.00	0.36	-0.14	-0.28	0.36	-0.10	0.3781	0.0304	6.3	1.1	6.7	1.2	A-	A-	A-
MATH	4	693311	15	A-T.2.1	1	6260	0.89	0.02	0.04	0.05	0.89	0.00	0.33	-0.18	-0.24	-0.13	0.33	-1.2364	0.0428	-0.5	1.0	2.4	1.2	C+	A-	A-
MATH	4	776698	15	B-O.3.1	2	6260	0.47	0.24	0.22	0.47	0.06	0.00	0.45	-0.26	-0.16	0.45	-0.17	1.4994	0.0289	-3.6	1.0	-0.5	1.0	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

MATH	4	665183	16	B-O.3.1	2	6268	0.46	0.07	0.42	0.05	0.46	0.00	0.22	-0.23	-0.01	-0.22	0.22	1.5428	0.0288	9.9	1.3	9.9	1.4	A+	A+	A+
MATH	4	137241	16	A-F.3.1	2	6268	0.26	0.46	0.16	0.11	0.26	0.00	0.24	-0.15	-0.01	-0.09	0.24	2.6290	0.0319	4.4	1.1	9.9	1.6	A-	A-	A+
MATH	4	108648	16	A-F.1.1	2	6268	0.40	0.40	0.08	0.39	0.13	0.00	0.33	0.33	-0.09	-0.20	-0.12	1.8426	0.0292	7.7	1.1	9.9	1.2	A-	A-	A-
MATH	4	630002	16	A-T.1.1	2	6268	0.36	0.30	0.19	0.15	0.36	0.00	0.29	-0.30	-0.05	0.05	0.29	2.0421	0.0296	9.9	1.1	9.9	1.3	A-	A+	A+
MATH	4	215242	16	A-F.2.1	1	6268	0.88	0.01	0.88	0.03	0.07	0.00	0.34	-0.16	0.34	-0.22	-0.20	-1.1981	0.0422	-0.3	1.0	-0.4	1.0	A+	A-	A-
MATH	4	409525	16	C-G.1.1	2	6268	0.34	0.34	0.26	0.29	0.11	0.00	0.21	0.21	-0.01	-0.06	-0.21	2.1715	0.0300	9.9	1.2	9.9	1.6	A-	A-	A-
MATH	4	369035	16	B-O.1.1	1	6268	0.86	0.02	0.03	0.08	0.86	0.00	0.27	-0.17	-0.18	-0.12	0.27	-0.9880	0.0398	3.1	1.1	4.5	1.3	A+	A+	A+
MATH	4	954759	16	B-O.1.1	2	6268	0.43	0.35	0.43	0.07	0.13	0.01	0.49	-0.21	0.49	-0.20	-0.24	1.6968	0.0290	-8.2	0.9	-3.2	0.9	A-	A-	A-
MATH	4	162448	16	D-M.1.1	2	6268	0.28	0.34	0.21	0.28	0.17	0.00	0.32	-0.33	-0.17	0.32	0.22	2.5224	0.0314	1.3	1.0	9.9	1.4	A-	A-	A-
MATH	4	529263	16	D-M.2.1	2	6268	0.67	0.20	0.02	0.67	0.11	0.00	0.50	-0.51	-0.17	0.50	-0.03	0.4088	0.0303	-5.0	0.9	-2.4	0.9	A-	A-	A+
MATH	4	348091	17	A-T.1.1	1	6317	0.79	0.13	0.03	0.79	0.04	0.00	0.41	-0.26	-0.23	0.41	-0.18	-0.3991	0.0341	-0.9	1.0	-1.7	0.9	A-	A+	A-
MATH	4	939380	17	B-O.1.1	2	6317	0.29	0.15	0.51	0.29	0.05	0.00	0.29	-0.23	-0.01	0.29	-0.21	2.4393	0.0309	3.5	1.1	9.9	1.4	A-	A-	A-
MATH	4	992692	17	A-F.2.1	1	6317	0.38	0.09	0.47	0.05	0.38	0.00	0.12	-0.21	0.08	-0.18	0.12	1.8957	0.0291	9.9	1.4	9.9	1.6	A+	A+	A+
MATH	4	310407	17	B-O.3.1	2	6317	0.26	0.26	0.48	0.17	0.08	0.00	0.02	0.02	0.07	-0.07	-0.07	2.6146	0.0318	9.9	1.4	9.9	2.1	A+	A+	A-
MATH	4	594870	17	C-G.1.1	2	6317	0.32	0.15	0.32	0.33	0.20	0.00	0.31	-0.34	0.31	-0.01	-0.04	2.2736	0.0302	3.9	1.1	9.9	1.3	A-	A-	A-
MATH	4	566203	17	A-F.1.1	2	6317	0.31	0.40	0.12	0.17	0.31	0.00	0.29	-0.15	-0.16	-0.01	0.29	2.3308	0.0304	5.1	1.1	9.9	1.3	A-	A+	A-
MATH	4	267218	17	D-M.3.1	1	6317	0.39	0.39	0.35	0.16	0.09	0.00	0.11	0.11	0.00	-0.05	-0.12	1.8560	0.0290	9.9	1.4	9.9	1.6	A-	A+	A-
MATH	4	245765	17	A-T.2.1	2	6317	0.56	0.23	0.16	0.56	0.04	0.00	0.49	-0.40	-0.11	0.49	-0.16	0.9741	0.0286	-5.3	0.9	-4.3	0.9	A+	A-	A-
MATH	4	538095	17	D-M.1.1	2	6317	0.63	0.17	0.07	0.11	0.63	0.01	0.55	-0.33	-0.30	-0.18	0.55	0.6331	0.0293	-9.9	0.9	-9.8	0.8	A-	A-	A-
MATH	4	687373	17	A-F.2.1	1	6317	0.39	0.26	0.23	0.39	0.11	0.00	0.36	-0.08	-0.18	0.36	-0.20	1.8585	0.0290	1.2	1.0	6.7	1.1	A-	A-	A-
MATH	4	324495	18	A-F.2.1	2	6321	0.38	0.24	0.38	0.23	0.15	0.00	0.34	-0.24	0.34	-0.06	-0.10	1.9205	0.0293	3.3	1.0	9.9	1.3	A-	A+	A-
MATH	4	875960	18	A-F.3.1	1	6321	0.73	0.13	0.07	0.07	0.73	0.00	0.40	-0.17	-0.23	-0.23	0.40	0.0086	0.0317	2.1	1.0	2.2	1.1	A+	A-	A-
MATH	4	885474	18	D-M.1.1	2	6321	0.25	0.21	0.25	0.20	0.34	0.00	0.02	0.12	0.02	-0.05	-0.08	2.7249	0.0325	9.9	1.4	9.9	2.2	A-	A-	A-
MATH	4	527321	18	A-T.2.1	1	6321	0.55	0.19	0.16	0.55	0.10	0.00	0.40	-0.16	-0.22	0.40	-0.17	1.0499	0.0287	3.9	1.1	3.9	1.1	A+	A+	A-
MATH	4	515617	18	C-G.1.1	2	6321	0.96	0.02	0.01	0.01	0.96	0.00	0.24	-0.15	-0.13	-0.13	0.24	-2.3783	0.0630	-0.6	1.0	-0.1	1.0	B+	A-	A-
MATH	4	189766	18	B-O.2.1	1	6321	0.37	0.20	0.37	0.27	0.16	0.00	0.24	-0.13	0.24	-0.01	-0.17	1.9995	0.0295	9.9	1.2	9.9	1.4	A+	A-	A-
MATH	4	211845	18	B-O.3.1	2	6321	0.63	0.18	0.08	0.10	0.63	0.01	0.48	-0.24	-0.28	-0.20	0.48	0.6136	0.0295	-3.2	1.0	-3.3	0.9	A+	A+	A+
MATH	4	776987	18	B-O.1.1	2	6321	0.60	0.18	0.12	0.09	0.60	0.00	0.52	-0.28	-0.22	-0.25	0.52	0.7633	0.0291	-7.2	0.9	-7.3	0.9	A+	A+	A+
MATH	4	237098	18	D-M.2.1	2	6321	0.94	0.94	0.02	0.01	0.02	0.00	0.30	0.30	-0.18	-0.17	-0.15	-2.0345	0.0551	-1.3	0.9	-1.3	0.9	A+	A-	A-
MATH	4	878140	18	A-T.1.1	2	6321	0.51	0.07	0.18	0.51	0.24	0.00	0.32	-0.18	-0.05	0.32	-0.22	1.2610	0.0286	9.9	1.1	9.9	1.2	A-	A-	A-
MATH	4	253626	19	A-T.1.1	1	6318	0.69	0.13	0.07	0.10	0.69	0.00	0.45	-0.23	-0.23	-0.24	0.45	0.2788	0.0305	-1.5	1.0	-1.8	1.0	A-	A-	A-
MATH	4	694977	19	A-F.2.1	1	6318	0.40	0.07	0.16	0.36	0.40	0.00	0.36	-0.27	-0.08	-0.15	0.36	1.8093	0.0290	3.7	1.1	8.7	1.2	A-	A-	A+
MATH	4	584690	19	B-O.3.1	2	6318	0.30	0.11	0.27	0.30	0.32	0.00	0.10	-0.21	-0.11	0.10	0.16	2.4213	0.0308	9.9	1.3	9.9	1.8	A-	A+	A+
MATH	4	624800	19	D-M.1.1	1	6318	0.67	0.07	0.06	0.67	0.20	0.00	0.50	-0.26	-0.29	0.50	-0.24	0.4140	0.0300	-5.7	0.9	-5.7	0.9	A-	B-	B-
MATH	4	878557	19	A-T.2.1	1	6318	0.73	0.14	0.73	0.07	0.06	0.00	0.46	-0.28	0.46	-0.25	-0.18	0.0321	0.0316	-2.4	1.0	-3.2	0.9	A+	A-	A-
MATH	4	301991	19	C-G.1.1	2	6318	0.43	0.13	0.43	0.30	0.14	0.00	0.28	0.05	0.28	-0.22	-0.14	1.6722	0.0288	9.9	1.2	9.9	1.3	A-	A-	A+
MATH	4	496430	19	D-M.3.1	1	6318	0.39	0.39	0.30	0.12	0.18	0.00	0.25	0.25	-0.04	-0.18	-0.11	1.8651	0.0291	9.9	1.2	9.9	1.4	A-	A-	A-
MATH	4	361871	19	B-O.1.1	2	6318	0.63	0.22	0.63	0.06	0.08	0.01	0.53	-0.33	0.53	-0.21	-0.23	0.6282	0.0294	-8.2	0.9	-8.1	0.8	A-	A+	A-
MATH	4	253456	19	C-G.1.1	2	6318	0.61	0.05	0.61	0.06	0.28	0.00	0.08	-0.14	0.08	-0.06	0.02	0.7255	0.0292	9.9	1.4	9.9	1.7	A-	A-	A+
MATH	4	443327	19	A-T.2.1	1	6318	0.80	0.09	0.06	0.05	0.80	0.00	0.48	-0.38	-0.18	-0.17	0.48	-0.4446	0.0346	-5.4	0.9	-3.1	0.9	A+	A-	A-
MATH	4	194888	20	D-M.3.1	2	6273	0.25	0.25	0.14	0.45	0.16	0.00	0.14	0.14	-0.14	0.10	-0.17	2.7099	0.0324	9.9	1.2	9.9	1.9	A+	A+	A+
MATH	4	836988	20	A-T.2.1	1	6273	0.58	0.12	0.22	0.58	0.07	0.00	0.23	-0.27	0.03	0.23	-0.16	0.8944	0.0290	9.9	1.3	9.9	1.4	A-	A-	A-
MATH	4	320567	20	B-O.1.1	2	6273	0.46	0.15	0.46	0.22	0.17	0.00	0.29	-0.11	0.29	-0.16	-0.11	1.5124	0.0287	9.9	1.2	9.9	1.2	A+	A-	A+
MATH	4	965049	20	A-T.1.1	2	6273	0.48	0.21	0.17	0.14	0.48	0.00	0.30	-0.14	-0.15	-0.09	0.30	1.4308	0.0286	9.9	1.2	9.9	1.2	A-	A+	A+
MATH	4	830046	20	B-O.3.1	2	6273	0.20	0.07	0.64	0.08	0.20	0.00	0.34	-0.17	-0.13	-0.10	0.34	3.0625	0.0347	-3.3	0.9	5.5	1.2	A-	B-	B-
MATH	4	583545	20	C-G.1.1	2	6273	0.30	0.16	0.28	0.27	0.30	0.00	0.22	-0.17	-0.05	-0.03	0.22	2.4128	0.0309	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	4	146137	20	C-G.1.1	2	6273	0.64	0.08	0.15	0.64	0.13	0.00	0.35	-0.17	-0.21	0.35	-0.13	0.6022	0.0296	7.7	1.1	5.1	1.1	A+	A-	A-
MATH	4	714433	20	D-M.1.1	1	6273	0.77	0.05	0.77	0.11	0.07	0.00	0.46	-0.23	0.46	-0.35	-0.12	-0.1856	0.0331	-3.7	0.9	-0.3	1.0	A-	A-	B-
MATH	4	246228	20	A-F.2.1	1	6273	0.68	0.68	0.04	0.04	0.23	0.00	0.48	0.48	-0.15	-0.23	-0.35	0.3309	0.0305	-4.3	0.9	-2.3	0.9	A+	A-	A-
MATH	4	203580	20	A-T.2.1	2	6273	0.61	0.25	0.61	0.09	0.05	0.00	0.56	-0.48	0.56	-0.09	-0.18	0.7670	0.0292	-9.9	0.9	-9.2	0.8	A+	A-	B-
MATH	5	394647	0	A.3.2.1	1	125346	0.70	0.70	0.13	0.13	0.03	0.00	0.46	0.46	-0.23	-0.29	-0.20	0.3903	0.0069	-8.2	1.0	-9.9	0.9			

Appendix G: Item Statistics Multiple Choice

MATH	5	477782	0	A.3.1.1	1	125346	0.70	0.03	0.08	0.70	0.19	0.00	0.41	-0.21	-0.29	0.41	-0.19	0.4708	0.0068	-1.9	1.0	-0.6	1.0				
MATH	5	914398	0	A.2.1.3	1	125346	0.84	0.08	0.06	0.02	0.84	0.00	0.46	-0.25	-0.32	-0.19	0.46	-0.4487	0.0082	-9.9	0.8	-9.9	0.7				
MATH	5	444378	0	A.2.1.1	2	125346	0.86	0.07	0.86	0.05	0.02	0.00	0.39	-0.30	0.39	-0.16	-0.16	-0.6264	0.0085	-9.9	0.9	-7.7	0.9				
MATH	5	156320	0	A.1.3.2	2	125346	0.50	0.27	0.09	0.14	0.50	0.00	0.51	-0.16	-0.26	-0.31	0.51	1.5261	0.0063	-9.9	0.9	-9.9	0.9				
MATH	5	511468	0	C.2.1.1	1	125346	0.89	0.04	0.89	0.01	0.06	0.00	0.33	-0.22	0.33	-0.17	-0.18	-0.9596	0.0094	-3.7	1.0	-4.1	1.0				
MATH	5	482722	0	A.1.5.1	2	125346	0.52	0.19	0.20	0.09	0.52	0.00	0.42	-0.44	0.01	-0.14	0.42	1.4745	0.0063	3.8	1.0	9.9	1.1				
MATH	5	846851	0	A.2.1.1	2	125346	0.49	0.17	0.49	0.07	0.27	0.00	0.49	-0.15	0.49	-0.24	-0.28	1.6007	0.0063	-9.9	0.9	-9.9	0.9				
MATH	5	602693	0	D.2.1.2	2	125346	0.35	0.19	0.38	0.08	0.35	0.00	0.31	-0.20	-0.02	-0.20	0.31	2.2370	0.0066	9.9	1.1	9.9	1.2				
MATH	5	805095	0	B.2.2.3	2	125346	0.54	0.07	0.54	0.27	0.12	0.00	0.55	-0.20	0.55	-0.27	-0.33	1.2740	0.0064	-9.9	0.9	-9.9	0.8				
MATH	5	367973	0	C.1.2.1	1	125346	0.64	0.64	0.03	0.15	0.17	0.00	0.36	0.36	-0.09	-0.12	-0.30	0.8047	0.0066	9.9	1.1	9.9	1.1				
MATH	5	742978	0	B.2.2.3	2	125346	0.49	0.09	0.49	0.20	0.22	0.00	0.45	-0.15	0.45	-0.41	-0.04	1.5795	0.0063	-9.9	1.0	-6.3	1.0				
MATH	5	484963	0	A.2.1.3	2	125346	0.61	0.19	0.09	0.11	0.61	0.00	0.53	-0.28	-0.27	-0.22	0.53	0.9730	0.0065	-9.9	0.9	-9.9	0.8				
MATH	5	708664	0	A.2.1.2	2	125346	0.64	0.64	0.12	0.07	0.16	0.00	0.39	0.39	-0.21	-0.20	-0.18	0.7035	0.0066	9.9	1.1	9.9	1.1				
MATH	5	827957	0	B.1.2.1	2	125346	0.66	0.66	0.08	0.18	0.07	0.00	0.56	0.56	-0.21	-0.45	-0.13	0.6949	0.0066	-9.9	0.8	-9.9	0.8				
MATH	5	376641	0	B.1.1.1	2	125346	0.64	0.18	0.64	0.05	0.13	0.00	0.28	-0.18	0.28	-0.12	-0.12	0.8098	0.0066	9.9	1.2	9.9	1.2				
MATH	5	552627	0	B.1.3.1	2	125346	0.39	0.53	0.04	0.04	0.39	0.00	0.27	-0.15	-0.13	-0.15	0.27	2.1055	0.0065	9.9	1.2	9.9	1.3				
MATH	5	877386	0	A.3.1.1	2	125346	0.78	0.07	0.06	0.78	0.09	0.00	0.47	-0.26	-0.19	0.47	-0.28	0.0249	0.0073	-9.9	0.9	-9.9	0.8				
MATH	5	681431	0	A.1.2.1	1	125346	0.70	0.07	0.16	0.07	0.70	0.00	0.49	-0.36	-0.31	-0.07	0.49	0.4759	0.0068	-9.9	0.9	-9.9	0.9				
MATH	5	440248	0	A.1.4.2	1	125346	0.70	0.02	0.01	0.70	0.27	0.00	0.40	-0.16	-0.16	0.40	-0.32	0.4751	0.0068	2.6	1.0	5.6	1.0				
MATH	5	928049	0	C.2.1.1	2	125346	0.87	0.03	0.06	0.87	0.04	0.00	0.36	-0.18	-0.24	0.36	-0.17	-0.7738	0.0089	-9.9	0.9	-8.7	0.9				
MATH	5	372646	0	B.1.3.2	2	125346	0.65	0.18	0.65	0.12	0.04	0.00	0.33	-0.17	0.33	-0.19	-0.12	0.7543	0.0066	9.9	1.1	9.9	1.2				
MATH	5	656108	0	A.1.5.1	2	125346	0.91	0.01	0.02	0.06	0.91	0.00	0.30	-0.14	-0.17	-0.21	0.30	-1.2747	0.0104	-0.9	1.0	-2.9	1.0				
MATH	5	755207	0	D.1.2.1	2	125346	0.82	0.12	0.03	0.02	0.82	0.00	0.31	-0.13	-0.23	-0.23	0.31	-0.3231	0.0079	5.7	1.0	9.9	1.2				
MATH	5	296811	0	E.2.1.2	1	125346	0.82	0.05	0.82	0.07	0.06	0.00	0.38	-0.27	0.38	-0.14	-0.21	-0.3302	0.0079	-8.0	1.0	-5.0	1.0				
MATH	5	557046	0	E.3.1.1	2	125346	0.70	0.20	0.06	0.04	0.70	0.00	0.43	-0.24	-0.23	-0.23	0.43	0.4305	0.0069	-4.1	1.0	-9.9	0.9				
MATH	5	291380	0	E.3.1.2	2	125346	0.81	0.07	0.81	0.05	0.07	0.00	0.40	-0.26	0.40	-0.18	-0.19	-0.2129	0.0077	-9.9	1.0	-3.1	1.0				
MATH	5	851650	0	D.2.1.2	2	125346	0.86	0.07	0.86	0.03	0.03	0.00	0.45	-0.30	0.45	-0.24	-0.20	-0.8127	0.0090	-7.6	1.0	-9.9	0.8				
MATH	5	162411	0	E.2.1.1	1	125346	0.70	0.04	0.70	0.08	0.17	0.00	0.47	-0.16	0.47	-0.25	-0.30	0.4781	0.0068	-9.9	0.9	-9.9	0.9				
MATH	5	604209	0	D.2.1.1	1	125346	0.64	0.29	0.04	0.03	0.64	0.00	0.41	-0.23	-0.24	-0.24	0.41	0.7293	0.0066	9.9	1.0	3.2	1.0				
MATH	5	771595	0	E.1.1.1	2	125346	0.75	0.06	0.06	0.75	0.12	0.00	0.48	-0.24	-0.31	0.48	-0.22	0.2068	0.0071	-9.9	0.9	-9.9	0.8				
MATH	5	232435	0	C.1.1.2	1	125346	0.62	0.62	0.12	0.09	0.17	0.00	0.46	0.46	-0.24	-0.23	-0.21	0.9517	0.0065	-9.9	1.0	-9.9	0.9				
MATH	5	175897	0	C.2.1.2	2	125346	0.78	0.78	0.05	0.09	0.07	0.00	0.34	0.34	-0.23	-0.15	-0.16	-0.0017	0.0074	4.0	1.0	9.9	1.1				
MATH	5	672090	0	C.2.1.2	2	125346	0.81	0.81	0.07	0.05	0.07	0.00	0.43	0.43	-0.18	-0.17	-0.33	-0.2572	0.0078	-9.9	0.9	-9.9	0.9				
MATH	5	665035	0	D.1.1.1	2	125346	0.61	0.21	0.07	0.61	0.11	0.00	0.51	-0.16	-0.21	0.51	-0.41	1.0096	0.0065	-9.9	0.9	-9.9	0.8				
MATH	5	190068	0	D.1.1.2	2	125346	0.82	0.82	0.03	0.04	0.10	0.00	0.32	0.32	-0.20	-0.31	-0.08	-0.3944	0.0080	2.4	1.0	9.9	1.4				
MATH	5	271912	0	C.1.2.1	1	125346	0.39	0.25	0.39	0.17	0.18	0.00	0.25	-0.13	0.25	-0.21	0.03	2.1032	0.0065	9.9	1.2	9.9	1.3				
MATH	5	991218	0	C.1.1.2	1	125346	0.69	0.69	0.12	0.10	0.09	0.00	0.43	0.43	-0.18	-0.25	-0.22	0.5420	0.0068	-2.7	1.0	-9.9	0.9				
MATH	5	244190	0	B.2.2.1	2	125346	0.55	0.19	0.03	0.55	0.22	0.00	0.29	-0.30	-0.10	0.29	-0.01	1.2759	0.0064	9.9	1.2	9.9	1.2				
MATH	5	359740	0	B.1.1.1	2	125346	0.71	0.09	0.14	0.71	0.06	0.00	0.42	-0.17	-0.22	0.42	-0.27	0.4138	0.0069	-6.5	1.0	-4.3	1.0				
MATH	5	452268	0	B.2.1.1	1	125346	0.75	0.01	0.75	0.21	0.03	0.00	0.46	-0.14	0.46	-0.37	-0.19	0.1846	0.0071	-9.9	0.9	-9.9	0.9				
MATH	5	697918	0	B.2.2.2	1	125346	0.78	0.07	0.12	0.02	0.78	0.00	0.49	-0.31	-0.30	-0.17	0.49	-0.0490	0.0074	-9.9	0.9	-9.9	0.8				
MATH	5	577163	0	C.1.1.1	1	125346	0.72	0.72	0.23	0.02	0.02	0.00	0.38	0.38	-0.27	-0.20	-0.16	0.3638	0.0069	5.7	1.0	-1.3	1.0				
MATH	5	211907	0	B.1.2.2	2	125346	0.79	0.05	0.03	0.79	0.13	0.00	0.29	-0.27	-0.20	0.29	-0.07	-0.0666	0.0075	9.9	1.1	9.9	1.2				
MATH	5	481793	0	C.1.1.1	1	125346	0.35	0.34	0.12	0.35	0.19	0.00	0.31	-0.08	-0.22	0.31	-0.10	2.2820	0.0066	9.9	1.1	9.9	1.3				
MATH	5	470276	0	A.3.2.1	2	125346	0.70	0.09	0.12	0.08	0.70	0.00	0.48	-0.30	-0.25	-0.18	0.48	0.3962	0.0069	-9.9	0.9	-9.9	0.9				
MATH	5	572321	0	B.1.2.2	2	125346	0.55	0.55	0.13	0.24	0.08	0.00	0.47	0.47	-0.18	-0.21	-0.31	1.3332	0.0064	-9.9	1.0	-9.9	0.9				
MATH	5	945951	0	A.1.6.2	1	125346	0.85	0.04	0.03	0.07	0.85	0.00	0.45	-0.23	-0.21	-0.29	0.45	-0.5970	0.0085	-9.9	0.9	-9.9	0.7				
MATH	5	841154	0	A.3.1.2	2	125346	0.45	0.22	0.12	0.45	0.21	0.00	0.30	0.06	-0.15	0.30	-0.31	1.7652	0.0064	9.9	1.1	9.9	1.2				
MATH	5	487543	0	A.2.1.3	2	125346	0.72	0.09	0.06	0.72	0.12	0.00	0.46	-0.31	-0.24	0.46	-0.17	0.3580	0.0069	-9.9	0.9	-9.9	0.9				
MATH	5	113148	0	A.3.1.2	2	125346	0.63	0.28	0.07	0.63	0.02	0.00	0.40	-0.27	-0.19	0.40	-0.14	0.8856	0.0065	9.9	1.0	9.9	1.1				
MATH	5	906446	0	A.2.1.1	2	125346	0.66	0.66	0.06	0.13	0.15	0.00	0.50	0.50	-0.25	-0.24	-0.26	0.7038	0.0066	-9.9	0.9	-9.9	0.9				

Appendix G: Item Statistics Multiple Choice

MATH	5	983883	0	A.1.6.1	1	125346	0.76	0.10	0.06	0.76	0.08	0.00	0.51	-0.29	-0.28	0.51	-0.23	0.0401	0.0073	-9.9	0.9	-9.9	0.8			
MATH	5	299022	0	A.1.2.1	1	125346	0.84	0.02	0.02	0.84	0.12	0.00	0.41	-0.19	-0.19	0.41	-0.30	-0.5077	0.0083	-8.7	1.0	-9.9	0.8			
MATH	5	952996	0	A.1.4.2	1	125346	0.78	0.13	0.03	0.06	0.78	0.00	0.43	-0.35	-0.19	-0.11	0.43	0.0102	0.0074	-9.9	0.9	-8.2	0.9			
MATH	5	493698	0	A.1.3.2	2	125346	0.64	0.14	0.64	0.15	0.07	0.00	0.47	-0.18	0.47	-0.28	-0.24	0.7968	0.0066	-9.9	1.0	-9.9	0.9			
MATH	5	269718	0	A.1.1.1	1	125346	0.77	0.11	0.05	0.07	0.77	0.00	0.48	-0.36	-0.16	-0.21	0.48	0.0663	0.0073	-9.9	0.9	-9.9	0.8			
MATH	5	497387	0	A.1.2.2	1	125346	0.80	0.80	0.02	0.09	0.09	0.00	0.29	0.29	-0.20	-0.16	-0.15	-0.1686	0.0076	9.9	1.1	9.9	1.2			
MATH	5	673117	0	A.1.4.1	1	125346	0.89	0.02	0.03	0.89	0.06	0.00	0.34	-0.19	-0.16	0.34	-0.22	-1.1363	0.0100	2.8	1.0	-0.8	1.0			
MATH	5	116154	0	A.1.3.3	1	125346	0.35	0.35	0.22	0.35	0.07	0.00	0.45	-0.30	-0.19	0.45	0.02	2.2977	0.0066	-9.9	0.9	-4.1	1.0			
MATH	5	808418	1	C.2.1.1	2	12793	0.52	0.52	0.16	0.27	0.05	0.00	0.22	0.22	-0.15	-0.05	-0.13	1.4012	0.0197	9.9	1.3	9.9	1.3			
MATH	5	767695	1	A.1.6.2	1	12793	0.72	0.15	0.07	0.72	0.06	0.01	0.50	-0.33	-0.22	0.50	-0.21	0.2856	0.0215	-9.9	0.9	-9.9	0.8			
MATH	5	545982	1	A-T.1.1	2	6571	0.22	0.54	0.13	0.11	0.22	0.00	0.25	0.08	-0.27	-0.17	0.25	2.9916	0.0323	4.8	1.1	9.9	1.4	A-	A+	A+
MATH	5	809120	1	B-O.1.1	1	6571	0.35	0.35	0.17	0.17	0.30	0.00	0.04	0.04	-0.10	-0.20	0.21	2.1727	0.0285	9.9	1.4	9.9	1.8	A+	A-	A+
MATH	5	832642	1	A-F.1.1	2	6571	0.47	0.47	0.16	0.13	0.24	0.00	0.31	0.31	-0.20	-0.22	-0.02	1.5526	0.0274	9.9	1.1	9.9	1.2	A+	A+	A+
MATH	5	609034	1	A-F.2.1	2	6571	0.28	0.28	0.26	0.30	0.15	0.00	0.31	0.31	-0.16	0.05	-0.26	2.5880	0.0300	3.4	1.1	8.7	1.2	A-	A-	A-
MATH	5	732170	1	D-M.3.1	2	6571	0.25	0.26	0.19	0.25	0.30	0.00	0.26	-0.18	-0.04	0.26	-0.04	2.7941	0.0311	4.3	1.1	9.9	1.4	A-	B-	A-
MATH	5	400386	1	A-T.1.1	1	6571	0.51	0.25	0.11	0.51	0.12	0.00	0.42	-0.16	-0.24	0.42	-0.19	1.3458	0.0273	0.2	1.0	-0.4	1.0	A-	A-	A-
MATH	5	998018	1	C-G.2.1	2	6571	0.44	0.14	0.44	0.24	0.18	0.00	0.31	-0.17	0.31	-0.13	-0.09	1.7340	0.0275	9.9	1.1	9.9	1.2	A+	A-	A-
MATH	5	890234	1	A-F.2.1	2	6571	0.22	0.07	0.22	0.60	0.10	0.00	-0.20	-0.15	-0.20	0.35	-0.16	2.9407	0.0320	9.9	1.7	9.9	2.7	A-	A-	B-
MATH	5	915205	1	D-M.2.1	2	6571	0.48	0.12	0.14	0.48	0.26	0.00	0.21	-0.09	-0.12	0.21	-0.07	1.5068	0.0273	9.9	1.2	9.9	1.4	A-	A+	A-
MATH	5	850509	1	B-O.2.1	1	6571	0.61	0.13	0.15	0.11	0.61	0.00	0.48	-0.27	-0.20	-0.22	0.48	0.8533	0.0278	-5.8	0.9	-5.7	0.9	A+	A+	A+
MATH	5	829302	2	B.1.1.1	2	12504	0.86	0.86	0.04	0.07	0.03	0.00	0.40	0.40	-0.21	-0.25	-0.19	-0.7328	0.0277	-3.8	0.9	-4.2	0.9			
MATH	5	993492	2	A.1.5.1	2	12524	0.33	0.33	0.06	0.08	0.53	0.00	0.54	0.54	-0.18	-0.02	-0.41	2.4779	0.0212	-9.9	0.8	-9.9	0.8			
MATH	5	662055	2	A-T.1.1	1	6262	0.72	0.03	0.15	0.72	0.10	0.00	0.45	-0.20	-0.29	0.45	-0.21	0.3466	0.0307	-3.0	1.0	-3.2	0.9	A-	A-	A-
MATH	5	349299	2	B-O.1.1	1	6262	0.45	0.45	0.13	0.24	0.18	0.00	0.44	0.44	-0.11	-0.14	-0.32	1.8021	0.0283	-3.1	1.0	-1.3	1.0	A+	A-	A-
MATH	5	520971	2	B-O.2.1	2	6262	0.50	0.50	0.33	0.07	0.10	0.00	0.24	0.24	-0.15	-0.23	0.03	1.5005	0.0282	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	5	263874	2	A-F.2.1	1	6262	0.33	0.14	0.15	0.38	0.33	0.00	0.30	-0.26	-0.22	0.06	0.30	2.4410	0.0298	6.0	1.1	9.9	1.3	A+	A-	A+
MATH	5	938386	2	C-G.2.1	2	6262	0.21	0.16	0.49	0.14	0.21	0.00	0.18	-0.15	0.02	-0.08	0.18	3.1562	0.0336	7.5	1.1	9.9	1.6	A-	A-	A+
MATH	5	436407	2	D-M.3.1	2	6262	0.22	0.40	0.27	0.22	0.11	0.00	0.16	-0.19	0.04	0.16	0.04	3.1226	0.0333	9.1	1.2	9.9	1.7	A-	A-	A-
MATH	5	637620	2	A-F.1.1	2	6262	0.52	0.13	0.52	0.23	0.12	0.00	0.37	-0.24	0.37	-0.14	-0.14	1.4375	0.0282	4.1	1.1	3.5	1.1	A-	A-	A+
MATH	5	625968	2	D-M.2.1	2	6262	0.38	0.21	0.34	0.38	0.07	0.00	0.42	-0.09	-0.29	0.42	-0.12	2.1462	0.0289	-4.9	0.9	2.8	1.1	A-	A-	A-
MATH	5	836480	2	A-T.1.1	2	6262	0.37	0.18	0.25	0.37	0.20	0.00	0.19	-0.10	-0.11	0.19	-0.01	2.1714	0.0290	9.9	1.3	9.9	1.5	A+	A-	A-
MATH	5	728858	2	A-F.1.1	2	6262	0.43	0.16	0.43	0.29	0.11	0.00	0.41	-0.16	0.41	-0.18	-0.19	1.8659	0.0284	-1.4	1.0	2.4	1.0	B-	A-	A-
MATH	5	229081	3	D.2.1.2	1	12521	0.73	0.17	0.03	0.73	0.06	0.00	0.42	-0.19	-0.21	0.42	-0.32	0.2781	0.0220	-2.2	1.0	-3.0	0.9			
MATH	5	880560	3	A.1.2.1	1	18790	0.76	0.04	0.14	0.06	0.76	0.00	0.52	-0.25	-0.40	-0.15	0.52	0.0861	0.0187	-9.9	0.9	-9.9	0.8			
MATH	5	758753	3	D-M.2.1	2	6258	0.32	0.31	0.16	0.21	0.32	0.00	0.30	-0.28	0.02	-0.05	0.30	2.4413	0.0297	5.0	1.1	9.9	1.2	A+	A+	A+
MATH	5	248018	3	A-F.2.1	2	6258	0.36	0.31	0.36	0.30	0.03	0.00	0.13	-0.09	0.13	0.02	-0.16	2.2107	0.0289	9.9	1.3	9.9	1.6	A-	A-	A-
MATH	5	380898	3	B-O.1.1	1	6258	0.50	0.50	0.31	0.12	0.07	0.00	0.14	0.14	-0.02	0.00	-0.24	1.5279	0.0279	9.9	1.3	9.9	1.4	A+	A+	A+
MATH	5	797321	3	A-T.2.1	1	6258	0.79	0.10	0.04	0.07	0.79	0.00	0.46	-0.29	-0.20	-0.23	0.46	-0.0955	0.0332	-5.1	0.9	-5.3	0.8	A+	A-	A-
MATH	5	846852	3	A-F.1.1	2	6258	0.71	0.06	0.07	0.71	0.16	0.00	0.39	-0.16	-0.16	0.39	-0.26	0.3873	0.0304	0.9	1.0	-2.3	0.9	A+	A+	A+
MATH	5	712400	3	B-O.2.1	1	6258	0.32	0.23	0.32	0.32	0.12	0.00	-0.01	-0.13	-0.01	0.17	-0.05	2.4254	0.0296	9.9	1.5	9.9	1.8	A-	A-	A+
MATH	5	726594	3	C-G.2.1	2	6258	0.64	0.64	0.12	0.14	0.09	0.00	0.31	0.31	-0.15	-0.14	-0.18	0.7706	0.0290	8.5	1.1	8.5	1.2	A+	A+	A+
MATH	5	680978	3	A-F.2.1	2	6258	0.41	0.41	0.15	0.19	0.24	0.00	0.22	0.22	-0.12	-0.10	-0.06	1.9569	0.0283	9.9	1.2	9.9	1.3	A-	A+	A+
MATH	5	115651	3	D-M.3.1	2	6258	0.22	0.30	0.31	0.22	0.16	0.01	0.03	-0.10	0.06	0.03	0.02	3.0376	0.0328	9.9	1.3	9.9	1.9	A-	A+	A-
MATH	5	319066	3	A-T.1.1	1	6258	0.50	0.29	0.12	0.50	0.09	0.00	0.22	-0.03	-0.20	0.22	-0.11	1.5013	0.0279	9.9	1.2	9.9	1.3	A+	A+	A-
MATH	5	982034	4	A.1.3.1	1	12514	0.80	0.07	0.80	0.05	0.08	0.00	0.44	-0.29	0.44	-0.23	-0.19	-0.1750	0.0242	-5.8	0.9	-5.7	0.9			
MATH	5	280349	4	D.2.1.1	1	12499	0.64	0.07	0.26	0.64	0.03	0.00	0.43	-0.20	-0.30	0.43	-0.15	0.8012	0.0208	-1.6	1.0	-4.9	0.9			
MATH	5	664066	4	A-F.2.1	1	6258	0.35	0.35	0.29	0.26	0.10	0.00	0.15	0.15	-0.15	0.01	-0.01	2.3085	0.0297	9.9	1.3	9.9	1.6	A-	A+	A-
MATH	5	507491	4	D-M.2.1	2	6258	0.45	0.02	0.45	0.30	0.22	0.00	0.50	-0.14	0.50	-0.31	-0.20	1.7816	0.0286	-8.9	0.9	-5.7	0.9	A-	A-	A-
MATH	5	271943	4	A-F.1.1	2	6258	0.62	0.13	0.10	0.15	0.62	0.00	0.46	-0.18	-0.22	-0.26	0.46	0.9325	0.0291	-3.3	1.0	-5.1	0.9	A+	A+	B+
MATH	5	523887	4	A-T.1.1	1	6258	0.66	0.08	0.21	0.66	0.05	0.00	0.46	-0.32	-0.20	0.46	-0.21	0.6864	0.0297	-3.0	1.0	-1.7	1.0	A-	A-	A-
MATH	5	153572	4	B-O.1.1	2	6258	0.49	0.14	0.18	0.49	0.19	0.00	0.42	-0.17	-0.31	0.42	-0.07	1.5966	0.0285	0.7	1.0	2.2	1.0	A-	A+	A-

Appendix G: Item Statistics Multiple Choice

MATH	5	774270	4	D-M.3.1	2	6258	0.35	0.35	0.21	0.32	0.11	0.00	0.19	0.19	-0.10	0.00	-0.14	2.3006	0.0297	9.9	1.2	9.9	1.5	A+	A-	A-
MATH	5	976187	4	C-G.2.1	2	6258	0.48	0.33	0.10	0.08	0.48	0.00	0.24	0.02	-0.25	-0.18	0.24	1.6260	0.0285	9.9	1.2	9.9	1.3	A+	A+	A-
MATH	5	882472	4	B-O.2.1	1	6258	0.36	0.35	0.11	0.36	0.17	0.00	0.30	-0.14	-0.21	0.30	-0.03	2.2347	0.0295	7.2	1.1	9.9	1.3	A+	A-	A-
MATH	5	961995	4	A-F.2.1	2	6258	0.07	0.07	0.11	0.15	0.68	0.00	-0.13	-0.13	-0.22	-0.17	0.34	4.7092	0.0532	5.1	1.2	9.9	4.6	A-	A-	A-
MATH	5	853763	4	A-F.2.1	2	6258	0.48	0.11	0.20	0.20	0.48	0.00	0.47	-0.13	-0.21	-0.27	0.47	1.6081	0.0285	-6.6	0.9	-3.8	0.9	A-	A+	A+
MATH	5	333758	5	A.1.2.2	1	18678	0.80	0.80	0.05	0.07	0.07	0.00	0.49	0.49	-0.23	-0.24	-0.31	-0.1735	0.0199	-9.9	0.9	-9.9	0.7			
MATH	5	450840	5	B.2.1.1	1	18712	0.83	0.02	0.06	0.83	0.09	0.01	0.30	-0.15	-0.06	0.30	-0.27	-0.4386	0.0212	3.4	1.0	7.8	1.2			
MATH	5	300485	5	A-F.2.1	1	6220	0.42	0.15	0.42	0.30	0.12	0.00	0.20	-0.11	0.20	0.01	-0.20	1.9295	0.0287	9.9	1.2	9.9	1.4	A-	A-	A-
MATH	5	331364	5	D-M.1.1	2	6220	0.18	0.51	0.23	0.18	0.08	0.00	-0.03	0.13	-0.08	-0.03	-0.08	3.3784	0.0356	9.9	1.4	9.9	2.4	A+	A-	A-
MATH	5	873283	5	A-T.2.1	2	6220	0.28	0.32	0.35	0.28	0.04	0.00	0.36	-0.19	-0.13	0.36	-0.05	2.7069	0.0312	-3.1	1.0	5.2	1.1	A-	B-	A-
MATH	5	461907	5	B-O.1.1	2	6220	0.13	0.32	0.24	0.32	0.13	0.00	0.05	0.05	-0.02	-0.07	0.05	3.8658	0.0404	5.6	1.2	9.9	2.4	A-	A-	A+
MATH	5	361142	5	A-F.1.1	2	6220	0.23	0.30	0.25	0.21	0.23	0.00	0.22	-0.12	-0.05	-0.03	0.22	3.0354	0.0330	4.0	1.1	9.9	1.6	A-	A-	A-
MATH	5	108847	5	C-G.1.1	1	6220	0.65	0.08	0.65	0.15	0.13	0.00	0.42	-0.29	0.42	-0.23	-0.12	0.7812	0.0295	-0.1	1.0	1.0	1.0	A+	A-	A-
MATH	5	938727	5	B-O.2.1	2	6220	0.23	0.19	0.23	0.52	0.05	0.00	0.22	-0.11	0.22	-0.02	-0.16	3.0169	0.0329	3.3	1.1	9.9	1.6	A-	A-	A-
MATH	5	185681	5	A-T.1.1	1	6220	0.43	0.08	0.39	0.43	0.11	0.00	0.46	-0.08	-0.37	0.46	-0.08	1.9130	0.0287	-5.9	0.9	-3.4	0.9	A+	A-	A-
MATH	5	766784	5	A-F.2.1	2	6220	0.45	0.45	0.17	0.27	0.10	0.00	0.37	0.37	-0.14	-0.22	-0.10	1.7930	0.0286	3.0	1.0	4.6	1.1	A-	A-	A-
MATH	5	351486	5	D-M.2.1	2	6220	0.43	0.17	0.12	0.28	0.43	0.00	0.30	-0.19	-0.26	0.02	0.30	1.9122	0.0287	9.4	1.1	9.9	1.2	A-	A-	A-
MATH	5	264847	6	D-M.3.1	2	6222	0.30	0.26	0.37	0.30	0.07	0.00	0.31	0.03	-0.29	0.31	-0.07	2.5770	0.0307	2.6	1.0	9.7	1.3	A-	A-	A-
MATH	5	825095	6	A-T.2.1	1	6222	0.80	0.05	0.09	0.07	0.80	0.00	0.47	-0.26	-0.28	-0.22	0.47	-0.1507	0.0342	-5.8	0.9	-5.8	0.8	A+	A-	A-
MATH	5	357212	6	D-M.1.1	2	6222	0.46	0.30	0.46	0.18	0.06	0.00	0.22	0.09	0.22	-0.29	-0.18	1.7136	0.0286	9.9	1.2	9.9	1.3	A-	A-	A+
MATH	5	133441	6	A-F.2.1	2	6222	0.35	0.35	0.11	0.33	0.21	0.00	0.28	0.28	-0.24	-0.04	-0.09	2.3307	0.0298	8.5	1.1	9.9	1.3	A-	A+	A+
MATH	5	823293	6	C-G.2.1	2	6222	0.34	0.12	0.20	0.33	0.34	0.00	0.29	-0.18	-0.27	0.07	0.29	2.3432	0.0298	7.2	1.1	9.9	1.3	A+	A+	A+
MATH	5	771290	6	C-G.1.1	1	6222	0.59	0.08	0.11	0.59	0.21	0.00	0.32	-0.15	-0.20	0.32	-0.12	1.0700	0.0289	9.6	1.1	7.8	1.2	A+	A-	A-
MATH	5	201475	6	A-T.1.1	2	6222	0.40	0.08	0.21	0.30	0.40	0.00	0.40	-0.22	-0.18	-0.14	0.40	2.0264	0.0290	-2.0	1.0	3.5	1.1	A-	A-	A-
MATH	5	282736	6	A-T.2.1	1	6222	0.48	0.07	0.48	0.25	0.20	0.00	0.41	-0.11	0.41	-0.07	-0.37	1.6309	0.0285	0.3	1.0	0.9	1.0	A-	A-	A+
MATH	5	289071	6	A-F.2.1	2	6222	0.23	0.23	0.16	0.33	0.28	0.00	0.04	0.04	-0.17	-0.08	0.18	3.0465	0.0332	9.9	1.3	9.9	2.2	A-	A+	A+
MATH	5	688396	6	B-O.1.1	2	6222	0.41	0.17	0.17	0.25	0.41	0.00	0.33	-0.17	-0.03	-0.20	0.33	1.9692	0.0289	7.7	1.1	9.1	1.2	A+	A-	A-
MATH	5	546551	7	E.1.1.1	2	12458	0.57	0.57	0.19	0.06	0.19	0.00	0.40	0.40	-0.30	-0.11	-0.14	1.2135	0.0203	4.6	1.0	4.3	1.1			
MATH	5	905431	7	A-F.1.1	1	6222	0.40	0.07	0.42	0.40	0.11	0.00	0.53	-0.08	-0.45	0.53	-0.04	2.0959	0.0292	-9.9	0.9	-9.8	0.8	A+	A+	A-
MATH	5	543814	7	C-G.1.1	2	6222	0.58	0.16	0.11	0.58	0.14	0.01	0.44	-0.14	-0.21	0.44	-0.28	1.1339	0.0289	-1.2	1.0	-1.7	1.0	A-	A-	A-
MATH	5	312181	7	D-M.3.1	1	6222	0.59	0.28	0.05	0.08	0.59	0.00	0.45	-0.34	-0.14	-0.15	0.45	1.1011	0.0290	-2.2	1.0	-3.0	0.9	A+	A-	A-
MATH	5	125403	7	A-F.2.1	2	6222	0.17	0.27	0.33	0.23	0.17	0.00	0.18	-0.09	-0.12	0.06	0.18	3.5263	0.0367	2.6	1.1	9.9	1.9	A-	A-	A+
MATH	5	767225	7	A-T.1.1	1	6222	0.27	0.17	0.27	0.38	0.18	0.00	0.23	-0.02	0.23	-0.18	-0.02	2.7989	0.0316	7.3	1.1	9.9	1.5	A-	A-	A+
MATH	5	503955	7	A-F.2.1	2	6222	0.26	0.26	0.32	0.23	0.19	0.00	0.26	0.26	-0.11	0.06	-0.22	2.8907	0.0321	4.1	1.1	9.9	1.5	A-	A+	A+
MATH	5	439584	7	D-M.2.1	2	6222	0.25	0.11	0.25	0.12	0.52	0.00	0.07	-0.22	0.07	-0.25	0.24	2.9146	0.0323	9.9	1.4	9.9	1.9	A-	A+	A-
MATH	5	173387	7	A-T.2.1	2	6222	0.64	0.64	0.09	0.14	0.12	0.00	0.56	0.56	-0.25	-0.41	-0.16	0.8224	0.0296	-9.9	0.9	-9.9	0.8	A-	A-	A-
MATH	5	592035	7	B-O.1.1	2	6222	0.55	0.12	0.19	0.55	0.13	0.00	0.29	-0.22	-0.15	0.29	-0.04	1.2797	0.0287	9.9	1.2	9.9	1.2	A+	A-	A-
MATH	5	205738	7	C-G.2.1	1	6222	0.51	0.23	0.51	0.09	0.17	0.00	0.30	-0.03	0.30	-0.20	-0.21	1.4856	0.0286	9.9	1.2	9.9	1.2	A-	A-	A-
MATH	5	245172	8	C-G.1.1	2	6236	0.64	0.06	0.64	0.15	0.14	0.00	0.43	-0.13	0.43	-0.25	-0.23	0.7790	0.0296	-0.4	1.0	0.1	1.0	A-	A-	B-
MATH	5	727262	8	A-T.1.1	1	6236	0.43	0.43	0.07	0.09	0.41	0.00	0.55	0.55	-0.23	-0.11	-0.37	1.8711	0.0288	-9.9	0.8	-9.9	0.8	B-	A-	A-
MATH	5	942790	8	A-T.2.1	1	6236	0.77	0.08	0.10	0.77	0.05	0.00	0.46	-0.29	-0.24	0.46	-0.21	0.0399	0.0329	-4.8	0.9	-4.6	0.9	A+	A-	A+
MATH	5	512697	8	B-O.2.1	2	6236	0.23	0.17	0.52	0.23	0.08	0.00	0.26	-0.30	0.06	0.26	-0.09	3.0715	0.0332	2.5	1.0	9.9	1.5	A+	A+	A-
MATH	5	557140	8	A-F.2.1	2	6236	0.19	0.35	0.19	0.29	0.17	0.00	0.10	-0.07	0.10	-0.05	0.05	3.3536	0.0353	8.7	1.2	9.9	2.1	A-	A+	A-
MATH	5	940759	8	A-F.2.1	2	6236	0.61	0.13	0.19	0.61	0.06	0.01	0.47	-0.18	-0.34	0.47	-0.15	0.9479	0.0292	-3.9	1.0	-4.8	0.9	A-	A-	A-
MATH	5	767221	8	C-G.1.1	1	6236	0.62	0.16	0.12	0.10	0.62	0.00	0.40	-0.13	-0.26	-0.21	0.40	0.8982	0.0293	2.9	1.0	1.7	1.0	A-	A-	A+
MATH	5	981107	8	D-M.1.1	2	6236	0.10	0.22	0.37	0.30	0.10	0.00	0.00	-0.06	-0.14	0.21	0.00	4.2007	0.0447	6.1	1.2	9.9	3.0	A-	A-	A-
MATH	5	590218	8	D-M.2.1	2	6236	0.28	0.12	0.25	0.35	0.28	0.00	0.09	-0.09	-0.11	0.08	0.09	2.7387	0.0314	9.9	1.3	9.9	1.8	A+	A-	A+
MATH	5	105066	8	A-T.2.1	1	6236	0.70	0.08	0.70	0.10	0.11	0.00	0.49	-0.21	0.49	-0.13	-0.41	0.4516	0.0308	-6.5	0.9	-3.1	0.9	A-	A-	A+
MATH	5	836464	9	D.1.2.1	2	12554	0.70	0.13	0.10	0.70	0.06	0.00	0.51	-0.30	-0.27	0.51	-0.19	0.4452	0.0217	-9.9	0.9	-9.9	0.8			
MATH	5	670651	9	A.2.1.1	2	12506	0.42	0.42	0.14	0.36	0.08	0.00	0.34	0.34	-0.19	-0.07	-0.24	1.9760	0.0204	7.4	1.1	9.9	1.2			
MATH	5	641231	9	A-T.2.1	1	6265	0.66	0.66	0.09	0.08	0.17	0.00	0.40	0.40	-0.22	-0.26	-0.14	0.7214	0.0298	2.8	1.0	0.3	1.0	A+	A+	A+

Appendix G: Item Statistics Multiple Choice

MATH	5	641348	9	A-F.2.1	2	6265	0.55	0.08	0.09	0.28	0.55	0.00	0.49	-0.19	-0.25	-0.27	0.49	1.2721	0.0286	-6.8	0.9	-5.4	0.9	A-	A-	A-
MATH	5	415362	9	B-O.2.1	2	6265	0.56	0.17	0.18	0.09	0.56	0.00	0.48	-0.22	-0.24	-0.20	0.48	1.2581	0.0286	-5.2	0.9	-4.8	0.9	A+	A-	A-
MATH	5	466363	9	D-M.1.1	2	6265	0.10	0.31	0.47	0.11	0.10	0.00	0.06	-0.05	0.08	-0.10	0.06	4.2240	0.0447	4.5	1.2	9.9	2.6	A-	A-	A-
MATH	5	330012	9	A-F.2.1	2	6265	0.18	0.09	0.55	0.18	0.18	0.00	-0.09	-0.15	0.29	-0.09	-0.17	3.4153	0.0356	9.9	1.4	9.9	2.9	A-	A-	A+
MATH	5	224394	9	C-G.1.1	2	6265	0.69	0.69	0.06	0.14	0.11	0.00	0.39	0.39	-0.22	-0.21	-0.17	0.5444	0.0304	2.2	1.0	1.7	1.0	A-	B-	C-
MATH	5	423615	9	C-G.1.1	1	6265	0.55	0.10	0.55	0.13	0.21	0.01	0.38	-0.17	0.38	-0.19	-0.18	1.2778	0.0286	4.8	1.1	3.3	1.1	A+	A-	A-
MATH	5	364728	9	A-T.2.1	2	6265	0.64	0.10	0.64	0.20	0.06	0.00	0.49	-0.23	0.49	-0.26	-0.25	0.8174	0.0295	-6.1	0.9	-5.1	0.9	A+	A-	A-
MATH	5	660823	9	D-M.2.1	2	6265	0.16	0.59	0.12	0.16	0.12	0.00	0.12	0.06	-0.09	0.12	-0.12	3.6511	0.0378	4.9	1.1	9.9	2.2	A-	A-	A-
MATH	5	919967	9	A-T.1.1	1	6265	0.46	0.06	0.09	0.39	0.46	0.00	0.51	-0.20	-0.10	-0.35	0.51	1.7816	0.0286	-9.9	0.9	-6.5	0.9	A-	A+	A-
MATH	5	325495	10	E.2.1.1	1	18791	0.71	0.11	0.10	0.71	0.08	0.00	0.49	-0.22	-0.31	0.49	-0.23	0.3828	0.0179	-9.9	0.9	-9.9	0.8			
MATH	5	227704	10	A-T.2.1	1	6243	0.78	0.78	0.07	0.07	0.07	0.00	0.52	0.52	-0.24	-0.29	-0.29	-0.0569	0.0336	-8.1	0.9	-9.0	0.7	A+	A-	A-
MATH	5	913300	10	D-M.1.1	2	6243	0.50	0.11	0.28	0.10	0.50	0.00	0.40	-0.29	-0.12	-0.17	0.40	1.5286	0.0286	3.5	1.0	3.9	1.1	A+	A+	A+
MATH	5	651553	10	D-M.3.1	2	6243	0.31	0.16	0.28	0.25	0.31	0.00	0.14	-0.05	0.06	-0.16	0.14	2.5967	0.0307	9.9	1.2	9.9	1.8	A+	A+	A+
MATH	5	625730	10	C-G.1.1	1	6243	0.63	0.07	0.63	0.07	0.23	0.00	0.37	-0.10	0.37	-0.23	-0.22	0.8858	0.0294	5.4	1.1	4.0	1.1	A-	B-	A-
MATH	5	112719	10	C-G.1.1	1	6243	0.83	0.83	0.05	0.06	0.06	0.00	0.36	0.36	-0.22	-0.24	-0.13	-0.4364	0.0367	-0.7	1.0	0.5	1.0	A+	A-	A-
MATH	5	599974	10	A-T.1.1	2	6243	0.47	0.31	0.11	0.47	0.11	0.00	0.41	-0.29	-0.18	0.41	-0.04	1.7083	0.0286	1.4	1.0	3.9	1.1	A-	A-	A-
MATH	5	184763	10	A-F.2.1	2	6243	0.31	0.16	0.33	0.31	0.20	0.00	0.19	-0.15	-0.12	0.19	0.06	2.5825	0.0306	9.9	1.2	9.9	1.6	A-	A-	A+
MATH	5	232294	10	B-O.1.1	2	6243	0.25	0.38	0.28	0.25	0.09	0.00	0.08	0.02	-0.05	0.08	-0.09	2.9105	0.0322	9.9	1.3	9.9	2.0	A-	A-	A-
MATH	5	205654	10	A-T.2.1	2	6243	0.60	0.15	0.60	0.11	0.14	0.00	0.57	-0.20	0.57	-0.25	-0.37	1.0533	0.0290	-9.9	0.8	-9.9	0.8	A+	A-	A-
MATH	5	295617	10	A-F.2.1	2	6243	0.23	0.23	0.16	0.46	0.15	0.00	0.20	0.20	-0.11	0.03	-0.16	3.0935	0.0333	4.5	1.1	9.9	1.7	A-	A-	A+
MATH	5	479783	11	A.1.6.1	1	12534	0.55	0.16	0.55	0.19	0.11	0.00	0.44	-0.25	0.44	-0.19	-0.17	1.3037	0.0202	-2.2	1.0	-2.6	1.0			
MATH	5	408297	11	C-G.2.1	2	6292	0.51	0.16	0.51	0.14	0.19	0.00	0.26	-0.17	0.26	-0.16	-0.02	1.4859	0.0284	9.9	1.2	9.9	1.3	A+	A+	A+
MATH	5	689162	11	A-T.2.1	1	6292	0.69	0.07	0.10	0.14	0.69	0.00	0.49	-0.25	-0.23	-0.27	0.49	0.5195	0.0303	-6.1	0.9	-6.1	0.9	A+	A+	A-
MATH	5	691530	11	A-F.2.1	2	6292	0.48	0.48	0.37	0.10	0.04	0.00	0.19	0.19	0.06	-0.26	-0.22	1.6263	0.0284	9.9	1.3	9.9	1.4	A-	A-	A-
MATH	5	184437	11	A-T.1.1	2	6292	0.31	0.15	0.40	0.14	0.31	0.00	0.24	-0.14	0.02	-0.19	0.24	2.5521	0.0304	8.4	1.1	9.9	1.4	A-	A+	A+
MATH	5	164307	11	A-T.1.1	1	6292	0.21	0.19	0.32	0.21	0.29	0.00	0.18	-0.30	0.01	0.18	0.10	3.2146	0.0342	7.1	1.1	9.9	1.7	A+	A-	A-
MATH	5	192661	11	D-M.2.1	2	6292	0.27	0.27	0.24	0.21	0.28	0.00	0.21	0.21	-0.09	-0.09	-0.04	2.7656	0.0314	7.5	1.1	9.9	1.6	A-	A-	A-
MATH	5	915062	11	B-O.2.1	2	6292	0.40	0.13	0.40	0.34	0.12	0.00	0.36	-0.21	0.36	-0.05	-0.24	2.0264	0.0288	3.9	1.1	7.0	1.1	A-	A-	A-
MATH	5	204802	11	A-F.1.1	2	6292	0.68	0.10	0.18	0.68	0.04	0.00	0.35	-0.11	-0.30	0.35	-0.06	0.5743	0.0301	5.3	1.1	1.7	1.0	A+	A+	A+
MATH	5	359908	11	D-M.3.1	1	6292	0.39	0.27	0.15	0.19	0.39	0.00	0.45	-0.21	-0.21	-0.13	0.45	2.0994	0.0290	-5.8	0.9	-0.2	1.0	A+	A-	A-
MATH	5	640370	11	B-O.1.1	1	6292	0.28	0.12	0.28	0.15	0.44	0.01	0.11	-0.24	0.11	-0.25	0.24	2.6990	0.0311	9.9	1.3	9.9	1.7	A+	A+	A+
MATH	5	441375	12	D.1.1.2	2	12514	0.68	0.06	0.68	0.16	0.09	0.00	0.50	-0.21	0.50	-0.31	-0.23	0.5907	0.0213	-9.7	0.9	-9.5	0.8			
MATH	5	718159	12	A.1.5.1	2	12515	0.79	0.09	0.79	0.06	0.05	0.00	0.38	-0.23	0.38	-0.16	-0.21	-0.1434	0.0241	-0.9	1.0	0.8	1.0			
MATH	5	304278	12	A-F.2.1	1	6252	0.40	0.30	0.14	0.15	0.40	0.00	0.36	-0.04	-0.17	-0.26	0.36	2.0605	0.0290	2.8	1.0	5.9	1.1	A-	A-	A+
MATH	5	484009	12	A-F.2.1	1	6252	0.36	0.21	0.21	0.22	0.36	0.00	0.32	-0.19	-0.06	-0.11	0.32	2.2738	0.0296	5.8	1.1	9.3	1.2	A+	A-	A+
MATH	5	852039	12	B-O.1.1	2	6252	0.54	0.54	0.11	0.22	0.12	0.00	0.28	0.28	-0.16	0.01	-0.28	1.3159	0.0286	9.9	1.2	9.9	1.2	A+	A-	A-
MATH	5	862369	12	A-F.2.1	1	6252	0.45	0.45	0.17	0.20	0.17	0.00	0.37	0.37	-0.20	-0.18	-0.10	1.7826	0.0286	4.8	1.1	5.3	1.1	A-	A-	A-
MATH	5	162434	12	D-M.3.1	2	6252	0.41	0.24	0.17	0.41	0.18	0.00	0.33	-0.13	-0.16	0.33	-0.12	2.0267	0.0290	5.9	1.1	8.8	1.2	A-	A-	A-
MATH	5	254375	12	D-M.1.1	2	6252	0.47	0.20	0.25	0.47	0.08	0.00	0.41	-0.24	-0.22	0.41	-0.05	1.6933	0.0285	1.5	1.0	2.0	1.0	A-	A-	A-
MATH	5	559890	12	C-G.1.1	2	6252	0.75	0.17	0.75	0.04	0.05	0.00	0.38	-0.22	0.38	-0.22	-0.18	0.1826	0.0320	0.7	1.0	1.1	1.0	A+	A-	A-
MATH	5	898026	12	B-O.2.1	2	6252	0.50	0.50	0.21	0.12	0.17	0.00	0.37	0.37	-0.19	-0.18	-0.12	1.5466	0.0285	5.2	1.1	4.7	1.1	A+	A-	A+
MATH	5	886669	12	A-T.1.1	2	6252	0.31	0.31	0.10	0.44	0.16	0.00	0.35	0.35	-0.16	-0.29	0.08	2.5663	0.0306	1.8	1.0	7.0	1.2	A-	A-	A+
MATH	5	987096	12	A-T.1.1	2	6252	0.34	0.20	0.24	0.34	0.22	0.00	0.14	-0.06	-0.05	0.14	-0.05	2.3855	0.0299	9.9	1.3	9.9	1.6	A+	A-	A+
MATH	5	631362	13	C.1.2.1	1	12492	0.66	0.02	0.25	0.07	0.66	0.00	0.42	-0.14	-0.30	-0.18	0.42	0.7075	0.0211	1.0	1.0	-0.1	1.0			
MATH	5	416128	13	D-M.2.1	3	6241	0.27	0.19	0.41	0.27	0.13	0.00	0.07	-0.09	0.07	0.07	-0.10	2.8232	0.0317	9.9	1.3	9.9	1.9	A+	A+	A-
MATH	5	673094	13	A-F.2.1	2	6241	0.26	0.12	0.26	0.13	0.49	0.00	0.16	-0.05	0.16	-0.08	-0.06	2.8526	0.0318	9.9	1.2	9.9	1.6	A-	A-	A-
MATH	5	237761	13	B-O.1.1	1	6241	0.72	0.72	0.05	0.17	0.06	0.00	0.48	0.48	-0.25	-0.29	-0.22	0.3473	0.0313	-5.9	0.9	-6.0	0.8	A+	A-	A-
MATH	5	887371	13	A-T.2.1	1	6241	0.51	0.24	0.14	0.11	0.51	0.00	0.52	-0.39	-0.14	-0.14	0.52	1.4806	0.0285	-9.7	0.9	-8.1	0.9	A+	A-	A-
MATH	5	284785	13	A-F.2.1	2	6241	0.64	0.10	0.12	0.64	0.14	0.00	0.46	-0.28	-0.27	0.46	-0.14	0.8137	0.0295	-3.4	1.0	-4.3	0.9	A-	A-	A-
MATH	5	187480	13	A-T.1.1	1	6241	0.25	0.06	0.25	0.46	0.24	0.00	0.39	-0.05	0.39	-0.36	0.05	2.9572	0.0324	-5.6	0.9	2.3	1.1	A-	A-	A-
MATH	5	218437	13	A-T.1.1	1	6241	0.45	0.45	0.26	0.21	0.07	0.00	0.38	0.38	-0.01	-0.30	-0.24	1.7803	0.0286	3.7	1.0	4.9	1.1	A-	A+	A-

Appendix G: Item Statistics Multiple Choice

MATH	5	940509	13	B-O.2.1	2	6241	0.28	0.13	0.28	0.53	0.06	0.00	0.07	-0.15	0.07	0.10	-0.12	2.7358	0.0312	9.9	1.3	9.9	1.9	A-	A-	A+
MATH	5	687540	13	D-M.3.1	2	6241	0.26	0.25	0.28	0.26	0.20	0.00	0.22	-0.22	-0.16	0.22	0.17	2.8495	0.0318	7.5	1.1	9.9	1.5	A-	A-	A+
MATH	5	812918	13	C-G.1.1	2	6241	0.60	0.06	0.10	0.24	0.60	0.00	0.44	-0.27	-0.28	-0.15	0.44	1.0487	0.0289	-0.9	1.0	1.6	1.0	A-	A-	A-
MATH	5	306710	14	D-M.2.1	2	6263	0.35	0.20	0.31	0.35	0.14	0.00	0.24	-0.17	-0.05	0.24	-0.05	2.3105	0.0295	9.9	1.2	9.9	1.4	A-	A-	A+
MATH	5	967101	14	A-F.2.1	1	6263	0.38	0.32	0.13	0.38	0.16	0.00	0.35	-0.11	-0.23	0.35	-0.11	2.1155	0.0290	2.5	1.0	8.7	1.2	A-	A+	A+
MATH	5	741958	14	B-O.1.1	2	6263	0.26	0.07	0.08	0.58	0.26	0.00	0.18	-0.28	-0.22	0.11	0.18	2.8073	0.0316	9.9	1.2	9.9	1.6	A-	A+	A-
MATH	5	526500	14	A-T.2.1	1	6263	0.69	0.07	0.69	0.11	0.13	0.00	0.51	-0.19	0.51	-0.25	-0.33	0.5192	0.0303	-8.1	0.9	-8.1	0.8	A-	A-	A-
MATH	5	864790	14	A-F.2.1	2	6263	0.48	0.24	0.48	0.16	0.12	0.00	0.24	-0.06	0.24	-0.08	-0.20	1.6478	0.0284	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	5	709434	14	A-T.1.1	2	6263	0.62	0.62	0.15	0.18	0.06	0.00	0.30	0.30	-0.18	-0.13	-0.14	0.9075	0.0291	9.9	1.1	6.4	1.1	A+	A-	A+
MATH	5	835947	14	B-O.2.1	2	6263	0.65	0.65	0.13	0.17	0.05	0.00	0.11	0.11	-0.10	-0.01	-0.07	0.7737	0.0294	9.9	1.3	9.9	1.7	A+	A-	A-
MATH	5	286967	14	C-G.1.1	2	6263	0.60	0.10	0.10	0.60	0.21	0.00	0.45	-0.19	-0.24	0.45	-0.23	1.0284	0.0288	-2.3	1.0	-2.2	1.0	A+	A-	A-
MATH	5	283451	14	D-M.3.1	1	6263	0.54	0.21	0.16	0.08	0.54	0.01	0.44	-0.30	-0.19	-0.08	0.44	1.2975	0.0284	-1.4	1.0	-1.8	1.0	A+	A-	A-
MATH	5	174089	14	A-T.1.1	2	6263	0.41	0.41	0.18	0.16	0.26	0.00	0.25	0.25	-0.20	-0.06	-0.06	1.9957	0.0288	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	5	507770	15	C-G.1.1	1	6241	0.50	0.10	0.33	0.06	0.50	0.00	0.32	-0.33	-0.02	-0.21	0.32	1.5825	0.0284	9.7	1.1	8.9	1.2	A+	A-	A-
MATH	5	705731	15	A-T.2.1	1	6241	0.67	0.67	0.23	0.06	0.03	0.00	0.46	0.46	-0.26	-0.29	-0.19	0.6572	0.0300	-3.4	1.0	-4.3	0.9	A-	A-	A-
MATH	5	867823	15	A-T.1.1	1	6241	0.67	0.07	0.67	0.15	0.11	0.00	0.37	-0.24	0.37	-0.14	-0.18	0.6869	0.0299	4.0	1.1	3.6	1.1	A+	A+	A+
MATH	5	688883	15	A-T.2.1	2	6241	0.46	0.46	0.16	0.29	0.09	0.00	0.08	0.08	-0.15	0.08	-0.08	1.7849	0.0285	9.9	1.4	9.9	1.6	A+	A-	A+
MATH	5	957630	15	B-O.1.1	1	6241	0.66	0.66	0.07	0.13	0.14	0.00	0.39	0.39	-0.22	-0.30	-0.08	0.7173	0.0298	2.0	1.0	1.8	1.0	A+	A-	A-
MATH	5	937294	15	D-M.3.1	2	6241	0.32	0.20	0.32	0.10	0.37	0.00	0.09	-0.26	0.09	-0.13	0.21	2.4866	0.0300	9.9	1.3	9.9	1.7	A-	A+	A-
MATH	5	983721	15	A-F.2.1	2	6241	0.27	0.27	0.29	0.27	0.18	0.00	0.15	0.15	0.02	0.00	-0.19	2.8090	0.0315	9.9	1.2	9.9	1.6	A-	A-	A-
MATH	5	327956	15	C-G.2.1	2	6241	0.49	0.19	0.16	0.16	0.49	0.00	0.42	-0.16	-0.24	-0.17	0.42	1.5922	0.0284	-0.9	1.0	-0.1	1.0	A+	A-	A-
MATH	5	408159	15	A-F.2.1	2	6241	0.36	0.23	0.24	0.17	0.36	0.00	0.29	-0.10	-0.17	-0.06	0.29	2.3068	0.0294	6.9	1.1	9.9	1.3	A-	A+	A-
MATH	5	961695	15	D-M.1.1	2	6241	0.38	0.19	0.28	0.38	0.15	0.00	0.42	-0.34	-0.14	0.42	-0.01	2.1848	0.0291	-2.4	1.0	0.9	1.0	A-	A-	A-
MATH	5	665584	16	A-F.1.1	2	6251	0.70	0.05	0.08	0.70	0.17	0.00	0.44	-0.21	-0.23	0.44	-0.25	0.4708	0.0306	-1.9	1.0	-5.1	0.9	A+	A+	A+
MATH	5	105327	16	A-T.1.1	1	6251	0.41	0.29	0.15	0.41	0.15	0.00	0.35	-0.23	-0.16	0.35	-0.04	2.0166	0.0289	3.7	1.1	7.9	1.2	A-	A-	A-
MATH	5	177799	16	D-M.2.1	2	6251	0.41	0.41	0.15	0.16	0.28	0.00	0.50	0.50	-0.06	-0.16	-0.36	2.0283	0.0290	-9.9	0.9	-4.5	0.9	A-	A-	A-
MATH	5	880525	16	A-F.2.1	1	6251	0.15	0.15	0.28	0.21	0.36	0.00	0.28	0.28	0.06	-0.21	-0.08	3.6599	0.0380	-1.4	1.0	5.9	1.3	A-	A+	A-
MATH	5	304777	16	A-F.2.1	2	6251	0.32	0.15	0.33	0.19	0.32	0.00	0.26	-0.14	0.01	-0.18	0.26	2.4958	0.0303	9.4	1.1	9.9	1.3	A-	A+	A-
MATH	5	256248	16	B-O.2.1	2	6251	0.62	0.13	0.07	0.62	0.18	0.00	0.34	-0.17	-0.24	0.34	-0.11	0.9238	0.0292	8.1	1.1	6.9	1.2	A-	A-	A+
MATH	5	276677	16	D-M.3.1	2	6251	0.10	0.17	0.66	0.08	0.10	0.00	0.09	-0.20	0.18	-0.14	0.09	4.2426	0.0451	1.8	1.1	9.9	2.5	A-	A-	A-
MATH	5	903868	16	C-G.2.1	2	6251	0.18	0.49	0.14	0.19	0.18	0.00	0.03	0.16	-0.22	-0.03	0.03	3.4134	0.0358	9.9	1.3	9.9	2.3	A-	A-	A+
MATH	5	933707	16	A-F.2.1	1	6251	0.67	0.13	0.67	0.09	0.11	0.00	0.34	-0.12	0.34	-0.20	-0.20	0.6645	0.0299	6.0	1.1	3.3	1.1	A+	A-	A-
MATH	5	859981	16	A-T.2.1	1	6251	0.36	0.55	0.36	0.06	0.03	0.00	0.30	-0.14	0.30	-0.23	-0.11	2.2892	0.0296	6.4	1.1	9.9	1.3	A-	A-	A-
MATH	5	675622	17	B-O.2.1	2	6262	0.51	0.10	0.13	0.25	0.51	0.00	0.38	-0.17	-0.23	-0.15	0.38	1.5005	0.0285	3.9	1.1	3.7	1.1	A-	A-	A-
MATH	5	706787	17	A-T.2.1	1	6262	0.79	0.05	0.09	0.07	0.79	0.00	0.46	-0.27	-0.25	-0.22	0.46	-0.1104	0.0340	-5.0	0.9	-4.8	0.8	A+	A-	A-
MATH	5	663156	17	A-T.1.1	2	6262	0.42	0.42	0.10	0.28	0.20	0.00	0.25	0.25	-0.15	-0.16	-0.02	1.9846	0.0288	9.9	1.2	9.9	1.3	A-	A+	A-
MATH	5	493602	17	B-O.1.1	2	6262	0.26	0.26	0.05	0.64	0.05	0.00	0.22	0.22	-0.23	-0.01	-0.18	2.8800	0.0319	7.3	1.1	9.9	1.6	A-	A-	A-
MATH	5	410063	17	D-M.3.1	2	6262	0.28	0.29	0.28	0.28	0.15	0.00	0.19	-0.15	0.01	0.19	-0.06	2.7680	0.0313	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	5	536570	17	C-G.2.1	2	6262	0.16	0.51	0.16	0.16	0.17	0.00	-0.20	0.27	-0.04	-0.20	-0.12	3.5670	0.0369	9.9	1.5	9.9	3.5	A+	A+	B+
MATH	5	768126	17	A-F.1.1	2	6262	0.65	0.18	0.12	0.65	0.05	0.01	0.42	-0.27	-0.22	0.42	-0.12	0.7620	0.0296	-0.3	1.0	-2.2	1.0	A+	A+	A+
MATH	5	815646	17	A-T.1.1	2	6262	0.44	0.14	0.25	0.17	0.44	0.00	0.35	-0.25	-0.11	-0.11	0.35	1.8483	0.0286	4.8	1.1	6.9	1.1	A-	A+	A-
MATH	5	198471	17	D-M.2.1	2	6262	0.41	0.18	0.23	0.41	0.18	0.00	0.39	-0.20	-0.14	0.39	-0.13	2.0087	0.0288	0.5	1.0	4.1	1.1	A-	A-	A-
MATH	5	393167	17	A-F.2.1	2	6262	0.35	0.35	0.11	0.24	0.30	0.00	0.31	0.31	-0.17	-0.13	-0.08	2.3473	0.0296	5.4	1.1	9.7	1.2	A-	A+	A+
MATH	5	921980	18	D-M.3.1	2	6289	0.36	0.31	0.36	0.24	0.08	0.00	0.14	-0.11	0.14	0.04	-0.12	2.2637	0.0294	9.9	1.3	9.9	1.5	A-	A-	A-
MATH	5	816798	18	C-G.2.1	2	6289	0.48	0.15	0.09	0.28	0.48	0.00	0.25	-0.23	-0.23	0.05	0.25	1.5986	0.0283	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	5	964853	18	A-F.2.1	1	6289	0.62	0.12	0.62	0.20	0.06	0.00	0.27	0.00	0.27	-0.23	-0.15	0.9039	0.0290	9.9	1.2	9.3	1.2	A-	A-	A-
MATH	5	453845	18	A-T.1.1	1	6289	0.46	0.24	0.46	0.14	0.15	0.00	0.44	-0.20	0.44	-0.15	-0.22	1.7100	0.0284	-3.4	1.0	-0.3	1.0	A-	A-	A-
MATH	5	793650	18	A-T.1.1	1	6289	0.48	0.08	0.12	0.48	0.32	0.00	0.44	-0.09	-0.10	0.44	-0.35	1.6413	0.0284	-1.8	1.0	-0.8	1.0	A-	A-	A-
MATH	5	185107	18	B-O.2.1	2	6289	0.41	0.22	0.41	0.30	0.07	0.00	0.06	0.27	0.06	-0.20	-0.18	1.9606	0.0287	9.9	1.5	9.9	1.7	A+	A-	A+
MATH	5	234823	18	A-F.2.1	1	6289	0.35	0.35	0.21	0.11	0.33	0.00	0.24	0.24	-0.22	-0.15	0.05	2.3273	0.0296	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	5	208826	18	D-M.2.1	2	6289	0.34	0.30	0.20	0.16	0.34	0.00	0.35	-0.24	-0.12	-0.02	0.35	2.3705	0.0297	1.2	1.0	7.6	1.2	A+	A+	A-

Appendix G: Item Statistics Multiple Choice

MATH	5	344539	18	A-F.1.1	2	6289	0.51	0.18	0.19	0.51	0.12	0.00	0.36	-0.15	-0.21	0.36	-0.12	1.4535	0.0283	6.2	1.1	6.2	1.1	A+	A-	A-
MATH	5	813035	18	B-O.1.1	2	6289	0.61	0.11	0.15	0.13	0.61	0.00	0.33	-0.13	-0.13	-0.22	0.33	0.9604	0.0289	7.9	1.1	7.2	1.2	A+	A-	A+
MATH	5	519804	19	B-O.1.1	2	6256	0.69	0.69	0.10	0.13	0.08	0.00	0.46	0.46	-0.24	-0.23	-0.23	0.5133	0.0303	-3.8	1.0	-6.1	0.9	A-	A+	A-
MATH	5	140681	19	A-F.2.1	1	6256	0.22	0.06	0.22	0.16	0.56	0.00	0.12	-0.08	0.12	-0.10	0.01	3.0732	0.0333	9.9	1.2	9.9	1.8	A-	A+	A-
MATH	5	899082	19	D-M.2.1	2	6256	0.19	0.42	0.09	0.19	0.31	0.00	0.21	0.19	-0.05	0.21	-0.36	3.3138	0.0351	4.2	1.1	9.9	1.6	A+	A-	A-
MATH	5	252237	19	A-T.1.1	1	6256	0.50	0.10	0.19	0.21	0.50	0.00	0.49	-0.12	-0.16	-0.35	0.49	1.5254	0.0284	-6.9	0.9	-5.9	0.9	A-	A-	A-
MATH	5	791552	19	A-F.2.1	2	6256	0.26	0.26	0.46	0.17	0.11	0.00	0.11	0.11	0.05	-0.12	-0.08	2.8410	0.0319	9.9	1.3	9.9	1.7	A-	A-	A-
MATH	5	911210	19	A-T.1.1	2	6256	0.26	0.28	0.30	0.26	0.16	0.00	0.07	0.03	-0.07	0.07	-0.02	2.8399	0.0319	9.9	1.3	9.9	1.9	A+	A-	A+
MATH	5	928075	19	B-O.2.1	2	6256	0.42	0.42	0.19	0.15	0.23	0.00	0.22	0.22	-0.10	-0.14	-0.04	1.9119	0.0287	9.9	1.2	9.9	1.3	A+	A-	A+
MATH	5	846711	19	A-F.1.1	2	6256	0.65	0.17	0.13	0.65	0.05	0.00	0.42	-0.20	-0.25	0.42	-0.18	0.7423	0.0295	-0.2	1.0	-2.3	1.0	A+	A+	A+
MATH	5	987700	19	D-M.3.1	1	6256	0.18	0.12	0.66	0.18	0.04	0.00	0.22	-0.23	0.02	0.22	-0.10	3.3588	0.0355	2.0	1.0	9.9	1.6	A-	A-	A-
MATH	5	238853	19	C-G.1.1	2	6256	0.69	0.17	0.69	0.06	0.08	0.00	0.34	-0.25	0.34	-0.16	-0.08	0.5262	0.0302	5.7	1.1	3.5	1.1	A+	A-	A+
MATH	5	216315	20	A-F.2.1	1	6242	0.48	0.13	0.48	0.22	0.17	0.00	0.38	-0.19	0.38	-0.04	-0.28	1.6163	0.0285	4.5	1.1	4.7	1.1	A-	A-	A+
MATH	5	176502	20	A-T.2.1	1	6242	0.80	0.80	0.04	0.07	0.08	0.00	0.56	0.56	-0.25	-0.38	-0.26	-0.2049	0.0345	-9.9	0.8	-9.9	0.6	A+	A-	A-
MATH	5	355776	20	B-O.1.1	2	6242	0.20	0.20	0.11	0.57	0.13	0.00	0.21	0.21	-0.15	-0.09	0.02	3.2626	0.0346	4.1	1.1	9.9	1.7	A+	A-	A-
MATH	5	623346	20	A-F.2.1	2	6242	0.62	0.19	0.11	0.62	0.08	0.00	0.28	-0.05	-0.22	0.28	-0.17	0.9114	0.0292	9.9	1.2	9.9	1.3	A+	A-	A+
MATH	5	269417	20	A-F.2.1	2	6242	0.46	0.46	0.25	0.15	0.14	0.00	0.20	0.20	-0.04	-0.11	-0.11	1.7386	0.0285	9.9	1.3	9.9	1.4	A+	A+	A+
MATH	5	988225	20	D-M.3.1	2	6242	0.22	0.59	0.14	0.22	0.05	0.00	0.22	0.01	-0.21	0.22	-0.11	3.0978	0.0334	4.9	1.1	9.9	1.6	A-	A-	A-
MATH	5	229397	20	C-G.1.1	1	6242	0.30	0.16	0.39	0.14	0.30	0.01	0.20	-0.18	0.04	-0.12	0.20	2.5669	0.0305	9.9	1.2	9.9	1.5	A+	A-	A+
MATH	5	252800	20	D-M.1.1	2	6242	0.35	0.17	0.35	0.09	0.38	0.00	0.41	-0.33	0.41	-0.13	-0.05	2.3139	0.0296	-1.8	1.0	2.1	1.1	A-	A-	A-
MATH	5	240794	20	B-O.2.1	2	6242	0.27	0.53	0.10	0.27	0.10	0.00	0.12	0.20	-0.27	0.12	-0.24	2.7973	0.0316	9.9	1.2	9.9	1.8	A-	A+	A-
MATH	5	146648	20	A-T.1.1	1	6242	0.22	0.25	0.19	0.34	0.22	0.00	0.15	-0.09	-0.18	0.10	0.15	3.1113	0.0335	9.9	1.2	9.9	1.7	A-	A-	A-
MATH	6	830344	0	C.1.2.1	1	128528	0.56	0.18	0.11	0.56	0.14	0.00	0.41	-0.21	-0.33	0.41	-0.05	0.9804	0.0064	9.9	1.1	9.9	1.1			
MATH	6	673089	0	E.3.1.2	2	128528	0.61	0.25	0.61	0.08	0.06	0.00	0.41	-0.36	0.41	-0.11	-0.05	0.7118	0.0065	9.9	1.1	8.5	1.0			
MATH	6	938904	0	E.2.1.1	2	128528	0.63	0.07	0.21	0.09	0.63	0.00	0.52	-0.21	-0.39	-0.14	0.52	0.6268	0.0065	-9.9	0.9	-9.9	0.9			
MATH	6	207996	0	D.2.1.1	1	128528	0.81	0.10	0.05	0.04	0.81	0.00	0.50	-0.31	-0.25	-0.25	0.50	-0.6455	0.0079	-9.9	0.9	-9.9	0.8			
MATH	6	419849	0	B.2.1.3	1	128528	0.58	0.58	0.03	0.21	0.18	0.00	0.39	0.39	-0.15	-0.11	-0.31	0.8335	0.0064	9.9	1.1	9.9	1.1			
MATH	6	223719	0	A.1.1.4	1	128528	0.87	0.05	0.87	0.06	0.02	0.00	0.52	-0.29	0.52	-0.36	-0.17	-1.0341	0.0088	-9.9	0.8	-9.9	0.6			
MATH	6	604859	0	A.3.1.1	2	128528	0.61	0.03	0.61	0.06	0.29	0.00	0.40	-0.17	0.40	-0.16	-0.28	0.6556	0.0065	9.9	1.1	9.9	1.2			
MATH	6	626379	0	A.1.3.2	1	128528	0.58	0.32	0.04	0.58	0.05	0.00	0.36	-0.27	-0.19	0.36	-0.07	0.8526	0.0064	9.9	1.1	9.9	1.1			
MATH	6	401528	0	E.1.1.3	2	128528	0.74	0.74	0.20	0.03	0.03	0.00	0.36	0.36	-0.29	-0.09	-0.17	-0.0452	0.0071	9.9	1.1	6.4	1.1			
MATH	6	531026	0	D.2.2.1	2	128528	0.81	0.10	0.81	0.05	0.05	0.00	0.42	-0.24	0.42	-0.24	-0.20	-0.6279	0.0079	1.9	1.0	1.0	1.0			
MATH	6	454917	0	D.1.1.1	2	128528	0.74	0.08	0.74	0.12	0.06	0.00	0.37	-0.26	0.37	-0.09	-0.26	-0.0425	0.0071	9.9	1.1	9.9	1.2			
MATH	6	884407	0	C.1.1.4	2	128528	0.72	0.08	0.11	0.72	0.10	0.00	0.39	-0.28	-0.30	0.39	-0.03	0.2052	0.0068	8.2	1.0	9.9	1.1			
MATH	6	954175	0	C.1.1.4	2	128528	0.83	0.83	0.08	0.04	0.04	0.00	0.39	0.39	-0.19	-0.23	-0.24	-0.6441	0.0079	-9.9	1.0	-8.2	0.9			
MATH	6	689244	0	C.3.1.1	1	128528	0.77	0.77	0.01	0.11	0.11	0.00	0.31	0.31	-0.13	-0.21	-0.17	-0.1984	0.0073	9.9	1.1	9.9	1.3			
MATH	6	803252	0	B.1.1.1	2	128528	0.35	0.26	0.35	0.18	0.21	0.00	0.29	-0.26	0.29	0.02	-0.07	2.1470	0.0067	9.9	1.1	9.9	1.4			
MATH	6	312557	0	B.2.3.1	1	128528	0.70	0.70	0.07	0.15	0.08	0.00	0.40	0.40	-0.29	-0.17	-0.18	0.2975	0.0067	9.9	1.0	6.4	1.0			
MATH	6	254325	0	A.3.2.1	2	128528	0.70	0.13	0.70	0.10	0.06	0.00	0.50	-0.32	0.50	-0.23	-0.20	0.1008	0.0069	-9.9	1.0	-9.9	0.9			
MATH	6	729582	0	A.1.2.1	1	128528	0.91	0.91	0.02	0.02	0.05	0.00	0.24	0.24	-0.12	-0.18	-0.13	-1.5558	0.0103	9.9	1.1	1.2	1.0			
MATH	6	600168	0	A.1.3.1	1	128528	0.77	0.05	0.16	0.77	0.03	0.00	0.41	-0.23	-0.23	0.41	-0.22	-0.2451	0.0073	1.7	1.0	9.9	1.1			
MATH	6	905259	0	A.3.2.1	2	128528	0.60	0.03	0.60	0.20	0.16	0.00	0.54	-0.17	0.54	-0.28	-0.34	0.7700	0.0065	-9.9	0.9	-9.9	0.8			
MATH	6	630454	0	E.1.1.3	2	128528	0.84	0.08	0.84	0.05	0.04	0.00	0.43	-0.24	0.43	-0.24	-0.22	-0.8438	0.0083	-8.3	1.0	-9.9	0.9			
MATH	6	821782	0	E.1.1.1	2	128528	0.80	0.07	0.12	0.80	0.01	0.00	0.37	-0.10	-0.33	0.37	-0.13	-0.4353	0.0076	0.8	1.0	7.2	1.1			
MATH	6	242790	0	E.1.1.2	2	128528	0.87	0.87	0.06	0.01	0.06	0.00	0.35	0.35	-0.16	-0.16	-0.27	-1.2433	0.0093	9.9	1.1	7.0	1.1			
MATH	6	236239	0	E.2.1.1	2	128528	0.49	0.19	0.49	0.22	0.10	0.00	0.41	-0.11	0.41	-0.24	-0.19	1.4019	0.0064	9.9	1.0	9.9	1.1			
MATH	6	946845	0	E.3.1.2	2	128528	0.70	0.05	0.13	0.12	0.70	0.00	0.53	-0.19	-0.33	-0.28	0.53	0.1980	0.0068	-9.9	0.9	-9.9	0.8			
MATH	6	244461	0	E.1.1.1	2	128528	0.68	0.08	0.06	0.68	0.18	0.00	0.45	-0.22	-0.23	0.45	-0.24	0.3241	0.0067	2.9	1.0	-7.6	1.0			
MATH	6	286671	0	E.3.1.1	2	128528	0.72	0.13	0.06	0.72	0.09	0.00	0.48	-0.25	-0.23	0.48	-0.28	0.1158	0.0069	-9.9	0.9	-9.9	0.9			
MATH	6	682213	0	E.3.1.1	1	128528	0.58	0.21	0.17	0.04	0.58	0.00	0.57	-0.50	-0.14	-0.15	0.57	0.9136	0.0064	-9.9	0.9	-9.9	0.8			
MATH	6	777859	0	D.1.2.1	2	128528	0.76	0.03	0.15	0.05	0.76	0.00	0.44	-0.25	-0.25	-0.24	0.44	-0.2072	0.0073	-4.6	1.0	3.9	1.0			

Appendix G: Item Statistics Multiple Choice

MATH	6	110866	0	D.2.2.1	2	128528	0.78	0.78	0.11	0.04	0.07	0.00	0.44	0.44	-0.27	-0.24	-0.20	-0.3463	0.0075	-3.9	1.0	-9.9	0.9			
MATH	6	760549	0	D.2.1.1	1	128528	0.74	0.74	0.20	0.03	0.04	0.00	0.47	0.47	-0.34	-0.20	-0.21	-0.0452	0.0071	-9.9	1.0	-9.9	0.9			
MATH	6	404836	0	D.2.1.1	1	128528	0.56	0.06	0.05	0.56	0.33	0.00	0.23	-0.22	-0.17	0.23	-0.05	0.9799	0.0064	9.9	1.3	9.9	1.4			
MATH	6	318109	0	D.2.1.2	1	128528	0.86	0.03	0.10	0.86	0.01	0.00	0.34	-0.19	-0.23	0.34	-0.16	-1.0126	0.0087	3.3	1.0	-1.1	1.0			
MATH	6	318325	0	D.2.1.2	1	128528	0.86	0.86	0.05	0.04	0.06	0.00	0.50	0.50	-0.29	-0.30	-0.24	-0.9613	0.0086	-9.9	0.8	-9.9	0.6			
MATH	6	897331	0	D.2.2.1	2	128528	0.57	0.22	0.57	0.13	0.07	0.00	0.49	-0.17	0.49	-0.34	-0.23	0.9371	0.0064	-9.9	1.0	-9.9	0.9			
MATH	6	551710	0	D.1.2.1	2	128528	0.80	0.05	0.80	0.08	0.07	0.00	0.50	-0.26	0.50	-0.31	-0.23	-0.4409	0.0076	-9.9	0.9	-9.9	0.8			
MATH	6	680022	0	C.3.1.1	1	128528	0.87	0.10	0.02	0.01	0.87	0.00	0.39	-0.29	-0.21	-0.16	0.39	-1.0887	0.0089	-6.1	1.0	-5.5	0.9			
MATH	6	332195	0	D.1.1.1	2	128528	0.89	0.05	0.02	0.04	0.89	0.00	0.39	-0.21	-0.22	-0.23	0.39	-1.1537	0.0091	-9.9	0.9	-9.9	0.8			
MATH	6	331202	0	C.1.1.4	2	128528	0.81	0.81	0.12	0.03	0.03	0.00	0.47	0.47	-0.37	-0.24	-0.10	-0.5679	0.0078	-9.9	0.9	-9.9	0.8			
MATH	6	383620	0	C.1.1.2	2	128528	0.64	0.17	0.04	0.64	0.15	0.00	0.38	-0.25	-0.23	0.38	-0.12	0.4831	0.0066	9.9	1.1	9.9	1.1			
MATH	6	710121	0	C.1.2.2	1	128528	0.64	0.14	0.64	0.09	0.13	0.00	0.45	-0.31	0.45	-0.17	-0.17	0.5241	0.0066	5.1	1.0	2.5	1.0			
MATH	6	322955	0	C.1.1.2	2	128528	0.49	0.23	0.49	0.13	0.15	0.00	0.51	-0.32	0.51	-0.11	-0.22	1.3978	0.0064	-9.9	0.9	-9.9	0.9			
MATH	6	502457	0	C.1.1.1	1	128528	0.65	0.13	0.14	0.65	0.08	0.00	0.42	-0.22	-0.15	0.42	-0.27	0.4870	0.0066	9.9	1.0	9.4	1.1			
MATH	6	116172	0	C.1.1.3	2	128528	0.40	0.09	0.43	0.08	0.40	0.00	0.48	-0.26	-0.31	-0.05	0.48	1.7290	0.0064	-9.9	0.9	-7.9	1.0			
MATH	6	531661	0	C.1.2.1	2	128528	0.85	0.06	0.04	0.05	0.85	0.00	0.43	-0.21	-0.25	-0.23	0.43	-0.9878	0.0087	-2.1	1.0	-9.9	0.9			
MATH	6	372373	0	B.1.1.1	2	128528	0.64	0.11	0.64	0.18	0.07	0.00	0.49	-0.15	0.49	-0.33	-0.23	0.5588	0.0066	-9.9	1.0	-9.9	0.9			
MATH	6	880326	0	B.2.1.1	1	128528	0.69	0.03	0.69	0.25	0.04	0.00	0.37	-0.21	0.37	-0.24	-0.17	0.2088	0.0068	9.9	1.1	9.9	1.1			
MATH	6	878917	0	B.2.2.1	2	128528	0.75	0.75	0.06	0.06	0.13	0.00	0.56	0.56	-0.20	-0.24	-0.41	-0.1578	0.0072	-9.9	0.9	-9.9	0.8			
MATH	6	760173	0	A.3.2.1	2	128528	0.70	0.07	0.70	0.13	0.09	0.00	0.50	-0.27	0.50	-0.19	-0.31	0.1563	0.0069	-9.9	1.0	-9.9	0.9			
MATH	6	402435	0	A.3.1.1	2	128528	0.66	0.11	0.12	0.66	0.11	0.00	0.46	-0.26	-0.21	0.46	-0.21	0.4667	0.0066	-5.5	1.0	-4.4	1.0			
MATH	6	497610	0	A.2.1.1	1	128528	0.77	0.12	0.77	0.06	0.04	0.00	0.38	-0.09	0.38	-0.30	-0.27	-0.1855	0.0072	2.1	1.0	9.9	1.1			
MATH	6	896841	0	A.1.1.1	1	128528	0.75	0.01	0.19	0.75	0.04	0.00	0.30	-0.06	-0.19	0.30	-0.23	-0.1435	0.0072	9.9	1.2	9.9	1.1			
MATH	6	747170	0	A.1.1.4	1	128528	0.82	0.05	0.09	0.04	0.82	0.00	0.54	-0.32	-0.32	-0.23	0.54	-0.5823	0.0078	-9.9	0.8	-9.9	0.7			
MATH	6	622963	0	A.1.1.2	1	128528	0.72	0.10	0.72	0.12	0.06	0.00	0.51	-0.17	0.51	-0.38	-0.22	0.1500	0.0069	-9.9	0.9	-9.9	0.8			
MATH	6	326270	0	A.1.2.1	1	128528	0.53	0.53	0.21	0.06	0.20	0.00	0.54	0.54	-0.46	-0.15	-0.12	1.1433	0.0064	-9.9	0.9	-9.9	0.9			
MATH	6	238164	0	A.1.4.1	2	128528	0.69	0.07	0.04	0.69	0.19	0.00	0.49	-0.10	-0.21	0.49	-0.40	0.2556	0.0068	-9.9	1.0	-7.5	1.0			
MATH	6	728524	0	A.1.1.3	1	128528	0.88	0.03	0.06	0.03	0.88	0.00	0.40	-0.24	-0.23	-0.20	0.40	-1.2351	0.0093	-5.9	1.0	-6.4	0.9			
MATH	6	734443	0	A.1.3.2	1	128528	0.55	0.25	0.08	0.55	0.12	0.00	0.38	-0.14	-0.27	0.38	-0.17	0.9965	0.0064	9.9	1.1	9.9	1.1			
MATH	6	209936	0	D.1.1.1	2	128528	0.49	0.49	0.31	0.05	0.14	0.00	0.27	0.27	-0.05	-0.11	-0.24	1.4008	0.0064	9.9	1.2	9.9	1.4			
MATH	6	719246	0	A.1.1.4	1	128528	0.82	0.08	0.05	0.05	0.82	0.00	0.54	-0.34	-0.28	-0.25	0.54	-0.5844	0.0078	-9.9	0.8	-9.9	0.6			
MATH	6	982442	1	B.2.1.1	1	14609	0.82	0.10	0.82	0.06	0.02	0.00	0.40	-0.26	0.40	-0.21	-0.18	-0.6633	0.0232	-1.2	1.0	-1.8	0.9			
MATH	6	880564	1	A.2.1.1	1	14609	0.60	0.60	0.19	0.09	0.12	0.00	0.38	0.38	-0.28	-0.25	-0.02	0.7453	0.0192	9.9	1.1	5.8	1.1			
MATH	6	819133	1	E.1.1.1	2	14609	0.79	0.06	0.11	0.79	0.04	0.00	0.54	-0.32	-0.34	0.54	-0.19	-0.4526	0.0223	-9.9	0.9	-9.9	0.7	A-	A-	B-
MATH	6	863330	1	E.3.1.1	2	14609	0.70	0.10	0.70	0.12	0.08	0.00	0.50	-0.27	0.50	-0.25	-0.24	0.1502	0.0202	-5.7	1.0	-6.8	0.9	A+	A-	A-
MATH	6	866239	1	C.1.1.4	2	14609	0.52	0.21	0.19	0.52	0.08	0.00	0.41	-0.09	-0.29	0.41	-0.18	1.1643	0.0189	7.4	1.1	7.6	1.1	A-	A+	A-
MATH	6	365713	1	C.3.1.1	1	14609	0.89	0.89	0.01	0.01	0.09	0.00	0.38	0.38	-0.14	-0.15	-0.32	-1.3392	0.0277	-3.5	0.9	-3.8	0.8	A+	A-	A-
MATH	6	405659	1	D.2.1.1	1	14609	0.80	0.80	0.12	0.04	0.04	0.00	0.51	0.51	-0.35	-0.26	-0.21	-1.5554	0.0227	-9.9	0.9	-7.9	0.8	A+	A+	A-
MATH	6	975746	1	B.2.3.1	1	14609	0.79	0.16	0.02	0.03	0.79	0.00	0.36	-0.23	-0.20	0.36	-0.4387	0.0222	5.3	1.1	4.5	1.1	A-	A-	A-	
MATH	6	113085	1	A.3.2.1	1	14609	0.86	0.01	0.07	0.06	0.86	0.00	0.42	-0.17	-0.25	-0.27	0.42	-1.0432	0.0255	-3.2	1.0	-4.9	0.8	A+	A-	A-
MATH	6	766097	1	B.1.1.1	1	14609	0.62	0.62	0.10	0.16	0.12	0.00	0.52	0.52	-0.21	-0.24	-0.31	0.6184	0.0193	-7.2	0.9	-5.3	0.9	B-	A-	A+
MATH	6	143643	1	A.1.4.1	2	14609	0.64	0.14	0.64	0.08	0.14	0.00	0.55	-0.33	0.55	-0.15	-0.32	0.5053	0.0195	-9.9	0.9	-9.9	0.8	A-	A-	A-
MATH	6	768560	1	A.1.1.3	1	14609	0.81	0.81	0.04	0.10	0.05	0.00	0.48	0.48	-0.25	-0.29	-0.24	-0.5693	0.0228	-6.7	0.9	-8.7	0.8	A+	A+	A+
MATH	6	945675	2	A.1.1.2	1	14277	0.77	0.05	0.15	0.03	0.77	0.00	0.52	-0.22	-0.38	-0.20	0.52	-0.2521	0.0219	-9.8	0.9	-9.9	0.7			
MATH	6	587756	2	E.3.1.1	2	14277	0.63	0.15	0.19	0.63	0.03	0.00	0.59	-0.36	-0.34	0.59	-0.13	0.6197	0.0195	-9.9	0.8	-9.9	0.8			
MATH	6	301053	2	D.2.2.1	2	14277	0.69	0.69	0.08	0.19	0.04	0.00	0.22	0.22	-0.22	-0.02	-0.18	0.2712	0.0202	9.9	1.3	9.9	1.4	A-	A-	A-
MATH	6	709496	2	E.1.1.3	2	14277	0.95	0.95	0.03	0.01	0.01	0.00	0.32	0.32	-0.21	-0.16	-0.16	-2.2114	0.0390	-3.1	0.9	-4.5	0.7	A+	A-	A-
MATH	6	361638	2	D.2.1.1	1	14277	0.65	0.05	0.05	0.25	0.65	0.00	0.53	-0.21	-0.12	-0.41	0.53	0.5047	0.0197	-9.9	0.9	-9.9	0.8	A+	A-	A-
MATH	6	205501	2	C.1.2.1	1	14277	0.79	0.79	0.03	0.06	0.12	0.00	0.44	0.44	-0.24	-0.31	-0.21	-0.3898	0.0225	-3.8	1.0	-5.3	0.9	A+	A-	A-
MATH	6	189389	2	C.3.1.1	1	14277	0.90	0.08	0.01	0.90	0.01	0.00	0.34	-0.26	-0.13	0.34	-0.17	-1.3653	0.0289	-1.9	1.0	-1.0	1.0	A+	A-	A-
MATH	6	552860	2	B.1.1.1	2	14277	0.40	0.23	0.27	0.40	0.10	0.00	-0.11	-0.05	0.19	-0.11	-0.03	1.8623	0.0193	9.9	1.7	9.9	2.3	A+	A+	A+

Appendix G: Item Statistics Multiple Choice

MATH	6	831589	2	B.2.3.1	1	14277	0.72	0.02	0.06	0.72	0.20	0.00	0.54	-0.18	-0.34	0.54	-0.34	0.0911	0.0207	-9.9	0.9	-9.9	0.8	A-	A-	A-
MATH	6	595258	2	A.1.4.1	2	14277	0.53	0.53	0.23	0.19	0.05	0.00	0.48	0.48	-0.11	-0.36	-0.25	1.1338	0.0190	-4.7	1.0	-4.2	1.0	A-	A-	A-
MATH	6	594018	2	A.1.2.1	1	14277	0.84	0.06	0.84	0.07	0.03	0.00	0.21	-0.11	0.21	-0.09	-0.15	-0.7870	0.0246	9.9	1.2	8.7	1.3	A-	A-	A-
MATH	6	278007	2	A.1.1.1	1	14277	0.82	0.12	0.82	0.02	0.05	0.00	0.37	-0.24	0.37	-0.12	-0.24	-0.5875	0.0234	1.5	1.0	-0.8	1.0	A-	A+	A-
MATH	6	426666	3	C.1.1.3	1	14248	0.66	0.26	0.66	0.66	0.03	0.00	0.47	-0.28	-0.30	0.47	-0.17	0.4607	0.0198	-2.3	1.0	-4.0	0.9			
MATH	6	977856	3	B.2.3.1	1	14248	0.87	0.08	0.87	0.03	0.02	0.00	0.33	-0.19	0.33	-0.19	-0.19	-1.1220	0.0268	-0.7	1.0	2.3	1.1			
MATH	6	803662	3	E.1.1.2	2	14248	0.84	0.84	0.06	0.05	0.05	0.00	0.45	0.45	-0.29	-0.21	-0.22	-0.7683	0.0244	-5.7	0.9	-6.2	0.8	B+	A-	A-
MATH	6	809936	3	E.2.1.1	1	14248	0.76	0.12	0.76	0.07	0.05	0.00	0.43	-0.29	0.43	-0.11	-0.27	-0.1931	0.0217	-1.3	1.0	0.0	1.0	A+	A+	A+
MATH	6	203692	3	D.2.1.2	1	14248	0.93	0.03	0.93	0.03	0.01	0.00	0.34	-0.18	0.34	-0.23	-0.16	-1.8416	0.0337	-3.0	0.9	-4.9	0.7	A+	A-	A-
MATH	6	991299	3	C.1.2.1	1	14248	0.88	0.06	0.03	0.03	0.88	0.00	0.46	-0.31	-0.24	-0.20	0.46	-1.1728	0.0272	-7.9	0.9	-8.3	0.7	A+	B-	B-
MATH	6	220928	3	D.1.1.1	2	14248	0.64	0.08	0.64	0.20	0.08	0.00	0.36	-0.22	0.36	-0.15	-0.20	0.5711	0.0196	9.9	1.1	9.9	1.2	A-	A-	A-
MATH	6	550827	3	C.1.1.1	2	14248	0.75	0.08	0.75	0.09	0.08	0.00	0.49	-0.22	0.49	-0.30	-0.24	-0.1028	0.0214	-6.3	0.9	-7.7	0.8	A-	A-	A-
MATH	6	960537	3	A.3.1.1	2	14248	0.42	0.10	0.24	0.24	0.42	0.00	0.29	-0.13	-0.14	-0.11	0.29	1.7248	0.0193	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	6	853253	3	B.2.1.1	1	14248	0.71	0.11	0.08	0.71	0.10	0.00	0.47	-0.31	-0.21	0.47	-0.20	0.1015	0.0207	-3.8	1.0	-5.3	0.9	A-	B-	A-
MATH	6	353313	3	A.1.3.2	2	14248	0.66	0.11	0.08	0.66	0.15	0.00	0.55	-0.31	-0.20	0.55	-0.30	0.4520	0.0199	-9.9	0.9	-9.5	0.8	A-	A-	A-
MATH	6	346188	3	A.1.1.3	1	14248	0.81	0.15	0.03	0.81	0.01	0.00	0.48	-0.41	-0.20	0.48	-0.10	-0.5289	0.0232	-7.5	0.9	-8.2	0.8	A+	A+	A-
MATH	6	781053	4	C.1.1.1	1	14206	0.89	0.01	0.89	0.04	0.05	0.00	0.32	-0.15	0.32	-0.22	-0.17	-1.3350	0.0288	0.2	1.0	-1.6	0.9			
MATH	6	553715	4	A.1.3.1	2	14206	0.57	0.12	0.57	0.17	0.14	0.00	0.27	-0.13	0.27	-0.07	-0.19	0.9267	0.0194	9.9	1.2	9.9	1.3			
MATH	6	981982	4	D.2.1.2	1	14206	0.88	0.02	0.88	0.06	0.03	0.00	0.49	-0.21	0.49	-0.32	-0.27	-1.2489	0.0281	-9.4	0.8	-9.9	0.6	A+	A-	A-
MATH	6	200890	4	E.1.1.2	2	14206	0.64	0.10	0.19	0.07	0.64	0.00	0.44	-0.26	-0.18	-0.25	0.44	0.5466	0.0198	1.7	1.0	0.1	1.0	A+	A-	A-
MATH	6	420503	4	E.3.1.1	2	14206	0.63	0.19	0.05	0.63	0.13	0.00	0.59	-0.34	-0.22	0.59	-0.30	0.6174	0.0197	-9.9	0.8	-9.9	0.8	A+	A-	A-
MATH	6	546138	4	C.1.2.2	1	14206	0.77	0.77	0.06	0.16	0.01	0.00	0.39	0.39	-0.18	-0.29	-0.14	-0.2822	0.0222	3.1	1.0	1.1	1.0	A-	A-	A-
MATH	6	758989	4	D.1.1.1	2	14206	0.69	0.13	0.07	0.11	0.69	0.00	0.50	-0.30	-0.24	-0.22	0.50	0.2264	0.0205	-7.7	0.9	-6.7	0.9	A-	A-	A-
MATH	6	753576	4	B.2.3.1	1	14206	0.91	0.91	0.04	0.02	0.03	0.00	0.44	0.44	-0.28	-0.22	-0.24	-1.5841	0.0312	-7.0	0.9	-9.9	0.5	A+	B-	B-
MATH	6	151088	4	A.3.1.1	2	14206	0.48	0.32	0.12	0.48	0.08	0.00	0.35	-0.17	-0.22	0.35	-0.08	1.4065	0.0193	9.9	1.1	9.9	1.3	A+	A-	A-
MATH	6	339461	4	B.2.1.1	1	14206	0.83	0.06	0.83	0.06	0.04	0.00	0.41	-0.22	0.41	-0.21	-0.23	-0.6905	0.0242	-1.8	1.0	-4.1	0.9	A-	A-	A-
MATH	6	262994	4	A.1.2.1	1	14206	0.54	0.15	0.18	0.13	0.54	0.00	0.53	-0.35	-0.07	-0.33	0.53	1.1147	0.0193	-9.9	0.9	-9.7	0.9	A-	A+	A-
MATH	6	191649	4	A.1.1.4	1	14206	0.87	0.07	0.04	0.87	0.02	0.00	0.49	-0.31	-0.29	0.49	-0.21	-1.0878	0.0268	-9.6	0.9	-9.9	0.6	A+	A-	A-
MATH	6	491875	5	E.3.1.2	2	14247	0.81	0.81	0.05	0.08	0.06	0.00	0.49	0.49	-0.25	-0.26	-0.28	-0.5110	0.0232	-8.7	0.9	-9.5	0.7			
MATH	6	257435	5	D.2.1.2	1	14247	0.59	0.33	0.05	0.03	0.59	0.00	0.43	-0.26	-0.25	-0.22	0.43	0.8128	0.0194	2.6	1.0	0.0	1.0			
MATH	6	253769	5	C.1.2.1	1	14247	0.72	0.03	0.04	0.21	0.72	0.00	0.51	-0.28	-0.28	-0.31	0.51	0.0951	0.0208	-9.4	0.9	-7.9	0.8	A+	A-	A-
MATH	6	493905	5	E.2.1.1	2	14247	0.66	0.09	0.66	0.09	0.15	0.00	0.49	-0.23	0.49	-0.16	-0.33	0.4102	0.0200	-5.6	1.0	-5.6	0.9	A+	A+	A+
MATH	6	375365	5	D.2.2.1	2	14247	0.73	0.05	0.10	0.12	0.73	0.00	0.43	-0.24	-0.28	-0.17	0.43	0.0383	0.0210	0.0	1.0	-4.0	0.9	A-	A-	A-
MATH	6	678567	5	D.1.2.1	2	14247	0.61	0.16	0.61	0.12	0.10	0.00	0.39	-0.20	0.39	-0.20	-0.17	0.7157	0.0195	8.1	1.1	2.8	1.0	A+	A+	A+
MATH	6	379158	5	C.1.1.3	1	14247	0.76	0.07	0.76	0.07	0.11	0.00	0.45	-0.21	0.45	-0.29	-0.22	-0.1599	0.0217	-3.2	1.0	-5.3	0.9	A+	A-	A-
MATH	6	771417	5	A.3.2.1	2	14247	0.44	0.19	0.19	0.44	0.17	0.00	0.08	-0.01	-0.06	0.08	-0.03	1.6008	0.0193	9.9	1.5	9.9	1.7	A-	A+	A-
MATH	6	211355	5	B.2.1.3	1	14247	0.78	0.78	0.08	0.08	0.05	0.00	0.40	0.40	-0.24	-0.19	-0.20	-0.3445	0.0224	0.8	1.0	0.4	1.0	A-	A-	A-
MATH	6	867804	5	A.1.3.1	1	14247	0.57	0.11	0.26	0.57	0.06	0.00	0.32	-0.18	-0.10	0.32	-0.24	0.9544	0.0193	9.9	1.2	9.9	1.2	A+	A+	A+
MATH	6	363870	5	A.1.1.1	1	14247	0.70	0.19	0.07	0.70	0.03	0.00	0.61	-0.52	-0.15	0.61	-0.20	0.1756	0.0206	-9.9	0.8	-9.9	0.7	B-	A+	A-
MATH	6	466747	5	A.1.1.2	1	14247	0.67	0.20	0.04	0.08	0.67	0.00	0.57	-0.43	-0.17	-0.21	0.57	0.3767	0.0201	-9.9	0.9	-9.9	0.8	A+	A+	A+
MATH	6	140481	6	D.2.1.1	1	14292	0.66	0.06	0.06	0.22	0.66	0.00	0.49	-0.29	-0.18	-0.30	0.49	0.4012	0.0200	-6.1	1.0	-6.9	0.9			
MATH	6	339400	6	B.2.1.3	1	14292	0.71	0.09	0.04	0.71	0.16	0.00	0.42	-0.20	-0.16	0.42	-0.28	0.1380	0.0206	1.5	1.0	1.9	1.0			
MATH	6	186342	6	B.1.1.1	1	14292	0.65	0.09	0.65	0.19	0.07	0.00	0.41	-0.14	0.41	-0.29	-0.18	0.4750	0.0198	4.8	1.0	1.6	1.0	A-	A-	A-
MATH	6	307385	6	D.2.2.1	2	14292	0.46	0.06	0.06	0.42	0.46	0.00	0.45	-0.22	-0.27	-0.22	0.45	1.4874	0.0192	-2.2	1.0	1.4	1.0	A+	A+	A-
MATH	6	265456	6	E.2.1.1	1	14292	0.82	0.04	0.82	0.07	0.07	0.00	0.33	-0.17	0.33	-0.24	-0.12	-0.6679	0.0240	3.4	1.1	5.6	1.2	A+	A-	A-
MATH	6	533418	6	E.1.1.2	2	14292	0.68	0.68	0.12	0.09	0.10	0.00	0.45	0.45	-0.15	-0.26	-0.28	0.3040	0.0202	-0.6	1.0	0.8	1.0	A+	A-	A-
MATH	6	921103	6	D.1.2.1	2	14292	0.33	0.20	0.41	0.33	0.05	0.00	0.26	-0.11	-0.06	0.26	-0.21	2.2212	0.0202	9.9	1.2	9.9	1.5	A-	A+	A-
MATH	6	600418	6	C.1.1.3	1	14292	0.74	0.06	0.15	0.74	0.05	0.00	0.54	-0.25	-0.38	0.54	-0.18	-0.0349	0.0212	-9.9	0.9	-9.9	0.8	A-	A-	A-
MATH	6	360479	6	A.3.1.1	2	14292	0.52	0.27	0.52	0.14	0.07	0.00	0.28	-0.29	0.28	-0.03	0.00	1.1988	0.0191	9.9	1.2	9.9	1.3	A-	A-	A+
MATH	6	882297	6	B.2.2.1	2	14292	0.59	0.14	0.11	0.59	0.15	0.00	0.55	-0.24	-0.17	0.55	-0.36	0.7950	0.0194	-9.9	0.9	-9.9	0.8	A-	A-	A-
MATH	6	524641	6	A.1.3.1	1	14292	0.75	0.14	0.05	0.75	0.05	0.00	0.37	-0.16	-0.22	0.37	-0.25	-0.1444	0.0216	5.2	1.1	4.2	1.1	A-	A+	A-

Appendix G: Item Statistics Multiple Choice

MATH	6	208498	6	A.1.1.2	1	14292	0.75	0.18	0.75	0.06	0.02	0.00	0.48	-0.44	0.48	-0.11	-0.10	-0.0978	0.0214	-6.1	0.9	-7.6	0.8	A+	A+	A+
MATH	6	357624	7	C.1.1.4	2	14270	0.74	0.08	0.09	0.74	0.09	0.00	0.44	-0.28	-0.35	0.44	-0.06	-0.0228	0.0212	-1.7	1.0	-2.4	1.0			
MATH	6	258486	7	A.1.1.2	1	14270	0.76	0.06	0.76	0.04	0.14	0.00	0.50	-0.20	0.50	-0.12	-0.41	-0.1870	0.0218	-8.2	0.9	-9.1	0.8			
MATH	6	582453	7	D.2.2.1	2	14270	0.64	0.64	0.20	0.08	0.08	0.00	0.55	0.55	-0.41	-0.19	-0.18	0.5552	0.0197	-9.9	0.9	-9.9	0.8	A+	A-	A-
MATH	6	703426	7	E.1.1.3	2	14270	0.45	0.23	0.16	0.15	0.45	0.00	0.32	-0.12	-0.05	-0.25	0.32	1.5523	0.0191	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	6	770305	7	E.3.1.2	2	14270	0.82	0.03	0.04	0.10	0.82	0.00	0.45	-0.24	-0.25	-0.27	0.45	-0.6143	0.0239	-5.1	0.9	-7.2	0.8	A+	A-	A+
MATH	6	176905	7	C.1.1.2	2	14270	0.64	0.64	0.14	0.17	0.05	0.00	0.35	0.35	-0.22	-0.12	-0.21	0.5736	0.0197	9.9	1.1	9.9	1.2	A+	A+	A+
MATH	6	461853	7	C.1.2.2	1	14270	0.13	0.11	0.13	0.20	0.56	0.00	-0.07	-0.14	-0.07	0.07	0.08	3.6951	0.0269	9.9	1.4	9.9	3.7	A-	A+	A+
MATH	6	930977	7	D.1.2.1	2	14270	0.82	0.82	0.06	0.06	0.06	0.00	0.33	0.33	-0.17	-0.21	-0.15	-0.6182	0.0239	2.9	1.0	7.3	1.2	B+	A-	A-
MATH	6	614811	7	B.2.2.1	1	14270	0.90	0.03	0.06	0.90	0.01	0.00	0.34	-0.23	-0.21	0.34	-0.12	-1.3809	0.0294	-1.8	1.0	-1.0	1.0	A-	A-	A+
MATH	6	939699	7	A.3.1.1	2	14270	0.34	0.25	0.34	0.34	0.07	0.00	0.27	-0.25	0.27	0.06	-0.19	2.1900	0.0200	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	6	743716	7	A.2.1.1	1	14270	0.58	0.10	0.23	0.09	0.58	0.00	0.48	-0.24	-0.31	-0.12	0.48	0.8774	0.0193	-4.5	1.0	-4.3	0.9	A+	A+	A+
MATH	6	849629	7	A.1.2.1	1	14270	0.78	0.78	0.08	0.10	0.03	0.00	0.50	0.50	-0.27	-0.31	-0.20	-0.3360	0.0225	-8.6	0.9	-9.9	0.8	A-	A-	A-
MATH	6	638487	8	E.2.1.1	2	14228	0.46	0.12	0.15	0.46	0.26	0.00	0.33	-0.25	-0.13	0.33	-0.08	1.5603	0.0192	9.9	1.2	9.9	1.2			
MATH	6	202339	8	A.1.1.3	1	14228	0.80	0.03	0.16	0.80	0.01	0.00	0.50	-0.28	-0.37	0.50	-0.15	-0.4415	0.0230	-8.4	0.9	-9.5	0.7			
MATH	6	139221	8	E.3.1.2	2	14228	0.35	0.09	0.35	0.33	0.22	0.00	0.25	-0.34	0.25	-0.03	-0.02	2.1116	0.0200	9.9	1.2	9.9	1.5	A+	A-	A-
MATH	6	798497	8	E.1.1.1	2	14228	0.74	0.07	0.07	0.74	0.12	0.00	0.38	-0.18	-0.24	0.38	-0.18	-0.0047	0.0213	4.8	1.1	7.0	1.2	A+	A-	A-
MATH	6	779927	8	D.2.1.1	1	14228	0.59	0.06	0.05	0.30	0.59	0.00	0.28	-0.22	-0.16	-0.10	0.28	0.8745	0.0194	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	6	749326	8	D.1.2.1	2	14228	0.73	0.10	0.08	0.09	0.73	0.00	0.48	-0.24	-0.25	-0.25	0.48	0.0360	0.0211	-5.6	0.9	-7.3	0.8	A+	A+	A-
MATH	6	877775	8	C.1.1.3	1	14228	0.67	0.24	0.06	0.67	0.03	0.00	0.48	-0.27	-0.33	0.48	-0.17	0.4143	0.0201	-3.7	1.0	-4.9	0.9	A-	A-	A-
MATH	6	425502	8	A.3.1.1	2	14228	0.67	0.12	0.67	0.16	0.05	0.00	0.34	-0.19	0.34	-0.13	-0.24	0.3857	0.0202	9.9	1.1	9.9	1.2	A-	A-	A-
MATH	6	231671	8	B.2.1.3	1	14228	0.72	0.07	0.03	0.72	0.17	0.00	0.44	-0.20	-0.19	0.44	-0.30	0.0765	0.0210	-0.6	1.0	-1.9	1.0	A-	A-	A-
MATH	6	925167	8	C.1.1.1	1	14228	0.80	0.80	0.08	0.09	0.03	0.00	0.42	0.42	-0.24	-0.24	-0.21	-0.4147	0.0229	-2.1	1.0	-2.3	0.9	A+	A-	A-
MATH	6	963427	8	A.1.4.1	1	14228	0.60	0.06	0.60	0.06	0.28	0.00	0.59	-0.12	0.59	-0.16	-0.50	0.7906	0.0195	-9.9	0.8	-9.9	0.8	B-	A-	A-
MATH	6	763007	8	A.2.1.1	1	14228	0.64	0.64	0.13	0.15	0.08	0.00	0.36	0.36	-0.22	-0.20	-0.10	0.5620	0.0198	9.9	1.1	7.6	1.1	A+	A-	A-
MATH	6	773778	9	D.2.2.1	2	14151	0.57	0.09	0.05	0.57	0.29	0.00	0.42	-0.36	-0.25	0.42	-0.12	0.9399	0.0194	5.0	1.0	2.9	1.0			
MATH	6	889787	9	C.1.2.2	1	14151	0.81	0.09	0.81	0.07	0.03	0.00	0.41	-0.17	0.41	-0.31	-0.21	-0.5536	0.0236	-1.4	1.0	-0.1	1.0			
MATH	6	339925	9	E.1.1.1	2	14151	0.39	0.19	0.21	0.22	0.39	0.00	0.31	-0.15	-0.16	-0.07	0.31	1.9282	0.0197	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	6	917857	9	E.3.1.1	2	14151	0.69	0.12	0.69	0.08	0.10	0.00	0.62	-0.38	0.62	-0.22	-0.32	0.2492	0.0206	-9.9	0.8	-9.9	0.7	A+	A-	A-
MATH	6	911881	9	D.2.1.2	1	14151	0.59	0.35	0.04	0.02	0.59	0.00	0.40	-0.24	-0.27	-0.19	0.40	0.8569	0.0195	8.8	1.1	4.9	1.1	A+	A+	A+
MATH	6	945319	9	C.1.1.4	1	14151	0.72	0.09	0.72	0.07	0.11	0.00	0.57	-0.26	0.57	-0.26	-0.36	0.0517	0.0211	-9.9	0.8	-9.9	0.7	A+	A-	A-
MATH	6	461507	9	D.1.1.1	2	14151	0.82	0.09	0.04	0.82	0.05	0.00	0.41	-0.21	-0.23	0.41	-0.23	-0.6563	0.0242	-2.3	1.0	0.1	1.0	A+	A+	A+
MATH	6	802822	9	C.1.1.1	1	14151	0.79	0.05	0.10	0.79	0.05	0.00	0.50	-0.20	-0.33	0.50	-0.25	-0.4036	0.0229	-8.6	0.9	-7.2	0.8	A+	B-	A-
MATH	6	312747	9	A.3.1.1	2	14151	0.50	0.27	0.08	0.50	0.15	0.00	0.40	-0.13	-0.17	0.40	-0.26	1.2899	0.0193	9.9	1.1	9.9	1.2	A+	A-	A-
MATH	6	412797	9	B.2.1.1	1	14151	0.49	0.49	0.36	0.05	0.11	0.00	0.33	0.33	-0.12	-0.21	-0.20	1.3900	0.0193	9.9	1.2	9.9	1.3	A-	A-	A+
MATH	6	270950	9	A.1.3.2	1	14151	0.80	0.06	0.07	0.80	0.06	0.00	0.44	-0.30	-0.24	0.44	-0.16	-0.4989	0.0234	-4.0	1.0	-1.7	1.0	A+	A+	A+
MATH	6	323111	9	A.1.1.4	1	14151	0.86	0.07	0.03	0.86	0.04	0.00	0.54	-0.37	-0.20	0.54	-0.31	-1.0213	0.0265	-9.9	0.8	-9.9	0.5	A+	A-	A-
MATH	7	295811	0	A.3.1.1	1	130652	0.83	0.03	0.83	0.08	0.05	0.00	0.43	-0.16	0.43	-0.26	-0.27	-1.5942	0.0078	-9.9	0.9	-9.9	0.8			
MATH	7	694992	0	E.2.1.1	1	130652	0.88	0.88	0.05	0.04	0.03	0.00	0.34	0.34	-0.26	-0.12	-0.18	-1.1580	0.0090	-6.4	1.0	3.5	1.1			
MATH	7	126589	0	E.1.1.1	2	130652	0.69	0.17	0.69	0.06	0.08	0.00	0.39	-0.17	0.39	-0.21	-0.25	0.2446	0.0067	9.9	1.1	9.9	1.1			
MATH	7	729525	0	C.3.1.1	1	130652	0.82	0.02	0.82	0.02	0.14	0.00	0.38	-0.15	0.38	-0.17	-0.29	-0.6253	0.0079	1.3	1.0	3.3	1.0			
MATH	7	894083	0	C.1.2.1	1	130652	0.53	0.53	0.04	0.26	0.17	0.00	0.28	0.28	-0.10	-0.26	-0.02	1.1949	0.0063	9.9	1.2	9.9	1.4			
MATH	7	223637	0	C.3.1.2	1	130652	0.74	0.74	0.17	0.07	0.03	0.00	0.41	0.41	-0.21	-0.26	-0.22	0.0462	0.0069	2.7	1.0	3.7	1.0			
MATH	7	959645	0	A.1.2.1	1	130652	0.61	0.17	0.07	0.61	0.15	0.00	0.54	-0.41	-0.19	0.54	-0.16	0.7145	0.0064	-9.9	0.9	-9.9	0.8			
MATH	7	396206	0	E.1.1.1	2	130652	0.58	0.08	0.15	0.18	0.58	0.00	0.40	-0.14	-0.22	-0.21	0.40	0.8924	0.0064	9.9	1.1	9.9	1.1			
MATH	7	283945	0	D.1.1.1	2	130652	0.65	0.23	0.06	0.65	0.06	0.00	0.34	-0.11	-0.26	0.34	-0.22	0.5302	0.0065	9.9	1.2	9.9	1.3			
MATH	7	418415	0	D.2.1.2	2	130652	0.77	0.08	0.09	0.77	0.06	0.00	0.49	-0.26	-0.29	0.49	-0.23	-0.2289	0.0072	-9.9	0.9	-9.9	0.8			
MATH	7	820572	0	D.2.2.1	2	130652	0.74	0.74	0.08	0.14	0.04	0.00	0.48	0.48	-0.18	-0.35	-0.20	-0.0026	0.0070	-9.9	0.9	-9.9	0.9			
MATH	7	684694	0	C.3.1.1	1	130652	0.89	0.89	0.02	0.07	0.02	0.00	0.36	0.36	-0.18	-0.25	-0.17	-1.3428	0.0095	-5.6	1.0	-8.6	0.9			
MATH	7	671260	0	C.1.2.2	2	130652	0.87	0.03	0.03	0.07	0.87	0.00	0.41	-0.19	-0.21	-0.27	0.41	-1.0304	0.0087	-9.9	0.9	-9.9	0.8			
MATH	7	180693	0	B.2.1.1	2	130652	0.47	0.01	0.37	0.47	0.15	0.00	0.58	-0.14	-0.53	0.58	-0.05	1.5542	0.0064	-9.9	0.8	-9.9	0.8			

Appendix G: Item Statistics Multiple Choice

MATH	7	315117	0	C.1.2.2	2	130652	0.77	0.77	0.05	0.09	0.08	0.00	0.41	0.41	-0.13	-0.26	-0.25	-0.2157	0.0072	-2.8	1.0	-2.7	1.0				
MATH	7	120142	0	C.1.1.1	1	130652	0.82	0.82	0.08	0.05	0.05	0.00	0.45	0.45	-0.29	-0.21	-0.22	-0.5756	0.0078	-9.9	0.9	-9.9	0.7				
MATH	7	189721	0	A.1.2.2	1	130652	0.89	0.05	0.89	0.03	0.03	0.00	0.37	-0.24	0.37	-0.21	-0.14	-1.2858	0.0094	-9.9	0.9	-9.2	0.9				
MATH	7	163397	0	A.2.2.2	1	130652	0.89	0.04	0.05	0.89	0.02	0.00	0.45	-0.27	-0.28	0.45	-0.19	-1.4121	0.0097	-9.9	0.9	-9.9	0.7				
MATH	7	428619	0	A.2.2.6	2	130652	0.67	0.14	0.14	0.67	0.05	0.00	0.50	-0.31	-0.26	0.50	-0.17	0.4519	0.0066	-9.9	0.9	-9.9	0.9				
MATH	7	681869	0	E.3.1.2	2	130652	0.74	0.20	0.03	0.03	0.74	0.00	0.48	-0.34	-0.23	-0.22	0.48	-0.0783	0.0071	-9.9	0.9	-5.7	1.0				
MATH	7	664097	0	E.3.1.3	2	130652	0.52	0.19	0.13	0.16	0.52	0.00	0.38	-0.36	-0.10	-0.05	0.38	1.0918	0.0063	9.9	1.1	9.9	1.2				
MATH	7	503012	0	E.2.1.1	1	130652	0.72	0.07	0.72	0.18	0.02	0.00	0.44	-0.24	0.44	-0.28	-0.19	0.1727	0.0068	-9.9	1.0	3.9	1.0				
MATH	7	420089	0	E.3.1.1	2	130652	0.62	0.18	0.06	0.62	0.13	0.00	0.53	-0.39	-0.28	0.53	-0.11	0.7335	0.0064	-9.9	0.9	-9.9	0.9				
MATH	7	540379	0	D.3.1.2	2	130652	0.78	0.03	0.12	0.07	0.78	0.00	0.39	-0.21	-0.22	-0.20	0.39	-0.2703	0.0073	1.2	1.0	8.7	1.1				
MATH	7	253473	0	E.3.1.3	2	130652	0.67	0.16	0.11	0.67	0.05	0.00	0.48	-0.37	-0.17	0.48	-0.15	0.3950	0.0066	-9.9	1.0	-5.6	1.0				
MATH	7	332123	0	E.2.1.1	1	130652	0.89	0.04	0.05	0.89	0.03	0.00	0.33	-0.22	-0.17	0.33	-0.17	-1.3114	0.0094	4.0	1.0	6.3	1.1				
MATH	7	757391	0	E.3.1.2	2	130652	0.60	0.23	0.11	0.06	0.60	0.00	0.49	-0.28	-0.21	-0.25	0.49	0.5769	0.0065	0.3	1.0	4.2	1.0				
MATH	7	598136	0	E.4.1.1	2	130652	0.49	0.19	0.49	0.19	0.13	0.00	0.33	-0.13	0.33	-0.10	-0.21	1.3607	0.0063	9.9	1.2	9.9	1.2				
MATH	7	687908	0	E.4.1.1	2	130652	0.78	0.08	0.78	0.07	0.07	0.00	0.33	-0.13	0.33	-0.19	-0.20	-0.3502	0.0074	9.9	1.1	9.9	1.2				
MATH	7	652832	0	D.2.1.2	1	130652	0.83	0.03	0.10	0.04	0.83	0.00	0.54	-0.24	-0.36	-0.28	0.54	-0.7372	0.0081	-9.9	0.8	-9.9	0.6				
MATH	7	198952	0	D.1.1.1	2	130652	0.72	0.20	0.03	0.72	0.05	0.00	0.56	-0.39	-0.20	0.56	-0.27	0.0589	0.0069	-9.9	0.9	-9.9	0.7				
MATH	7	200795	0	D.2.1.1	1	130652	0.63	0.63	0.11	0.19	0.07	0.00	0.38	0.38	-0.18	-0.18	-0.24	0.5666	0.0065	9.9	1.1	9.9	1.1				
MATH	7	167848	0	D.3.1.1	2	130652	0.53	0.21	0.18	0.53	0.08	0.00	0.42	-0.13	-0.25	0.42	-0.20	1.2375	0.0063	9.9	1.1	9.9	1.1				
MATH	7	921830	0	D.3.1.1	2	130652	0.68	0.05	0.68	0.23	0.05	0.00	0.51	-0.20	0.51	-0.34	-0.24	0.2741	0.0067	-9.9	1.0	-9.9	0.9				
MATH	7	597220	0	D.3.1.2	2	130652	0.77	0.77	0.05	0.10	0.07	0.00	0.41	0.41	-0.24	-0.22	-0.20	-0.2812	0.0073	0.5	1.0	9.9	1.1				
MATH	7	698111	0	D.2.2.1	2	130652	0.50	0.07	0.25	0.19	0.50	0.00	0.48	-0.24	-0.18	-0.26	0.48	1.2786	0.0063	-8.7	1.0	-2.8	1.0				
MATH	7	123702	0	D.2.2.1	2	130652	0.63	0.07	0.15	0.15	0.63	0.00	0.41	-0.23	-0.07	-0.31	0.41	0.6522	0.0065	9.9	1.1	9.9	1.1				
MATH	7	204405	0	D.2.1.1	1	130652	0.70	0.22	0.05	0.03	0.70	0.00	0.45	-0.24	-0.29	-0.23	0.45	0.2821	0.0067	-4.9	1.0	-5.4	1.0				
MATH	7	937480	0	C.1.1.3	2	130652	0.84	0.84	0.07	0.04	0.06	0.00	0.36	0.36	-0.23	-0.21	-0.15	-0.7588	0.0081	3.2	1.0	7.1	1.1				
MATH	7	946084	0	C.1.1.1	1	130652	0.81	0.03	0.81	0.11	0.04	0.00	0.43	-0.19	0.43	-0.25	-0.27	-0.5881	0.0078	-7.0	1.0	-9.9	0.9				
MATH	7	841037	0	C.3.1.1	1	130652	0.86	0.86	0.11	0.01	0.01	0.00	0.36	0.36	-0.29	-0.16	-0.14	-0.9687	0.0086	-6.5	1.0	0.9	1.0				
MATH	7	284666	0	C.1.2.1	2	130652	0.78	0.12	0.78	0.09	0.02	0.00	0.44	-0.36	0.44	-0.17	-0.15	-0.2769	0.0073	-9.9	1.0	-9.9	0.8				
MATH	7	677973	0	C.1.1.2	1	130652	0.80	0.11	0.80	0.06	0.03	0.00	0.51	-0.33	0.51	-0.28	-0.21	-0.4445	0.0076	-9.9	0.9	-9.9	0.7				
MATH	7	464845	0	C.1.1.2	1	130652	0.86	0.03	0.86	0.09	0.02	0.00	0.45	-0.19	0.45	-0.34	-0.19	-0.9428	0.0085	-9.9	0.9	-9.9	0.7				
MATH	7	830106	0	B.2.2.1	2	130652	0.50	0.14	0.08	0.29	0.50	0.00	0.50	-0.23	-0.29	-0.20	0.50	1.3666	0.0063	-9.9	1.0	-9.8	1.0				
MATH	7	772247	0	B.1.1.1	2	130652	0.47	0.13	0.17	0.24	0.47	0.00	0.45	-0.25	-0.24	-0.12	0.45	1.5754	0.0064	-0.4	1.0	9.9	1.1				
MATH	7	965910	0	B.2.1.2	2	130652	0.59	0.22	0.59	0.12	0.07	0.00	0.39	-0.31	0.39	-0.16	-0.03	0.8611	0.0064	9.9	1.1	9.9	1.1				
MATH	7	724881	0	B.2.1.3	1	130652	0.60	0.10	0.15	0.60	0.15	0.00	0.59	-0.29	-0.43	0.59	-0.13	0.8320	0.0064	-9.9	0.8	-9.9	0.8				
MATH	7	940018	0	B.2.2.2	2	130652	0.72	0.13	0.72	0.06	0.09	0.00	0.50	-0.22	0.50	-0.28	-0.28	0.1527	0.0068	-9.9	0.9	-9.9	0.8				
MATH	7	230575	0	A.3.2.1	1	130652	0.65	0.08	0.23	0.65	0.04	0.00	0.31	-0.15	-0.21	0.31	-0.11	0.5449	0.0065	9.9	1.2	9.9	1.3				
MATH	7	553156	0	A.2.2.5	2	130652	0.76	0.76	0.09	0.08	0.06	0.00	0.35	0.35	-0.24	-0.16	-0.14	-0.1748	0.0072	9.9	1.1	9.9	1.2				
MATH	7	383206	0	A.2.2.4	1	130652	0.62	0.26	0.62	0.06	0.06	0.00	0.44	-0.26	0.44	-0.30	-0.11	0.6700	0.0065	9.3	1.0	2.0	1.0				
MATH	7	945351	0	A.1.1.1	1	130652	0.50	0.12	0.28	0.50	0.10	0.00	0.46	-0.15	-0.32	0.46	-0.12	1.2835	0.0063	3.6	1.0	0.9	1.0				
MATH	7	138197	0	A.3.1.1	2	130652	0.42	0.16	0.13	0.29	0.42	0.00	0.49	-0.35	-0.21	-0.10	0.49	1.6920	0.0064	-9.9	0.9	-9.9	1.0				
MATH	7	391671	0	A.2.1.1	1	130652	0.73	0.73	0.15	0.07	0.05	0.00	0.29	0.29	-0.14	-0.16	-0.17	0.0104	0.0070	9.9	1.2	9.9	1.4				
MATH	7	725842	0	A.2.2.2	1	130652	0.83	0.06	0.83	0.08	0.04	0.00	0.40	-0.19	0.40	-0.27	-0.18	-0.5994	0.0078	-9.9	1.0	-7.8	0.9				
MATH	7	959160	0	A.2.2.1	1	130652	0.54	0.54	0.14	0.13	0.19	0.00	0.53	0.53	-0.05	-0.30	-0.37	1.0731	0.0063	-9.9	0.9	-9.9	0.9				
MATH	7	977064	0	D.1.1.1	2	130652	0.38	0.22	0.24	0.16	0.38	0.00	0.33	-0.15	-0.01	-0.24	0.33	1.9895	0.0065	9.9	1.1	9.9	1.3				
MATH	7	239773	0	C.3.1.1	1	130652	0.80	0.80	0.05	0.11	0.04	0.00	0.41	0.41	-0.21	-0.27	-0.18	-0.3995	0.0075	-5.1	1.0	-8.6	0.9				
MATH	7	557746	0	D.2.1.1	1	130652	0.81	0.81	0.07	0.08	0.04	0.00	0.48	0.48	-0.26	-0.27	-0.24	-0.6053	0.0078	-9.9	0.9	-9.9	0.8				
MATH	7	624691	1	C.1.1.2	1	14799	0.86	0.04	0.86	0.08	0.02	0.00	0.45	-0.23	0.45	-0.31	-0.19	-0.9928	0.0249	-6.6	0.9	-9.6	0.7				
MATH	7	293374	1	A.2.2.6	2	14799	0.42	0.05	0.05	0.48	0.42	0.00	0.43	-0.24	-0.30	-0.19	0.43	1.7037	0.0189	0.6	1.0	7.5	1.1				
MATH	7	902542	1	E.3.1.2	2	14799	0.52	0.04	0.52	0.13	0.30	0.00	0.29	-0.27	0.29	-0.20	-0.04	1.1362	0.0186	9.9	1.2	9.9	1.3	A+	A+	A+	
MATH	7	238537	1	E.4.1.1	2	14799	0.23	0.36	0.22	0.23	0.19	0.00	-0.01	0.20	-0.06	-0.01	-0.16	2.8635	0.0218	9.9	1.5	9.9	2.6	A-	A-	A-	
MATH	7	981701	1	D.3.1.2	2	14799	0.79	0.79	0.05	0.10	0.06	0.00	0.43	0.43	-0.31	-0.21	-0.19	-0.4270	0.0218	-3.8	1.0	-3.7	0.9	A-	A-	A-	

Appendix G: Item Statistics Multiple Choice

MATH	7	989037	1	D.2.2.1	2	14799	0.37	0.37	0.24	0.23	0.17	0.00	0.36	0.36	-0.15	-0.08	-0.20	2.0007	0.0193	9.0	1.1	9.9	1.3	A-	A-	A-
MATH	7	172706	1	D.2.1.1	1	14799	0.73	0.05	0.73	0.12	0.09	0.00	0.34	-0.16	0.34	-0.22	-0.15	-0.0447	0.0204	9.9	1.1	7.5	1.2	A+	A+	A+
MATH	7	639117	1	D.1.1.1	2	14799	0.79	0.09	0.79	0.04	0.07	0.00	0.51	-0.29	0.51	-0.20	-0.30	-0.4206	0.0218	-9.9	0.9	-9.9	0.7	A-	A-	A-
MATH	7	969444	1	B.2.1.3	1	14799	0.45	0.15	0.31	0.45	0.09	0.00	0.43	-0.43	-0.09	0.43	-0.07	1.5518	0.0187	3.6	1.0	6.1	1.1	A-	A-	A-
MATH	7	276767	1	A.3.2.2	1	14799	0.52	0.21	0.15	0.52	0.12	0.00	0.41	-0.14	-0.28	0.41	-0.15	1.1585	0.0186	7.6	1.1	5.0	1.1	A-	A-	A-
MATH	7	458421	1	B.1.1.1	1	14799	0.65	0.65	0.12	0.13	0.09	0.00	0.55	0.55	-0.28	-0.35	-0.17	0.4506	0.0192	-9.9	0.9	-9.1	0.9	A-	B-	A-
MATH	7	469863	1	A.2.2.1	2	14799	0.43	0.27	0.43	0.18	0.12	0.00	0.41	-0.03	0.41	-0.30	-0.23	1.6650	0.0188	6.6	1.1	9.9	1.2	A+	A+	A-
MATH	7	770525	2	E.3.1.3	2	14516	0.63	0.14	0.12	0.63	0.10	0.00	0.43	-0.37	-0.14	0.43	-0.11	0.6305	0.0192	3.3	1.0	5.7	1.1			
MATH	7	166213	2	D.2.1.1	1	14516	0.88	0.88	0.07	0.03	0.03	0.00	0.45	0.45	-0.28	-0.24	-0.22	-1.1530	0.0268	-6.9	0.9	-8.9	0.7			
MATH	7	173413	2	D.3.1.1	2	14516	0.63	0.11	0.63	0.09	0.16	0.00	0.50	-0.30	0.50	-0.23	-0.22	0.6037	0.0193	-7.3	0.9	-7.1	0.9	A+	A-	A-
MATH	7	884894	2	E.4.1.1	2	14516	0.49	0.05	0.49	0.34	0.11	0.00	0.44	-0.14	0.44	-0.23	-0.24	1.3668	0.0188	1.4	1.0	5.8	1.1	A-	A-	A-
MATH	7	453977	2	C.3.1.2	1	14516	0.67	0.67	0.10	0.08	0.15	0.00	0.40	0.40	-0.04	-0.15	-0.38	0.4059	0.0196	6.0	1.1	9.9	1.3	A-	B-	A-
MATH	7	236956	2	D.1.1.1	2	14516	0.49	0.12	0.13	0.49	0.26	0.00	0.37	-0.24	-0.14	0.37	-0.13	1.3782	0.0188	9.9	1.1	9.9	1.2	A+	A+	A+
MATH	7	316787	2	D.2.2.1	2	14516	0.56	0.56	0.12	0.22	0.09	0.00	0.41	0.41	-0.28	-0.12	-0.21	1.0016	0.0189	8.3	1.1	6.3	1.1	A-	A-	A+
MATH	7	964707	2	B.2.1.1	2	14516	0.52	0.52	0.33	0.12	0.03	0.00	0.29	0.29	-0.22	-0.04	-0.16	1.2264	0.0188	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	7	954682	2	B.2.2.2	2	14516	0.32	0.17	0.32	0.32	0.19	0.00	0.22	-0.06	0.05	0.22	-0.26	2.3385	0.0201	9.9	1.2	9.9	1.7	A-	A-	A+
MATH	7	989543	2	C.1.1.3	2	14516	0.45	0.22	0.21	0.12	0.45	0.00	0.30	-0.12	-0.07	-0.22	0.30	1.5733	0.0189	9.9	1.2	9.9	1.4	A+	A-	A-
MATH	7	506345	2	A.1.1.1	1	14516	0.51	0.14	0.23	0.12	0.51	0.00	0.53	-0.39	-0.10	-0.27	0.53	1.2512	0.0188	-9.9	0.9	-9.9	0.9	A-	A-	A-
MATH	7	127652	2	A.2.2.3	2	14516	0.66	0.14	0.66	0.11	0.09	0.00	0.47	-0.28	0.47	-0.24	-0.17	0.4587	0.0195	-2.6	1.0	-6.3	0.9	A+	A+	A+
MATH	7	600663	3	D.3.1.2	2	14525	0.73	0.18	0.05	0.73	0.04	0.00	0.50	-0.36	-0.22	0.50	-0.19	0.0442	0.0206	-7.7	0.9	-7.3	0.8			
MATH	7	368087	3	D.2.1.2	1	14525	0.85	0.03	0.85	0.03	0.09	0.00	0.51	-0.26	0.51	-0.19	-0.37	-0.8613	0.0248	-9.9	0.8	-9.6	0.7			
MATH	7	216776	3	B.2.2.1	2	14525	0.84	0.05	0.05	0.05	0.84	0.00	0.48	-0.20	-0.29	-0.29	0.48	-0.8156	0.0245	-9.2	0.9	-7.5	0.8	A-	A-	A-
MATH	7	454213	3	E.3.1.1	2	14525	0.25	0.07	0.25	0.13	0.56	0.00	0.23	-0.03	0.23	-0.12	-0.10	2.8115	0.0216	9.9	1.1	9.9	2.0	A-	A-	A-
MATH	7	925071	3	E.4.1.1	2	14525	0.51	0.18	0.51	0.20	0.10	0.00	0.37	-0.21	0.37	-0.17	-0.12	1.2577	0.0188	9.9	1.1	9.9	1.2	A-	A-	A-
MATH	7	991658	3	E.1.1.1	2	14525	0.63	0.63	0.12	0.13	0.12	0.00	0.45	0.45	-0.20	-0.23	-0.22	0.6219	0.0193	1.9	1.0	0.2	1.0	A-	A-	A-
MATH	7	554992	3	C.3.1.1	1	14525	0.86	0.01	0.02	0.11	0.86	0.00	0.38	-0.17	-0.17	-0.29	0.38	-1.0120	0.0258	-2.3	1.0	-1.4	0.9	A+	A-	A-
MATH	7	627005	3	B.2.2.2	2	14525	0.53	0.16	0.16	0.53	0.15	0.00	0.42	-0.13	-0.19	0.42	-0.25	1.1898	0.0189	6.3	1.1	6.4	1.1	A-	A-	A-
MATH	7	822620	3	C.1.2.2	2	14525	0.61	0.14	0.04	0.21	0.61	0.00	0.32	-0.10	-0.24	-0.17	0.32	0.7647	0.0191	9.9	1.2	9.9	1.4	A+	A+	A+
MATH	7	819875	3	C.1.1.1	1	14525	0.76	0.76	0.03	0.17	0.04	0.00	0.47	0.47	-0.22	-0.34	-0.19	-0.1498	0.0213	-5.4	0.9	-3.5	0.9	A+	A-	A-
MATH	7	455813	3	A.3.1.1	2	14525	0.40	0.27	0.25	0.40	0.09	0.00	0.38	-0.14	-0.21	0.38	-0.12	1.8964	0.0193	7.5	1.1	9.9	1.2	A-	A-	A-
MATH	7	236136	3	A.2.2.2	1	14525	0.86	0.04	0.07	0.86	0.03	0.00	0.43	-0.23	-0.25	0.43	-0.23	-0.9481	0.0253	-6.4	0.9	-2.3	0.9	A+	A-	A+
MATH	7	732209	4	B.2.1.3	1	14459	0.69	0.09	0.07	0.69	0.15	0.00	0.42	-0.31	-0.27	0.42	-0.10	0.2952	0.0202	3.7	1.0	4.7	1.1			
MATH	7	919191	4	A.2.2.1	2	14459	0.51	0.13	0.27	0.51	0.09	0.00	0.29	-0.25	0.04	0.29	-0.27	1.2846	0.0191	9.9	1.2	9.9	1.4			
MATH	7	835443	4	E.3.1.1	2	14459	0.41	0.14	0.41	0.36	0.09	0.00	0.27	-0.25	0.27	0.01	-0.17	1.8057	0.0194	9.9	1.2	9.9	1.4	A+	A+	A+
MATH	7	843113	4	E.2.1.2	1	14459	0.63	0.16	0.10	0.63	0.10	0.00	0.38	-0.21	-0.16	0.38	-0.20	0.5921	0.0196	9.9	1.1	9.9	1.2	A+	A-	A-
MATH	7	599435	4	D.3.1.2	2	14459	0.33	0.47	0.11	0.33	0.09	0.00	0.42	-0.14	-0.12	0.42	-0.32	2.2391	0.0202	-1.1	1.0	8.4	1.2	B-	A-	A-
MATH	7	891444	4	D.2.1.1	2	14459	0.70	0.10	0.11	0.08	0.70	0.00	0.56	-0.29	-0.30	-0.27	0.56	0.2087	0.0204	-9.9	0.9	-9.9	0.7	A+	A+	A-
MATH	7	815538	4	D.1.1.1	2	14459	0.76	0.76	0.07	0.12	0.05	0.00	0.45	0.45	-0.26	-0.25	-0.20	-0.1869	0.0217	-3.1	1.0	-3.6	0.9	A+	A-	A-
MATH	7	711402	4	C.3.1.1	1	14459	0.80	0.02	0.16	0.02	0.80	0.00	0.47	-0.14	-0.39	-0.16	0.47	-0.4842	0.0230	-6.9	0.9	-4.0	0.9	A+	A-	A-
MATH	7	920018	4	B.2.2.1	2	14459	0.59	0.11	0.59	0.18	0.12	0.00	0.48	-0.22	0.48	-0.21	-0.27	0.8430	0.0193	-3.5	1.0	-4.4	0.9	A-	A-	A-
MATH	7	529594	4	C.1.1.2	2	14459	0.70	0.10	0.11	0.70	0.08	0.00	0.49	-0.26	-0.27	0.49	-0.22	0.2255	0.0204	-6.4	0.9	-6.5	0.9	A-	A-	A-
MATH	7	180583	4	A.3.1.1	2	14459	0.63	0.16	0.63	0.14	0.07	0.00	0.33	-0.26	0.33	-0.12	-0.09	0.6137	0.0196	9.9	1.2	9.9	1.2	A-	A-	A-
MATH	7	256392	4	A.2.1.1	1	14459	0.78	0.78	0.06	0.13	0.03	0.00	0.35	0.35	-0.24	-0.15	-0.20	-0.2806	0.0221	5.5	1.1	5.9	1.2	A+	A+	A+
MATH	7	689725	5	B.1.1.1	2	14495	0.70	0.70	0.15	0.06	0.09	0.00	0.56	0.56	-0.30	-0.25	-0.31	0.2089	0.0204	-9.9	0.9	-9.9	0.8			
MATH	7	904775	5	E.1.1.1	2	14495	0.63	0.06	0.10	0.21	0.63	0.00	0.41	-0.20	-0.27	-0.17	0.41	0.6452	0.0196	7.5	1.1	4.7	1.1			
MATH	7	860207	5	E.2.1.1	1	14495	0.83	0.06	0.05	0.83	0.05	0.00	0.50	-0.28	-0.20	0.50	-0.32	-0.7115	0.0242	-9.9	0.9	-8.8	0.7	A+	A+	A-
MATH	7	708740	5	D.3.1.1	2	14495	0.43	0.43	0.19	0.20	0.18	0.00	0.28	0.28	-0.06	-0.19	-0.10	1.6802	0.0193	9.9	1.3	9.9	1.4	A-	A+	A+
MATH	7	394035	5	E.3.1.2	2	14495	0.43	0.05	0.46	0.43	0.05	0.00	0.30	-0.22	-0.10	0.30	-0.23	1.6914	0.0193	9.9	1.2	9.9	1.4	A-	A-	A-
MATH	7	881764	5	D.1.1.1	2	14495	0.68	0.09	0.10	0.13	0.68	0.00	0.62	-0.35	-0.30	-0.29	0.62	0.3119	0.0202	-9.9	0.8	-9.9	0.7	B-	A+	A-
MATH	7	731753	5	D.2.1.2	1	14495	0.80	0.13	0.04	0.80	0.02	0.00	0.32	-0.16	-0.23	0.32	-0.18	-0.4753	0.0229	6.4	1.1	9.7	1.3	B+	A-	A+
MATH	7	557714	5	C.3.1.1	1	14495	0.86	0.86	0.01	0.10	0.02	0.00	0.38	0.38	-0.16	-0.28	-0.19	-0.9916	0.0259	-2.2	1.0	-2.2	0.9	A+	A-	A-

Appendix G: Item Statistics Multiple Choice

MATH	7	374133	5	C.1.1.1	2	14495	0.71	0.06	0.09	0.71	0.13	0.00	0.42	-0.21	-0.27	0.42	-0.17	0.1621	0.0206	4.1	1.0	0.5	1.0	A+	A-	A-
MATH	7	404345	5	B.2.1.3	1	14495	0.60	0.08	0.60	0.04	0.28	0.00	0.55	-0.37	0.55	-0.20	-0.29	0.7952	0.0194	-9.9	0.9	-9.9	0.8	A+	A-	A+
MATH	7	772248	5	A.1.2.1	1	14495	0.88	0.02	0.03	0.06	0.88	0.00	0.47	-0.18	-0.29	-0.30	0.47	-1.2200	0.0276	-9.4	0.8	-8.9	0.6	A-	A-	A-
MATH	7	689898	5	A.3.1.1	2	14495	0.70	0.09	0.70	0.13	0.08	0.00	0.45	-0.15	0.45	-0.21	-0.34	0.2161	0.0204	-0.4	1.0	-0.6	1.0	A-	A-	A-
MATH	7	957646	6	D.2.2.1	2	14489	0.78	0.78	0.06	0.07	0.08	0.00	0.51	0.51	-0.26	-0.28	-0.26	-0.3058	0.0222	-9.8	0.9	-9.9	0.7			
MATH	7	870502	6	C.3.1.2	1	14489	0.61	0.27	0.61	0.04	0.09	0.00	0.31	-0.16	0.31	-0.16	-0.16	0.7454	0.0193	9.9	1.2	9.9	1.4			
MATH	7	343056	6	D.3.1.2	2	14489	0.40	0.28	0.14	0.18	0.40	0.00	0.16	-0.02	-0.02	-0.15	0.16	1.8540	0.0193	9.9	1.4	9.9	1.6	A+	A-	A-
MATH	7	350923	6	E.2.1.2	2	14489	0.38	0.34	0.38	0.12	0.16	0.00	0.15	0.12	0.15	-0.16	-0.20	1.9891	0.0195	9.9	1.4	9.9	1.7	A-	A+	A+
MATH	7	975929	6	E.3.1.2	2	14489	0.50	0.11	0.26	0.50	0.13	0.00	0.46	-0.28	-0.06	0.46	-0.34	1.3190	0.0190	-1.6	1.0	1.6	1.0	A+	A-	A-
MATH	7	414004	6	D.2.1.2	1	14489	0.80	0.04	0.80	0.12	0.04	0.00	0.50	-0.28	0.50	-0.36	-0.15	-0.4535	0.0229	-9.9	0.9	-9.4	0.7	A+	A-	A-
MATH	7	520458	6	C.1.1.2	2	14489	0.55	0.20	0.55	0.22	0.04	0.00	0.49	-0.14	0.49	-0.38	-0.16	1.0912	0.0190	-6.8	1.0	-3.6	1.0	A+	A-	A-
MATH	7	759080	6	C.1.2.2	2	14489	0.64	0.17	0.08	0.11	0.64	0.00	0.45	-0.29	-0.23	-0.13	0.45	0.5924	0.0196	1.0	1.0	3.0	1.1	A-	A-	A-
MATH	7	445121	6	A.2.2.6	2	14489	0.50	0.12	0.13	0.50	0.25	0.00	0.35	-0.13	-0.25	0.35	-0.11	1.3230	0.0190	9.9	1.1	9.9	1.2	A-	A-	A-
MATH	7	173629	6	B.1.1.1	2	14489	0.54	0.11	0.08	0.27	0.54	0.00	0.52	-0.36	-0.31	-0.12	0.52	1.1414	0.0190	-9.6	0.9	-6.2	0.9	A+	A-	A-
MATH	7	351491	6	A.1.1.1	1	14489	0.89	0.02	0.05	0.89	0.04	0.00	0.26	-0.08	-0.13	0.26	-0.20	-1.2116	0.0279	3.2	1.1	4.4	1.2	A-	A-	A-
MATH	7	336858	6	A.2.1.1	1	14489	0.77	0.08	0.06	0.08	0.77	0.00	0.49	-0.24	-0.25	-0.28	0.49	-0.2423	0.0220	-8.7	0.9	-7.7	0.8	A+	A+	A-
MATH	7	882239	7	C.1.2.2	2	14414	0.68	0.10	0.68	0.15	0.07	0.00	0.46	-0.17	0.46	-0.29	-0.23	0.3698	0.0201	-1.9	1.0	-2.3	1.0			
MATH	7	268352	7	A.2.2.5	2	14414	0.67	0.04	0.09	0.67	0.20	0.00	0.32	-0.22	-0.24	0.32	-0.11	0.4398	0.0199	9.9	1.2	9.9	1.2			
MATH	7	391524	7	E.2.1.2	2	14414	0.39	0.15	0.24	0.21	0.39	0.00	0.24	-0.13	-0.08	-0.10	0.24	1.9213	0.0195	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	7	632856	7	E.3.1.3	2	14414	0.70	0.70	0.14	0.10	0.06	0.00	0.41	0.41	-0.14	-0.26	-0.25	0.2636	0.0204	3.7	1.0	6.5	1.1	A-	A-	A-
MATH	7	329051	7	D.3.1.2	2	14414	0.75	0.75	0.06	0.16	0.03	0.00	0.35	0.35	-0.26	-0.14	-0.21	-0.0749	0.0214	7.5	1.1	9.9	1.3	A-	A-	A-
MATH	7	912200	7	D.2.2.1	2	14414	0.61	0.16	0.09	0.14	0.61	0.00	0.55	-0.32	-0.32	-0.17	0.55	0.7677	0.0194	-9.9	0.9	-9.9	0.8	A+	A-	A+
MATH	7	298042	7	D.2.1.1	1	14414	0.67	0.08	0.13	0.13	0.67	0.00	0.51	-0.31	-0.14	-0.33	0.51	0.4330	0.0200	-8.7	0.9	-7.5	0.9	A+	A-	A-
MATH	7	117292	7	B.2.1.1	2	14414	0.24	0.30	0.24	0.13	0.33	0.00	0.27	-0.13	0.27	-0.15	-0.01	2.8171	0.0219	5.6	1.1	9.9	1.7	A-	A-	A-
MATH	7	658875	7	C.1.1.2	2	14414	0.82	0.07	0.08	0.82	0.03	0.00	0.46	-0.22	-0.31	0.46	-0.23	-0.6011	0.0237	-7.4	0.9	-5.1	0.8	A-	B-	A-
MATH	7	991380	7	A.1.2.2	1	14414	0.90	0.01	0.04	0.90	0.04	0.00	0.40	-0.17	-0.25	0.40	-0.24	-1.4004	0.0296	-5.2	0.9	-6.4	0.7	A-	A-	A-
MATH	7	653733	7	B.1.1.1	1	14414	0.46	0.10	0.46	0.12	0.32	0.00	0.48	-0.09	0.48	-0.19	-0.33	1.5645	0.0192	-7.5	0.9	-1.2	1.0	C-	A-	A-
MATH	7	762478	7	A.3.1.1	2	14414	0.45	0.04	0.44	0.45	0.07	0.00	0.24	-0.17	-0.04	0.24	-0.25	1.6233	0.0192	9.9	1.3	9.9	1.4	A-	A-	A-
MATH	7	374162	8	C.1.1.1	1	14473	0.68	0.68	0.09	0.12	0.11	0.00	0.53	0.53	-0.22	-0.27	-0.31	0.3536	0.0202	-9.9	0.9	-9.9	0.8			
MATH	7	534297	8	A.1.2.1	1	14473	0.53	0.09	0.10	0.53	0.28	0.00	0.48	-0.25	-0.15	0.48	-0.27	1.1548	0.0192	-1.7	1.0	-0.6	1.0			
MATH	7	994862	8	A.2.2.4	1	14473	0.86	0.05	0.02	0.86	0.06	0.00	0.42	-0.09	-0.22	0.42	-0.37	-1.0209	0.0262	-5.9	0.9	-0.2	1.0	A+	A-	A-
MATH	7	396590	8	E.1.1.1	2	14473	0.43	0.10	0.14	0.33	0.43	0.00	0.42	-0.11	-0.33	-0.13	0.42	1.7143	0.0194	5.2	1.0	9.7	1.1	A+	A-	A-
MATH	7	904609	8	E.3.1.1	2	14473	0.73	0.12	0.10	0.73	0.04	0.00	0.56	-0.44	-0.25	0.56	-0.14	-0.0031	0.0211	-9.9	0.8	-9.0	0.8	A+	A-	A-
MATH	7	218642	8	C.3.1.2	1	14473	0.76	0.76	0.11	0.05	0.09	0.00	0.39	0.39	-0.25	-0.26	-0.11	-0.1501	0.0216	3.3	1.0	9.9	1.3	A-	A-	A-
MATH	7	818041	8	D.2.1.1	1	14473	0.86	0.08	0.02	0.86	0.04	0.00	0.32	-0.19	-0.17	0.32	-0.17	-0.9470	0.0257	2.6	1.0	2.5	1.1	A+	A-	A+
MATH	7	885584	8	D.2.2.1	2	14473	0.51	0.10	0.14	0.25	0.51	0.00	0.47	-0.23	-0.20	-0.23	0.47	1.2564	0.0192	-1.4	1.0	0.4	1.0	A+	A-	A-
MATH	7	387042	8	C.1.2.1	2	14473	0.78	0.05	0.10	0.78	0.07	0.00	0.40	-0.21	-0.27	0.40	-0.16	-0.2777	0.0221	1.3	1.0	3.2	1.1	A+	A-	A-
MATH	7	550725	8	B.2.2.2	2	14473	0.74	0.74	0.11	0.06	0.09	0.00	0.57	0.57	-0.26	-0.29	-0.35	-0.0584	0.0213	-9.9	0.8	-9.9	0.7	A-	A-	A-
MATH	7	140549	8	B.2.1.1	2	14473	0.48	0.39	0.48	0.09	0.04	0.00	0.48	-0.48	0.48	0.02	-0.07	1.4504	0.0192	-3.0	1.0	-1.0	1.0	A-	A-	A-
MATH	7	763975	8	A.3.1.1	2	14473	0.71	0.12	0.71	0.13	0.05	0.00	0.32	-0.12	0.32	-0.19	-0.20	0.1721	0.0206	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	7	465450	9	E.1.1.1	2	14482	0.67	0.11	0.13	0.67	0.09	0.00	0.45	-0.24	-0.27	0.45	-0.16	0.4071	0.0200	-0.5	1.0	-3.1	0.9			
MATH	7	478167	9	D.1.1.1	2	14482	0.59	0.23	0.07	0.59	0.11	0.00	0.39	-0.28	-0.17	0.39	-0.09	0.8603	0.0193	9.9	1.1	8.7	1.1			
MATH	7	436336	9	D.3.1.1	2	14482	0.29	0.08	0.19	0.29	0.44	0.00	0.10	-0.15	-0.31	0.10	0.24	2.5499	0.0209	9.9	1.4	9.9	2.0	A-	A-	A-
MATH	7	449071	9	E.3.1.3	2	14482	0.66	0.11	0.66	0.11	0.12	0.00	0.53	-0.32	0.53	-0.12	-0.35	0.4559	0.0199	-9.9	0.9	-6.2	0.9	A+	A-	A-
MATH	7	812401	9	E.2.1.1	1	14482	0.64	0.10	0.18	0.64	0.08	0.00	0.43	-0.13	-0.31	0.43	-0.17	0.5987	0.0196	3.3	1.0	5.9	1.1	A+	A-	A+
MATH	7	714505	9	D.2.1.2	1	14482	0.84	0.84	0.12	0.03	0.01	0.00	0.50	0.50	-0.43	-0.16	-0.17	-0.7794	0.0248	-9.9	0.9	-9.9	0.6	A+	A-	A-
MATH	7	253377	9	C.3.1.2	1	14482	0.86	0.04	0.05	0.05	0.86	0.00	0.37	-0.20	-0.19	-0.21	0.37	-0.8937	0.0255	-1.5	1.0	0.2	1.0	A+	A-	A-
MATH	7	845549	9	C.1.2.1	2	14482	0.74	0.74	0.15	0.06	0.06	0.00	0.41	0.41	-0.25	-0.14	-0.25	0.0040	0.0211	3.1	1.0	-2.1	1.0	A-	A-	A-
MATH	7	735864	9	C.1.1.3	2	14482	0.91	0.04	0.03	0.02	0.91	0.00	0.38	-0.23	-0.23	-0.17	0.38	-1.4842	0.0304	-4.5	0.9	-6.4	0.7	A+	B-	A-
MATH	7	262098	9	B.2.1.2	1	14482	0.63	0.24	0.63	0.07	0.06	0.00	0.48	-0.34	0.48	-0.25	-0.08	0.6614	0.0195	-3.7	1.0	-3.5	0.9	A+	A+	A-
MATH	7	828093	9	A.2.2.5	2	14482	0.80	0.07	0.80	0.08	0.05	0.00	0.55	-0.28	0.55	-0.30	-0.30	-0.3887	0.0227	-9.9	0.8	-9.9	0.7	A+	A-	A-

Appendix G: Item Statistics Multiple Choice

MATH	7	661942	9	A.3.2.1	1	14482	0.56	0.14	0.08	0.23	0.56	0.00	0.36	-0.19	-0.07	-0.22	0.36	1.0497	0.0191	9.9	1.1	9.9	1.2	A+	A-	A-
MATH	8	336885	0	C.1.2.1	1	129460	0.50	0.50	0.12	0.07	0.31	0.00	0.52	0.52	-0.10	-0.14	-0.41	1.3248	0.0063	-9.9	0.9	-9.9	0.9			
MATH	8	570649	0	C.3.1.1	1	129460	0.78	0.11	0.09	0.78	0.01	0.00	0.43	-0.23	-0.30	0.43	-0.16	-0.2866	0.0074	-6.4	1.0	-6.9	0.9			
MATH	8	384306	0	A.2.2.2	1	129460	0.67	0.04	0.16	0.13	0.67	0.00	0.38	-0.18	-0.19	-0.22	0.38	0.4389	0.0066	9.9	1.1	9.9	1.1			
MATH	8	596319	0	C.1.1.3	1	129460	0.61	0.09	0.23	0.06	0.61	0.00	0.41	-0.27	-0.17	-0.20	0.41	0.7063	0.0064	9.9	1.1	9.9	1.1			
MATH	8	726312	0	C.1.1.1	2	129460	0.93	0.01	0.01	0.05	0.93	0.00	0.27	-0.12	-0.14	-0.20	0.27	-1.8016	0.0114	-2.5	1.0	1.0	1.0			
MATH	8	209285	0	D.2.2.2	1	129460	0.83	0.08	0.05	0.04	0.83	0.00	0.52	-0.25	-0.34	-0.26	0.52	-0.6081	0.0080	-9.9	0.8	-9.9	0.7			
MATH	8	109474	0	A.3.2.1	2	129460	0.62	0.10	0.11	0.17	0.62	0.00	0.41	-0.19	-0.25	-0.17	0.41	0.6586	0.0065	9.9	1.0	0.1	1.0			
MATH	8	860931	0	A.1.1.1	1	129460	0.77	0.77	0.10	0.03	0.10	0.00	0.41	0.41	-0.21	-0.14	-0.29	-0.2235	0.0073	3.2	1.0	4.6	1.0			
MATH	8	819288	0	A.3.1.2	1	129460	0.81	0.81	0.05	0.09	0.06	0.00	0.35	0.35	-0.21	-0.24	-0.11	-0.5292	0.0078	9.9	1.1	9.9	1.2			
MATH	8	180959	0	E.3.1.1	2	129460	0.67	0.15	0.12	0.05	0.67	0.00	0.58	-0.41	-0.26	-0.17	0.58	0.4672	0.0066	-9.9	0.8	-9.9	0.8			
MATH	8	877328	0	E.1.1.1	1	129460	0.87	0.87	0.04	0.05	0.04	0.00	0.45	0.45	-0.21	-0.29	-0.24	-0.9929	0.0088	-9.9	0.9	-9.9	0.7			
MATH	8	630766	0	D.1.1.3	2	129460	0.82	0.05	0.06	0.07	0.82	0.00	0.59	-0.30	-0.30	-0.34	0.59	-0.5364	0.0078	-9.9	0.8	-9.9	0.6			
MATH	8	467560	0	D.2.1.2	1	129460	0.87	0.04	0.04	0.87	0.05	0.00	0.49	-0.29	-0.25	0.49	-0.27	-1.0662	0.0090	-9.9	0.8	-9.9	0.7			
MATH	8	379071	0	C.3.1.1	1	129460	0.86	0.02	0.04	0.86	0.08	0.00	0.46	-0.23	-0.17	0.46	-0.35	-0.9091	0.0086	-9.9	0.9	-9.9	0.8			
MATH	8	617045	0	B.2.2.2	1	129460	0.87	0.04	0.04	0.04	0.87	0.00	0.47	-0.30	-0.29	-0.19	0.47	-1.0552	0.0090	-9.9	0.9	-9.9	0.7			
MATH	8	289836	0	B.2.2.3	1	129460	0.79	0.14	0.79	0.05	0.02	0.00	0.42	-0.27	0.42	-0.24	-0.17	-0.3027	0.0074	-6.7	1.0	-9.9	0.9			
MATH	8	974129	0	A.2.1.1	1	129460	0.81	0.14	0.81	0.04	0.01	0.00	0.28	-0.11	0.28	-0.26	-0.17	-0.4773	0.0077	9.9	1.1	9.9	1.4			
MATH	8	773570	0	A.2.1.1	1	129460	0.83	0.83	0.07	0.06	0.04	0.00	0.41	0.41	-0.20	-0.26	-0.19	-0.6497	0.0080	-9.5	1.0	-8.9	0.9			
MATH	8	286833	0	A.1.1.1	1	129460	0.81	0.81	0.04	0.12	0.03	0.00	0.45	0.45	-0.21	-0.32	-0.16	-0.4199	0.0076	-9.9	0.9	-9.9	0.9			
MATH	8	392171	0	E.1.1.1	2	129460	0.78	0.78	0.02	0.09	0.11	0.00	0.30	0.30	-0.21	-0.23	-0.10	-0.2381	0.0073	9.9	1.1	9.9	1.2			
MATH	8	152697	0	E.3.2.1	2	129460	0.42	0.12	0.05	0.41	0.42	0.00	0.37	-0.36	-0.19	-0.04	0.37	1.8011	0.0063	9.9	1.1	9.9	1.1			
MATH	8	626729	0	E.1.1.2	2	129460	0.49	0.14	0.49	0.26	0.10	0.00	0.43	-0.24	0.43	-0.18	-0.16	1.3621	0.0063	6.1	1.0	8.1	1.0			
MATH	8	397147	0	D.4.1.3	2	129460	0.82	0.09	0.06	0.82	0.04	0.00	0.54	-0.34	-0.32	0.54	-0.20	-0.5733	0.0079	-9.9	0.8	-9.9	0.7			
MATH	8	899099	0	E.1.1.2	2	129460	0.57	0.05	0.28	0.10	0.57	0.00	0.57	-0.27	-0.39	-0.15	0.57	0.9902	0.0063	-9.9	0.9	-9.9	0.8			
MATH	8	719841	0	E.1.1.3	2	129460	0.46	0.39	0.46	0.11	0.04	0.00	0.23	-0.09	0.23	-0.12	-0.17	1.6036	0.0063	9.9	1.2	9.9	1.4			
MATH	8	401745	0	E.4.1.2	2	129460	0.48	0.07	0.37	0.48	0.09	0.00	0.27	-0.31	-0.04	0.27	-0.12	1.4195	0.0063	9.9	1.2	9.9	1.3			
MATH	8	998906	0	D.4.1.2	1	129460	0.74	0.74	0.11	0.11	0.04	0.00	0.39	0.39	-0.22	-0.22	-0.16	0.0080	0.0070	9.9	1.0	9.9	1.1			
MATH	8	394222	0	D.2.1.2	1	129460	0.80	0.09	0.06	0.05	0.80	0.00	0.53	-0.29	-0.30	-0.26	0.53	-0.4467	0.0077	-9.9	0.9	-9.9	0.8			
MATH	8	867671	0	D.2.1.3	1	129460	0.86	0.05	0.07	0.86	0.03	0.00	0.51	-0.31	-0.31	0.51	-0.20	-0.9208	0.0086	-9.9	0.8	-9.9	0.6			
MATH	8	147865	0	D.2.1.1	1	129460	0.73	0.73	0.13	0.09	0.05	0.00	0.44	0.44	-0.23	-0.26	-0.18	0.1010	0.0069	-5.2	1.0	-9.9	0.9			
MATH	8	823775	0	D.2.1.2	1	129460	0.65	0.65	0.13	0.13	0.09	0.00	0.53	0.53	-0.29	-0.22	-0.27	0.5313	0.0065	-9.9	0.9	-9.9	0.8			
MATH	8	209177	0	D.4.1.1	1	129460	0.64	0.09	0.08	0.19	0.64	0.00	0.48	-0.15	-0.17	-0.35	0.48	0.6453	0.0065	-9.9	1.0	-9.9	0.9			
MATH	8	128713	0	D.2.1.3	1	129460	0.89	0.05	0.03	0.89	0.03	0.00	0.46	-0.32	-0.28	0.46	-0.16	-1.3105	0.0097	-9.9	0.9	-9.9	0.7			
MATH	8	590664	0	D.2.2.1	2	129460	0.64	0.10	0.64	0.20	0.07	0.00	0.52	-0.28	0.52	-0.23	-0.30	0.6945	0.0064	-9.9	0.9	-9.9	0.8			
MATH	8	674597	0	C.1.1.2	1	129460	0.53	0.15	0.21	0.53	0.11	0.00	0.36	-0.22	-0.11	0.36	-0.17	1.3235	0.0063	9.9	1.1	9.9	1.2			
MATH	8	318354	0	C.1.2.1	2	129460	0.70	0.10	0.70	0.12	0.07	0.00	0.40	-0.30	0.40	-0.21	-0.07	0.2657	0.0068	9.9	1.0	1.0	1.0			
MATH	8	389121	0	C.1.1.1	2	129460	0.55	0.41	0.02	0.02	0.55	0.00	0.31	-0.23	-0.15	-0.14	0.31	1.1720	0.0063	9.9	1.2	9.9	1.2			
MATH	8	410768	0	D.1.1.1	2	129460	0.66	0.05	0.66	0.12	0.18	0.00	0.52	-0.13	0.52	-0.25	-0.36	0.6224	0.0065	-9.9	0.9	-9.9	0.8			
MATH	8	876103	0	C.1.1.3	2	129460	0.74	0.07	0.15	0.74	0.04	0.00	0.45	-0.19	-0.32	0.45	-0.18	0.0383	0.0070	-9.3	1.0	-9.9	0.9			
MATH	8	273496	0	C.1.1.2	2	129460	0.50	0.50	0.16	0.30	0.04	0.00	0.40	0.40	-0.23	-0.16	-0.19	1.4133	0.0063	9.9	1.0	9.9	1.1			
MATH	8	604441	0	C.1.1.3	2	129460	0.74	0.74	0.09	0.05	0.11	0.00	0.51	0.51	-0.21	-0.26	-0.33	0.0351	0.0070	-9.9	0.9	-9.9	0.8			
MATH	8	520127	0	C.3.1.1	1	129460	0.83	0.09	0.06	0.83	0.02	0.00	0.40	-0.29	-0.22	0.40	-0.10	-0.7101	0.0082	0.6	1.0	0.5	1.0			
MATH	8	778930	0	D.1.1.1	2	129460	0.51	0.16	0.26	0.51	0.06	0.00	0.49	-0.35	-0.20	0.49	-0.11	1.3148	0.0063	-9.9	0.9	-9.9	0.9			
MATH	8	846283	0	D.1.1.2	2	129460	0.48	0.07	0.33	0.48	0.12	0.00	0.33	-0.18	-0.16	0.33	-0.14	1.5635	0.0063	9.9	1.1	9.9	1.2			
MATH	8	734995	0	C.1.1.1	2	129460	0.86	0.02	0.86	0.08	0.03	0.00	0.31	-0.13	0.31	-0.18	-0.21	-0.9956	0.0088	9.9	1.1	9.9	1.2			
MATH	8	499216	0	B.2.1.3	2	129460	0.58	0.14	0.58	0.21	0.07	0.00	0.33	-0.11	0.33	-0.17	-0.21	0.9894	0.0063	9.9	1.1	9.9	1.2			
MATH	8	301673	0	B.1.1.4	1	129460	0.72	0.15	0.72	0.10	0.03	0.00	0.37	-0.16	0.37	-0.23	-0.21	0.1678	0.0068	9.9	1.1	9.9	1.1			
MATH	8	534707	0	B.1.1.1	2	129460	0.51	0.51	0.09	0.34	0.05	0.00	0.35	0.35	-0.20	-0.17	-0.17	1.2174	0.0063	9.9	1.1	9.9	1.2			
MATH	8	522891	0	B.1.1.2	2	129460	0.87	0.04	0.05	0.87	0.05	0.00	0.45	-0.31	-0.27	0.45	-0.17	-0.9257	0.0086	-9.9	0.9	-9.9	0.8			
MATH	8	698465	0	B.1.1.3	2	129460	0.65	0.09	0.21	0.65	0.05	0.00	0.48	-0.28	-0.32	0.48	-0.07	0.6453	0.0065	-9.9	0.9	-9.9	0.9			

Appendix G: Item Statistics Multiple Choice

MATH	8	218658	0	A.3.2.1	2	129460	0.53	0.06	0.31	0.53	0.10	0.00	0.17	-0.14	0.06	0.17	-0.26	1.1470	0.0063	9.9	1.3	9.9	1.5			
MATH	8	200162	0	A.3.1.1	2	129460	0.73	0.07	0.08	0.12	0.73	0.00	0.50	-0.29	-0.26	-0.23	0.50	0.0442	0.0070	-9.9	0.9	-9.9	0.9			
MATH	8	916884	0	A.1.1.2	1	129460	0.88	0.09	0.88	0.02	0.01	0.00	0.45	-0.38	0.45	-0.14	-0.16	-1.0870	0.0090	-9.9	0.9	-9.9	0.7			
MATH	8	188337	0	A.2.1.1	1	129460	0.57	0.10	0.27	0.06	0.57	0.00	0.52	-0.36	-0.22	-0.22	0.52	0.9827	0.0063	-9.9	0.9	-9.9	0.9			
MATH	8	881412	0	A.3.1.2	2	129460	0.81	0.06	0.07	0.81	0.07	0.00	0.45	-0.23	-0.28	0.45	-0.21	-0.4008	0.0076	-9.9	0.9	-9.9	0.8			
MATH	8	569666	0	A.1.1.1	1	129460	0.76	0.13	0.06	0.76	0.05	0.00	0.47	-0.28	-0.23	0.47	-0.25	-0.0095	0.0070	-9.9	0.9	-9.9	0.8			
MATH	8	947578	0	A.2.2.1	2	129460	0.54	0.22	0.54	0.07	0.17	0.00	0.29	-0.21	0.29	-0.28	0.04	1.1808	0.0063	9.9	1.2	9.9	1.3			
MATH	8	254478	0	A.2.2.2	2	129460	0.65	0.07	0.65	0.06	0.22	0.00	0.47	-0.20	0.47	-0.25	-0.28	0.5812	0.0065	-9.9	1.0	-9.9	0.9			
MATH	8	730058	0	D.1.1.2	2	129460	0.51	0.22	0.23	0.51	0.04	0.00	0.39	-0.23	-0.17	0.39	-0.14	1.3724	0.0063	9.9	1.1	9.9	1.1			
MATH	8	542128	0	E.3.2.1	2	129460	0.86	0.02	0.08	0.04	0.86	0.00	0.44	-0.21	-0.29	-0.23	0.44	-0.9426	0.0087	-9.9	0.9	-9.9	0.8			
MATH	8	542175	1	E.3.1.1	2	14718	0.70	0.09	0.11	0.70	0.10	0.00	0.45	-0.35	-0.22	0.45	-0.13	0.2206	0.0198	-0.7	1.0	-2.3	1.0			
MATH	8	773144	1	D.2.1.1	1	14718	0.72	0.72	0.09	0.07	0.12	0.00	0.42	0.42	-0.19	-0.20	-0.26	0.0999	0.0201	1.7	1.0	-0.4	1.0			
MATH	8	833783	1	D.4.1.3	1	14718	0.66	0.16	0.07	0.11	0.66	0.00	0.60	-0.29	-0.31	-0.30	0.60	0.4680	0.0192	-9.9	0.8	-9.9	0.8	A+	A+	A+
MATH	8	455603	1	E.4.1.2	2	14718	0.61	0.14	0.14	0.11	0.61	0.00	0.60	-0.29	-0.31	-0.26	0.60	0.7482	0.0187	-9.9	0.8	-9.9	0.7	A-	A-	A-
MATH	8	137499	1	E.1.1.3	2	14718	0.21	0.25	0.21	0.34	0.19	0.00	-0.02	0.07	-0.02	0.07	-0.14	2.9479	0.0217	9.9	1.4	9.9	2.7	A-	A-	A-
MATH	8	456307	1	D.4.1.1	1	14718	0.79	0.79	0.10	0.07	0.04	0.00	0.47	0.47	-0.26	-0.25	-0.25	-0.3921	0.0219	-5.9	0.9	-4.0	0.9	A+	A-	A+
MATH	8	994290	1	D.2.1.3	1	14718	0.89	0.06	0.89	0.04	0.01	0.00	0.33	-0.30	0.33	-0.09	-0.12	-1.2674	0.0273	-0.7	1.0	4.8	1.2	A+	A+	A+
MATH	8	720426	1	B.2.2.2	2	14718	0.67	0.18	0.67	0.11	0.04	0.00	0.51	-0.37	0.51	-0.21	-0.16	0.3742	0.0194	-8.1	0.9	-8.8	0.9	A+	A-	A-
MATH	8	516668	1	C.1.1.1	2	14718	0.86	0.07	0.03	0.04	0.86	0.00	0.39	-0.21	-0.21	-0.22	0.39	-0.9613	0.0250	-1.9	1.0	-2.5	0.9	A+	A-	A-
MATH	8	178573	1	A.2.2.1	2	14718	0.41	0.06	0.37	0.41	0.17	0.00	0.29	-0.19	0.09	0.29	-0.37	1.8004	0.0186	9.9	1.2	9.9	1.4	A-	A-	A-
MATH	8	914809	1	A.3.3.1	1	14718	0.31	0.05	0.06	0.59	0.31	0.00	0.30	-0.18	-0.21	-0.10	0.30	2.3626	0.0197	9.9	1.1	9.9	1.3	A+	A+	A-
MATH	8	398651	1	B.1.1.3	1	14718	0.71	0.06	0.71	0.16	0.07	0.00	0.51	-0.24	0.51	-0.28	-0.27	0.1489	0.0200	-8.5	0.9	-9.8	0.8	A-	A-	A-
MATH	8	497859	2	C.1.1.2	2	14346	0.68	0.06	0.09	0.17	0.68	0.00	0.48	-0.19	-0.30	-0.25	0.48	0.4171	0.0197	-5.3	1.0	-7.8	0.9			
MATH	8	797012	2	A.3.1.1	2	14346	0.81	0.05	0.81	0.09	0.05	0.00	0.50	-0.19	0.50	-0.33	-0.27	-0.4852	0.0230	-8.6	0.9	-8.7	0.8			
MATH	8	339104	2	E.1.1.3	2	14346	0.43	0.11	0.37	0.43	0.09	0.00	0.03	-0.21	0.17	0.03	-0.12	1.7322	0.0187	9.9	1.5	9.9	1.8	A-	A-	A+
MATH	8	220561	2	D.4.1.2	1	14346	0.76	0.76	0.10	0.07	0.07	0.00	0.55	0.55	-0.31	-0.27	-0.28	-0.1243	0.0214	-9.9	0.9	-9.9	0.7	A+	A-	A-
MATH	8	817277	2	E.4.1.2	2	14346	0.60	0.23	0.60	0.11	0.06	0.00	0.49	-0.22	0.49	-0.27	-0.27	0.8131	0.0189	-7.5	0.9	-8.7	0.9	A-	A-	A-
MATH	8	769160	2	D.2.1.3	1	14346	0.83	0.83	0.05	0.11	0.02	0.00	0.37	0.37	-0.30	-0.16	-0.20	-0.6045	0.0236	-0.2	1.0	6.7	1.2	A+	A-	A+
MATH	8	583309	2	D.1.1.2	1	14346	0.79	0.79	0.08	0.10	0.03	0.00	0.54	0.54	-0.29	-0.34	-0.21	-0.3089	0.0221	-9.9	0.9	-9.9	0.7	A+	A+	A+
MATH	8	500942	2	C.1.2.1	2	14346	0.42	0.09	0.39	0.42	0.10	0.00	0.16	-0.12	0.02	0.16	-0.18	1.7872	0.0188	9.9	1.3	9.9	1.5	A-	A-	A+
MATH	8	178673	2	B.1.1.4	1	14346	0.66	0.04	0.10	0.20	0.66	0.00	0.54	-0.21	-0.31	-0.31	0.54	0.5211	0.0194	-9.9	0.9	-9.9	0.8	A+	A-	A+
MATH	8	630057	2	B.2.2.3	1	14346	0.75	0.10	0.75	0.10	0.05	0.00	0.47	-0.29	0.47	-0.22	-0.25	-0.0582	0.0211	-5.6	0.9	-5.6	0.9	A+	B-	B-
MATH	8	429912	2	A.1.1.2	1	14346	0.86	0.01	0.12	0.86	0.02	0.00	0.52	-0.20	-0.46	0.52	-0.12	-0.8707	0.0252	-9.9	0.8	-9.9	0.6	A-	A-	B-
MATH	8	978218	2	A.2.2.2	2	14346	0.76	0.76	0.11	0.05	0.07	0.00	0.43	0.43	-0.30	-0.24	-0.13	-0.1455	0.0214	-0.8	1.0	-3.5	0.9	A+	A-	A-
MATH	8	592257	3	D.4.1.3	1	14353	0.74	0.13	0.07	0.06	0.74	0.00	0.56	-0.30	-0.29	-0.30	0.56	-0.0306	0.0209	-9.9	0.9	-9.9	0.8			
MATH	8	482169	3	B.2.1.2	2	14353	0.42	0.22	0.20	0.16	0.42	0.00	0.49	-0.24	-0.20	-0.18	0.49	1.7698	0.0188	-9.9	0.9	-6.5	0.9			
MATH	8	452687	3	E.4.1.2	2	14353	0.58	0.10	0.25	0.58	0.07	0.00	0.38	-0.30	-0.14	0.38	-0.14	0.9397	0.0188	9.9	1.1	9.9	1.2	B-	A-	A-
MATH	8	909780	3	E.1.1.2	2	14353	0.53	0.34	0.10	0.53	0.04	0.00	0.57	-0.45	-0.17	0.57	-0.13	1.2048	0.0186	-9.9	0.8	-9.9	0.8	B-	A-	A-
MATH	8	960094	3	D.1.1.1	2	14353	0.78	0.05	0.13	0.78	0.04	0.00	0.39	-0.21	-0.27	0.39	-0.12	-0.2648	0.0219	1.4	1.0	3.1	1.1	A+	A-	A-
MATH	8	212824	3	D.2.2.1	2	14353	0.48	0.15	0.13	0.23	0.48	0.00	0.29	-0.13	-0.24	-0.04	0.29	1.4360	0.0186	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	8	843424	3	D.4.1.1	1	14353	0.77	0.08	0.10	0.05	0.77	0.00	0.42	-0.19	-0.26	-0.20	0.42	-0.1535	0.0214	-0.6	1.0	0.4	1.0	A+	A-	A-
MATH	8	158670	3	C.1.1.1	2	14353	0.75	0.75	0.08	0.06	0.10	0.00	0.32	0.32	-0.19	-0.18	-0.13	-0.0858	0.0211	9.9	1.1	9.6	1.2	A+	A-	A-
MATH	8	847884	3	B.2.2.1	2	14353	0.50	0.07	0.36	0.50	0.07	0.00	0.40	-0.22	-0.17	0.40	-0.23	1.3643	0.0186	4.5	1.0	8.9	1.1	A+	A-	A+
MATH	8	152893	3	B.1.1.2	1	14353	0.50	0.14	0.21	0.50	0.14	0.00	0.37	-0.11	-0.16	0.37	-0.23	1.3222	0.0186	9.9	1.1	9.9	1.2	A-	A+	A+
MATH	8	470894	3	A.2.1.1	1	14353	0.72	0.72	0.10	0.15	0.03	0.00	0.47	0.47	-0.32	-0.23	-0.19	0.1454	0.0204	-3.3	1.0	-6.0	0.9	A+	A-	A-
MATH	8	490985	3	A.1.1.1	1	14353	0.76	0.13	0.06	0.76	0.05	0.00	0.46	-0.33	-0.20	0.46	-0.18	-0.1096	0.0212	-3.9	1.0	-4.2	0.9	A+	A+	A+
MATH	8	601123	4	C.3.1.1	1	14336	0.74	0.74	0.12	0.10	0.04	0.00	0.49	0.49	-0.26	-0.26	-0.26	0.0561	0.0211	-7.7	0.9	-6.0	0.9			
MATH	8	598782	4	A.2.2.1	2	14336	0.71	0.13	0.71	0.09	0.07	0.00	0.55	-0.34	0.55	-0.27	-0.23	0.2216	0.0205	-9.9	0.9	-9.9	0.8			
MATH	8	533730	4	E.1.1.3	2	14336	0.33	0.13	0.33	0.42	0.11	0.00	0.20	-0.08	0.20	-0.04	-0.16	2.2827	0.0199	9.9	1.2	9.9	1.5	A-	A-	A-
MATH	8	509039	4	D.4.1.2	1	14336	0.66	0.05	0.11	0.17	0.66	0.00	0.53	-0.23	-0.33	-0.26	0.53	0.5221	0.0198	-9.9	0.9	-9.9	0.8	A+	A-	A+
MATH	8	750151	4	E.4.1.1	2	14336	0.36	0.40	0.09	0.36	0.16	0.00	0.26	0.04	-0.28	0.26	-0.17	2.1195	0.0196	9.9	1.1	9.9	1.4	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

MATH	8	910734	4	D.1.1.2	2	14336	0.49	0.09	0.49	0.29	0.13	0.00	0.35	-0.16	0.35	-0.13	-0.21	1.4381	0.0188	9.9	1.1	9.9	1.1	A-	A+	A+
MATH	8	662718	4	D.2.1.2	1	14336	0.67	0.07	0.04	0.21	0.67	0.00	0.44	-0.30	-0.27	-0.19	0.44	0.4541	0.0199	-1.4	1.0	4.8	1.1	A+	A-	A-
MATH	8	131495	4	C.1.1.3	2	14336	0.79	0.11	0.79	0.06	0.04	0.00	0.38	-0.22	0.38	-0.20	-0.19	-0.2824	0.0224	2.9	1.0	-0.9	1.0	A+	A-	A-
MATH	8	921927	4	B.2.2.3	1	14336	0.77	0.10	0.03	0.09	0.77	0.00	0.47	-0.24	-0.24	-0.27	0.47	-0.1759	0.0220	-5.9	0.9	-7.7	0.8	A-	C-	C-
MATH	8	518357	4	A.2.2.2	2	14336	0.34	0.14	0.46	0.34	0.06	0.00	0.30	-0.16	-0.15	0.30	-0.05	2.2119	0.0197	9.1	1.1	9.9	1.3	A-	A-	A-
MATH	8	408659	4	A.3.2.1	2	14336	0.32	0.10	0.53	0.32	0.05	0.00	0.10	-0.19	0.09	0.10	-0.16	2.3075	0.0200	9.9	1.3	9.9	1.9	A+	A-	A-
MATH	8	788520	4	B.1.1.3	1	14336	0.64	0.07	0.64	0.13	0.16	0.00	0.43	-0.16	0.43	-0.26	-0.21	0.6165	0.0196	0.8	1.0	-2.6	1.0	A-	A-	A-
MATH	8	452612	5	E.1.1.1	2	14351	0.72	0.09	0.11	0.72	0.08	0.00	0.41	-0.16	-0.23	0.41	-0.25	0.1339	0.0208	1.8	1.0	3.7	1.1			
MATH	8	616725	5	D.2.2.2	2	14351	0.65	0.12	0.14	0.10	0.65	0.00	0.43	-0.14	-0.22	-0.29	0.43	0.5812	0.0197	1.2	1.0	0.2	1.0			
MATH	8	104466	5	E.1.1.2	2	14351	0.69	0.09	0.08	0.69	0.14	0.00	0.41	-0.20	-0.27	0.41	-0.17	0.3082	0.0203	2.4	1.0	2.6	1.1	A+	A-	A-
MATH	8	311773	5	E.3.2.1	2	14351	0.70	0.12	0.08	0.70	0.10	0.00	0.40	-0.19	-0.32	0.40	-0.12	0.2995	0.0203	3.6	1.0	2.7	1.1	A+	A-	A-
MATH	8	267489	5	D.4.1.1	1	14351	0.75	0.08	0.75	0.08	0.08	0.00	0.52	-0.23	0.52	-0.29	-0.28	-0.0452	0.0214	-9.9	0.9	-9.9	0.8	A+	A-	A+
MATH	8	137514	5	D.2.1.3	1	14351	0.86	0.04	0.86	0.07	0.03	0.00	0.52	-0.27	0.52	-0.36	-0.22	-0.9252	0.0261	-9.9	0.8	-9.9	0.6	A+	A-	A-
MATH	8	582181	5	D.1.1.3	1	14351	0.60	0.16	0.13	0.11	0.60	0.00	0.54	-0.20	-0.31	-0.27	0.54	0.8517	0.0192	-9.9	0.9	-9.9	0.8	B+	A+	A+
MATH	8	444099	5	C.1.1.2	1	14351	0.50	0.09	0.14	0.50	0.28	0.00	0.40	-0.26	-0.17	0.40	-0.15	1.3652	0.0189	4.6	1.0	8.4	1.1	A-	A-	A-
MATH	8	207658	5	B.2.1.1	1	14351	0.53	0.11	0.23	0.53	0.13	0.00	0.46	-0.35	-0.21	0.46	-0.09	1.2271	0.0189	-2.7	1.0	-2.0	1.0	A-	A+	A-
MATH	8	804091	5	C.1.2.1	2	14351	0.53	0.53	0.32	0.10	0.06	0.00	0.27	0.27	-0.12	-0.18	-0.10	1.2332	0.0189	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	8	427781	5	A.3.1.1	2	14351	0.52	0.04	0.04	0.40	0.52	0.00	0.50	-0.23	-0.21	-0.34	0.50	1.2567	0.0189	-9.9	0.9	-6.1	0.9	A+	C-	C-
MATH	8	929331	5	A.3.2.1	2	14351	0.46	0.12	0.46	0.27	0.15	0.00	0.31	-0.14	0.31	-0.21	-0.04	1.5756	0.0190	9.9	1.1	9.9	1.3	A-	A-	A-
MATH	8	893634	6	D.1.1.3	2	14342	0.86	0.04	0.06	0.86	0.04	0.00	0.51	-0.30	-0.30	0.51	-0.25	-0.9726	0.0264	-9.9	0.8	-9.9	0.6			
MATH	8	564091	6	A.2.2.2	2	14342	0.26	0.08	0.37	0.29	0.26	0.00	0.29	-0.19	-0.10	-0.05	0.29	2.7360	0.0214	6.2	1.1	9.9	1.5			
MATH	8	212037	6	E.3.1.1	2	14342	0.56	0.56	0.20	0.17	0.06	0.00	0.48	0.48	-0.21	-0.29	-0.17	1.0262	0.0190	-6.6	1.0	-6.4	0.9	A-	A-	A-
MATH	8	645793	6	E.4.1.1	2	14342	0.77	0.04	0.12	0.07	0.77	0.00	0.44	-0.21	-0.23	-0.26	0.44	-0.1903	0.0220	-2.7	1.0	-4.4	0.9	A+	A-	A-
MATH	8	589965	6	D.4.1.3	1	14342	0.74	0.10	0.08	0.08	0.74	0.00	0.50	-0.22	-0.28	-0.29	0.50	0.0248	0.0212	-8.8	0.9	-8.6	0.8	B+	A+	A+
MATH	8	998195	6	D.1.1.1	2	14342	0.58	0.18	0.16	0.08	0.58	0.00	0.46	-0.33	-0.11	-0.21	0.46	0.9361	0.0191	-2.7	1.0	-3.0	1.0	A-	A+	A-
MATH	8	615794	6	D.2.1.1	2	14342	0.32	0.14	0.18	0.32	0.35	0.00	0.18	-0.07	-0.16	0.18	0.01	2.3148	0.0201	9.9	1.2	9.9	1.6	A-	A-	A-
MATH	8	386356	6	C.1.1.2	2	14342	0.47	0.06	0.25	0.47	0.21	0.00	0.31	-0.12	-0.10	0.31	-0.20	1.4848	0.0189	9.9	1.2	9.9	1.3	A-	A-	A-
MATH	8	792661	6	B.2.1.3	1	14342	0.70	0.11	0.70	0.09	0.10	0.00	0.46	-0.19	0.46	-0.26	-0.26	0.2939	0.0203	-2.7	1.0	-6.0	0.9	A-	A-	A-
MATH	8	340970	6	A.1.1.1	1	14342	0.89	0.89	0.02	0.03	0.06	0.00	0.35	0.35	-0.25	-0.24	-0.14	-1.2287	0.0285	-2.4	1.0	0.3	1.0	A+	A-	A-
MATH	8	589156	6	B.1.1.1	2	14342	0.59	0.11	0.59	0.23	0.07	0.00	0.41	-0.22	0.41	-0.20	-0.18	0.8937	0.0192	3.9	1.0	2.8	1.0	A+	A-	A-
MATH	8	999422	6	A.2.1.1	1	14342	0.61	0.05	0.61	0.15	0.19	0.00	0.45	-0.16	0.45	-0.26	-0.24	0.7662	0.0193	-1.2	1.0	-1.9	1.0	A+	A-	A-
MATH	8	715523	7	E.3.2.1	2	14308	0.78	0.06	0.05	0.10	0.78	0.00	0.48	-0.24	-0.26	-0.26	0.48	-0.2830	0.0225	-6.1	0.9	-4.8	0.9			
MATH	8	656496	7	B.2.2.1	1	14308	0.64	0.05	0.64	0.28	0.02	0.00	0.55	-0.19	0.55	-0.44	-0.12	0.6012	0.0197	-9.9	0.9	-9.9	0.8			
MATH	8	416903	7	D.4.1.2	1	14308	0.77	0.11	0.07	0.77	0.05	0.00	0.52	-0.27	-0.31	0.52	-0.24	-0.1617	0.0220	-9.9	0.9	-9.5	0.8	A+	A-	A-
MATH	8	326022	7	E.4.1.1	2	14308	0.72	0.72	0.11	0.11	0.05	0.00	0.49	0.49	-0.25	-0.27	-0.23	0.1363	0.0209	-6.6	0.9	-5.8	0.9	A-	A-	A-
MATH	8	616009	7	E.3.1.1	2	14308	0.45	0.18	0.32	0.45	0.05	0.00	0.40	-0.41	0.01	0.40	-0.19	1.6195	0.0191	4.2	1.0	9.4	1.1	A+	B-	A-
MATH	8	766588	7	D.1.1.3	1	14308	0.82	0.09	0.06	0.82	0.03	0.00	0.54	-0.33	-0.31	0.54	-0.21	-0.5126	0.0236	-9.9	0.8	-9.9	0.7	A+	A+	A+
MATH	8	844917	7	D.2.1.1	1	14308	0.68	0.20	0.68	0.07	0.05	0.00	0.42	-0.18	0.42	-0.25	-0.25	0.4174	0.0201	3.1	1.0	0.0	1.0	A+	A+	A-
MATH	8	313693	7	C.1.1.2	2	14308	0.36	0.16	0.24	0.36	0.24	0.00	0.31	-0.14	-0.19	0.31	-0.02	2.1309	0.0197	7.4	1.1	9.9	1.4	A-	A+	A-
MATH	8	849461	7	C.1.2.1	1	14308	0.56	0.15	0.16	0.56	0.13	0.00	0.50	-0.20	-0.20	0.50	-0.30	1.0595	0.0191	-8.9	0.9	-8.9	0.9	A+	A-	A-
MATH	8	293897	7	B.1.1.4	1	14308	0.73	0.14	0.73	0.09	0.04	0.00	0.39	-0.18	0.39	-0.24	-0.21	0.0698	0.0211	4.2	1.0	2.0	1.0	A+	A+	A+
MATH	8	121865	7	A.2.2.1	1	14308	0.50	0.11	0.50	0.18	0.21	0.00	0.36	-0.24	0.36	-0.33	0.05	1.3739	0.0190	9.9	1.1	9.9	1.2	A-	A+	A+
MATH	8	249723	7	A.3.2.1	2	14308	0.41	0.14	0.41	0.31	0.14	0.00	0.27	-0.05	0.27	-0.15	-0.14	1.8441	0.0193	9.9	1.2	9.9	1.4	B-	A-	A-
MATH	8	556425	8	D.4.1.1	1	14357	0.77	0.08	0.09	0.05	0.77	0.00	0.49	-0.27	-0.27	-0.24	0.49	-0.1671	0.0221	-7.5	0.9	-8.2	0.8			
MATH	8	462758	8	B.1.1.2	2	14357	0.60	0.10	0.09	0.21	0.60	0.00	0.55	-0.35	-0.27	-0.21	0.55	0.8803	0.0192	-9.9	0.9	-9.9	0.9			
MATH	8	136185	8	B.2.1.2	1	14357	0.44	0.16	0.44	0.15	0.25	0.00	0.32	-0.20	0.32	-0.24	0.00	1.6781	0.0189	9.9	1.1	9.9	1.2	A-	A-	A-
MATH	8	468676	8	E.1.1.1	2	14357	0.89	0.89	0.02	0.05	0.05	0.00	0.37	0.37	-0.20	-0.24	-0.18	-1.1430	0.0282	-2.9	1.0	-1.5	0.9	A-	A-	A-
MATH	8	285052	8	E.3.1.1	2	14357	0.66	0.66	0.17	0.05	0.13	0.00	0.53	0.53	-0.26	-0.30	-0.27	0.5769	0.0197	-9.9	0.9	-9.9	0.8	A-	A-	A-
MATH	8	639565	8	D.2.1.2	1	14357	0.72	0.18	0.03	0.07	0.72	0.00	0.55	-0.35	-0.25	-0.28	0.55	0.1767	0.0208	-9.9	0.9	-9.9	0.8	A-	B-	A-
MATH	8	778728	8	D.2.2.1	2	14357	0.32	0.33	0.10	0.32	0.25	0.00	0.15	0.03	-0.27	0.15	0.00	2.3750	0.0200	9.9	1.2	9.9	1.7	A-	A-	A-
MATH	8	856790	8	D.1.1.3	1	14357	0.79	0.08	0.09	0.79	0.04	0.00	0.55	-0.32	-0.32	0.55	-0.23	-0.2669	0.0225	-9.9	0.8	-9.9	0.7	A+	A+	A-

Appendix G: Item Statistics Multiple Choice

MATH	8	164112	8	C.3.1.1	1	14357	0.90	0.90	0.06	0.01	0.02	0.00	0.41	0.41	-0.31	-0.21	-0.15	-1.3130	0.0297	-5.6	0.9	-5.8	0.8	A+	A-	A-
MATH	8	982679	8	C.1.1.3	2	14357	0.72	0.72	0.09	0.12	0.07	0.00	0.26	0.26	-0.16	-0.12	-0.12	0.2090	0.0207	9.9	1.2	9.9	1.3	A+	A-	A-
MATH	8	382080	8	A.3.2.1	1	14357	0.46	0.16	0.10	0.28	0.46	0.00	0.28	-0.11	-0.11	-0.15	0.28	1.5996	0.0189	9.9	1.1	9.9	1.3	A-	A-	A-
MATH	8	541498	8	A.3.1.2	2	14357	0.28	0.24	0.28	0.19	0.29	0.00	-0.01	0.02	-0.01	-0.05	0.04	2.5850	0.0206	9.9	1.5	9.9	2.2	A-	A+	A-
MATH	8	213065	9	E.4.1.2	2	14349	0.69	0.11	0.69	0.13	0.07	0.00	0.48	-0.23	0.48	-0.25	-0.26	0.3350	0.0203	-5.4	1.0	-6.9	0.9			
MATH	8	414235	9	C.1.2.1	1	14349	0.60	0.09	0.08	0.60	0.22	0.00	0.51	-0.17	-0.19	0.51	-0.35	0.8758	0.0192	-9.9	0.9	-9.7	0.9			
MATH	8	710697	9	E.3.2.1	2	14349	0.38	0.38	0.27	0.21	0.14	0.00	0.30	0.30	-0.27	0.07	-0.15	1.9883	0.0194	9.9	1.1	9.9	1.3	A+	A-	A-
MATH	8	838931	9	D.4.1.3	1	14349	0.83	0.09	0.83	0.06	0.02	0.00	0.50	-0.31	0.50	-0.29	-0.21	-0.5924	0.0241	-9.5	0.9	-8.6	0.8	A+	A-	A-
MATH	8	478975	9	E.1.1.1	2	14349	0.78	0.07	0.78	0.07	0.08	0.00	0.41	-0.24	0.41	-0.28	-0.13	-0.2249	0.0223	-0.1	1.0	-1.2	1.0	A+	A-	A+
MATH	8	515723	9	D.2.1.2	1	14349	0.77	0.05	0.08	0.11	0.77	0.00	0.44	-0.23	-0.22	-0.25	0.44	-0.1320	0.0219	-3.4	1.0	-1.1	1.0	A+	A-	A-
MATH	8	252213	9	D.1.1.1	2	14349	0.36	0.06	0.23	0.34	0.36	0.00	0.37	-0.29	-0.14	-0.11	0.37	2.1176	0.0196	4.3	1.0	9.2	1.2	A-	A+	A+
MATH	8	119683	9	C.1.1.3	2	14349	0.74	0.09	0.08	0.09	0.74	0.00	0.57	-0.31	-0.32	-0.26	0.57	0.0705	0.0211	-9.9	0.8	-9.9	0.7	A-	A-	A-
MATH	8	363442	9	C.3.1.1	1	14349	0.93	0.02	0.02	0.03	0.93	0.00	0.38	-0.18	-0.19	-0.26	0.38	-1.7184	0.0336	-4.6	0.9	-5.2	0.7	A+	B-	A-
MATH	8	355989	9	B.2.1.1	1	14349	0.65	0.17	0.65	0.08	0.09	0.00	0.38	-0.21	0.38	-0.23	-0.12	0.5659	0.0197	9.2	1.1	3.4	1.1	A-	A+	A-
MATH	8	774904	9	A.3.2.1	2	14349	0.52	0.29	0.14	0.52	0.05	0.00	0.20	0.06	-0.24	0.20	-0.19	1.2719	0.0189	9.9	1.3	9.9	1.4	A+	A-	A+
MATH	8	395394	9	A.3.1.2	2	14349	0.86	0.06	0.04	0.04	0.86	0.00	0.45	-0.25	-0.23	-0.26	0.45	-0.9114	0.0261	-6.1	0.9	-6.3	0.8	A+	C-	C-
READIN	3	262291	0	A.2.2.2		126408	0.82	0.07	0.82	0.05	0.05	0.01	0.59	-0.34	0.59	-0.34	-0.27	-0.9438	0.0081	-9.9	0.8	-9.9	0.6			
READIN	3	413909	0	A.2.3.1		126408	0.60	0.14	0.08	0.17	0.60	0.01	0.55	-0.29	-0.29	-0.22	0.55	0.4540	0.0066	-9.9	0.9	-9.9	0.8			
READIN	3	845335	0	B.3.3.1		126408	0.46	0.31	0.46	0.11	0.11	0.01	0.37	-0.08	0.37	-0.28	-0.19	1.2890	0.0064	9.9	1.1	9.9	1.2			
READIN	3	896266	0	B.1.1.1		126408	0.74	0.06	0.12	0.74	0.07	0.01	0.51	-0.30	-0.22	0.51	-0.30	-0.2652	0.0071	-9.9	0.9	-9.9	0.8			
READIN	3	432442	0	A.2.2.2		126408	0.75	0.75	0.08	0.05	0.12	0.00	0.29	0.29	-0.06	-0.22	-0.17	-0.3473	0.0072	9.9	1.2	9.9	1.5			
READIN	3	997224	0	A.2.4.1		126408	0.52	0.06	0.10	0.52	0.31	0.00	0.48	-0.32	-0.37	0.48	-0.11	0.9020	0.0064	-9.9	0.9	-9.9	1.0			
READIN	3	570439	0	B.3.1.1		126408	0.51	0.17	0.51	0.21	0.10	0.01	0.40	-0.19	0.40	-0.12	-0.25	0.9264	0.0064	9.9	1.0	9.9	1.1			
READIN	3	791246	0	A.2.3.1		126408	0.66	0.17	0.08	0.09	0.66	0.01	0.53	-0.23	-0.22	-0.36	0.53	0.1530	0.0068	-9.9	0.9	-9.9	0.8			
READIN	3	837029	0	A.1.2.2	2	126408	0.74	0.04	0.10	0.12	0.74	0.00	0.41	-0.23	-0.28	-0.16	0.41	-0.2729	0.0071	2.6	1.0	4.1	1.0			
READIN	3	106390	0	B.1.1.1	2	126408	0.62	0.23	0.62	0.08	0.06	0.00	0.50	-0.33	0.50	-0.10	-0.29	0.3869	0.0066	-9.9	0.9	-9.9	0.9			
READIN	3	736644	0	B.1.1.1	2	126408	0.66	0.06	0.14	0.14	0.66	0.00	0.39	-0.23	-0.21	-0.15	0.39	0.1289	0.0068	9.9	1.1	9.9	1.1			
READIN	3	367689	0	A.1.6.1	2	126408	0.66	0.10	0.05	0.66	0.19	0.01	0.45	-0.29	-0.27	0.45	-0.17	0.3735	0.0066	-9.9	1.0	-9.9	0.9			
READIN	3	904559	0	A.1.4.1	2	126408	0.75	0.75	0.08	0.04	0.12	0.00	0.42	0.42	-0.20	-0.22	-0.24	-0.4161	0.0073	5.3	1.0	-9.3	0.9			
READIN	3	860691	0	B.1.1.1	2	126408	0.72	0.08	0.12	0.09	0.72	0.00	0.48	-0.27	-0.18	-0.30	0.48	-0.2847	0.0072	-2.3	1.0	-3.8	1.0			
READIN	3	433951	0	B.1.1.1	2	126408	0.73	0.08	0.08	0.73	0.11	0.00	0.52	-0.23	-0.27	0.52	-0.29	-0.1520	0.0070	-9.9	0.9	-9.9	0.8			
READIN	3	858044	0	A.1.4.1	1	126408	0.88	0.02	0.04	0.06	0.88	0.00	0.50	-0.24	-0.30	-0.29	0.50	-1.4358	0.0092	-9.9	0.8	-9.9	0.6			
READIN	3	634032	0	A.1.3.1	2	126408	0.78	0.08	0.78	0.11	0.03	0.00	0.44	-0.28	0.44	-0.21	-0.23	-0.6359	0.0076	-0.1	1.0	6.8	1.1			
READIN	3	321297	0	A.1.3.1	2	126408	0.77	0.06	0.07	0.10	0.77	0.01	0.54	-0.26	-0.25	-0.34	0.54	-0.4696	0.0074	-9.9	0.9	-9.9	0.7			
READIN	3	682837	0	A.1.1.2	2	126408	0.85	0.11	0.85	0.02	0.02	0.00	0.48	-0.34	0.48	-0.20	-0.26	-1.1611	0.0086	-9.9	0.9	-9.9	0.8			
READIN	3	756962	0	A.1.2.2	2	126408	0.76	0.76	0.06	0.12	0.05	0.00	0.34	0.34	-0.20	-0.15	-0.21	-0.5073	0.0074	9.9	1.1	9.9	1.2			
READIN	3	347555	0	A.1.3.1	2	126408	0.48	0.10	0.05	0.48	0.36	0.00	0.25	-0.25	-0.28	0.25	0.03	1.1222	0.0064	9.9	1.2	9.9	1.4			
READIN	3	557563	0	A.1.3.1	2	126408	0.80	0.80	0.14	0.02	0.03	0.00	0.28	0.28	-0.07	-0.25	-0.28	-0.7563	0.0078	9.9	1.1	9.9	1.5			
READIN	3	207195	0	B.1.1.1	2	126408	0.87	0.02	0.08	0.03	0.87	0.00	0.46	-0.25	-0.29	-0.24	0.46	-1.3661	0.0090	-9.9	0.9	-9.9	0.7			
READIN	3	754128	0	A.1.4.1	2	126408	0.60	0.04	0.05	0.60	0.31	0.00	0.41	-0.31	-0.33	0.41	-0.16	0.4488	0.0066	9.9	1.1	9.9	1.1			
READIN	3	700239	0	B.1.1.1	2	126408	0.85	0.85	0.02	0.09	0.03	0.00	0.42	0.42	-0.24	-0.23	-0.25	-1.5580	0.0095	9.9	1.2	8.0	1.1			
READIN	3	303608	0	B.2.1.1	2	126408	0.57	0.57	0.17	0.06	0.19	0.00	0.35	0.35	-0.13	-0.18	-0.20	0.7050	0.0065	9.9	1.1	9.9	1.2			
READIN	3	502427	0	A.1.6.1	2	126408	0.60	0.12	0.15	0.12	0.60	0.00	0.41	-0.36	-0.16	-0.08	0.41	0.6101	0.0065	9.9	1.0	6.8	1.0			
READIN	3	929065	0	A.1.4.1	1	126408	0.70	0.13	0.70	0.13	0.04	0.00	0.50	-0.26	0.50	-0.26	-0.28	0.0164	0.0069	-9.9	0.9	-9.9	0.9			
READIN	3	514105	0	A.1.4.1	1	126408	0.68	0.11	0.68	0.16	0.05	0.00	0.49	-0.33	0.49	-0.18	-0.26	0.0183	0.0069	-9.9	1.0	-9.9	0.9			
READIN	3	906062	0	B.1.1.1	2	126408	0.82	0.82	0.11	0.03	0.03	0.00	0.42	0.42	-0.22	-0.25	-0.27	-0.8772	0.0080	-8.8	1.0	-8.6	0.9			
READIN	3	971163	0	B.1.1.1	2	126408	0.37	0.50	0.10	0.02	0.37	0.00	0.17	0.03	-0.19	-0.25	0.17	1.5381	0.0065	9.9	1.3	9.9	1.5			
READIN	3	551743	0	A.2.2.2	2	126408	0.78	0.07	0.78	0.06	0.08	0.00	0.57	-0.28	0.57	-0.31	-0.31	-0.6259	0.0076	-9.9	0.8	-9.9	0.7			
READIN	3	514426	0	B.3.3.1	2	126408	0.62	0.20	0.62	0.07	0.11	0.01	0.50	-0.25	0.50	-0.25	-0.24	0.2213	0.0067	-9.9	1.0	-9.9	0.9			
READIN	3	148587	0	B.3.3.2	2	126408	0.76	0.07	0.08	0.09	0.76	0.00	0.49	-0.27	-0.24	-0.25	0.49	-0.3879	0.0073	-9.9	0.9	-9.9	0.8			
READIN	3	954125	0	B.3.3.2	2	126408	0.76	0.76	0.07	0.09	0.08	0.00	0.44	0.44	-0.27	-0.20	-0.23	-0.4949	0.0074	-5.0	1.0	-2.3	1.0			

Appendix G: Item Statistics Multiple Choice

READIN	3	304611	0	A.2.6.1	2	126408	0.89	0.89	0.04	0.03	0.03	0.01	0.48	0.48	-0.27	-0.27	-0.27	-1.6483	0.0098	-9.9	0.8	-9.9	0.6				
READIN	3	307559	0	A.2.4.1	2	126408	0.72	0.07	0.13	0.72	0.07	0.01	0.36	-0.13	-0.24	0.36	-0.15	-0.1551	0.0070	9.9	1.1	8.1	1.1				
READIN	3	695991	0	A.2.4.1	2	126408	0.63	0.15	0.63	0.10	0.11	0.01	0.51	-0.27	0.51	-0.25	-0.22	0.4323	0.0066	-9.9	0.9	-9.9	0.9				
READIN	3	660233	0	A.2.4.1	1	126408	0.75	0.17	0.04	0.75	0.02	0.00	0.43	-0.24	-0.25	0.43	-0.25	-0.4280	0.0073	0.9	1.0	3.3	1.0				
READIN	3	832463	0	A.2.4.1	2	126408	0.65	0.15	0.65	0.06	0.14	0.01	0.49	-0.27	0.49	-0.21	-0.24	0.2392	0.0067	-9.9	0.9	-9.9	0.9				
ELA	3	322025	1	A.2.3.1	2	63341	0.72	0.09	0.09	0.72	0.09	0.00	0.55	-0.31	-0.25	0.55	-0.28	-0.2126	0.0100	-9.9	0.9	-9.9	0.7				
ELA	3	634052	1	A.2.3.1	2	63341	0.56	0.08	0.56	0.14	0.21	0.00	0.38	-0.29	0.38	-0.23	-0.06	0.7141	0.0091	9.9	1.1	9.9	1.1				
ELA	3	553923	1	B.3.1.1	2	63341	0.68	0.08	0.14	0.09	0.68	0.01	0.49	-0.30	-0.19	-0.26	0.49	0.0240	0.0097	-9.9	1.0	-9.9	0.9				
ELA	3	110222	1	A.2.4.1	2	63341	0.82	0.82	0.05	0.07	0.05	0.00	0.55	0.55	-0.27	-0.31	-0.31	-0.9620	0.0115	-9.9	0.8	-9.9	0.6				
ELA	3	616793	1	A.2.4.1	2	63341	0.77	0.14	0.05	0.77	0.04	0.00	0.58	-0.42	-0.25	0.58	-0.22	-0.5590	0.0106	-9.9	0.8	-9.9	0.7				
ELA	3	731578	1	A.2.3.1	2	63341	0.77	0.06	0.08	0.77	0.08	0.00	0.53	-0.27	-0.25	0.53	-0.33	-0.5858	0.0106	-9.9	0.9	-9.9	0.7				
ELA	3	635862	1	B.1.2.1	2	63341	0.68	0.17	0.04	0.68	0.11	0.00	0.49	-0.27	-0.26	0.49	-0.24	0.0326	0.0097	-9.9	0.9	-9.9	0.9				
ELA	3	564018	1	B.1.2.1	2	63341	0.49	0.15	0.49	0.18	0.17	0.01	0.30	-0.11	0.30	-0.15	-0.13	1.0772	0.0091	9.9	1.2	9.9	1.3				
ELA	3	708980	1	A-V.4.1	2	6471	0.76	0.76	0.13	0.06	0.05	0.01	0.41	0.41	-0.18	-0.26	-0.25	-0.5843	0.0328	2.0	1.0	1.1	1.0	A+	A-	A-	
ELA	3	431680	1	A-C.2.1	2	6471	0.61	0.20	0.05	0.13	0.61	0.00	0.50	-0.21	-0.29	-0.27	0.50	0.3939	0.0291	-3.0	1.0	-3.8	0.9	A+	A-	A+	
ELA	3	984700	1	A-C.2.1	3	6471	0.45	0.45	0.11	0.24	0.20	0.01	0.21	0.21	-0.22	-0.01	-0.07	1.2615	0.0286	9.9	1.3	9.9	1.5	A-	A-	A-	
ELA	3	477978	1	A-K.1.1	2	6471	0.75	0.11	0.75	0.07	0.06	0.00	0.45	-0.34	0.45	-0.14	-0.21	-0.4749	0.0322	-0.3	1.0	-2.0	0.9	A-	A-	A-	B-
ELA	3	892416	1	A-K.1.1	2	6471	0.63	0.20	0.05	0.11	0.63	0.01	0.49	-0.27	-0.29	-0.20	0.49	0.2315	0.0295	-3.3	1.0	-2.9	0.9	A+	A+	A+	
ELA	3	507712	1	A-V.4.1	2	6471	0.80	0.07	0.80	0.06	0.06	0.01	0.52	-0.34	0.52	-0.22	-0.28	-0.8848	0.0347	-7.3	0.9	-7.5	0.7	A-	A-	A-	
ELA	3	229594	1	A-V.4.1	1	6471	0.83	0.06	0.05	0.05	0.83	0.01	0.58	-0.32	-0.33	-0.30	0.58	-1.1080	0.0364	-9.9	0.8	-9.9	0.6	A+	A-	B-	
ELA	3	954117	1	A-V.4.1	2	6471	0.68	0.13	0.10	0.68	0.08	0.01	0.56	-0.28	-0.31	0.56	-0.26	-0.0530	0.0304	-9.4	0.9	-8.7	0.8	A+	A-	B-	
ELA	3	249577	2	A-K.1.1	2	6376	0.36	0.19	0.36	0.24	0.20	0.01	0.27	-0.18	0.27	-0.11	-0.01	1.7089	0.0290	7.7	1.1	9.9	1.4	A+	A-	A-	
ELA	3	984152	2	A-V.4.1	2	6376	0.64	0.12	0.11	0.11	0.64	0.01	0.43	-0.25	-0.18	-0.21	0.43	0.2165	0.0295	0.3	1.0	1.1	1.0	A-	A-	A-	
ELA	3	910007	2	A-V.4.1	2	6376	0.62	0.62	0.18	0.10	0.09	0.01	0.44	0.44	-0.20	-0.28	-0.17	0.3355	0.0292	-0.1	1.0	0.3	1.0	A-	A+	A-	
ELA	3	418780	2	A-K.1.1	2	6376	0.41	0.18	0.14	0.41	0.27	0.01	0.25	-0.16	-0.16	0.25	0.00	1.4737	0.0285	9.9	1.2	9.9	1.4	A-	A-	A-	
ELA	3	285383	2	A-K.1.1	3	6376	0.54	0.11	0.15	0.54	0.18	0.01	0.35	-0.25	-0.15	0.35	-0.09	0.7531	0.0284	8.0	1.1	7.2	1.1	A+	A-	A-	
ELA	3	829031	2	A-K.1.1	2	6376	0.50	0.27	0.09	0.13	0.50	0.01	0.37	-0.06	-0.30	-0.20	0.37	1.0055	0.0282	6.1	1.1	5.9	1.1	A-	A-	A-	
ELA	3	392892	2	A-K.1.1	2	6376	0.52	0.13	0.19	0.16	0.52	0.01	0.41	-0.21	-0.21	-0.14	0.41	0.8837	0.0283	0.7	1.0	1.1	1.0	A+	A-	A-	
ELA	3	623891	2	A-C.3.1	3	6376	0.33	0.33	0.08	0.15	0.44	0.01	0.07	0.07	-0.23	-0.11	0.14	1.8940	0.0295	9.9	1.3	9.9	2.0	A-	A-	A-	
ELA	3	117584	3	A-V.4.1	2	6314	0.88	0.88	0.04	0.04	0.04	0.00	0.53	0.53	-0.28	-0.30	-0.30	-1.5193	0.0417	-8.0	0.8	-8.8	0.6	A+	A-	B-	
ELA	3	230668	3	A-K.1.1	3	6314	0.71	0.71	0.10	0.14	0.05	0.00	0.44	0.44	-0.30	-0.18	-0.22	-0.1530	0.0313	0.6	1.0	-0.6	1.0	A+	A-	A-	
ELA	3	317160	3	A-K.1.1	2	6314	0.58	0.30	0.58	0.06	0.06	0.00	0.35	-0.12	0.35	-0.26	-0.21	0.6034	0.0290	9.0	1.1	7.3	1.2	A-	A-	A-	
ELA	3	804961	3	A-C.2.1	2	6314	0.68	0.09	0.07	0.15	0.68	0.00	0.56	-0.35	-0.30	-0.22	0.56	0.0430	0.0305	-9.9	0.9	-9.9	0.8	A+	A+	A+	
ELA	3	641805	3	A-C.2.1	3	6314	0.29	0.29	0.16	0.13	0.41	0.01	0.18	0.18	-0.16	-0.26	0.13	2.1616	0.0308	9.9	1.2	9.9	1.8	A+	A-	A-	
ELA	3	273347	3	A-V.4.1	2	6314	0.31	0.19	0.14	0.35	0.31	0.01	0.19	-0.15	-0.13	0.04	0.19	2.0287	0.0303	9.9	1.2	9.9	1.8	A-	A-	A+	
ELA	3	839210	3	A-V.4.1	1	6314	0.45	0.10	0.23	0.45	0.21	0.01	0.31	-0.26	-0.09	0.31	-0.08	1.2677	0.0287	9.9	1.2	9.9	1.3	A+	A-	A-	
ELA	3	748912	3	A-V.4.1	2	6314	0.43	0.17	0.08	0.31	0.43	0.00	0.41	-0.07	-0.23	-0.24	0.41	1.3788	0.0288	-0.8	1.0	3.9	1.1	A-	A-	A-	
ELA	3	867069	4	A-V.4.1	2	6309	0.76	0.76	0.06	0.09	0.08	0.01	0.50	0.50	-0.21	-0.26	-0.32	-0.4980	0.0335	-4.3	0.9	-5.2	0.8	A+	A+	A+	
ELA	3	832121	4	A-K.1.1	3	6309	0.37	0.21	0.37	0.15	0.26	0.01	0.24	-0.21	0.24	-0.15	0.05	1.7218	0.0296	9.9	1.2	9.9	1.5	A-	A+	A-	
ELA	3	984132	4	A-K.1.1	3	6309	0.65	0.65	0.11	0.16	0.08	0.00	0.47	0.47	-0.32	-0.18	-0.20	0.2330	0.0303	-1.4	1.0	-4.0	0.9	A-	A-	A-	
ELA	3	548959	4	A-K.1.1	2	6309	0.76	0.11	0.76	0.07	0.04	0.02	0.58	-0.38	0.58	-0.31	-0.24	-0.5014	0.0335	-9.9	0.8	-9.7	0.7	A+	A-	A-	
ELA	3	897617	4	A-C.2.1	2	6309	0.65	0.15	0.13	0.65	0.07	0.00	0.48	-0.24	-0.22	0.48	-0.27	0.1988	0.0304	-2.0	1.0	-4.7	0.9	A+	A-	A+	
ELA	3	991171	4	A-V.4.1	2	6309	0.84	0.07	0.04	0.84	0.05	0.00	0.55	-0.33	-0.25	0.55	-0.31	-1.1283	0.0381	-9.2	0.8	-8.4	0.6	A+	A-	A-	
ELA	3	694021	4	A-V.4.1	2	6309	0.24	0.10	0.24	0.55	0.11	0.00	0.31	-0.22	0.31	-0.19	0.08	2.5326	0.0328	-0.1	1.0	9.8	1.4	A-	A-	A-	
ELA	3	820427	4	A-K.1.1	2	6309	0.57	0.57	0.17	0.15	0.11	0.01	0.37	0.37	-0.11	-0.23	-0.21	0.6505	0.0294	7.7	1.1	8.8	1.2	A+	A-	A-	
ELA	3	177286	5	A-V.4.1	2	6343	0.34	0.49	0.06	0.34	0.09	0.02	0.28	0.00	-0.25	0.28	-0.26	1.8103	0.0298	6.3	1.1	9.9	1.4	A-	A-	A-	
ELA	3	332699	5	A-K.1.1	2	6343	0.69	0.69	0.07	0.14	0.09	0.01	0.52	0.52	-0.29	-0.25	-0.25	-0.0885	0.0309	-5.9	0.9	-7.2	0.8	A-	A-	A-	
ELA	3	949451	5	A-K.1.1	3	6343	0.71	0.10	0.10	0.09	0.71	0.00	0.58	-0.31	-0.27	-0.30	0.58	-0.2016	0.0314	-9.9	0.8	-9.9	0.7	A+	A-	A-	
ELA	3	571546	5	A-K.1.1	3	6343	0.48	0.48	0.15	0.25	0.11	0.00	0.30	0.30	-0.11	-0.08	-0.23	1.0655	0.0287	9.9	1.2	9.9	1.3	A-	A-	A+	
ELA	3	995880	5	A-V.4.1	2	6343	0.71	0.12	0.07	0.09	0.71	0.01	0.41	-0.15	-0.23	-0.25	0.41	-0.1671	0.0313	3.3	1.1	2.5	1.1	A-	A-	A+	
ELA	3	117448	5	A-C.2.1	2	6343	0.54	0.16	0.15	0.54	0.14	0.01	0.36	-0.17	-0.17	0.36	-0.16	0.7676	0.0288	7.4	1.1	6.5	1.1	A+	A-	A+	

Appendix G: Item Statistics Multiple Choice

ELA	3	292229	5	A-K.1.1	1	6343	0.67	0.17	0.07	0.67	0.09	0.00	0.36	-0.11	-0.31	0.36	-0.18	0.0727	0.0304	7.4	1.1	8.4	1.2	A-	A-	A-
ELA	3	643057	5	A-V.4.1	1	6343	0.29	0.31	0.29	0.18	0.22	0.00	0.21	-0.13	0.21	-0.04	-0.05	2.1481	0.0310	9.8	1.2	9.9	1.7	A-	A+	A-
ELA	3	440428	6	A-V.4.1	2	6359	0.87	0.87	0.05	0.05	0.03	0.01	0.53	0.53	-0.27	-0.33	-0.27	-1.3881	0.0406	-7.9	0.8	-8.8	0.6	A+	B-	C-
ELA	3	792044	6	A-V.4.1	2	6359	0.89	0.05	0.89	0.03	0.03	0.00	0.47	-0.24	0.47	-0.31	-0.23	-1.6401	0.0436	-5.7	0.8	-3.3	0.8	A-	A-	A-
ELA	3	912399	6	A-V.4.1	2	6359	0.61	0.61	0.07	0.08	0.24	0.00	0.40	0.40	-0.32	-0.27	-0.08	0.4502	0.0295	5.2	1.1	4.0	1.1	A+	A-	A-
ELA	3	298913	6	A-V.4.1	1	6359	0.58	0.18	0.58	0.15	0.09	0.00	0.42	-0.20	0.42	-0.14	-0.28	0.5967	0.0292	2.7	1.0	1.2	1.0	A-	A-	A-
ELA	3	730864	6	A-K.1.1	3	6359	0.50	0.12	0.25	0.13	0.50	0.01	0.36	-0.22	-0.03	-0.26	0.36	1.0613	0.0287	5.6	1.1	8.7	1.2	A+	A+	A+
ELA	3	651345	6	A-K.1.1	2	6359	0.49	0.26	0.14	0.10	0.49	0.01	0.40	-0.05	-0.27	-0.25	0.40	1.1167	0.0287	3.6	1.0	6.1	1.1	A-	A-	A-
ELA	3	924881	6	A-K.1.1	2	6359	0.78	0.08	0.07	0.06	0.78	0.01	0.56	-0.27	-0.32	-0.31	0.56	-0.6448	0.0342	-9.4	0.8	-9.5	0.7	A-	A-	A-
ELA	3	735770	6	A-K.1.1	2	6359	0.37	0.30	0.14	0.37	0.19	0.01	0.22	-0.03	-0.17	0.22	-0.07	1.7565	0.0295	9.9	1.2	9.9	1.6	A+	A+	A+
ELA	3	994549	7	A-K.1.1	2	6289	0.48	0.21	0.15	0.14	0.48	0.02	0.38	-0.16	-0.11	-0.18	0.38	1.1305	0.0288	5.7	1.1	5.9	1.1	A-	A-	A-
ELA	3	608586	7	A-K.1.1	2	6289	0.37	0.18	0.37	0.29	0.15	0.01	0.26	-0.31	0.26	0.08	-0.12	1.7175	0.0295	9.9	1.2	9.9	1.4	A-	A-	A+
ELA	3	820069	7	A-K.1.1	3	6289	0.47	0.22	0.47	0.15	0.15	0.01	0.29	-0.12	0.29	-0.18	-0.07	1.1979	0.0288	9.9	1.2	9.9	1.3	A+	A+	A-
ELA	3	817462	7	A-K.1.1	2	6289	0.64	0.15	0.10	0.11	0.64	0.00	0.49	-0.22	-0.25	-0.25	0.49	0.2854	0.0299	-4.5	0.9	-4.7	0.9	A+	A-	A+
ELA	3	272411	7	A-V.4.1	2	6289	0.79	0.06	0.09	0.05	0.79	0.00	0.50	-0.28	-0.27	-0.25	0.50	-0.7086	0.0347	-5.0	0.9	-7.0	0.8	A-	A-	A-
ELA	3	542279	7	A-V.4.1	2	6289	0.61	0.26	0.61	0.06	0.07	0.00	0.36	-0.15	0.36	-0.24	-0.21	0.4695	0.0295	7.6	1.1	3.4	1.1	A-	A-	A+
ELA	3	138426	7	A-V.4.1	2	6289	0.59	0.59	0.07	0.18	0.15	0.00	0.24	0.24	-0.24	-0.03	-0.12	0.5476	0.0293	9.9	1.3	9.9	1.4	A-	A+	A+
ELA	3	752620	7	A-V.4.1	2	6289	0.63	0.09	0.63	0.17	0.09	0.01	0.40	-0.22	0.40	-0.17	-0.21	0.3196	0.0298	4.7	1.1	4.0	1.1	A+	A+	A+
ELA	3	343489	8	A-K.1.1	2	6304	0.60	0.15	0.60	0.15	0.09	0.00	0.53	-0.27	0.53	-0.27	-0.21	0.5224	0.0294	-8.6	0.9	-8.4	0.8	A-	A-	A-
ELA	3	985223	8	A-K.1.1	2	6304	0.46	0.18	0.13	0.21	0.46	0.01	0.34	-0.11	-0.22	-0.12	0.34	1.2298	0.0289	9.0	1.1	9.9	1.2	A-	A-	A-
ELA	3	433159	8	A-K.1.1	2	6304	0.53	0.11	0.53	0.14	0.22	0.00	0.41	-0.31	0.41	-0.20	-0.08	0.9010	0.0289	3.2	1.0	3.1	1.1	A-	A-	A-
ELA	3	102056	8	A-C.2.1	2	6304	0.43	0.43	0.18	0.29	0.09	0.01	0.27	0.27	-0.16	-0.03	-0.19	1.4004	0.0290	9.9	1.2	9.9	1.4	A-	A+	A+
ELA	3	501801	8	A-V.4.1	2	6304	0.57	0.57	0.11	0.12	0.20	0.01	0.29	0.29	-0.18	-0.16	-0.08	0.6869	0.0292	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	3	150411	8	A-V.4.1	2	6304	0.55	0.22	0.08	0.14	0.55	0.01	0.36	-0.06	-0.32	-0.18	0.36	0.7695	0.0290	9.4	1.1	9.2	1.2	A-	B-	B-
ELA	3	352525	8	A-V.4.1	1	6304	0.83	0.08	0.04	0.83	0.04	0.01	0.55	-0.34	-0.27	0.55	-0.30	-1.0481	0.0374	-9.7	0.8	-8.2	0.7	A-	A-	A-
ELA	3	439168	8	A-V.4.1	2	6304	0.68	0.09	0.14	0.08	0.68	0.01	0.48	-0.23	-0.21	-0.28	0.48	0.0741	0.0307	-2.3	1.0	-1.5	1.0	A-	A-	A-
ELA	3	754027	9	A-K.1.1	2	6282	0.56	0.17	0.56	0.09	0.17	0.00	0.41	-0.13	0.41	-0.30	-0.17	0.7261	0.0290	2.1	1.0	1.7	1.0	A+	A+	A-
ELA	3	130552	9	A-K.1.1	2	6282	0.52	0.20	0.52	0.16	0.11	0.01	0.31	-0.11	0.31	-0.09	-0.23	0.9150	0.0288	9.9	1.2	9.9	1.2	A+	A-	A-
ELA	3	889088	9	A-V.4.1	2	6282	0.76	0.10	0.76	0.05	0.08	0.00	0.52	-0.30	0.52	-0.29	-0.24	-0.4737	0.0332	-7.4	0.9	-8.1	0.7	A+	A-	A-
ELA	3	233865	9	A-V.4.1	2	6282	0.37	0.28	0.37	0.18	0.17	0.00	0.20	-0.28	0.20	-0.07	0.15	1.7085	0.0294	9.9	1.2	9.9	1.5	A-	A+	A+
ELA	3	136251	9	A-V.4.1	2	6282	0.58	0.12	0.58	0.16	0.13	0.00	0.37	-0.24	0.37	-0.17	-0.11	0.6280	0.0291	6.8	1.1	5.0	1.1	A+	A-	A-
ELA	3	646104	9	A-K.1.1	3	6282	0.37	0.38	0.09	0.37	0.14	0.01	0.24	-0.05	-0.21	0.24	-0.08	1.7249	0.0294	9.9	1.1	9.9	1.5	A+	A+	A+
ELA	3	504732	9	A-V.4.1	2	6282	0.71	0.71	0.18	0.06	0.04	0.01	0.42	0.42	-0.18	-0.26	-0.29	-0.1456	0.0315	1.1	1.0	1.1	1.0	A+	A-	A-
ELA	3	164722	9	A-K.1.1	2	6282	0.37	0.34	0.17	0.37	0.11	0.01	0.31	-0.01	-0.25	0.31	-0.14	1.7249	0.0294	7.0	1.1	9.9	1.3	A+	A+	A-
ELA	3	159753	10	A-K.1.1	2	6294	0.71	0.71	0.10	0.09	0.09	0.00	0.45	0.45	-0.23	-0.23	-0.22	-0.1279	0.0315	-0.2	1.0	-2.7	0.9	A+	A+	A-
ELA	3	921100	10	A-K.1.1	3	6294	0.56	0.15	0.20	0.56	0.09	0.00	0.39	-0.27	-0.07	0.39	-0.22	0.7474	0.0290	5.1	1.1	5.3	1.1	A+	A-	A-
ELA	3	349808	10	A-V.4.1	2	6294	0.87	0.06	0.87	0.04	0.04	0.00	0.50	-0.30	0.50	-0.28	-0.24	-1.3407	0.0403	-6.1	0.9	-8.5	0.6	A-	A-	A-
ELA	3	885979	10	A-K.1.1	2	6294	0.55	0.55	0.09	0.19	0.16	0.01	0.31	0.31	-0.22	-0.11	-0.12	0.7659	0.0290	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	3	539117	10	A-C.2.1	2	6294	0.51	0.38	0.04	0.05	0.51	0.01	0.36	-0.11	-0.27	-0.29	0.36	0.9904	0.0288	7.5	1.1	7.3	1.1	A+	A-	A-
ELA	3	352057	10	A-V.4.1	2	6294	0.11	0.21	0.11	0.51	0.16	0.00	-0.14	-0.10	-0.14	0.16	0.02	3.6544	0.0434	8.0	1.3	9.9	5.1	A+	A+	A+
ELA	3	316464	10	A-V.4.1	2	6294	0.79	0.12	0.04	0.79	0.05	0.00	0.55	-0.29	-0.30	0.55	-0.31	-0.6470	0.0343	-8.4	0.9	-9.9	0.7	A+	B-	A-
ELA	3	205933	10	A-C.3.1	3	6294	0.30	0.30	0.19	0.26	0.24	0.01	0.17	0.17	-0.19	0.06	-0.05	2.1197	0.0307	9.9	1.2	9.9	1.8	A-	A-	A+
ELA	3	531308	11	B.2.1.1	2	63067	0.66	0.07	0.08	0.66	0.18	0.00	0.46	-0.28	-0.20	0.46	-0.23	0.1570	0.0095	-6.3	1.0	-9.8	0.9			
ELA	3	729263	11	B.1.1.1	2	63067	0.54	0.07	0.19	0.19	0.54	0.00	0.45	-0.16	-0.13	-0.33	0.45	0.8306	0.0091	-7.3	1.0	-4.8	1.0			
ELA	3	176097	11	A.1.4.1	1	63067	0.75	0.75	0.08	0.07	0.09	0.00	0.53	0.53	-0.28	-0.28	-0.27	-0.3884	0.0103	-9.9	0.9	-9.9	0.7			
ELA	3	274899	11	A.1.3.1	2	63067	0.71	0.13	0.11	0.71	0.04	0.01	0.35	-0.16	-0.18	0.35	-0.24	-0.1091	0.0099	9.9	1.1	9.9	1.2			
ELA	3	205293	11	A.1.5.1	3	63067	0.55	0.15	0.55	0.19	0.11	0.00	0.34	-0.29	0.34	-0.10	-0.07	0.7864	0.0091	9.9	1.1	9.9	1.2			
ELA	3	921044	11	A.1.3.1	2	63067	0.77	0.11	0.04	0.08	0.77	0.00	0.44	-0.30	-0.31	-0.11	0.44	-0.5069	0.0106	-6.8	1.0	3.8	1.0			
ELA	3	629231	11	B.1.1.1	2	63067	0.59	0.59	0.03	0.32	0.06	0.01	0.39	0.39	-0.24	-0.19	-0.25	0.5922	0.0092	9.9	1.1	9.9	1.1			
ELA	3	244633	11	A.1.2.2	2	63067	0.85	0.85	0.03	0.06	0.06	0.01	0.47	0.47	-0.26	-0.26	-0.26	-1.1693	0.0122	-9.9	0.9	-9.9	0.8			
ELA	3	918956	11	B-K.1.1	2	6315	0.37	0.26	0.37	0.16	0.21	0.01	0.20	-0.16	0.20	-0.15	0.09	1.6983	0.0293	9.9	1.2	9.9	1.5	A-	A-	A+

Appendix G: Item Statistics Multiple Choice

ELA	3	442381	11	B-C.2.1	3	6315	0.25	0.12	0.25	0.17	0.45	0.01	0.12	-0.20	0.12	-0.11	0.11	2.3741	0.0319	9.9	1.2	9.9	2.0	A-	A+	A+
ELA	3	236105	11	B-C.3.1	2	6315	0.48	0.14	0.19	0.18	0.48	0.01	0.39	-0.22	-0.07	-0.22	0.39	1.1291	0.0285	2.1	1.0	5.5	1.1	A+	A-	A-
ELA	3	177732	11	B-C.3.1	2	6315	0.39	0.14	0.38	0.39	0.08	0.01	0.15	-0.17	0.08	0.15	-0.19	1.5893	0.0290	9.9	1.3	9.9	1.6	A-	A-	A-
ELA	3	980627	11	B-V.4.1	2	6315	0.62	0.62	0.14	0.14	0.10	0.01	0.43	0.43	-0.21	-0.25	-0.16	0.3869	0.0294	1.4	1.0	1.1	1.0	A+	A-	A-
ELA	3	353408	11	B-V.4.1	2	6315	0.54	0.25	0.11	0.09	0.54	0.01	0.34	-0.16	-0.14	-0.18	0.34	0.7824	0.0287	8.9	1.1	8.4	1.2	A+	A-	A-
ELA	3	551200	11	B-V.4.1	1	6315	0.80	0.09	0.05	0.80	0.05	0.00	0.56	-0.34	-0.34	0.56	-0.20	-0.7995	0.0351	-9.9	0.8	-9.9	0.6	A-	A-	A-
ELA	3	198444	11	B-K.1.1	2	6315	0.76	0.76	0.07	0.07	0.10	0.00	0.57	0.57	-0.22	-0.28	-0.38	-0.4536	0.0328	-9.9	0.8	-9.9	0.7	A+	A-	B-
ELA	3	818152	12	B-K.1.1	2	6327	0.58	0.58	0.13	0.13	0.14	0.01	0.39	0.39	-0.24	-0.23	-0.08	0.6322	0.0290	4.4	1.1	3.6	1.1	A-	A-	A-
ELA	3	384544	12	B-K.1.1	2	6327	0.45	0.21	0.10	0.23	0.45	0.01	0.41	-0.23	-0.24	-0.08	0.41	1.3095	0.0286	-2.1	1.0	3.1	1.1	A+	A-	A-
ELA	3	388152	12	B-C.2.1	2	6327	0.23	0.12	0.23	0.42	0.22	0.01	0.03	-0.13	0.03	0.12	-0.07	2.6061	0.0330	9.9	1.3	9.9	2.4	A-	A-	A+
ELA	3	937279	12	B-C.3.1	3	6327	0.59	0.19	0.59	0.13	0.09	0.01	0.46	-0.19	0.46	-0.23	-0.27	0.5746	0.0291	-3.3	1.0	-3.9	0.9	A-	A+	A-
ELA	3	590350	12	B-C.3.1	2	6327	0.54	0.24	0.10	0.12	0.54	0.00	0.46	-0.17	-0.26	-0.25	0.46	0.8342	0.0287	-4.3	1.0	-3.2	0.9	A-	A-	A-
ELA	3	128476	12	B-K.1.1	2	6327	0.52	0.25	0.08	0.52	0.14	0.01	0.34	-0.16	-0.23	0.34	-0.10	0.9340	0.0286	8.8	1.1	8.8	1.2	A+	A-	A+
ELA	3	397272	12	B-V.4.1	2	6327	0.67	0.11	0.67	0.07	0.15	0.00	0.44	-0.26	0.44	-0.26	-0.17	0.1281	0.0303	-0.2	1.0	-0.8	1.0	A-	A-	A-
ELA	3	365385	12	B-V.4.1	2	6327	0.62	0.62	0.16	0.09	0.12	0.01	0.36	0.36	-0.16	-0.17	-0.21	0.4042	0.0295	6.5	1.1	4.5	1.1	C-	A-	B-
ELA	3	586668	13	B-C.3.1	2	6294	0.61	0.17	0.61	0.12	0.08	0.01	0.33	-0.05	0.33	-0.21	-0.24	0.5010	0.0290	8.8	1.1	8.4	1.2	A-	A+	A-
ELA	3	929778	13	B-K.1.1	3	6294	0.36	0.36	0.33	0.19	0.12	0.01	0.09	0.09	0.12	-0.13	-0.14	1.7992	0.0291	9.9	1.3	9.9	1.7	A+	A+	A+
ELA	3	250894	13	B-C.2.1	2	6294	0.24	0.19	0.07	0.24	0.48	0.02	0.05	-0.19	-0.26	0.05	0.25	2.4469	0.0318	9.9	1.3	9.9	2.1	A-	A-	A+
ELA	3	376062	13	B-C.2.1	2	6294	0.56	0.12	0.56	0.21	0.10	0.00	0.16	-0.14	0.16	-0.06	-0.02	0.7318	0.0285	9.9	1.3	9.9	1.4	A-	A-	A-
ELA	3	228611	13	B-K.1.1	2	6294	0.44	0.28	0.20	0.08	0.44	0.01	0.30	-0.11	-0.07	-0.26	0.30	1.3465	0.0283	9.5	1.1	9.9	1.2	A+	A-	A-
ELA	3	618080	13	B-C.3.1	2	6294	0.64	0.64	0.06	0.14	0.14	0.01	0.26	0.26	-0.21	-0.21	0.01	0.3094	0.0295	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	3	494450	13	B-V.4.1	2	6294	0.43	0.16	0.34	0.06	0.43	0.00	0.25	-0.27	0.03	-0.15	0.25	1.3884	0.0284	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	3	142225	13	B-V.4.1	2	6294	0.75	0.09	0.08	0.75	0.07	0.01	0.57	-0.31	-0.30	0.57	-0.30	-0.3475	0.0325	-9.9	0.8	-9.9	0.7	A+	A-	A-
ELA	3	987688	14	B-C.2.1	1	6308	0.76	0.07	0.08	0.76	0.09	0.00	0.46	-0.24	-0.19	0.46	-0.30	-0.4305	0.0329	-3.4	0.9	-5.3	0.8	A+	A-	A-
ELA	3	812261	14	B-C.2.1	2	6308	0.25	0.25	0.38	0.15	0.20	0.01	0.13	0.13	-0.03	-0.07	-0.05	2.4066	0.0319	9.9	1.2	9.9	1.9	A-	A-	A-
ELA	3	850547	14	B-C.3.1	1	6308	0.61	0.25	0.05	0.07	0.61	0.01	0.45	-0.25	-0.22	-0.21	0.45	0.4633	0.0293	-1.6	1.0	-2.0	1.0	A-	A-	A-
ELA	3	905413	14	B-V.4.1	2	6308	0.75	0.10	0.75	0.07	0.07	0.01	0.55	-0.29	0.55	-0.26	-0.31	-0.3981	0.0327	-9.2	0.9	-9.9	0.7	A-	A-	A-
ELA	3	698948	14	B-V.4.1	2	6308	0.82	0.08	0.04	0.82	0.05	0.00	0.48	-0.29	-0.26	0.48	-0.23	-0.9206	0.0364	-5.6	0.9	-4.3	0.8	A-	B-	C-
ELA	3	469943	14	B-C.2.1	1	6308	0.55	0.14	0.55	0.22	0.07	0.01	0.48	-0.39	0.48	-0.14	-0.15	0.7662	0.0288	-5.5	0.9	-5.0	0.9	A-	A-	A-
ELA	3	113898	14	B-K.1.1	1	6308	0.39	0.39	0.06	0.15	0.39	0.00	0.31	-0.04	-0.27	-0.19	0.31	1.6023	0.0290	8.5	1.1	9.9	1.2	A-	A-	A-
ELA	3	803010	14	B-K.1.1	2	6308	0.34	0.13	0.23	0.34	0.29	0.00	0.25	-0.19	-0.28	0.25	0.15	1.8961	0.0298	9.8	1.1	9.9	1.5	A-	A-	A-
ELA	3	654854	15	B-K.1.1	2	6314	0.45	0.35	0.10	0.08	0.45	0.01	0.34	-0.11	-0.19	-0.20	0.34	1.2794	0.0285	5.4	1.1	7.2	1.1	A+	A-	A-
ELA	3	712028	15	B-V.4.1	1	6314	0.78	0.78	0.04	0.10	0.07	0.00	0.35	0.35	-0.14	-0.17	-0.25	-0.6098	0.0339	2.4	1.1	5.6	1.2	A+	A+	A+
ELA	3	922687	15	B-C.3.1	2	6314	0.61	0.16	0.61	0.08	0.15	0.00	0.31	-0.19	0.31	-0.12	-0.14	0.4689	0.0291	9.9	1.1	8.5	1.2	A+	A+	A+
ELA	3	673146	15	B-C.3.1	2	6314	0.43	0.23	0.43	0.10	0.23	0.00	0.32	-0.13	0.32	-0.23	-0.07	1.3791	0.0286	6.0	1.1	9.6	1.2	A-	A-	A-
ELA	3	473751	15	B-K.1.1	2	6314	0.68	0.68	0.13	0.12	0.06	0.01	0.23	0.23	-0.22	-0.04	-0.07	0.0488	0.0304	9.9	1.2	9.9	1.3	A+	A-	A+
ELA	3	841114	15	B-C.3.1	2	6314	0.40	0.40	0.16	0.19	0.24	0.00	0.20	0.20	-0.18	-0.10	0.02	1.5320	0.0288	9.9	1.2	9.9	1.5	A-	A-	A-
ELA	3	786370	15	B-V.4.1	2	6314	0.60	0.17	0.15	0.60	0.07	0.00	0.35	-0.21	-0.18	0.35	-0.10	0.5021	0.0290	7.0	1.1	4.4	1.1	A+	A-	A+
ELA	3	766623	15	B-V.4.1	2	6314	0.57	0.18	0.57	0.15	0.09	0.00	0.39	-0.13	0.39	-0.15	-0.30	0.6578	0.0287	3.3	1.0	2.6	1.1	A-	A+	A-
ELA	3	973885	16	B-K.1.1	2	6327	0.62	0.16	0.13	0.09	0.62	0.00	0.50	-0.24	-0.23	-0.27	0.50	0.3776	0.0296	-5.5	0.9	-6.1	0.9	A+	A+	A+
ELA	3	326907	16	B-K.1.1	2	6327	0.39	0.33	0.18	0.08	0.39	0.01	0.19	0.07	-0.13	-0.26	0.19	1.5916	0.0291	9.9	1.3	9.9	1.5	A+	A-	A-
ELA	3	486980	16	B-C.2.1	3	6327	0.47	0.47	0.18	0.23	0.11	0.01	0.36	0.36	-0.13	-0.17	-0.20	1.1753	0.0287	5.4	1.1	7.6	1.2	A-	A-	A+
ELA	3	395229	16	B-C.3.1	3	6327	0.54	0.09	0.30	0.54	0.05	0.01	0.26	-0.27	0.01	0.26	-0.24	0.8201	0.0288	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	3	139172	16	B-V.4.1	3	6327	0.60	0.60	0.15	0.11	0.13	0.00	0.39	0.39	-0.25	-0.09	-0.20	0.4880	0.0293	5.5	1.1	4.8	1.1	A-	A+	A+
ELA	3	133657	16	B-V.4.1	2	6327	0.42	0.23	0.42	0.26	0.09	0.00	0.45	-0.26	0.45	-0.16	-0.14	1.4709	0.0289	-7.5	0.9	0.6	1.0	A+	A-	A-
ELA	3	359221	16	B-V.4.1	2	6327	0.43	0.29	0.12	0.14	0.43	0.02	0.42	-0.21	-0.09	-0.23	0.42	1.4131	0.0288	-3.1	1.0	2.9	1.1	A-	A-	A-
ELA	3	162339	16	B-V.4.1	2	6327	0.80	0.09	0.80	0.06	0.05	0.00	0.56	-0.29	0.56	-0.31	-0.31	-0.7430	0.0349	-9.4	0.8	-9.9	0.6	A-	A-	A-
ELA	3	269356	17	B-C.2.1	2	6345	0.21	0.41	0.22	0.16	0.21	0.00	0.12	0.12	-0.13	-0.15	0.12	2.6774	0.0335	9.6	1.2	9.9	1.9	A+	A-	A-
ELA	3	508561	17	B-C.3.1	2	6345	0.67	0.67	0.15	0.13	0.04	0.00	0.41	0.41	-0.27	-0.18	-0.15	0.1147	0.0303	2.1	1.0	0.9	1.0	A+	A-	A-
ELA	3	864851	17	B-V.4.1	2	6345	0.87	0.06	0.87	0.04	0.03	0.00	0.53	-0.31	0.53	-0.30	-0.27	-1.3418	0.0404	-8.1	0.8	-9.5	0.6	A+	A-	B-
ELA	3	778103	17	B-V.4.1	2	6345	0.45	0.35	0.16	0.45	0.04	0.01	0.18	-0.02	-0.07	0.18	-0.28	1.3224	0.0285	9.9	1.3	9.9	1.5	A+	A-	A+

Appendix G: Item Statistics Multiple Choice

ELA	3	435805	17	B-V.4.1	2	6345	0.70	0.07	0.11	0.70	0.11	0.00	0.52	-0.32	-0.23	0.52	-0.26	-0.0583	0.0310	-6.1	0.9	-8.4	0.8	B-	A-	A-
ELA	3	667042	17	B-V.4.1	3	6345	0.66	0.19	0.66	0.06	0.09	0.00	0.43	-0.27	0.43	-0.26	-0.12	0.2012	0.0300	0.6	1.0	0.7	1.0	A+	A-	A-
ELA	3	748090	17	B-K.1.1	1	6345	0.43	0.11	0.17	0.28	0.43	0.00	0.27	-0.26	-0.19	0.04	0.27	1.4164	0.0286	9.9	1.2	9.9	1.3	A+	A+	A+
ELA	3	210560	17	B-K.1.1	1	6345	0.74	0.74	0.11	0.10	0.05	0.01	0.44	0.44	-0.22	-0.23	-0.27	-0.2832	0.0320	-1.0	1.0	0.1	1.0	A+	A-	A-
ELA	3	619223	18	B-K.1.1	3	6299	0.32	0.37	0.32	0.25	0.06	0.00	0.21	-0.20	0.21	0.11	-0.21	1.9525	0.0300	9.9	1.1	9.9	1.6	A-	A-	A-
ELA	3	617363	18	B-K.1.1	3	6299	0.54	0.10	0.17	0.54	0.19	0.00	0.24	-0.21	-0.09	0.24	-0.06	0.7741	0.0286	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	3	123806	18	B-K.1.1	2	6299	0.47	0.24	0.21	0.47	0.07	0.01	0.23	-0.07	-0.10	0.23	-0.17	1.1793	0.0285	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	3	672807	18	B-K.1.1	2	6299	0.42	0.42	0.18	0.20	0.19	0.01	0.15	0.15	-0.12	-0.01	-0.06	1.3994	0.0287	9.9	1.3	9.9	1.5	A+	A+	A-
ELA	3	419043	18	B-C.3.1	2	6299	0.54	0.19	0.21	0.54	0.05	0.01	0.50	-0.19	-0.32	0.50	-0.17	0.8037	0.0286	-8.0	0.9	-6.4	0.9	A+	A-	A-
ELA	3	637413	18	B-C.3.1	2	6299	0.60	0.12	0.09	0.18	0.60	0.01	0.33	-0.15	-0.22	-0.11	0.33	0.4780	0.0291	9.4	1.1	8.0	1.2	A+	A-	A-
ELA	3	838470	18	B-V.4.1	2	6299	0.39	0.39	0.48	0.10	0.03	0.00	0.12	0.12	0.11	-0.24	-0.23	1.5885	0.0290	9.9	1.3	9.9	1.6	A+	A+	A-
ELA	3	783083	18	B-V.4.1	1	6299	0.68	0.68	0.19	0.05	0.08	0.00	0.50	0.50	-0.28	-0.28	-0.22	0.0276	0.0304	-5.4	0.9	-4.6	0.9	A+	A+	A-
ELA	3	917784	19	B-V.4.1	1	6291	0.77	0.06	0.77	0.13	0.02	0.00	0.40	-0.28	0.40	-0.16	-0.27	-0.5328	0.0338	1.3	1.0	2.5	1.1	A+	A-	A-
ELA	3	615393	19	B-K.1.1	1	6291	0.49	0.25	0.49	0.20	0.06	0.00	0.35	-0.17	0.35	-0.05	-0.32	1.1174	0.0288	9.5	1.1	9.7	1.2	A-	A-	A-
ELA	3	273729	19	B-K.1.1	1	6291	0.74	0.74	0.15	0.06	0.04	0.01	0.42	0.42	-0.17	-0.28	-0.29	-0.3224	0.0326	0.7	1.0	-0.7	1.0	A+	A-	A-
ELA	3	504589	19	B-K.1.1	1	6291	0.75	0.09	0.07	0.75	0.08	0.00	0.52	-0.32	-0.24	0.52	-0.24	-0.3850	0.0330	-6.0	0.9	-7.2	0.8	A+	A-	A-
ELA	3	280092	19	B-C.2.1	2	6291	0.67	0.67	0.18	0.09	0.06	0.00	0.43	0.43	-0.16	-0.26	-0.28	0.1443	0.0305	1.6	1.0	-0.7	1.0	A-	A+	A-
ELA	3	944676	19	B-C.3.1	2	6291	0.66	0.14	0.10	0.66	0.10	0.00	0.52	-0.31	-0.23	0.52	-0.24	0.1723	0.0304	-6.6	0.9	-8.2	0.8	A+	A-	A-
ELA	3	547645	19	B-C.3.1	2	6291	0.58	0.58	0.17	0.14	0.10	0.01	0.44	0.44	-0.28	-0.17	-0.18	0.6295	0.0292	0.0	1.0	-1.1	1.0	A-	A+	A-
ELA	3	481890	19	B-C.3.1	3	6291	0.22	0.23	0.44	0.22	0.11	0.00	0.12	-0.10	0.11	0.12	-0.19	2.6663	0.0334	9.5	1.2	9.9	2.1	A-	A-	A-
ELA	3	498928	20	B-K.1.1	2	6247	0.70	0.08	0.70	0.11	0.11	0.01	0.50	-0.31	0.50	-0.20	-0.26	-0.0746	0.0314	-4.2	0.9	-4.8	0.9	A-	A-	A-
ELA	3	696782	20	B-K.1.1	3	6247	0.83	0.07	0.83	0.04	0.05	0.00	0.54	-0.30	0.54	-0.28	-0.29	-1.0067	0.0372	-7.9	0.8	-9.8	0.6	A+	A-	A-
ELA	3	569492	20	B-C.2.1	2	6247	0.43	0.14	0.33	0.43	0.10	0.00	0.23	-0.23	0.06	0.23	-0.20	1.4070	0.0291	9.9	1.2	9.9	1.5	A+	A-	A+
ELA	3	628630	20	B-V.4.1	1	6247	0.86	0.03	0.05	0.03	0.86	0.01	0.53	-0.28	-0.34	-0.29	0.53	-1.3136	0.0402	-8.6	0.8	-8.2	0.6	A+	A-	A-
ELA	3	882670	20	B-V.4.1	2	6247	0.90	0.05	0.03	0.90	0.02	0.00	0.50	-0.34	-0.27	0.50	-0.22	-1.7125	0.0450	-6.9	0.8	-9.1	0.5	A-	A-	A-
ELA	3	685380	20	B-V.4.1	2	6247	0.83	0.83	0.04	0.07	0.05	0.00	0.53	0.53	-0.30	-0.29	-0.27	-0.9694	0.0369	-7.7	0.8	-7.8	0.7	A-	A-	A-
ELA	3	268174	20	B-K.1.1	2	6247	0.56	0.20	0.14	0.56	0.10	0.00	0.42	-0.20	-0.21	0.42	-0.19	0.7143	0.0292	2.3	1.0	3.8	1.1	A-	A-	A+
ELA	3	900776	20	B-C.3.1	2	6247	0.35	0.42	0.15	0.07	0.35	0.00	0.33	-0.01	-0.28	-0.20	0.33	1.8336	0.0299	1.6	1.0	9.9	1.4	A+	A-	A+
READIN	4	857289	0	A.1.2.1	2	126253	0.75	0.05	0.16	0.03	0.75	0.00	0.31	-0.18	-0.15	-0.20	0.31	-0.3941	0.0072	9.9	1.1	9.9	1.1			
READIN	4	676948	0	A.1.3.1	1	126253	0.80	0.80	0.06	0.05	0.08	0.00	0.48	0.48	-0.25	-0.26	-0.26	-0.7147	0.0077	-9.9	0.9	-9.9	0.8			
READIN	4	170162	0	A.1.5.1	2	126253	0.81	0.04	0.09	0.81	0.06	0.00	0.48	-0.25	-0.27	0.48	-0.24	-0.7846	0.0078	-9.9	0.9	-9.9	0.7			
READIN	4	854571	0	B.1.1.1	2	126253	0.80	0.10	0.03	0.06	0.80	0.00	0.52	-0.25	-0.29	-0.31	0.52	-0.6570	0.0076	-9.9	0.8	-9.9	0.7			
READIN	4	845807	0	A.1.1.1	2	126253	0.71	0.20	0.04	0.71	0.05	0.00	0.43	-0.20	-0.28	0.43	-0.25	-0.0906	0.0068	-8.6	1.0	-9.9	0.9			
READIN	4	996614	0	A.1.6.1	2	126253	0.61	0.10	0.17	0.61	0.12	0.00	0.35	-0.28	-0.12	0.35	-0.11	0.4869	0.0064	9.9	1.1	9.9	1.1			
READIN	4	686072	0	B.1.1.1	2	126253	0.68	0.68	0.13	0.10	0.09	0.00	0.38	0.38	-0.16	-0.11	-0.31	0.0735	0.0067	7.4	1.0	9.9	1.1			
READIN	4	767504	0	A.2.3.1	2	126253	0.37	0.47	0.03	0.37	0.13	0.00	0.31	-0.10	-0.23	0.31	-0.17	1.5858	0.0064	9.9	1.1	9.9	1.2			
READIN	4	754929	0	A.2.4.1	1	126253	0.67	0.23	0.03	0.06	0.67	0.00	0.35	-0.11	-0.24	-0.30	0.35	0.1110	0.0067	9.9	1.1	9.9	1.1			
READIN	4	306348	0	A.2.2.1	2	126253	0.69	0.19	0.69	0.06	0.06	0.00	0.47	-0.35	0.47	-0.20	-0.15	0.0475	0.0067	-9.9	0.9	-9.9	0.9			
READIN	4	604428	0	B.3.3.3	2	126253	0.66	0.16	0.10	0.66	0.08	0.00	0.31	-0.12	-0.18	0.31	-0.17	0.1790	0.0066	9.9	1.1	9.9	1.1			
READIN	4	621765	0	A.2.3.1	2	126253	0.76	0.76	0.05	0.15	0.04	0.00	0.47	0.47	-0.25	-0.26	-0.26	-0.4425	0.0073	-9.9	0.9	-9.9	0.8			
READIN	4	405322	0	A.2.4.1	2	126253	0.45	0.32	0.06	0.16	0.45	0.00	0.28	-0.20	-0.20	0.01	0.28	1.1026	0.0063	9.9	1.1	9.9	1.2			
READIN	4	880961	0	A.2.3.1	2	126253	0.74	0.04	0.74	0.11	0.11	0.00	0.50	-0.26	0.50	-0.24	-0.29	-0.3393	0.0071	-9.9	0.9	-9.9	0.8			
READIN	4	228772	0	A.2.3.1	2	126253	0.62	0.62	0.05	0.14	0.18	0.00	0.35	0.35	-0.21	-0.15	-0.18	0.5327	0.0064	9.9	1.1	9.9	1.1			
READIN	4	200141	0	A.1.2.2	2	126253	0.89	0.03	0.04	0.04	0.89	0.00	0.44	-0.22	-0.24	-0.27	0.44	-1.6045	0.0097	-9.9	0.9	-9.9	0.7			
READIN	4	873058	0	B.2.1.1	2	126253	0.62	0.15	0.62	0.11	0.11	0.00	0.47	-0.30	0.47	-0.21	-0.16	0.3721	0.0065	-9.9	0.9	-9.9	0.9			
READIN	4	433250	0	B.1.1.1	2	126253	0.79	0.79	0.06	0.05	0.09	0.00	0.30	0.30	-0.18	-0.27	-0.06	-0.7906	0.0078	9.9	1.1	9.9	1.4			
READIN	4	778345	0	B.2.1.3	2	126253	0.71	0.06	0.12	0.71	0.10	0.00	0.36	-0.31	-0.18	0.36	-0.10	-0.1124	0.0069	9.9	1.0	6.9	1.0			
READIN	4	539204	0	A.1.3.1	2	126253	0.78	0.06	0.08	0.78	0.07	0.00	0.41	-0.27	-0.21	0.41	-0.18	-0.6452	0.0076	2.1	1.0	-7.0	1.0			
READIN	4	249409	0	B.2.1.1	2	126253	0.74	0.74	0.13	0.08	0.05	0.00	0.44	0.44	-0.28	-0.19	-0.21	-0.2191	0.0070	-9.9	1.0	-9.9	0.9			
READIN	4	387664	0	B.1.2.1	2	126253	0.78	0.06	0.06	0.78	0.09	0.01	0.37	-0.23	-0.28	0.37	-0.10	-0.5634	0.0074	1.9	1.0	4.4	1.0			
READIN	4	961412	0	A.1.3.1	2	126253	0.58	0.20	0.14	0.58	0.08	0.00	0.31	-0.21	-0.04	0.31	-0.21	0.4820	0.0064	9.9	1.1	9.9	1.2			

Appendix G: Item Statistics Multiple Choice

READIN	4	554550	0	A.2.6.1	2	126253	0.77	0.77	0.06	0.12	0.05	0.00	0.40	0.40	-0.25	-0.20	-0.20	-0.4173	0.0072	-8.1	1.0	-9.9	0.9			
READIN	4	630461	0	B.3.3.4	2	126253	0.54	0.14	0.16	0.54	0.16	0.00	0.35	-0.12	-0.16	0.35	-0.19	0.6417	0.0064	9.9	1.1	9.9	1.1			
READIN	4	891456	0	A.2.4.1	2	126253	0.70	0.08	0.07	0.70	0.14	0.00	0.37	-0.23	-0.22	0.37	-0.12	-0.1309	0.0069	9.9	1.1	9.9	1.1			
READIN	4	936150	0	A.2.3.1	2	126253	0.77	0.05	0.12	0.05	0.77	0.01	0.55	-0.27	-0.31	-0.30	0.55	-0.4506	0.0073	-9.9	0.8	-9.9	0.7			
READIN	4	625316	0	A.2.6.1	2	126253	0.70	0.70	0.07	0.15	0.08	0.01	0.37	0.37	-0.18	-0.18	-0.21	-0.1163	0.0069	9.9	1.1	9.9	1.1			
READIN	4	653670	0	A.2.4.1	1	126253	0.60	0.28	0.60	0.03	0.08	0.00	0.48	-0.28	0.48	-0.21	-0.25	0.4893	0.0064	-9.9	0.9	-9.9	0.9			
READIN	4	271261	0	A.2.4.1	2	126253	0.70	0.06	0.70	0.13	0.11	0.00	0.44	-0.21	0.44	-0.27	-0.18	-0.0801	0.0068	-9.3	1.0	-1.2	1.0			
READIN	4	286426	0	A.2.4.1	1	126253	0.52	0.52	0.15	0.06	0.26	0.00	0.43	0.43	-0.30	-0.28	-0.08	0.9407	0.0063	-8.1	1.0	-2.3	1.0			
READIN	4	139778	0	A.2.3.1	2	126253	0.64	0.21	0.05	0.64	0.09	0.00	0.43	-0.22	-0.26	0.43	-0.18	0.2250	0.0066	0.1	1.0	-5.9	1.0			
READIN	4	364956	0	A.1.2.1	2	126253	0.82	0.82	0.11	0.04	0.03	0.00	0.43	0.43	-0.22	-0.25	-0.25	-0.8290	0.0079	-9.9	0.9	-9.9	0.8			
READIN	4	301642	0	A.1.1.1	2	126253	0.76	0.03	0.15	0.05	0.76	0.01	0.45	-0.25	-0.24	-0.27	0.45	-0.4513	0.0073	-9.9	0.9	-9.9	0.9			
READIN	4	739313	0	A.1.3.1	2	126253	0.57	0.23	0.14	0.06	0.57	0.00	0.40	-0.25	-0.13	-0.18	0.40	0.6197	0.0064	9.4	1.0	9.9	1.1			
READIN	4	642662	0	A.1.3.1	2	126253	0.79	0.11	0.79	0.03	0.06	0.00	0.40	-0.15	0.40	-0.24	-0.28	-0.6803	0.0076	-1.1	1.0	7.5	1.1			
READIN	4	366336	0	A.1.4.1	2	126253	0.56	0.09	0.08	0.56	0.26	0.01	0.48	-0.28	-0.24	0.48	-0.19	0.7491	0.0063	-9.9	0.9	-9.9	0.9			
READIN	4	153137	0	B.2.1.2	2	126253	0.72	0.72	0.07	0.16	0.04	0.01	0.43	0.43	-0.20	-0.23	-0.26	-0.2582	0.0070	-3.4	1.0	-5.7	1.0			
READIN	4	278091	0	A.1.6.1	2	126253	0.72	0.13	0.72	0.11	0.04	0.01	0.53	-0.29	0.53	-0.27	-0.26	-0.1514	0.0069	-9.9	0.9	-9.9	0.8			
READIN	4	632492	0	A.1.4.1	1	126253	0.61	0.13	0.22	0.61	0.03	0.00	0.36	-0.32	-0.05	0.36	-0.23	0.5485	0.0064	9.9	1.1	9.9	1.1			
ELA	4	814134	1	B.2.1.3	2	63316	0.60	0.60	0.17	0.17	0.06	0.00	0.39	0.39	-0.26	-0.12	-0.21	0.4808	0.0091	9.9	1.0	7.7	1.1			
ELA	4	271851	1	B.1.1.1	2	63316	0.78	0.10	0.06	0.06	0.78	0.00	0.53	-0.22	-0.32	-0.32	0.53	-0.5812	0.0105	-9.9	0.9	-9.9	0.7			
ELA	4	635182	1	B.1.1.1	2	63316	0.66	0.23	0.03	0.66	0.07	0.00	0.47	-0.25	-0.24	0.47	-0.28	0.1353	0.0094	-9.9	0.9	-9.9	0.9			
ELA	4	510956	1	B.1.1.1	2	63316	0.85	0.08	0.85	0.04	0.03	0.00	0.41	-0.22	0.41	-0.24	-0.23	-1.1351	0.0119	-9.9	0.9	-7.9	0.9			
ELA	4	650367	1	A.1.1.1	2	63316	0.81	0.81	0.05	0.05	0.09	0.00	0.48	0.48	-0.27	-0.29	-0.23	-0.7991	0.0110	-9.9	0.9	-9.9	0.8			
ELA	4	159092	1	A.1.6.1	2	63316	0.80	0.80	0.07	0.08	0.05	0.00	0.46	0.46	-0.22	-0.21	-0.32	-0.7586	0.0109	-9.9	0.9	-9.9	0.8			
ELA	4	517815	1	A.1.4.1	2	63316	0.82	0.08	0.82	0.06	0.05	0.00	0.40	-0.24	0.40	-0.18	-0.23	-0.9184	0.0113	-7.4	1.0	-4.6	0.9			
ELA	4	653146	1	B.1.1.1	2	63316	0.45	0.20	0.31	0.45	0.04	0.00	0.36	-0.32	-0.03	0.36	-0.17	1.2769	0.0089	9.9	1.1	9.9	1.1			
ELA	4	600030	1	B-C.3.1	3	6580	0.59	0.23	0.59	0.09	0.09	0.01	0.41	-0.08	0.41	-0.29	-0.29	0.4333	0.0282	3.8	1.1	4.1	1.1	A-	A-	A-
ELA	4	155536	1	B-V.4.1	2	6580	0.72	0.08	0.15	0.72	0.05	0.00	0.54	-0.28	-0.32	0.54	-0.24	-0.3140	0.0304	-9.7	0.9	-9.9	0.7	A-	B-	B-
ELA	4	968083	1	B-K.1.1	2	6580	0.40	0.25	0.17	0.17	0.40	0.01	0.34	-0.10	-0.15	-0.17	0.34	1.4047	0.0282	4.7	1.1	9.9	1.2	A-	A-	A-
ELA	4	663495	1	B-K.1.1	2	6580	0.48	0.29	0.09	0.13	0.48	0.00	0.37	-0.11	-0.31	-0.14	0.37	0.9763	0.0278	5.1	1.1	6.2	1.1	A+	A-	A-
ELA	4	140798	1	B-K.1.1	3	6580	0.52	0.27	0.11	0.10	0.52	0.00	0.46	-0.20	-0.21	-0.23	0.46	0.7981	0.0278	-3.2	1.0	-1.2	1.0	A+	A-	A-
ELA	4	261053	1	B-K.1.1	2	6580	0.58	0.58	0.10	0.22	0.09	0.00	0.42	0.42	-0.31	-0.05	-0.30	0.4524	0.0282	2.2	1.0	1.7	1.0	A-	A+	A+
ELA	4	374208	1	B-C.3.1	2	6580	0.52	0.24	0.12	0.52	0.11	0.00	0.41	-0.09	-0.29	0.41	-0.23	0.7592	0.0278	1.9	1.0	2.7	1.1	A-	A-	B-
ELA	4	185881	1	B-V.4.1	2	6580	0.70	0.04	0.18	0.70	0.08	0.00	0.52	-0.27	-0.31	0.52	-0.24	-0.1807	0.0299	-7.8	0.9	-7.4	0.8	A-	A-	A-
ELA	4	232436	2	B-K.1.1	3	6300	0.43	0.36	0.10	0.11	0.43	0.00	0.25	0.02	-0.22	-0.21	0.25	1.3317	0.0282	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	147275	2	B-C.2.1	3	6300	0.38	0.24	0.21	0.38	0.17	0.00	0.18	-0.06	-0.08	0.18	-0.07	1.5884	0.0286	9.9	1.2	9.9	1.4	A+	A+	A-
ELA	4	571619	2	B-C.3.1	2	6300	0.54	0.07	0.07	0.54	0.31	0.00	0.39	-0.26	-0.32	0.39	-0.09	0.7714	0.0281	0.8	1.0	1.8	1.0	A-	A-	A-
ELA	4	705734	2	B-C.3.1	3	6300	0.51	0.51	0.20	0.16	0.12	0.00	0.35	0.35	-0.16	-0.17	-0.15	0.9044	0.0280	4.1	1.0	6.1	1.1	A-	A-	A-
ELA	4	555072	2	B-C.3.1	3	6300	0.31	0.31	0.26	0.25	0.17	0.01	0.12	0.12	-0.02	-0.02	-0.10	1.9400	0.0297	9.9	1.2	9.9	1.6	A-	A-	A-
ELA	4	238993	2	B-V.4.1	2	6300	0.62	0.13	0.11	0.13	0.62	0.01	0.39	-0.19	-0.23	-0.15	0.39	0.3243	0.0288	1.9	1.0	2.2	1.0	A-	A-	A-
ELA	4	473876	2	B-V.4.1	1	6300	0.65	0.65	0.05	0.20	0.09	0.00	0.34	0.34	-0.21	-0.16	-0.17	0.1639	0.0293	5.5	1.1	2.5	1.1	A-	B-	B-
ELA	4	813782	2	B-V.4.1	2	6300	0.42	0.34	0.14	0.09	0.42	0.00	0.26	0.07	-0.24	-0.27	0.26	1.3348	0.0282	9.9	1.1	9.9	1.2	A-	A-	A+
ELA	4	689021	3	B-K.1.1	3	6331	0.37	0.29	0.21	0.37	0.13	0.01	0.30	-0.11	-0.11	0.30	-0.12	1.6467	0.0290	4.2	1.1	9.9	1.3	A-	A-	A-
ELA	4	650765	3	B-C.2.1	2	6331	0.44	0.44	0.22	0.09	0.23	0.00	0.31	0.31	-0.09	-0.26	-0.09	1.2427	0.0283	9.1	1.1	9.8	1.2	A+	A-	A+
ELA	4	396231	3	B-V.4.1	2	6331	0.60	0.17	0.12	0.10	0.60	0.00	0.51	-0.17	-0.27	-0.31	0.51	0.4177	0.0288	-9.2	0.9	-8.3	0.9	A-	A-	A+
ELA	4	330964	3	B-V.4.1	1	6331	0.40	0.25	0.28	0.06	0.40	0.00	0.30	-0.23	-0.01	-0.17	0.30	1.4483	0.0286	8.0	1.1	9.9	1.2	A-	A-	A-
ELA	4	322013	3	B-V.4.1	2	6331	0.58	0.11	0.58	0.17	0.14	0.00	0.39	-0.27	0.39	-0.16	-0.14	0.5493	0.0285	2.2	1.0	1.1	1.0	A-	A-	A-
ELA	4	133579	3	B-C.3.1	3	6331	0.50	0.28	0.50	0.09	0.12	0.00	0.38	-0.14	0.38	-0.25	-0.15	0.9770	0.0282	2.2	1.0	4.1	1.1	A+	A-	A-
ELA	4	554795	3	B-C.3.1	2	6331	0.49	0.15	0.16	0.20	0.49	0.00	0.40	-0.16	-0.26	-0.11	0.40	1.0311	0.0282	1.3	1.0	2.5	1.0	A+	A-	A+
ELA	4	795222	3	B-C.3.1	2	6331	0.57	0.57	0.19	0.08	0.16	0.00	0.37	0.37	-0.13	-0.26	-0.18	0.5786	0.0285	4.5	1.1	4.4	1.1	A-	A-	A-
ELA	4	560992	4	B-C.3.1	2	6316	0.80	0.06	0.08	0.06	0.80	0.00	0.55	-0.28	-0.31	-0.29	0.55	-0.7508	0.0344	-9.9	0.8	-9.9	0.6	A+	A-	A-
ELA	4	156377	4	B-V.4.1	1	6316	0.26	0.29	0.26	0.08	0.36	0.00	0.02	-0.05	0.02	-0.24	0.16	2.2447	0.0312	9.9	1.3	9.9	1.9	A-	A+	A-

Appendix G: Item Statistics Multiple Choice

ELA	4	269089	4	B-K.1.1	2	6316	0.46	0.29	0.46	0.12	0.13	0.00	0.38	-0.30	0.38	-0.12	-0.04	1.1873	0.0282	0.9	1.0	4.3	1.1	A-	A+	A-
ELA	4	989811	4	B-K.1.1	2	6316	0.78	0.06	0.13	0.78	0.03	0.00	0.39	-0.27	-0.18	0.39	-0.21	-0.5964	0.0333	-0.9	1.0	-0.1	1.0	A+	B-	B-
ELA	4	234944	4	B-K.1.1	2	6316	0.67	0.14	0.12	0.07	0.67	0.00	0.34	-0.14	-0.16	-0.23	0.34	0.0806	0.0298	5.5	1.1	6.6	1.2	A-	A-	A-
ELA	4	695332	4	B-C.3.1	3	6316	0.72	0.72	0.14	0.08	0.06	0.01	0.48	0.48	-0.22	-0.27	-0.28	-0.1821	0.0309	-5.8	0.9	-7.2	0.8	A+	A-	A-
ELA	4	648973	4	B-C.2.1	2	6316	0.59	0.23	0.10	0.59	0.09	0.00	0.42	-0.18	-0.25	0.42	-0.20	0.5418	0.0286	-1.2	1.0	-2.1	1.0	A+	A-	A-
ELA	4	247395	4	B-V.4.1	2	6316	0.31	0.46	0.31	0.15	0.08	0.00	0.13	0.14	0.13	-0.18	-0.23	1.9619	0.0299	9.9	1.2	9.9	1.7	A+	A-	A+
ELA	4	741587	5	B-K.1.1	3	6313	0.73	0.08	0.06	0.73	0.12	0.00	0.50	-0.28	-0.25	0.50	-0.26	-0.3185	0.0315	-7.4	0.9	-8.3	0.8	A+	A-	A+
ELA	4	684452	5	B-K.1.1	2	6313	0.51	0.07	0.09	0.51	0.32	0.00	0.30	-0.28	-0.13	0.30	-0.08	0.8831	0.0282	9.9	1.1	9.9	1.2	A-	A-	B-
ELA	4	367575	5	B-K.1.1	1	6313	0.49	0.49	0.12	0.09	0.29	0.00	0.31	0.31	-0.21	-0.23	-0.05	0.9886	0.0282	9.4	1.1	8.3	1.1	A+	A-	A-
ELA	4	904012	5	B-K.1.1	1	6313	0.45	0.14	0.45	0.25	0.16	0.00	0.38	-0.16	0.38	-0.12	-0.21	1.2120	0.0283	1.0	1.0	5.3	1.1	A+	A-	A-
ELA	4	504398	5	B-C.2.1	3	6313	0.70	0.70	0.09	0.11	0.10	0.01	0.47	0.47	-0.25	-0.25	-0.22	-0.0868	0.0304	-4.4	0.9	-4.2	0.9	A+	A+	A+
ELA	4	791724	5	B-C.3.1	2	6313	0.39	0.33	0.12	0.17	0.39	0.00	0.24	0.03	-0.19	-0.18	0.24	1.5285	0.0288	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	711107	5	B-C.3.1	3	6313	0.56	0.24	0.15	0.04	0.56	0.00	0.46	-0.18	-0.26	-0.28	0.46	0.6418	0.0284	-5.3	0.9	-4.5	0.9	A+	B-	A-
ELA	4	949987	5	B-V.4.1	2	6313	0.54	0.20	0.54	0.10	0.16	0.00	0.29	-0.07	0.29	-0.21	-0.15	0.7460	0.0283	9.9	1.2	9.9	1.2	A-	A-	A-
ELA	4	753517	6	B-K.1.1	2	6284	0.54	0.22	0.17	0.54	0.06	0.00	0.36	-0.09	-0.25	0.36	-0.20	0.7905	0.0284	3.7	1.0	3.3	1.1	A-	A-	A-
ELA	4	343544	6	B-V.4.1	1	6284	0.70	0.70	0.09	0.09	0.11	0.00	0.46	0.46	-0.26	-0.27	-0.17	-0.0986	0.0306	-4.1	0.9	-5.1	0.9	A-	A-	A-
ELA	4	235897	6	B-V.4.1	1	6284	0.72	0.16	0.72	0.07	0.05	0.00	0.40	-0.20	0.40	-0.20	-0.26	-0.1748	0.0310	0.0	1.0	-0.1	1.0	A+	A-	A-
ELA	4	847733	6	B-V.4.1	1	6284	0.61	0.61	0.07	0.11	0.21	0.00	0.36	0.36	-0.24	-0.28	-0.06	0.4230	0.0289	5.0	1.1	4.9	1.1	B-	A-	A-
ELA	4	261498	6	B-C.3.1	2	6284	0.44	0.19	0.44	0.21	0.15	0.00	0.36	-0.28	0.36	0.00	-0.20	1.2840	0.0285	1.9	1.0	5.9	1.1	A-	A-	A-
ELA	4	248499	6	B-C.3.1	2	6284	0.66	0.09	0.11	0.66	0.13	0.01	0.46	-0.26	-0.23	0.46	-0.20	0.1546	0.0297	-4.0	1.0	-5.3	0.9	A+	A-	A-
ELA	4	239106	6	B-C.3.1	1	6284	0.44	0.16	0.44	0.10	0.30	0.00	0.35	-0.16	0.35	-0.18	-0.12	1.3011	0.0285	2.0	1.0	6.6	1.1	A-	A-	A+
ELA	4	369428	6	B-K.1.1	3	6284	0.52	0.13	0.22	0.52	0.13	0.00	0.34	-0.20	-0.18	0.34	-0.08	0.8986	0.0283	6.3	1.1	6.3	1.1	A+	A-	A-
ELA	4	531655	7	B-K.1.1	2	6318	0.50	0.50	0.17	0.27	0.06	0.00	0.35	0.35	-0.23	-0.07	-0.22	1.0545	0.0282	5.6	1.1	7.6	1.1	A-	A-	A-
ELA	4	767416	7	B-K.1.1	2	6318	0.61	0.19	0.12	0.08	0.61	0.00	0.48	-0.16	-0.35	-0.22	0.48	0.4545	0.0289	-7.0	0.9	-5.8	0.9	A-	A-	A-
ELA	4	667159	7	B-K.1.1	3	6318	0.55	0.16	0.55	0.08	0.21	0.00	0.30	-0.20	0.30	-0.27	-0.01	0.7609	0.0284	9.9	1.1	9.1	1.2	A-	A-	A-
ELA	4	491225	7	B-K.1.1	3	6318	0.49	0.16	0.22	0.13	0.49	0.01	0.33	-0.21	-0.05	-0.20	0.33	1.1055	0.0282	6.1	1.1	8.4	1.2	A+	A-	A-
ELA	4	434483	7	B-K.1.1	1	6318	0.48	0.06	0.12	0.48	0.33	0.00	0.33	-0.32	-0.31	0.33	0.03	1.1206	0.0282	7.7	1.1	8.3	1.2	A-	A-	A-
ELA	4	861080	7	B-V.4.1	2	6318	0.82	0.07	0.07	0.04	0.82	0.00	0.55	-0.30	-0.29	-0.30	0.55	-0.8590	0.0358	-9.9	0.8	-9.9	0.7	A-	B-	A-
ELA	4	638256	7	B-V.4.1	1	6318	0.76	0.12	0.07	0.76	0.05	0.00	0.42	-0.21	-0.23	0.42	-0.25	-0.3843	0.0324	-1.4	1.0	-4.0	0.9	A-	A-	A-
ELA	4	548362	7	B-V.4.1	2	6318	0.47	0.27	0.47	0.16	0.10	0.00	0.25	-0.05	0.25	-0.12	-0.19	1.1875	0.0282	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	372915	8	B-V.4.1	2	6269	0.48	0.14	0.05	0.48	0.34	0.00	0.24	-0.23	-0.30	0.24	0.05	1.1402	0.0282	9.9	1.2	9.9	1.3	A-	A-	A+
ELA	4	314383	8	B-V.4.1	2	6269	0.48	0.36	0.48	0.09	0.07	0.00	0.37	-0.21	0.37	-0.17	-0.13	1.1146	0.0282	2.4	1.0	4.6	1.1	A-	A+	A+
ELA	4	311030	8	B-C.2.1	3	6269	0.46	0.21	0.46	0.14	0.19	0.00	0.38	-0.07	0.38	-0.24	-0.19	1.2203	0.0283	-1.1	1.0	2.0	1.0	A-	A-	A-
ELA	4	154010	8	B-K.1.1	1	6269	0.65	0.65	0.06	0.16	0.13	0.00	0.34	0.34	-0.27	-0.16	-0.11	0.2543	0.0295	5.6	1.1	7.0	1.2	A+	A-	A-
ELA	4	144240	8	B-K.1.1	3	6269	0.53	0.24	0.12	0.11	0.53	0.00	0.33	-0.04	-0.25	-0.21	0.33	0.8793	0.0283	7.3	1.1	7.4	1.1	A+	A-	A-
ELA	4	371654	8	B-K.1.1	2	6269	0.43	0.16	0.15	0.27	0.43	0.00	0.38	-0.17	-0.25	-0.08	0.38	1.3914	0.0284	-2.0	1.0	4.6	1.1	A+	A-	A-
ELA	4	526123	8	B-K.1.1	3	6269	0.62	0.62	0.07	0.15	0.16	0.00	0.37	0.37	-0.25	-0.26	-0.06	0.3884	0.0291	3.2	1.0	5.5	1.1	A+	A-	A-
ELA	4	784611	8	B-C.3.1	2	6269	0.48	0.48	0.29	0.14	0.08	0.00	0.34	0.34	-0.09	-0.20	-0.21	1.1041	0.0282	4.5	1.1	7.1	1.1	A+	A-	A-
ELA	4	686491	9	B-C.3.1	2	6325	0.60	0.15	0.12	0.12	0.60	0.00	0.43	-0.20	-0.20	-0.21	0.43	0.5004	0.0287	-2.4	1.0	-2.4	1.0	A-	A-	A+
ELA	4	469458	9	B-K.1.1	3	6325	0.48	0.48	0.21	0.12	0.18	0.01	0.27	0.27	-0.11	-0.19	-0.05	1.1309	0.0281	9.9	1.1	9.9	1.2	A-	A-	A-
ELA	4	629525	9	B-C.2.1	3	6325	0.62	0.62	0.15	0.12	0.10	0.00	0.46	0.46	-0.22	-0.24	-0.21	0.4155	0.0289	-5.7	0.9	-5.6	0.9	A-	A-	A-
ELA	4	567076	9	B-C.2.1	3	6325	0.60	0.60	0.15	0.12	0.12	0.00	0.23	0.23	-0.08	-0.17	-0.08	0.5325	0.0286	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	937269	9	B-C.2.1	2	6325	0.32	0.19	0.20	0.29	0.32	0.00	0.28	-0.17	-0.08	-0.06	0.28	1.9443	0.0297	4.0	1.1	9.9	1.3	A-	A-	A-
ELA	4	700228	9	B-C.3.1	3	6325	0.50	0.27	0.50	0.13	0.09	0.01	0.29	0.02	0.29	-0.22	-0.26	1.0217	0.0281	9.9	1.1	9.9	1.2	A-	A-	A-
ELA	4	922838	9	B-C.3.1	2	6325	0.58	0.21	0.08	0.58	0.13	0.01	0.39	-0.17	-0.25	0.39	-0.16	0.6508	0.0284	0.8	1.0	0.3	1.0	A+	A-	A-
ELA	4	162642	9	B-V.4.1	2	6325	0.77	0.15	0.06	0.77	0.02	0.00	0.55	-0.37	-0.28	0.55	-0.20	-0.4545	0.0327	-9.9	0.8	-9.9	0.7	A-	A-	B-
ELA	4	223801	10	B-K.1.1	2	6280	0.36	0.38	0.08	0.17	0.36	0.00	0.32	-0.07	-0.26	-0.12	0.32	1.7277	0.0291	1.2	1.0	8.4	1.2	A-	A-	A-
ELA	4	228354	10	B-C.3.1	3	6280	0.47	0.12	0.47	0.20	0.20	0.01	0.36	-0.25	0.36	-0.15	-0.09	1.1701	0.0282	1.4	1.0	4.5	1.1	A+	A-	A-
ELA	4	597072	10	B-C.2.1	3	6280	0.64	0.10	0.15	0.10	0.64	0.00	0.50	-0.25	-0.22	-0.28	0.50	0.2851	0.0294	-8.2	0.9	-7.9	0.8	A+	A-	A-
ELA	4	203103	10	B-C.3.1	2	6280	0.45	0.33	0.09	0.45	0.13	0.00	0.32	-0.11	-0.25	0.32	-0.10	1.2830	0.0283	5.8	1.1	8.8	1.2	A+	A+	A-
ELA	4	852629	10	B-C.3.1	2	6280	0.65	0.65	0.15	0.13	0.07	0.00	0.40	0.40	-0.16	-0.19	-0.28	0.2617	0.0294	0.8	1.0	0.6	1.0	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

ELA	4	625882	10	B-V.4.1	2	6280	0.56	0.56	0.12	0.20	0.11	0.01	0.32	0.32	-0.29	-0.05	-0.14	0.7230	0.0284	7.8	1.1	7.4	1.1	A-	A-	A-
ELA	4	298434	10	B-V.4.1	1	6280	0.66	0.19	0.07	0.07	0.66	0.00	0.26	0.03	-0.26	-0.25	0.26	0.1702	0.0297	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	342803	10	B-V.4.1	1	6280	0.42	0.39	0.14	0.42	0.06	0.00	0.20	0.01	-0.20	0.20	-0.16	1.4536	0.0285	9.9	1.2	9.9	1.4	A-	A+	A+
ELA	4	181299	11	A.2.2.1	2	62937	0.87	0.05	0.04	0.87	0.04	0.00	0.49	-0.28	-0.27	0.49	-0.26	-1.3602	0.0129	-9.9	0.8	-9.9	0.6			
ELA	4	666860	11	A.2.4.1	1	62937	0.82	0.05	0.82	0.04	0.09	0.00	0.45	-0.19	0.45	-0.19	-0.33	-0.8749	0.0113	-9.9	0.9	-9.9	0.8			
ELA	4	636874	11	A.2.3.1	2	62937	0.84	0.08	0.05	0.02	0.84	0.00	0.43	-0.29	-0.19	-0.22	0.43	-1.0628	0.0119	-9.9	0.9	-9.9	0.8			
ELA	4	878620	11	A.2.3.1	2	62937	0.64	0.14	0.64	0.11	0.11	0.00	0.42	-0.27	0.42	-0.15	-0.20	0.2611	0.0093	-4.0	1.0	-7.7	1.0			
ELA	4	184637	11	A.2.6.1	2	62937	0.64	0.13	0.10	0.64	0.13	0.00	0.49	-0.28	-0.23	0.49	-0.21	0.2744	0.0093	-9.9	0.9	-9.9	0.9			
ELA	4	354728	11	A.2.3.1	2	62937	0.55	0.19	0.05	0.55	0.20	0.00	0.22	-0.16	-0.23	0.22	0.01	0.7403	0.0090	9.9	1.2	9.9	1.3			
ELA	4	889448	11	A.2.2.1	2	62937	0.83	0.83	0.08	0.06	0.03	0.00	0.46	0.46	-0.24	-0.26	-0.26	-0.9856	0.0116	-9.9	0.9	-9.9	0.8			
ELA	4	538462	11	B.3.2.1	2	62937	0.54	0.15	0.05	0.26	0.54	0.00	0.33	-0.18	-0.28	-0.09	0.33	0.7829	0.0090	9.9	1.1	9.9	1.1			
ELA	4	291014	11	B-V.4.1	2	6301	0.79	0.08	0.79	0.10	0.04	0.00	0.35	-0.18	0.35	-0.19	-0.20	-0.5997	0.0337	0.9	1.0	2.8	1.1	A-	A-	B-
ELA	4	542134	11	B-V.4.1	1	6301	0.78	0.14	0.04	0.04	0.78	0.00	0.47	-0.26	-0.25	-0.27	0.47	-0.5036	0.0330	-5.9	0.9	-6.3	0.8	A+	A-	A-
ELA	4	908932	11	B-V.4.1	2	6301	0.59	0.21	0.59	0.08	0.12	0.00	0.30	-0.10	0.30	-0.29	-0.09	0.5711	0.0285	8.7	1.1	7.2	1.1	A-	A-	A-
ELA	4	150693	11	B-K.1.1	2	6301	0.63	0.63	0.11	0.15	0.11	0.01	0.32	0.32	-0.12	-0.18	-0.18	0.3683	0.0290	6.3	1.1	6.5	1.1	A-	A-	A+
ELA	4	324567	11	B-C.2.1	2	6301	0.56	0.56	0.25	0.08	0.09	0.01	0.26	0.26	0.03	-0.23	-0.25	0.7253	0.0282	9.9	1.2	9.9	1.2	A-	A-	A-
ELA	4	123980	11	B-V.4.1	3	6301	0.56	0.56	0.08	0.06	0.30	0.00	0.26	0.26	-0.26	-0.24	0.01	0.7156	0.0283	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	575012	11	B-K.1.1	3	6301	0.68	0.15	0.09	0.68	0.08	0.00	0.52	-0.33	-0.28	0.52	-0.16	0.0718	0.0300	-9.8	0.9	-9.6	0.8	A+	A-	A-
ELA	4	260039	11	B-K.1.1	1	6301	0.57	0.12	0.14	0.17	0.57	0.00	0.42	-0.23	-0.19	-0.18	0.42	0.6643	0.0283	-1.5	1.0	-1.0	1.0	A-	A-	A-
ELA	4	891022	12	A-K.1.1	2	6320	0.63	0.07	0.63	0.12	0.18	0.00	0.41	-0.26	0.41	-0.23	-0.14	0.3677	0.0290	-0.3	1.0	-1.3	1.0	A+	A-	A-
ELA	4	270316	12	A-V.4.1	2	6320	0.74	0.74	0.09	0.10	0.06	0.00	0.38	0.38	-0.20	-0.17	-0.22	-0.3004	0.0317	-0.1	1.0	1.0	1.0	A+	A-	A-
ELA	4	186509	12	A-V.4.1	2	6320	0.43	0.19	0.43	0.15	0.23	0.00	0.11	-0.12	0.11	-0.15	0.11	1.3722	0.0282	9.9	1.3	9.9	1.5	A-	A+	A+
ELA	4	755247	12	A-V.4.1	1	6320	0.68	0.15	0.68	0.05	0.12	0.01	0.46	-0.28	0.46	-0.22	-0.20	0.0976	0.0298	-4.6	0.9	-5.0	0.9	A+	A-	A-
ELA	4	400219	12	A-K.1.1	2	6320	0.76	0.76	0.08	0.13	0.03	0.00	0.36	0.36	-0.19	-0.21	-0.18	-0.4421	0.0325	1.0	1.0	1.1	1.0	A-	A+	A-
ELA	4	381733	12	A-K.1.1	2	6320	0.84	0.04	0.07	0.84	0.06	0.00	0.51	-0.28	-0.27	0.51	-0.29	-0.9851	0.0368	-7.9	0.8	-9.9	0.6	A+	A-	A-
ELA	4	600692	12	A-K.1.1	2	6320	0.49	0.11	0.11	0.29	0.49	0.00	0.26	-0.15	-0.16	-0.07	0.26	1.0675	0.0280	9.9	1.2	9.9	1.2	A+	A-	A-
ELA	4	785821	12	A-K.1.1	2	6320	0.59	0.09	0.17	0.14	0.59	0.00	0.25	-0.17	-0.09	-0.11	0.25	0.5624	0.0285	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	294497	13	A-V.4.1	1	6297	0.72	0.07	0.07	0.13	0.72	0.00	0.41	-0.21	-0.24	-0.21	0.41	-0.2118	0.0313	-0.8	1.0	-3.1	0.9	A-	A-	C-
ELA	4	325863	13	A-K.1.1	2	6297	0.52	0.27	0.52	0.14	0.07	0.00	0.31	-0.12	0.31	-0.15	-0.20	0.8746	0.0282	8.7	1.1	8.7	1.2	A+	A-	A-
ELA	4	793360	13	A-K.1.1	3	6297	0.59	0.13	0.18	0.10	0.59	0.01	0.45	-0.15	-0.27	-0.22	0.45	0.5298	0.0287	-4.1	1.0	-3.0	1.0	A+	A-	A-
ELA	4	477297	13	A-V.4.1	2	6297	0.74	0.07	0.08	0.74	0.11	0.00	0.42	-0.26	-0.23	0.42	-0.18	-0.3005	0.0317	-2.0	1.0	-1.5	1.0	A+	B-	A-
ELA	4	353718	13	A-K.1.1	2	6297	0.90	0.04	0.03	0.90	0.03	0.00	0.53	-0.33	-0.26	0.53	-0.28	-1.6203	0.0439	-7.9	0.8	-9.9	0.5	A-	B-	B-
ELA	4	641326	13	A-K.1.1	2	6297	0.60	0.11	0.11	0.60	0.17	0.00	0.38	-0.23	-0.16	0.38	-0.17	0.4668	0.0288	2.0	1.0	1.4	1.0	A-	A-	A-
ELA	4	456566	13	A-K.1.1	2	6297	0.65	0.65	0.10	0.12	0.12	0.00	0.39	0.39	-0.19	-0.16	-0.23	0.2029	0.0296	1.8	1.0	3.5	1.1	A+	A-	A-
ELA	4	880257	13	A-K.1.1	2	6297	0.48	0.13	0.18	0.48	0.20	0.00	0.35	-0.19	-0.17	0.35	-0.11	1.0782	0.0282	3.2	1.0	6.1	1.1	A+	A-	A-
ELA	4	471069	14	A-V.4.1	2	6287	0.77	0.77	0.09	0.09	0.05	0.00	0.46	0.46	-0.23	-0.29	-0.20	-0.4733	0.0329	-4.1	0.9	-6.6	0.8	A-	A-	A-
ELA	4	393571	14	A-V.4.1	1	6287	0.61	0.24	0.04	0.61	0.11	0.00	0.47	-0.21	-0.27	0.47	-0.28	0.4600	0.0289	-5.8	0.9	-5.5	0.9	A-	A-	A-
ELA	4	563781	14	A-K.1.1	2	6287	0.49	0.21	0.13	0.49	0.17	0.00	0.33	-0.28	-0.14	0.33	0.00	1.0737	0.0283	8.4	1.1	8.1	1.1	A-	A-	A-
ELA	4	124069	14	A-K.1.1	2	6287	0.45	0.14	0.32	0.08	0.45	0.01	0.35	-0.23	-0.06	-0.23	0.35	1.2705	0.0283	1.7	1.0	6.8	1.1	A-	A+	A+
ELA	4	931487	14	A-K.1.1	2	6287	0.45	0.29	0.16	0.45	0.09	0.00	0.30	-0.03	-0.17	0.30	-0.23	1.2617	0.0283	8.9	1.1	9.9	1.2	A-	A-	A-
ELA	4	516276	14	A-V.4.1	2	6287	0.75	0.07	0.75	0.08	0.09	0.00	0.52	-0.31	0.52	-0.28	-0.21	-0.3772	0.0323	-8.6	0.9	-8.7	0.8	A-	A-	A-
ELA	4	770068	14	A-K.1.1	1	6287	0.81	0.05	0.08	0.06	0.81	0.00	0.52	-0.28	-0.26	-0.31	0.52	-0.7581	0.0350	-8.8	0.8	-9.6	0.7	A+	A-	A-
ELA	4	597037	14	A-K.1.1	2	6287	0.64	0.14	0.64	0.08	0.14	0.00	0.48	-0.26	0.48	-0.25	-0.20	0.3109	0.0293	-6.6	0.9	-7.0	0.9	A+	A-	A+
ELA	4	673206	15	A-K.1.1	2	6256	0.73	0.14	0.08	0.73	0.05	0.00	0.52	-0.30	-0.27	0.52	-0.24	-0.2667	0.0318	-8.5	0.9	-9.3	0.8	A-	A-	A-
ELA	4	205097	15	A-K.1.1	2	6256	0.90	0.04	0.04	0.03	0.90	0.00	0.49	-0.28	-0.29	-0.23	0.49	-1.6459	0.0443	-6.8	0.8	-9.5	0.5	A+	A-	A-
ELA	4	872834	15	A-K.1.1	2	6256	0.71	0.10	0.09	0.10	0.71	0.00	0.56	-0.24	-0.31	-0.31	0.56	-0.1296	0.0311	-9.9	0.8	-9.9	0.7	A-	A-	B-
ELA	4	447513	15	A-V.4.1	1	6256	0.42	0.15	0.33	0.10	0.42	0.00	0.27	-0.15	-0.08	-0.14	0.27	1.4176	0.0287	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	891793	15	A-V.4.1	2	6256	0.68	0.21	0.04	0.06	0.68	0.00	0.47	-0.23	-0.28	-0.28	0.47	0.0449	0.0304	-4.5	0.9	-6.0	0.9	A-	A-	A-
ELA	4	867637	15	A-V.4.1	1	6256	0.80	0.09	0.80	0.04	0.67	0.01	0.43	-0.24	0.43	-0.23	-0.23	-0.7094	0.0346	-2.9	1.0	-1.6	0.9	A-	A-	A-
ELA	4	923471	15	A-V.4.1	2	6256	0.38	0.38	0.34	0.17	0.10	0.00	0.15	0.15	0.05	-0.13	-0.15	1.6090	0.0290	9.9	1.3	9.9	1.5	A-	A-	A-
ELA	4	731774	15	A-K.1.1	2	6256	0.83	0.83	0.07	0.05	0.05	0.00	0.50	0.50	-0.31	-0.24	-0.25	-0.9540	0.0366	-7.0	0.9	-9.0	0.7	A+	A-	B-

Appendix G: Item Statistics Multiple Choice

ELA	4	197253	16	A-V.4.1	1	6263	0.42	0.34	0.13	0.42	0.11	0.00	0.32	-0.14	-0.07	0.32	-0.22	1.4267	0.0286	6.2	1.1	8.5	1.2	A-	A-	A-
ELA	4	674162	16	A-K.1.1	2	6263	0.82	0.10	0.82	0.04	0.04	0.00	0.43	-0.29	0.43	-0.23	-0.16	-0.8448	0.0358	-3.0	0.9	-3.8	0.9	A-	A-	A-
ELA	4	901427	16	A-V.4.1	2	6263	0.52	0.52	0.34	0.07	0.07	0.01	0.34	0.34	-0.05	-0.28	-0.28	0.9481	0.0284	6.4	1.1	6.4	1.1	A-	A-	A-
ELA	4	960877	16	A-V.4.1	2	6263	0.72	0.13	0.07	0.72	0.07	0.00	0.45	-0.20	-0.22	0.45	-0.29	-0.1774	0.0314	-3.6	0.9	-4.2	0.9	A-	B-	A-
ELA	4	134880	16	A-K.1.1	3	6263	0.62	0.17	0.13	0.62	0.07	0.01	0.39	-0.19	-0.15	0.39	-0.25	0.4183	0.0292	2.0	1.0	0.9	1.0	A-	A-	A+
ELA	4	916496	16	A-K.1.1	2	6263	0.67	0.19	0.67	0.07	0.07	0.00	0.47	-0.21	0.47	-0.24	-0.31	0.1427	0.0300	-5.4	0.9	-6.0	0.9	A-	A-	A-
ELA	4	378941	16	A-V.4.1	2	6263	0.63	0.16	0.16	0.63	0.05	0.00	0.37	-0.19	-0.18	0.37	-0.19	0.3443	0.0294	4.2	1.1	5.6	1.1	A-	A-	A-
ELA	4	157543	16	A-K.1.1	2	6263	0.80	0.06	0.05	0.09	0.80	0.00	0.54	-0.27	-0.29	-0.31	0.54	-0.6824	0.0345	-9.9	0.8	-9.9	0.7	A-	A-	A-
ELA	4	863946	17	A-K.1.1	2	6311	0.48	0.12	0.16	0.24	0.48	0.00	0.40	-0.24	-0.25	-0.07	0.40	1.0619	0.0281	-1.0	1.0	0.6	1.0	A-	A+	A+
ELA	4	696893	17	A-K.1.1	3	6311	0.41	0.25	0.08	0.41	0.25	0.01	0.23	0.06	-0.20	0.23	-0.20	1.4425	0.0285	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	642797	17	A-K.1.1	3	6311	0.70	0.10	0.70	0.10	0.09	0.00	0.49	-0.31	0.49	-0.29	-0.14	-0.1125	0.0306	-6.8	0.9	-7.1	0.8	A+	A-	A-
ELA	4	516337	17	A-K.1.1	2	6311	0.60	0.12	0.22	0.60	0.06	0.01	0.43	-0.24	-0.17	0.43	-0.24	0.4781	0.0287	-1.8	1.0	-2.8	1.0	A+	A-	A-
ELA	4	271090	17	A-V.4.1	2	6311	0.76	0.08	0.09	0.07	0.76	0.00	0.48	-0.31	-0.26	-0.17	0.48	-0.4842	0.0326	-6.1	0.9	-6.9	0.8	A+	A-	B-
ELA	4	242732	17	A-V.4.1	2	6311	0.84	0.09	0.04	0.03	0.84	0.00	0.44	-0.22	-0.26	-0.27	0.44	-1.0911	0.0374	-4.8	0.9	-4.3	0.8	A+	A-	A-
ELA	4	650853	17	A-V.4.1	2	6311	0.27	0.60	0.09	0.27	0.04	0.00	0.16	0.08	-0.23	0.16	-0.23	2.2296	0.0312	9.4	1.2	9.9	1.7	A-	A-	A-
ELA	4	182922	17	A-V.4.1	2	6311	0.82	0.82	0.05	0.10	0.03	0.00	0.42	0.42	-0.30	-0.20	-0.20	-0.9028	0.0356	-3.2	0.9	-2.7	0.9	A+	A-	A-
ELA	4	761508	18	A-K.1.1	2	6313	0.71	0.08	0.13	0.71	0.07	0.01	0.51	-0.30	-0.23	0.51	-0.27	-0.1108	0.0309	-7.2	0.9	-8.9	0.8	A-	A-	A-
ELA	4	979343	18	A-K.1.1	2	6313	0.50	0.37	0.07	0.50	0.06	0.00	0.19	-0.07	-0.12	0.19	-0.12	1.0219	0.0282	9.9	1.3	9.9	1.4	A+	A-	A-
ELA	4	111831	18	A-K.1.1	3	6313	0.79	0.14	0.02	0.05	0.79	0.00	0.42	-0.23	-0.25	-0.27	0.42	-0.6317	0.0339	-2.2	1.0	-4.2	0.9	A+	A+	A+
ELA	4	571714	18	A-K.1.1	2	6313	0.81	0.05	0.08	0.06	0.81	0.00	0.51	-0.29	-0.29	-0.25	0.51	-0.7784	0.0350	-8.0	0.9	-8.6	0.7	A+	A-	A-
ELA	4	569319	18	A-C.2.1	3	6313	0.59	0.59	0.12	0.17	0.12	0.00	0.39	0.39	-0.10	-0.25	-0.20	0.5682	0.0287	2.8	1.0	2.7	1.1	A-	A+	A-
ELA	4	325255	18	A-V.4.1	2	6313	0.62	0.62	0.15	0.09	0.13	0.00	0.40	0.40	-0.24	-0.17	-0.17	0.3972	0.0291	1.7	1.0	-0.2	1.0	A-	A-	A-
ELA	4	350528	18	A-V.4.1	1	6313	0.92	0.03	0.92	0.03	0.01	0.00	0.38	-0.27	0.38	-0.20	-0.16	-1.9237	0.0485	-3.6	0.9	-3.0	0.8	A-	A-	A-
ELA	4	376190	18	A-V.4.1	1	6313	0.80	0.09	0.07	0.80	0.03	0.00	0.37	-0.20	-0.22	0.37	-0.17	-0.7332	0.0347	-0.3	1.0	1.4	1.1	A+	A-	A-
ELA	4	248827	19	A-K.1.1	2	6316	0.60	0.60	0.05	0.04	0.30	0.00	0.25	0.25	-0.26	-0.24	-0.03	0.4739	0.0287	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	827959	19	A-K.1.1	2	6316	0.76	0.08	0.76	0.06	0.09	0.00	0.52	-0.31	0.52	-0.25	-0.26	-0.4219	0.0323	-9.2	0.9	-8.7	0.8	A+	A-	A-
ELA	4	567707	19	A-K.1.1	3	6316	0.44	0.44	0.23	0.21	0.12	0.00	0.21	0.21	-0.08	-0.10	-0.09	1.3027	0.0282	9.9	1.2	9.9	1.3	A-	A-	A+
ELA	4	524317	19	A-C.2.1	3	6316	0.42	0.19	0.12	0.27	0.42	0.01	0.34	-0.12	-0.18	-0.13	0.34	1.3975	0.0284	1.8	1.0	8.3	1.2	A-	A-	A-
ELA	4	218070	19	A-K.1.1	2	6316	0.65	0.18	0.07	0.11	0.65	0.00	0.47	-0.27	-0.23	-0.20	0.47	0.2288	0.0294	-5.8	0.9	-4.5	0.9	A-	A-	A-
ELA	4	828395	19	A-V.4.1	1	6316	0.92	0.03	0.03	0.92	0.02	0.00	0.47	-0.26	-0.30	0.47	-0.23	-1.8584	0.0475	-6.2	0.8	-9.8	0.5	A+	B-	B-
ELA	4	753711	19	A-V.4.1	2	6316	0.77	0.09	0.07	0.07	0.77	0.01	0.43	-0.17	-0.26	-0.25	0.43	-0.4856	0.0327	-3.0	1.0	-3.7	0.9	A-	A-	A-
ELA	4	981911	19	A-C.3.1	3	6316	0.69	0.20	0.69	0.05	0.07	0.00	0.50	-0.27	0.50	-0.25	-0.27	0.0206	0.0301	-7.8	0.9	-8.1	0.8	A-	A-	A-
ELA	4	435384	20	A-K.1.1	2	6273	0.44	0.15	0.20	0.20	0.44	0.00	0.33	-0.17	-0.16	-0.09	0.33	1.2790	0.0284	5.3	1.1	7.8	1.1	A-	A-	A-
ELA	4	864799	20	A-K.1.1	2	6273	0.82	0.08	0.82	0.07	0.04	0.00	0.50	-0.28	0.50	-0.26	-0.27	-0.8443	0.0354	-7.3	0.9	-6.9	0.8	A+	A-	B-
ELA	4	349959	20	A-K.1.1	2	6273	0.51	0.14	0.10	0.51	0.24	0.00	0.40	-0.28	-0.21	0.40	-0.08	0.9209	0.0283	0.3	1.0	1.5	1.0	A-	A-	A-
ELA	4	165639	20	A-V.4.1	2	6273	0.64	0.19	0.08	0.64	0.09	0.00	0.42	-0.18	-0.25	0.42	-0.21	0.2850	0.0293	-1.2	1.0	-3.6	0.9	A-	A-	A-
ELA	4	439516	20	A-K.1.1	3	6273	0.58	0.15	0.18	0.58	0.09	0.00	0.42	-0.26	-0.17	0.42	-0.18	0.5760	0.0286	-1.5	1.0	-1.4	1.0	A+	A-	A-
ELA	4	435811	20	A-V.4.1	1	6273	0.40	0.40	0.08	0.22	0.30	0.00	0.23	0.23	-0.13	-0.08	-0.08	1.5133	0.0288	9.9	1.2	9.9	1.4	A-	A+	A+
ELA	4	418778	20	A-C.3.1	3	6273	0.47	0.14	0.47	0.23	0.16	0.01	0.34	-0.26	0.34	-0.04	-0.16	1.1474	0.0283	4.4	1.1	6.0	1.1	A-	A-	A-
ELA	4	822375	20	A-V.4.1	2	6273	0.49	0.22	0.14	0.15	0.49	0.00	0.37	-0.17	-0.14	-0.19	0.37	1.0309	0.0283	3.0	1.0	3.9	1.1	A-	A-	A-
READIN	5	795874	0	A.2.1.2		125284	0.66	0.24	0.06	0.66	0.04	0.00	0.30	-0.24	-0.11	0.30	-0.06	0.3674	0.0067	9.9	1.2	9.9	1.2			
READIN	5	281111	0	A.2.4.1		125284	0.81	0.02	0.12	0.04	0.81	0.00	0.51	-0.26	-0.33	-0.26	0.51	-0.5950	0.0078	-9.9	0.8	-9.9	0.7			
READIN	5	317589	0	A.2.4.1	1	125284	0.75	0.03	0.15	0.07	0.75	0.00	0.51	-0.26	-0.32	-0.24	0.51	-0.2751	0.0073	-9.9	0.9	-9.9	0.8			
READIN	5	904670	0	A.2.4.1		125284	0.80	0.05	0.80	0.06	0.09	0.00	0.51	-0.29	0.51	-0.30	-0.24	-0.5319	0.0077	-9.9	0.9	-9.9	0.8			
READIN	5	124985	0	B.3.1.1		125284	0.84	0.84	0.04	0.05	0.07	0.00	0.51	0.51	-0.28	-0.28	-0.28	-0.8874	0.0084	-9.9	0.8	-9.9	0.7			
READIN	5	643928	0	A.2.4.1		125284	0.48	0.06	0.25	0.48	0.21	0.00	0.34	-0.32	-0.07	0.34	-0.16	1.3372	0.0063	9.9	1.1	9.9	1.1			
READIN	5	625565	0	A.2.4.1		125284	0.79	0.79	0.11	0.04	0.06	0.00	0.36	0.36	-0.16	-0.26	-0.18	-0.4891	0.0077	8.7	1.0	9.9	1.1			
READIN	5	144608	0	A.2.6.2		125284	0.47	0.31	0.15	0.07	0.47	0.00	0.28	-0.18	-0.04	-0.15	0.28	1.3377	0.0063	9.9	1.1	9.9	1.2			
READIN	5	308821	0	A.2.2.1		125284	0.91	0.03	0.03	0.91	0.02	0.00	0.36	-0.22	-0.19	0.36	-0.19	-1.6988	0.0107	-7.3	1.0	-9.9	0.8			
READIN	5	413600	0	A.2.4.1		125284	0.87	0.02	0.87	0.08	0.03	0.00	0.42	-0.20	0.42	-0.30	-0.20	-1.1945	0.0091	-9.9	0.9	-9.9	0.8			
READIN	5	781187	0	A.2.2.2		125284	0.52	0.52	0.10	0.08	0.30	0.00	0.37	0.37	-0.34	-0.28	-0.01	1.1544	0.0063	9.9	1.1	9.9	1.1			

Appendix G: Item Statistics Multiple Choice

READIN	5	893584	0	A.2.4.1		125284	0.84	0.06	0.06	0.84	0.05	0.00	0.53	-0.31	-0.30	0.53	-0.26	-0.8416	0.0083	-9.9	0.8	-9.9	0.6				
READIN	5	555502	0	A.2.4.1		125284	0.67	0.27	0.67	0.03	0.03	0.00	0.46	-0.30	0.46	-0.20	-0.27	0.4134	0.0066	-9.9	0.9	-9.9	0.9				
READIN	5	730512	0	B.1.2.1		125284	0.53	0.08	0.15	0.53	0.24	0.00	0.41	-0.17	-0.23	0.41	-0.17	1.0443	0.0063	2.8	1.0	8.0	1.0				
READIN	5	896897	0	A.2.4.1		125284	0.81	0.05	0.81	0.09	0.05	0.00	0.54	-0.25	0.54	-0.35	-0.26	-0.7038	0.0080	-9.9	0.9	-9.9	0.7				
READIN	5	832981	0	B.3.3.1		125284	0.58	0.09	0.58	0.14	0.19	0.01	0.37	-0.24	0.37	-0.25	-0.07	0.8450	0.0064	9.9	1.1	9.9	1.1				
READIN	5	213836	0	A.1.3.1	3	125284	0.68	0.68	0.07	0.06	0.19	0.01	0.42	0.42	-0.27	-0.28	-0.13	0.2842	0.0067	-1.6	1.0	1.6	1.0				
READIN	5	628360	0	A.1.4.1	1	125284	0.80	0.08	0.80	0.04	0.08	0.01	0.52	-0.31	0.52	-0.25	-0.25	-0.5488	0.0078	-9.9	0.9	-9.9	0.8				
READIN	5	305133	0	B.1.1.1	2	125284	0.81	0.04	0.07	0.81	0.08	0.01	0.46	-0.29	-0.30	0.46	-0.15	-0.7513	0.0081	-6.5	1.0	1.3	1.0				
READIN	5	187320	0	A.1.3.1	2	125284	0.87	0.03	0.87	0.03	0.06	0.01	0.50	-0.27	0.50	-0.25	-0.28	-1.0500	0.0088	-9.9	0.8	-9.9	0.7				
READIN	5	127779	0	A.1.6.2	3	125284	0.53	0.07	0.25	0.53	0.14	0.01	0.33	-0.20	-0.11	0.33	-0.17	1.0029	0.0064	9.9	1.1	9.9	1.2				
READIN	5	666247	0	B.2.1.1	2	125284	0.73	0.08	0.73	0.10	0.08	0.01	0.47	-0.27	0.47	-0.21	-0.22	-0.0546	0.0071	-9.9	0.9	-9.9	0.9				
READIN	5	753187	0	A.1.4.1	1	125284	0.65	0.65	0.05	0.06	0.23	0.01	0.34	0.34	-0.24	-0.28	-0.08	0.4907	0.0066	9.9	1.1	9.9	1.1				
READIN	5	469653	0	B.1.1.1	2	125284	0.63	0.63	0.12	0.06	0.17	0.01	0.34	0.34	-0.19	-0.20	-0.11	0.5333	0.0065	9.9	1.1	9.9	1.1				
READIN	5	357399	0	A.1.1.2	1	125284	0.80	0.03	0.13	0.80	0.03	0.00	0.36	-0.23	-0.18	0.36	-0.24	-0.5620	0.0078	3.9	1.0	7.8	1.1				
READIN	5	615093	0	A.1.4.1	1	125284	0.53	0.38	0.06	0.03	0.53	0.00	0.43	-0.24	-0.27	-0.22	0.43	0.9849	0.0064	-6.9	1.0	-3.5	1.0				
READIN	5	689341	0	A.1.6.1	3	125284	0.74	0.05	0.10	0.11	0.74	0.00	0.48	-0.29	-0.23	-0.26	0.48	-0.1076	0.0071	-9.9	0.9	-9.9	0.8				
READIN	5	346828	0	A.1.5.1	2	125284	0.70	0.04	0.11	0.70	0.15	0.00	0.49	-0.29	-0.25	0.49	-0.25	0.1752	0.0068	-9.9	0.9	-9.9	0.9				
READIN	5	461548	0	B.1.1.1	3	125284	0.63	0.19	0.63	0.08	0.10	0.00	0.36	-0.17	0.36	-0.21	-0.16	0.4910	0.0066	9.9	1.1	9.9	1.1				
READIN	5	518488	0	B.2.2.1	2	125284	0.68	0.68	0.20	0.07	0.05	0.00	0.43	0.43	-0.24	-0.19	-0.26	0.2103	0.0068	-1.3	1.0	-9.9	1.0				
READIN	5	832131	0	A.1.3.1	2	125284	0.71	0.10	0.08	0.11	0.71	0.00	0.51	-0.31	-0.27	-0.21	0.51	-0.0153	0.0070	-9.9	0.9	-9.9	0.9				
READIN	5	165045	0	A.1.3.1	2	125284	0.80	0.80	0.06	0.04	0.10	0.00	0.44	0.44	-0.23	-0.27	-0.22	-0.5055	0.0077	-9.9	0.9	-9.9	0.8				
READIN	5	761821	0	A.1.6.1	3	125284	0.63	0.11	0.17	0.08	0.63	0.00	0.34	-0.18	-0.15	-0.16	0.34	0.4558	0.0066	9.9	1.1	9.9	1.2				
READIN	5	510021	0	A.2.2.1	2	125284	0.74	0.09	0.09	0.74	0.08	0.00	0.49	-0.26	-0.21	0.49	-0.28	-0.0947	0.0071	-9.9	0.9	-9.9	0.8				
READIN	5	811321	0	A.2.3.2	3	125284	0.53	0.16	0.21	0.53	0.09	0.00	0.34	-0.05	-0.23	0.34	-0.19	1.0154	0.0064	9.9	1.1	9.9	1.1				
READIN	5	968749	0	A.2.3.1	2	125284	0.65	0.12	0.12	0.65	0.11	0.00	0.38	-0.27	-0.11	0.38	-0.18	0.3519	0.0067	9.9	1.1	9.9	1.1				
READIN	5	909390	0	B.1.2.1	3	125284	0.68	0.10	0.15	0.06	0.68	0.01	0.45	-0.24	-0.24	-0.21	0.45	0.2295	0.0068	-9.9	1.0	-9.9	0.9				
READIN	5	379304	0	A.2.6.2	3	125284	0.69	0.69	0.11	0.07	0.13	0.00	0.40	0.40	-0.28	-0.27	-0.07	0.1756	0.0068	9.9	1.0	9.9	1.1				
READIN	5	684978	0	B.3.1.1	1	125284	0.63	0.63	0.05	0.08	0.23	0.00	0.37	0.37	-0.31	-0.23	-0.10	0.5447	0.0065	9.9	1.1	9.9	1.1				
READIN	5	398230	0	A.1.2.2	2	125284	0.60	0.21	0.60	0.15	0.04	0.00	0.35	-0.13	0.35	-0.20	-0.20	0.6939	0.0065	9.9	1.1	9.9	1.1				
ELA	5	538567	1	A.2.1.1	2	62724	0.70	0.14	0.70	0.11	0.05	0.00	0.40	-0.17	0.40	-0.21	-0.27	0.0743	0.0097	2.7	1.0	-1.1	1.0				
ELA	5	295719	1	A.2.2.2	2	62724	0.75	0.03	0.19	0.75	0.03	0.00	0.29	-0.21	-0.16	0.29	-0.16	-0.1810	0.0101	9.9	1.1	9.9	1.2				
ELA	5	141009	1	A.2.4.1	2	62724	0.47	0.11	0.14	0.47	0.28	0.00	0.32	-0.18	-0.16	0.32	-0.11	1.3179	0.0089	9.9	1.1	9.9	1.2				
ELA	5	644489	1	A.2.1.1	1	62724	0.68	0.07	0.19	0.05	0.68	0.00	0.48	-0.30	-0.21	-0.28	0.48	0.1935	0.0096	-9.9	0.9	-9.9	0.9				
ELA	5	931567	1	B.3.1.1	2	62724	0.87	0.87	0.04	0.05	0.04	0.00	0.43	0.43	-0.25	-0.23	-0.23	-1.1517	0.0127	-9.9	0.9	-9.9	0.8				
ELA	5	354587	1	A.2.3.1	3	62724	0.73	0.04	0.16	0.73	0.07	0.00	0.47	-0.22	-0.29	0.47	-0.24	-0.0998	0.0100	-9.9	0.9	-9.9	0.9				
ELA	5	643018	1	B.3.2.2	2	62724	0.58	0.22	0.58	0.08	0.12	0.00	0.40	-0.23	0.40	-0.26	-0.10	0.7725	0.0090	2.8	1.0	3.0	1.0				
ELA	5	807610	1	A.2.4.1	3	62724	0.54	0.11	0.15	0.54	0.20	0.00	0.35	-0.14	-0.22	0.35	-0.12	0.9598	0.0090	9.9	1.1	9.9	1.1				
ELA	5	561197	1	A-K.1.1	2	6560	0.46	0.46	0.43	0.06	0.05	0.00	0.36	0.36	-0.08	-0.32	-0.28	1.2704	0.0277	6.1	1.1	8.6	1.2	A-	A-	A-	
ELA	5	244185	1	A-K.1.1	2	6560	0.34	0.30	0.34	0.22	0.13	0.00	0.18	0.12	0.18	-0.13	-0.25	1.8775	0.0287	9.9	1.3	9.9	1.6	A-	A+	A-	
ELA	5	316210	1	A-K.1.1	3	6560	0.79	0.06	0.09	0.05	0.79	0.00	0.55	-0.32	-0.30	-0.27	0.55	-0.6342	0.0330	-9.9	0.8	-9.9	0.7	A+	A-	A-	
ELA	5	127194	1	A-C.2.1	2	6560	0.58	0.09	0.16	0.58	0.17	0.00	0.44	-0.26	-0.17	0.44	-0.20	0.6589	0.0280	0.8	1.0	0.1	1.0	A+	A-	A-	
ELA	5	302548	1	A-V.4.1	2	6560	0.79	0.79	0.07	0.06	0.07	0.00	0.50	0.50	-0.31	-0.25	-0.25	-0.6320	0.0330	-6.6	0.9	-7.1	0.8	A-	B-	C-	
ELA	5	232790	1	A-V.4.1	2	6560	0.75	0.14	0.75	0.07	0.04	0.00	0.47	-0.24	0.47	-0.26	-0.26	-0.3739	0.0315	-3.4	0.9	-4.6	0.9	A-	C+	A+	
ELA	5	627612	1	A-V.4.1	2	6560	0.55	0.28	0.09	0.55	0.08	0.00	0.40	-0.15	-0.25	0.40	-0.21	0.8082	0.0278	3.7	1.0	3.5	1.1	A-	A-	B-	
ELA	5	130676	1	A-V.4.1	1	6560	0.52	0.26	0.09	0.52	0.13	0.00	0.40	-0.27	-0.11	0.40	-0.14	0.9798	0.0277	3.1	1.0	4.5	1.1	B-	A-	B-	
ELA	5	920479	2	B-V.4.1	2	6260	0.52	0.24	0.52	0.10	0.14	0.00	0.13	-0.02	0.13	-0.21	0.02	1.0361	0.0280	9.9	1.3	9.9	1.5	A-	A+	A-	
ELA	5	547032	2	A-V.4.1	2	6260	0.72	0.06	0.16	0.72	0.06	0.00	0.46	-0.29	-0.23	0.46	-0.22	-0.0139	0.0309	-4.4	0.9	-5.7	0.9	A-	C-	B-	
ELA	5	697321	2	A-K.1.1	2	6260	0.57	0.27	0.57	0.12	0.03	0.00	0.33	-0.08	0.33	-0.27	-0.22	0.7913	0.0283	6.7	1.1	6.6	1.1	A-	A-	A-	
ELA	5	931330	2	A-C.2.1	3	6260	0.52	0.52	0.09	0.09	0.30	0.00	0.27	0.27	-0.24	-0.29	0.04	1.0675	0.0280	9.9	1.2	9.9	1.2	A+	A-	A-	
ELA	5	875992	2	A-K.1.1	2	6260	0.40	0.17	0.22	0.21	0.40	0.01	0.21	-0.06	-0.10	-0.09	0.21	1.6749	0.0284	9.9	1.2	9.9	1.4	A+	A-	A-	
ELA	5	263453	2	A-K.1.1	3	6260	0.61	0.61	0.24	0.06	0.09	0.00	0.31	0.31	-0.11	-0.20	-0.20	0.6181	0.0286	9.5	1.1	9.3	1.2	A+	A-	A-	

Appendix G: Item Statistics Multiple Choice

ELA	5	795504	2	A-C.3.1	3	6260	0.46	0.06	0.30	0.17	0.46	0.01	0.22	-0.28	0.03	-0.15	0.22	1.3500	0.0280	9.9	1.2	9.9	1.3	A+	A-	A+
ELA	5	416466	2	A-V.4.1	2	6260	0.83	0.06	0.06	0.83	0.05	0.00	0.45	-0.23	-0.29	0.45	-0.19	-0.7729	0.0360	-4.4	0.9	-5.5	0.8	C-	A-	A-
ELA	5	265330	3	A-K.1.1	2	6258	0.45	0.14	0.45	0.30	0.10	0.01	0.29	-0.24	0.29	-0.02	-0.18	1.4411	0.0282	8.9	1.1	9.9	1.2	A-	A-	A-
ELA	5	535256	3	A-V.4.1	2	6258	0.45	0.29	0.14	0.45	0.11	0.00	0.28	-0.07	-0.18	0.28	-0.13	1.4156	0.0281	9.9	1.1	9.9	1.2	A-	A-	A-
ELA	5	197014	3	A-V.4.1	1	6258	0.65	0.14	0.09	0.13	0.65	0.00	0.45	-0.14	-0.27	-0.26	0.45	0.4008	0.0293	-2.9	1.0	-3.8	0.9	A-	A-	B-
ELA	5	628182	3	A-V.4.1	1	6258	0.83	0.83	0.03	0.04	0.09	0.00	0.38	0.38	-0.27	-0.26	-0.14	-0.8334	0.0365	-1.2	1.0	-0.4	1.0	A-	A-	A-
ELA	5	781323	3	A-K.1.1	3	6258	0.73	0.12	0.09	0.73	0.05	0.00	0.42	-0.21	-0.20	0.42	-0.27	-0.0885	0.0313	-1.2	1.0	-2.5	0.9	A+	A-	A-
ELA	5	417718	3	A-C.2.1	3	6258	0.43	0.34	0.11	0.43	0.11	0.00	0.25	0.00	-0.15	0.25	-0.22	1.5353	0.0283	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	5	251496	3	A-C.2.1	3	6258	0.39	0.20	0.35	0.06	0.39	0.00	0.18	-0.11	0.04	-0.25	0.18	1.7461	0.0286	9.9	1.2	9.9	1.4	A+	A-	A+
ELA	5	911982	3	A-V.4.1	1	6258	0.30	0.07	0.30	0.33	0.30	0.00	0.08	-0.18	0.08	-0.09	0.11	2.2336	0.0302	9.9	1.3	9.9	1.8	A-	A-	A-
ELA	5	650611	4	A-C.2.1	3	6261	0.71	0.12	0.05	0.11	0.71	0.00	0.45	-0.21	-0.32	-0.20	0.45	0.0219	0.0313	-2.9	1.0	-0.4	1.0	A+	A-	A+
ELA	5	901799	4	A-V.4.1	2	6261	0.73	0.73	0.07	0.10	0.10	0.00	0.43	0.43	-0.20	-0.27	-0.19	-0.0779	0.0318	-0.6	1.0	-4.7	0.9	A-	A-	A-
ELA	5	540164	4	A-V.4.1	2	6261	0.80	0.05	0.06	0.09	0.80	0.00	0.47	-0.28	-0.27	-0.23	0.47	-0.5629	0.0348	-4.4	0.9	-6.0	0.8	A-	A-	C-
ELA	5	311297	4	A-K.1.1	3	6261	0.82	0.06	0.07	0.82	0.04	0.01	0.53	-0.30	-0.29	0.53	-0.26	-0.7375	0.0362	-7.9	0.8	-9.1	0.7	A+	A-	A-
ELA	5	184724	4	A-C.2.1	3	6261	0.22	0.25	0.22	0.28	0.25	0.00	0.09	-0.08	0.09	-0.02	0.02	2.7554	0.0332	9.9	1.2	9.9	2.1	A-	A-	A-
ELA	5	241876	4	A-K.1.1	2	6261	0.82	0.05	0.82	0.07	0.06	0.00	0.53	-0.33	0.53	-0.29	-0.25	-0.7126	0.0360	-8.9	0.8	-7.7	0.7	A+	A-	A-
ELA	5	336647	4	A-V.4.1	1	6261	0.82	0.06	0.82	0.07	0.05	0.00	0.49	-0.26	0.49	-0.27	-0.27	-0.7126	0.0360	-5.8	0.9	-7.5	0.7	A-	B-	B-
ELA	5	337915	4	A-V.4.1	2	6261	0.45	0.15	0.25	0.45	0.15	0.00	0.16	0.00	-0.11	0.16	-0.08	1.4596	0.0285	9.9	1.3	9.9	1.5	A-	A+	A-
ELA	5	857865	5	A-K.1.1	2	6210	0.30	0.16	0.30	0.22	0.32	0.00	0.19	-0.13	0.19	-0.13	0.03	2.2617	0.0305	9.7	1.1	9.9	1.5	A-	A-	A-
ELA	5	773113	5	A-V.4.1	2	6210	0.61	0.30	0.05	0.04	0.61	0.00	0.30	-0.09	-0.27	-0.23	0.30	0.6398	0.0291	9.9	1.1	8.4	1.2	B-	A-	A-
ELA	5	164782	5	A-K.1.1	3	6210	0.51	0.20	0.13	0.51	0.16	0.00	0.42	-0.28	-0.14	0.42	-0.14	1.1750	0.0284	-2.9	1.0	-0.7	1.0	A+	A-	A-
ELA	5	194800	5	A-C.2.1	3	6210	0.65	0.65	0.11	0.18	0.06	0.00	0.43	0.43	-0.26	-0.14	-0.29	0.4553	0.0296	-1.2	1.0	-1.6	1.0	A-	A-	A+
ELA	5	821934	5	A-V.4.1	1	6210	0.88	0.03	0.88	0.03	0.06	0.00	0.37	-0.24	0.37	-0.17	-0.20	-1.2186	0.0417	-1.8	1.0	-1.4	0.9	A+	C-	C-
ELA	5	871051	5	A-V.4.1	2	6210	0.76	0.05	0.76	0.06	0.13	0.00	0.40	-0.20	0.40	-0.29	-0.17	-0.2179	0.0327	-0.4	1.0	0.2	1.0	A+	A+	A+
ELA	5	917388	5	A-V.4.1	1	6210	0.65	0.05	0.10	0.65	0.20	0.00	0.36	-0.18	-0.23	0.36	-0.15	0.4464	0.0297	4.3	1.1	3.4	1.1	A+	A-	A-
ELA	5	504983	5	A-V.4.1	2	6210	0.41	0.23	0.30	0.05	0.41	0.00	0.25	-0.19	0.03	-0.24	0.25	1.6609	0.0287	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	5	235542	6	A-K.1.1	2	6222	0.57	0.57	0.10	0.24	0.10	0.00	0.22	0.22	-0.20	-0.02	-0.14	0.8398	0.0287	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	5	218265	6	A-C.2.1	3	6222	0.28	0.13	0.28	0.28	0.31	0.00	0.16	-0.19	-0.06	0.16	0.04	2.3697	0.0310	9.6	1.1	9.9	1.6	A+	A-	A-
ELA	5	299218	6	A-C.2.1	3	6222	0.56	0.13	0.08	0.22	0.56	0.00	0.33	-0.21	-0.25	-0.07	0.33	0.8579	0.0286	8.0	1.1	8.0	1.1	A+	A+	A+
ELA	5	218606	6	A-V.4.1	2	6222	0.72	0.72	0.23	0.03	0.02	0.00	0.21	0.21	-0.06	-0.22	-0.21	0.0055	0.0313	9.9	1.2	9.9	1.5	A+	A-	A+
ELA	5	873413	6	A-V.4.1	2	6222	0.83	0.05	0.83	0.08	0.05	0.00	0.50	-0.27	0.50	-0.29	-0.25	-0.7416	0.0363	-6.8	0.9	-7.1	0.7	A+	A-	B-
ELA	5	307292	6	A-V.4.1	3	6222	0.57	0.11	0.16	0.57	0.15	0.01	0.38	-0.23	-0.14	0.38	-0.17	0.8076	0.0287	2.1	1.0	1.2	1.0	A-	A-	A-
ELA	5	488004	6	A-K.1.1	2	6222	0.44	0.16	0.12	0.44	0.28	0.00	0.25	-0.18	-0.20	0.25	0.03	1.4901	0.0285	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	5	886141	6	A-K.1.1	3	6222	0.42	0.42	0.37	0.11	0.09	0.00	0.28	0.28	-0.02	-0.19	-0.25	1.5645	0.0286	9.4	1.1	9.9	1.2	A+	A+	A+
ELA	5	843650	7	A-K.1.1	3	6223	0.60	0.08	0.20	0.11	0.60	0.00	0.44	-0.21	-0.24	-0.19	0.44	0.6530	0.0291	-3.3	1.0	-3.8	0.9	B-	A-	A-
ELA	5	427814	7	A-C.2.1	3	6223	0.67	0.11	0.67	0.16	0.06	0.01	0.43	-0.25	0.43	-0.21	-0.20	0.3017	0.0301	-1.5	1.0	-1.2	1.0	A-	A-	A-
ELA	5	277268	7	A-K.1.1	2	6223	0.55	0.14	0.14	0.55	0.17	0.00	0.40	-0.16	-0.18	0.40	-0.21	0.9158	0.0286	0.4	1.0	0.6	1.0	A-	A-	A-
ELA	5	867928	7	A-K.1.1	2	6223	0.46	0.46	0.16	0.26	0.12	0.00	0.25	0.25	-0.20	-0.06	-0.08	1.3732	0.0285	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	5	943487	7	A-V.4.1	2	6223	0.87	0.04	0.07	0.87	0.02	0.00	0.47	-0.24	-0.31	0.47	-0.23	-1.1919	0.0410	-6.0	0.9	-6.4	0.7	A-	B-	A-
ELA	5	711379	7	A-V.4.1	2	6223	0.50	0.07	0.50	0.33	0.09	0.00	0.33	-0.23	0.33	-0.06	-0.25	1.1930	0.0284	7.5	1.1	7.8	1.1	C-	A-	A-
ELA	5	236043	7	A-V.4.1	2	6223	0.54	0.54	0.31	0.06	0.10	0.00	0.36	0.36	-0.14	-0.16	-0.26	1.0059	0.0285	4.2	1.1	4.1	1.1	B-	A-	A-
ELA	5	395617	7	A-C.2.1	3	6223	0.36	0.17	0.37	0.36	0.11	0.00	0.13	-0.12	0.06	0.13	-0.15	1.9075	0.0293	9.9	1.3	9.9	1.6	A+	A-	A-
ELA	5	524740	8	A-C.2.1	3	6237	0.40	0.08	0.40	0.36	0.16	0.00	0.28	-0.30	0.28	0.06	-0.23	1.7280	0.0287	8.8	1.1	9.9	1.2	A-	A-	B-
ELA	5	945874	8	A-V.4.1	2	6237	0.92	0.02	0.03	0.92	0.02	0.00	0.38	-0.20	-0.27	0.38	-0.16	-1.6837	0.0481	-3.2	0.9	-3.3	0.8	A+	A-	A-
ELA	5	101207	8	A-V.4.1	1	6237	0.61	0.08	0.08	0.61	0.24	0.00	0.30	-0.14	-0.26	0.30	-0.09	0.6290	0.0290	9.3	1.1	6.9	1.1	A+	A-	A-
ELA	5	536653	8	A-V.4.1	2	6237	0.66	0.15	0.07	0.12	0.66	0.00	0.39	-0.23	-0.17	-0.18	0.39	0.3920	0.0297	1.8	1.0	1.3	1.0	A-	A-	A+
ELA	5	313577	8	A-K.1.1	3	6237	0.63	0.11	0.13	0.63	0.12	0.00	0.23	-0.13	-0.11	0.23	-0.11	0.5153	0.0293	9.9	1.2	9.9	1.4	A+	A-	A-
ELA	5	526774	8	A-K.1.1	2	6237	0.57	0.30	0.08	0.05	0.57	0.01	0.30	-0.03	-0.25	-0.28	0.30	0.8578	0.0286	9.9	1.1	9.9	1.3	A+	A+	A+
ELA	5	964514	8	A-K.1.1	3	6237	0.74	0.08	0.74	0.07	0.12	0.00	0.40	-0.29	0.40	-0.30	-0.07	-0.0820	0.0318	-0.2	1.0	1.0	1.0	A-	A+	A-
ELA	5	407275	8	A-K.1.1	2	6237	0.80	0.08	0.08	0.04	0.80	0.00	0.44	-0.30	-0.18	-0.24	0.44	-0.5094	0.0346	-4.2	0.9	-1.4	1.0	A+	A-	A-
ELA	5	792753	9	A-V.4.1	1	6256	0.63	0.63	0.10	0.09	0.17	0.00	0.36	0.36	-0.22	-0.21	-0.12	0.5298	0.0292	3.8	1.1	1.6	1.0	C-	A-	A-

Appendix G: Item Statistics Multiple Choice

ELA	5	307195	9	A-K.1.1	2	6256	0.54	0.23	0.54	0.16	0.07	0.00	0.29	-0.06	0.29	-0.18	-0.20	0.9930	0.0283	9.9	1.1	9.9	1.2	A+	A-	A-
ELA	5	896072	9	A-C.2.1	3	6256	0.47	0.34	0.10	0.08	0.47	0.00	0.20	0.12	-0.28	-0.24	0.20	1.3517	0.0281	9.9	1.3	9.9	1.4	A+	A+	A+
ELA	5	367139	9	A-K.1.1	3	6256	0.43	0.28	0.43	0.18	0.11	0.00	0.17	-0.09	0.17	-0.07	-0.06	1.5353	0.0283	9.9	1.2	9.9	1.4	A-	A+	A-
ELA	5	779780	9	A-C.2.1	3	6256	0.47	0.11	0.47	0.21	0.21	0.00	0.27	-0.28	0.27	-0.05	-0.06	1.3589	0.0281	9.9	1.1	9.9	1.2	A+	A-	A-
ELA	5	135054	9	A-V.4.1	2	6256	0.35	0.35	0.26	0.09	0.30	0.00	0.27	0.27	-0.11	-0.13	-0.10	1.9417	0.0291	3.2	1.0	9.9	1.3	A-	A+	A-
ELA	5	640458	9	A-K.1.1	2	6256	0.31	0.31	0.27	0.10	0.31	0.00	0.17	-0.06	0.02	-0.20	0.17	2.1720	0.0299	9.9	1.2	9.9	1.5	A-	A-	A+
ELA	5	670330	9	A-V.4.1	2	6256	0.25	0.13	0.35	0.25	0.26	0.00	0.13	-0.20	0.06	0.13	-0.04	2.5260	0.0316	7.0	1.1	9.9	1.7	A-	A+	A+
ELA	5	242147	10	A-K.1.1	3	6237	0.31	0.32	0.31	0.20	0.18	0.00	0.17	0.03	0.17	-0.13	-0.10	2.2019	0.0302	9.9	1.2	9.9	1.6	A-	A-	A-
ELA	5	121940	10	A-C.3.1	3	6237	0.54	0.54	0.14	0.15	0.16	0.00	0.20	0.20	-0.10	-0.08	-0.09	0.9668	0.0285	9.9	1.3	9.9	1.4	A-	A+	A-
ELA	5	700602	10	A-V.4.1	1	6237	0.76	0.08	0.76	0.05	0.11	0.00	0.43	-0.24	0.43	-0.21	-0.24	-0.2517	0.0328	-2.0	1.0	-5.0	0.9	A-	B-	B-
ELA	5	220028	10	A-K.1.1	3	6237	0.24	0.24	0.15	0.23	0.38	0.00	-0.08	-0.08	-0.06	0.01	0.11	2.5827	0.0321	9.9	1.4	9.9	2.3	A+	A+	A+
ELA	5	732469	10	A-K.1.1	2	6237	0.70	0.09	0.09	0.70	0.12	0.00	0.43	-0.20	-0.26	0.43	-0.20	0.1437	0.0307	-1.0	1.0	-2.1	1.0	A-	A+	A-
ELA	5	864335	10	A-C.2.1	3	6237	0.38	0.32	0.14	0.38	0.16	0.00	0.26	-0.05	-0.22	0.26	-0.07	1.8061	0.0289	9.2	1.1	9.9	1.3	A+	A-	A-
ELA	5	317812	10	A-V.4.1	2	6237	0.78	0.05	0.13	0.78	0.04	0.00	0.39	-0.25	-0.17	0.39	-0.25	-0.4072	0.0338	-0.2	1.0	-0.9	1.0	A-	A-	B-
ELA	5	808266	10	A-K.1.1	2	6237	0.66	0.19	0.08	0.06	0.66	0.00	0.42	-0.32	-0.18	-0.10	0.42	0.3346	0.0300	-0.6	1.0	-0.5	1.0	A+	A+	A+
ELA	5	238111	11	A.1.3.1	2	62560	0.74	0.04	0.19	0.03	0.74	0.00	0.31	-0.29	-0.10	-0.25	0.31	-0.1069	0.0101	9.9	1.1	9.9	1.3			
ELA	5	395108	11	A.2.3.2	2	62560	0.74	0.08	0.08	0.10	0.74	0.00	0.56	-0.32	-0.29	-0.26	0.56	-0.1032	0.0101	-9.9	0.8	-9.9	0.7			
ELA	5	448613	11	A.1.6.1	3	62560	0.75	0.75	0.05	0.06	0.13	0.00	0.47	0.47	-0.24	-0.27	-0.25	-0.2042	0.0103	-9.9	0.9	-9.9	0.8			
ELA	5	906530	11	A.1.4.1	1	62560	0.82	0.14	0.02	0.82	0.02	0.00	0.43	-0.29	-0.24	0.43	-0.21	-0.6545	0.0113	-8.0	1.0	-9.7	0.9			
ELA	5	599152	11	B.2.2.2	3	62560	0.49	0.34	0.05	0.49	0.12	0.00	0.32	-0.03	-0.25	0.32	-0.28	1.2978	0.0090	9.9	1.1	9.9	1.2			
ELA	5	120119	11	A.1.5.1	2	62560	0.65	0.21	0.65	0.09	0.05	0.00	0.41	-0.18	0.41	-0.25	-0.23	0.4575	0.0094	1.6	1.0	2.1	1.0			
ELA	5	975807	11	A.1.2.1	2	62560	0.90	0.90	0.03	0.03	0.05	0.00	0.42	0.42	-0.23	-0.25	-0.23	-1.4207	0.0139	-9.9	0.9	-9.9	0.7			
ELA	5	355090	11	B.1.1.1	2	62560	0.65	0.18	0.65	0.03	0.14	0.00	0.41	-0.26	0.41	-0.23	-0.17	0.4358	0.0094	1.0	1.0	-1.4	1.0			
ELA	5	942560	11	B-K.1.1	2	6283	0.39	0.20	0.39	0.16	0.25	0.00	0.30	-0.16	0.30	-0.27	0.05	1.8060	0.0289	5.9	1.1	9.9	1.3	A+	A-	A-
ELA	5	800161	11	B-C.3.1	3	6283	0.65	0.08	0.20	0.65	0.07	0.00	0.49	-0.31	-0.24	0.49	-0.22	0.4461	0.0297	-6.4	0.9	-7.4	0.9	A+	A+	A-
ELA	5	435116	11	B-K.1.1	3	6283	0.68	0.68	0.05	0.22	0.04	0.00	0.44	0.44	-0.29	-0.20	-0.28	0.2334	0.0304	-1.6	1.0	-2.2	1.0	A-	A-	A-
ELA	5	639053	11	B-C.2.1	3	6283	0.20	0.13	0.49	0.20	0.18	0.00	-0.01	-0.07	0.10	-0.01	-0.05	2.9185	0.0341	9.9	1.3	9.9	2.5	A-	A-	A-
ELA	5	931699	11	B-C.2.1	3	6283	0.38	0.19	0.22	0.38	0.21	0.00	0.14	-0.14	0.01	0.14	-0.04	1.8580	0.0290	9.9	1.3	9.9	1.6	A+	A-	A-
ELA	5	436642	11	B-V.4.1	2	6283	0.78	0.07	0.09	0.06	0.78	0.00	0.50	-0.30	-0.23	-0.26	0.50	-0.3786	0.0337	-6.8	0.9	-6.2	0.8	A+	B-	A-
ELA	5	185183	11	B-C.3.1	2	6283	0.56	0.14	0.14	0.56	0.16	0.00	0.43	-0.26	-0.12	0.43	-0.23	0.9186	0.0286	-2.4	1.0	-2.4	1.0	A+	A-	A-
ELA	5	569312	11	B-V.4.1	2	6283	0.57	0.57	0.20	0.16	0.07	0.00	0.45	0.45	-0.20	-0.23	-0.22	0.8677	0.0287	-3.6	1.0	-3.4	0.9	A-	A-	A-
ELA	5	925115	12	B-V.4.1	3	6250	0.78	0.78	0.09	0.09	0.04	0.00	0.53	0.53	-0.26	-0.31	-0.27	-0.4082	0.0339	-7.9	0.9	-9.1	0.7	A-	A-	A-
ELA	5	414359	12	B-K.1.1	3	6250	0.62	0.20	0.62	0.08	0.10	0.00	0.50	-0.21	0.50	-0.27	-0.28	0.5790	0.0293	-7.3	0.9	-6.6	0.9	A+	A+	A-
ELA	5	370408	12	B-K.1.1	3	6250	0.27	0.07	0.42	0.27	0.24	0.00	-0.03	-0.27	0.19	-0.03	-0.01	2.4503	0.0313	9.9	1.4	9.9	2.3	A+	A-	A+
ELA	5	466761	12	B-C.3.1	3	6250	0.35	0.28	0.17	0.20	0.35	0.00	0.35	-0.09	-0.13	-0.19	0.35	1.9798	0.0294	-2.4	1.0	8.3	1.2	A+	A+	A+
ELA	5	569067	12	B-V.4.1	2	6250	0.88	0.03	0.03	0.06	0.88	0.00	0.53	-0.30	-0.30	-0.29	0.53	-1.2895	0.0421	-8.0	0.8	-9.9	0.5	A+	B-	B-
ELA	5	754789	12	B-C.3.1	2	6250	0.65	0.65	0.09	0.16	0.09	0.00	0.37	0.37	-0.22	-0.23	-0.09	0.3847	0.0299	4.7	1.1	4.3	1.1	A+	A-	A+
ELA	5	539103	12	B-V.4.1	2	6250	0.51	0.13	0.51	0.07	0.29	0.00	0.13	-0.09	0.13	-0.17	0.02	1.1246	0.0285	9.9	1.3	9.9	1.5	A+	A+	A+
ELA	5	426667	12	B-V.4.1	2	6250	0.69	0.17	0.08	0.69	0.05	0.00	0.32	-0.09	-0.22	0.32	-0.22	0.1730	0.0307	7.7	1.1	9.9	1.3	A+	A+	A-
ELA	5	600110	13	B-K.1.1	3	6243	0.43	0.16	0.21	0.19	0.43	0.00	0.33	-0.15	-0.12	-0.14	0.33	1.5665	0.0286	5.5	1.1	9.9	1.2	A-	B-	A-
ELA	5	811534	13	B-C.3.1	2	6243	0.70	0.08	0.70	0.06	0.15	0.01	0.42	-0.29	0.42	-0.28	-0.14	0.1413	0.0310	0.1	1.0	-0.1	1.0	A+	A-	A+
ELA	5	167718	13	B-C.3.1	2	6243	0.76	0.76	0.12	0.06	0.05	0.00	0.50	0.50	-0.28	-0.28	-0.25	-0.2436	0.0330	-6.0	0.9	-7.6	0.8	A+	A+	A+
ELA	5	922462	13	B-C.3.1	2	6243	0.79	0.13	0.05	0.03	0.79	0.00	0.48	-0.28	-0.25	-0.25	0.48	-0.4389	0.0343	-4.5	0.9	-6.1	0.8	A+	A-	A+
ELA	5	964251	13	B-V.4.1	2	6243	0.86	0.86	0.05	0.05	0.04	0.00	0.53	0.53	-0.27	-0.33	-0.26	-1.0505	0.0397	-8.2	0.8	-9.6	0.6	A+	A-	A-
ELA	5	679320	13	B-V.4.1	2	6243	0.78	0.05	0.78	0.08	0.09	0.00	0.33	-0.26	0.33	-0.16	-0.13	-0.3633	0.0338	4.3	1.1	3.9	1.1	A+	A-	A-
ELA	5	743721	13	B-V.4.1	2	6243	0.90	0.90	0.03	0.05	0.01	0.00	0.50	0.50	-0.30	-0.32	-0.20	-1.5084	0.0454	-6.6	0.8	-9.9	0.5	A+	A-	A-
ELA	5	206785	13	B-K.1.1	2	6243	0.50	0.33	0.50	0.10	0.07	0.00	0.28	-0.04	0.28	-0.27	-0.16	1.2271	0.0284	9.9	1.2	9.9	1.2	A-	A-	A+
ELA	5	287556	14	B-V.4.1	1	6264	0.54	0.19	0.09	0.54	0.18	0.00	0.32	-0.17	-0.24	0.32	-0.06	0.9951	0.0285	8.6	1.1	8.4	1.2	A-	A-	A-
ELA	5	570066	14	B-C.3.1	3	6264	0.78	0.10	0.07	0.78	0.06	0.00	0.47	-0.20	-0.31	0.47	-0.24	-0.3489	0.0334	-4.9	0.9	-6.9	0.8	A+	A-	A-
ELA	5	497584	14	B-V.4.1	2	6264	0.37	0.37	0.11	0.40	0.12	0.00	0.21	0.21	-0.21	0.04	-0.17	1.8588	0.0291	9.9	1.2	9.9	1.4	A-	B-	A-
ELA	5	573141	14	B-K.1.1	2	6264	0.44	0.23	0.12	0.22	0.44	0.00	0.42	-0.22	-0.20	-0.11	0.42	1.5160	0.0285	-5.4	0.9	0.4	1.0	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

ELA	5	555872	14	B-V.4.1	2	6264	0.65	0.65	0.09	0.13	0.13	0.00	0.44	0.44	-0.37	-0.14	-0.16	0.4473	0.0296	-2.3	1.0	0.4	1.0	A-	A+	A-
ELA	5	867819	14	B-C.3.1	3	6264	0.31	0.20	0.25	0.31	0.24	0.00	0.17	-0.11	-0.07	0.17	0.00	2.2072	0.0302	9.9	1.1	9.9	1.6	A+	A-	A+
ELA	5	793760	14	B-K.1.1	2	6264	0.49	0.26	0.49	0.12	0.13	0.00	0.30	-0.13	0.30	-0.19	-0.09	1.2773	0.0283	8.5	1.1	9.8	1.2	A-	A-	A-
ELA	5	802853	14	B-K.1.1	2	6264	0.55	0.16	0.14	0.15	0.55	0.01	0.37	-0.16	-0.22	-0.13	0.37	0.9404	0.0285	4.2	1.1	4.3	1.1	A-	A-	A-
ELA	5	860349	15	B-V.4.1	3	6244	0.54	0.20	0.54	0.13	0.13	0.00	0.37	-0.17	0.37	-0.15	-0.19	1.0424	0.0286	4.4	1.1	5.2	1.1	A-	A-	A-
ELA	5	631012	15	B-K.1.1	2	6244	0.62	0.20	0.08	0.62	0.09	0.00	0.47	-0.20	-0.27	0.47	-0.25	0.6068	0.0294	-4.1	1.0	-5.2	0.9	A+	A-	A-
ELA	5	505691	15	B-V.4.1	1	6244	0.67	0.05	0.14	0.67	0.13	0.00	0.44	-0.26	-0.26	0.44	-0.17	0.3458	0.0302	-1.5	1.0	-3.9	0.9	A+	A-	A-
ELA	5	403618	15	B-K.1.1	2	6244	0.74	0.06	0.15	0.74	0.05	0.00	0.47	-0.28	-0.26	0.47	-0.20	-0.0672	0.0321	-3.6	0.9	-3.8	0.9	A-	A-	A-
ELA	5	238114	15	B-V.4.1	2	6244	0.59	0.59	0.09	0.04	0.27	0.00	0.21	0.21	-0.18	-0.23	-0.01	0.7516	0.0291	9.9	1.3	9.9	1.4	A+	A+	A+
ELA	5	846912	15	B-V.4.1	2	6244	0.38	0.18	0.28	0.16	0.38	0.00	0.24	-0.15	-0.01	-0.15	0.24	1.8703	0.0291	9.9	1.1	9.9	1.4	A+	A-	A-
ELA	5	702089	15	B-C.3.1	2	6244	0.79	0.79	0.10	0.05	0.05	0.01	0.50	0.50	-0.20	-0.31	-0.32	-0.4404	0.0344	-5.9	0.9	-4.9	0.8	A-	A-	A-
ELA	5	748030	15	B-K.1.1	2	6244	0.74	0.16	0.05	0.74	0.04	0.00	0.46	-0.23	-0.29	0.46	-0.26	-0.1182	0.0324	-3.1	1.0	-3.8	0.9	A+	B-	A-
ELA	5	748644	16	B-K.1.1	2	6249	0.32	0.23	0.37	0.08	0.32	0.00	0.19	-0.04	0.01	-0.27	0.19	2.1852	0.0300	9.9	1.2	9.9	1.5	A-	A-	A-
ELA	5	597726	16	B-C.3.1	2	6249	0.71	0.19	0.04	0.71	0.06	0.00	0.41	-0.20	-0.27	0.41	-0.24	0.1044	0.0311	1.0	1.0	-1.3	1.0	A+	A-	A-
ELA	5	231867	16	B-V.4.1	2	6249	0.53	0.53	0.09	0.17	0.20	0.00	0.40	0.40	-0.23	-0.11	-0.23	1.0594	0.0285	1.7	1.0	2.3	1.0	A-	A-	A-
ELA	5	118861	16	B-K.1.1	2	6249	0.68	0.15	0.10	0.68	0.07	0.00	0.46	-0.26	-0.22	0.46	-0.22	0.2602	0.0304	-3.1	1.0	-4.7	0.9	A+	A+	A-
ELA	5	134909	16	B-V.4.1	2	6249	0.43	0.16	0.27	0.13	0.43	0.01	0.32	-0.14	-0.11	-0.16	0.32	1.5663	0.0285	7.9	1.1	7.9	1.2	B-	A-	A-
ELA	5	322506	16	B-V.4.1	2	6249	0.43	0.41	0.14	0.02	0.43	0.00	0.41	-0.25	-0.13	-0.22	0.41	1.5785	0.0285	-1.1	1.0	1.1	1.0	A-	A-	A-
ELA	5	844589	16	B-K.1.1	2	6249	0.12	0.70	0.12	0.10	0.07	0.00	-0.19	0.45	-0.19	-0.30	-0.21	3.6004	0.0409	9.9	1.3	9.9	4.2	A+	A+	A+
ELA	5	616530	16	B-C.3.1	2	6249	0.89	0.06	0.89	0.02	0.03	0.00	0.44	-0.29	0.44	-0.21	-0.23	-1.3598	0.0435	-4.7	0.9	-6.1	0.7	A+	A-	A+
ELA	5	510148	17	B-K.1.1	3	6262	0.71	0.11	0.07	0.71	0.10	0.00	0.45	-0.25	-0.28	0.45	-0.16	0.0899	0.0312	-2.2	1.0	-3.2	0.9	A-	A-	A-
ELA	5	858266	17	B-K.1.1	3	6262	0.46	0.23	0.18	0.12	0.46	0.00	0.35	-0.13	-0.08	-0.26	0.35	1.4357	0.0285	4.2	1.1	6.5	1.1	A+	A-	A-
ELA	5	544282	17	B-C.3.1	2	6262	0.42	0.23	0.20	0.14	0.42	0.00	0.36	-0.03	-0.15	-0.31	0.36	1.6600	0.0287	1.6	1.0	5.4	1.1	A-	A-	A-
ELA	5	521311	17	B-C.3.1	2	6262	0.60	0.17	0.14	0.60	0.08	0.00	0.42	-0.30	-0.11	0.42	-0.19	0.7529	0.0290	-0.6	1.0	0.3	1.0	A+	A-	A-
ELA	5	560009	17	B-V.4.1	2	6262	0.62	0.07	0.24	0.07	0.62	0.00	0.54	-0.33	-0.31	-0.18	0.54	0.6232	0.0293	-9.9	0.9	-9.9	0.8	A-	A-	A-
ELA	5	245886	17	B-V.4.1	2	6262	0.59	0.59	0.05	0.18	0.18	0.00	0.41	0.41	-0.26	-0.17	-0.20	0.8000	0.0289	0.6	1.0	0.2	1.0	A-	A-	A-
ELA	5	996527	17	B-V.4.1	2	6262	0.91	0.02	0.03	0.91	0.03	0.00	0.39	-0.26	-0.23	0.39	-0.18	-1.6148	0.0472	-3.2	0.9	-2.0	0.9	A+	A-	A-
ELA	5	737179	17	B-V.4.1	1	6262	0.49	0.24	0.49	0.11	0.16	0.00	0.34	-0.22	0.34	-0.13	-0.09	1.3025	0.0284	7.3	1.1	8.9	1.2	A-	A-	A-
ELA	5	996931	18	B-C.2.1	3	6285	0.29	0.29	0.24	0.30	0.17	0.00	0.14	0.14	-0.01	0.01	-0.17	2.3003	0.0304	9.9	1.2	9.9	1.7	A-	A-	A-
ELA	5	704416	18	B-C.3.1	3	6285	0.56	0.16	0.15	0.56	0.13	0.00	0.39	-0.31	-0.18	0.39	-0.05	0.8680	0.0285	1.7	1.0	2.2	1.0	A+	A-	A+
ELA	5	945587	18	B-C.3.1	3	6285	0.37	0.08	0.14	0.41	0.37	0.01	0.05	-0.19	-0.27	0.25	0.05	1.8377	0.0288	9.9	1.4	9.9	1.7	A+	A+	A+
ELA	5	970395	18	B-V.4.1	2	6285	0.91	0.02	0.04	0.03	0.91	0.00	0.48	-0.22	-0.28	-0.29	0.48	-1.5600	0.0459	-5.4	0.8	-9.3	0.5	A+	B-	B-
ELA	5	637037	18	B-V.4.1	2	6285	0.68	0.21	0.08	0.03	0.68	0.00	0.47	-0.27	-0.25	-0.24	0.47	0.2494	0.0302	-3.7	1.0	-3.2	0.9	B-	C-	C-
ELA	5	465892	18	B-C.2.1	3	6285	0.49	0.12	0.49	0.21	0.18	0.00	0.34	-0.16	0.34	-0.20	-0.08	1.2343	0.0282	5.4	1.1	6.9	1.1	A+	A-	A-
ELA	5	289920	18	B-V.4.1	1	6285	0.44	0.09	0.44	0.07	0.40	0.00	0.29	-0.25	0.29	-0.30	0.01	1.4842	0.0283	9.1	1.1	9.9	1.2	A-	A-	A-
ELA	5	361623	18	B-K.1.1	3	6285	0.20	0.47	0.20	0.20	0.13	0.00	0.10	0.11	-0.16	0.10	-0.08	2.8786	0.0340	7.4	1.1	9.9	2.0	A-	A-	A-
ELA	5	358098	19	B-C.2.1	3	6247	0.40	0.26	0.15	0.40	0.19	0.01	0.26	-0.04	-0.21	0.26	-0.09	1.6984	0.0287	8.9	1.1	9.9	1.3	A-	A-	A-
ELA	5	942081	19	B-V.4.1	2	6247	0.36	0.14	0.27	0.22	0.36	0.00	0.12	-0.11	0.01	-0.05	0.12	1.9126	0.0292	9.9	1.3	9.9	1.5	A-	A+	A-
ELA	5	155406	19	B-C.3.1	3	6247	0.53	0.08	0.53	0.19	0.19	0.00	0.38	-0.18	0.38	-0.17	-0.19	1.0454	0.0284	1.1	1.0	2.0	1.0	A-	A-	A-
ELA	5	896961	19	B-K.1.1	2	6247	0.45	0.17	0.45	0.34	0.03	0.00	0.18	-0.17	0.18	0.02	-0.18	1.4398	0.0284	9.9	1.3	9.9	1.4	A-	A-	A-
ELA	5	680527	19	B-C.2.1	3	6247	0.18	0.39	0.19	0.18	0.24	0.00	0.06	-0.10	-0.08	0.06	0.13	3.0588	0.0356	8.5	1.2	9.9	2.2	A-	A+	A+
ELA	5	137362	19	B-C.3.1	3	6247	0.57	0.11	0.23	0.57	0.09	0.01	0.36	-0.22	-0.13	0.36	-0.17	0.8608	0.0286	4.5	1.1	5.0	1.1	A+	A-	A-
ELA	5	541125	19	B-V.4.1	2	6247	0.55	0.55	0.20	0.07	0.19	0.00	0.33	0.33	-0.21	-0.28	-0.02	0.9628	0.0284	7.9	1.1	8.0	1.1	A-	A-	A-
ELA	5	377391	19	B-K.1.1	3	6247	0.50	0.50	0.15	0.12	0.22	0.00	0.40	0.40	-0.19	-0.18	-0.17	1.1767	0.0283	-1.0	1.0	0.8	1.0	A-	A-	A-
ELA	5	455241	20	B-C.3.1	3	6233	0.32	0.34	0.18	0.32	0.16	0.00	0.19	-0.03	-0.17	0.19	-0.02	2.1699	0.0300	9.7	1.1	9.9	1.5	A-	A-	A-
ELA	5	670447	20	B-C.3.1	2	6233	0.35	0.35	0.18	0.30	0.16	0.00	0.11	0.11	-0.17	0.08	-0.06	1.9683	0.0294	9.9	1.3	9.9	1.6	A-	A-	A-
ELA	5	877596	20	B-V.4.1	1	6233	0.71	0.14	0.06	0.71	0.09	0.00	0.43	-0.22	-0.27	0.43	-0.19	0.0634	0.0312	-1.2	1.0	-2.9	0.9	A-	A-	A-
ELA	5	451229	20	B-K.1.1	3	6233	0.61	0.61	0.11	0.10	0.18	0.00	0.30	0.30	-0.22	-0.21	-0.04	0.6445	0.0292	9.9	1.2	9.9	1.2	A-	A+	A+
ELA	5	695937	20	B-K.1.1	3	6233	0.43	0.12	0.28	0.16	0.43	0.01	0.30	-0.21	-0.01	-0.20	0.30	1.5665	0.0286	7.1	1.1	9.5	1.2	A-	A-	A-
ELA	5	471098	20	B-C.2.1	3	6233	0.46	0.46	0.16	0.20	0.18	0.00	0.22	0.22	-0.12	-0.05	-0.12	1.4230	0.0284	9.9	1.2	9.9	1.3	A+	A+	A+
ELA	5	890916	20	B-C.2.1	3	6233	0.60	0.19	0.60	0.13	0.08	0.00	0.44	-0.25	0.44	-0.18	-0.20	0.7023	0.0290	-1.8	1.0	-1.3	1.0	A-	A+	A-

Appendix G: Item Statistics Multiple Choice

ELA	5	299554	20	B-K.1.1	2	6233	0.39	0.30	0.14	0.39	0.16	0.00	0.25	-0.02	-0.25	0.25	-0.06	1.7768	0.0289	9.1	1.1	9.9	1.4	A+	A+	A+
READIN	6	665376	0	A.2.2.1		128469	0.76	0.05	0.05	0.76	0.14	0.00	0.39	-0.26	-0.25	0.39	-0.16	-0.5052	0.0072	1.1	1.0	-8.8	0.9			
READIN	6	693185	0	A.2.3.1		128469	0.77	0.09	0.77	0.09	0.05	0.00	0.49	-0.26	0.49	-0.25	-0.26	-0.5556	0.0073	-9.9	0.9	-9.9	0.8			
READIN	6	630176	0	A.2.4.1		128469	0.72	0.21	0.04	0.72	0.03	0.00	0.34	-0.12	-0.30	0.34	-0.25	-0.1733	0.0068	9.9	1.1	9.9	1.1			
READIN	6	691880	0	B.3.1.1		128469	0.87	0.04	0.04	0.87	0.04	0.00	0.52	-0.31	-0.31	0.52	-0.23	-1.2184	0.0085	-9.9	0.8	-9.9	0.6			
READIN	6	800013	0	B.3.3.1		128469	0.71	0.19	0.71	0.05	0.05	0.00	0.46	-0.24	0.46	-0.24	-0.26	-0.1565	0.0068	-9.9	0.9	-9.9	0.9			
READIN	6	141293	0	A.2.2.1		128469	0.48	0.48	0.08	0.25	0.18	0.00	0.36	0.36	-0.30	-0.13	-0.10	1.0350	0.0062	3.3	1.0	9.9	1.1			
READIN	6	634961	0	A.1.3.1	2	128469	0.74	0.06	0.74	0.05	0.14	0.00	0.50	-0.32	0.50	-0.23	-0.25	-0.3643	0.0070	-9.9	0.9	-9.9	0.8			
READIN	6	348368	0	B.1.1.1	2	128469	0.69	0.08	0.09	0.14	0.69	0.00	0.46	-0.19	-0.26	-0.24	0.46	-0.0519	0.0066	-9.9	0.9	-9.9	0.9			
READIN	6	791314	0	A.1.4.1	2	128469	0.60	0.22	0.60	0.13	0.06	0.00	0.37	-0.06	0.37	-0.24	-0.31	0.5112	0.0063	9.9	1.0	9.9	1.0			
READIN	6	424466	0	A.1.3.1	3	128469	0.63	0.09	0.15	0.13	0.63	0.00	0.42	-0.26	-0.11	-0.26	0.42	0.2646	0.0064	-5.6	1.0	-6.6	1.0			
READIN	6	349178	0	A.1.6.2	2	128469	0.60	0.12	0.20	0.60	0.07	0.00	0.41	-0.17	-0.27	0.41	-0.12	0.4626	0.0063	-3.9	1.0	-2.9	1.0			
READIN	6	227473	0	B.1.1.1	1	128469	0.81	0.81	0.08	0.09	0.02	0.00	0.43	0.43	-0.28	-0.24	-0.16	-0.9394	0.0079	-2.3	1.0	-9.9	0.9			
READIN	6	383719	0	B.1.1.1	2	128469	0.82	0.07	0.04	0.82	0.07	0.00	0.39	-0.13	-0.26	0.39	-0.25	-0.8309	0.0077	-9.9	0.9	-4.6	1.0			
READIN	6	750894	0	B.1.1.1	2	128469	0.65	0.65	0.14	0.06	0.14	0.00	0.30	0.30	-0.28	-0.14	-0.02	0.1740	0.0065	9.9	1.1	9.9	1.2			
READIN	6	113791	0	A.1.1.1	2	128469	0.79	0.07	0.79	0.06	0.08	0.00	0.40	-0.28	0.40	-0.20	-0.16	-0.6244	0.0074	-9.9	1.0	-9.8	0.9			
READIN	6	447456	0	A.1.4.1	3	128469	0.44	0.44	0.13	0.33	0.09	0.00	0.32	0.32	-0.23	-0.05	-0.17	1.2334	0.0062	9.9	1.1	9.9	1.1			
READIN	6	640104	0	A.1.4.1	1	128469	0.73	0.14	0.73	0.12	0.02	0.00	0.43	-0.38	0.43	-0.10	-0.22	-0.2496	0.0069	-9.9	1.0	-9.1	1.0			
READIN	6	340507	0	A.1.4.1	1	128469	0.70	0.12	0.15	0.03	0.70	0.00	0.47	-0.23	-0.27	-0.24	0.47	-0.0382	0.0066	-9.9	0.9	-9.9	0.8			
READIN	6	841102	0	B.2.2.1	2	128469	0.60	0.13	0.08	0.60	0.18	0.00	0.39	-0.24	-0.28	0.39	-0.09	0.5044	0.0063	0.5	1.0	1.4	1.0			
READIN	6	505392	0	A.2.1.1	2	128469	0.83	0.12	0.03	0.03	0.83	0.00	0.35	-0.17	-0.24	-0.22	0.35	-0.9998	0.0080	4.6	1.0	7.6	1.1			
READIN	6	635004	0	A.2.3.1	2	128469	0.84	0.08	0.84	0.03	0.05	0.00	0.39	-0.17	0.39	-0.15	-0.33	-1.1026	0.0083	-5.0	1.0	-2.9	1.0			
READIN	6	100431	0	A.2.3.1	2	128469	0.63	0.01	0.63	0.23	0.13	0.00	0.19	-0.20	0.19	-0.04	-0.16	0.3572	0.0063	9.9	1.2	9.9	1.3			
READIN	6	873972	0	A.2.5.1	3	128469	0.69	0.04	0.08	0.18	0.69	0.00	0.43	-0.29	-0.19	-0.22	0.43	-0.0163	0.0066	-9.9	1.0	-9.9	0.9			
READIN	6	735055	0	A.2.3.1	2	128469	0.84	0.08	0.84	0.05	0.04	0.00	0.25	-0.10	0.25	-0.14	-0.20	-0.7862	0.0076	-5.9	1.0	9.9	1.1			
READIN	6	369159	0	A.2.4.1	1	128469	0.79	0.06	0.79	0.06	0.09	0.00	0.45	-0.22	0.45	-0.28	-0.23	-0.6378	0.0074	-9.9	0.9	-9.9	0.8			
READIN	6	123600	0	B.2.1.2	1	128469	0.79	0.09	0.03	0.08	0.79	0.00	0.45	-0.27	-0.26	-0.22	0.45	-0.6904	0.0075	-9.9	0.9	-9.9	0.8			
READIN	6	709979	0	B.1.2.1	3	128469	0.77	0.03	0.12	0.08	0.77	0.00	0.29	-0.30	-0.05	-0.19	0.29	-0.4733	0.0071	9.9	1.1	9.9	1.3			
READIN	6	588872	0	A.1.4.1	3	128469	0.85	0.03	0.85	0.10	0.02	0.00	0.40	-0.25	0.40	-0.23	-0.22	-1.1181	0.0083	-9.9	0.9	-9.9	0.9			
READIN	6	597967	0	A.1.4.1	1	128469	0.47	0.36	0.11	0.47	0.06	0.00	0.28	-0.01	-0.18	0.28	-0.32	1.0817	0.0062	9.9	1.1	9.9	1.2			
READIN	6	939653	0	B.3.3.4	2	128469	0.82	0.03	0.82	0.04	0.11	0.00	0.35	-0.24	0.35	-0.27	-0.13	-0.9182	0.0079	7.8	1.0	9.9	1.1			
READIN	6	584203	0	B.3.3.4	2	128469	0.65	0.08	0.23	0.65	0.05	0.00	0.36	-0.26	-0.14	0.36	-0.20	0.2050	0.0064	9.9	1.0	9.9	1.1			
READIN	6	883042	0	A.2.3.1	2	128469	0.74	0.07	0.05	0.15	0.74	0.00	0.45	-0.20	-0.24	-0.27	0.45	-0.4200	0.0071	-7.8	1.0	-9.9	0.9			
READIN	6	392011	0	A.2.4.1	2	128469	0.58	0.58	0.05	0.31	0.06	0.00	0.32	0.32	-0.25	-0.12	-0.20	0.6152	0.0062	9.9	1.1	9.9	1.1			
READIN	6	933263	0	B.1.1.1	3	128469	0.63	0.07	0.09	0.63	0.20	0.00	0.16	-0.06	-0.07	0.16	-0.10	0.1950	0.0064	9.9	1.3	9.9	1.5			
READIN	6	226650	0	A.2.3.1	2	128469	0.62	0.62	0.13	0.12	0.11	0.01	0.48	0.48	-0.23	-0.24	-0.20	0.3428	0.0063	-9.9	0.9	-9.9	0.9			
READIN	6	728547	0	A.2.3.1	2	128469	0.65	0.16	0.12	0.06	0.65	0.01	0.37	-0.22	-0.13	-0.17	0.37	0.2009	0.0064	9.9	1.0	9.9	1.1			
READIN	6	193167	0	B.3.3.2	2	128469	0.57	0.25	0.57	0.12	0.05	0.01	0.36	-0.03	0.36	-0.30	-0.25	0.4738	0.0063	9.9	1.1	9.9	1.1			
READIN	6	473542	0	B.3.3.3	1	128469	0.86	0.86	0.05	0.03	0.05	0.01	0.40	0.40	-0.22	-0.24	-0.17	-1.0969	0.0082	-9.9	0.9	-9.9	0.8			
READIN	6	203053	0	B.3.1.1	2	128469	0.55	0.14	0.12	0.55	0.18	0.01	0.37	-0.14	-0.23	0.37	-0.12	0.7465	0.0062	9.4	1.0	9.9	1.0			
READIN	6	236614	0	A.2.4.1	1	128469	0.73	0.12	0.08	0.73	0.07	0.01	0.47	-0.21	-0.25	0.47	-0.25	-0.4079	0.0071	-3.3	1.0	-9.9	0.9			
READIN	6	672306	1	A.2.1.1	2	71542	0.62	0.10	0.08	0.62	0.20	0.00	0.37	-0.21	-0.16	0.37	-0.18	0.3546	0.0084	6.6	1.0	2.0	1.0			
READIN	6	151276	1	A.2.4.1	1	71542	0.69	0.17	0.06	0.69	0.07	0.00	0.44	-0.27	-0.22	0.44	-0.17	-0.0658	0.0089	-9.9	1.0	-9.9	0.9			
READIN	6	645461	1	A.2.3.2	3	71542	0.75	0.10	0.11	0.75	0.04	0.00	0.44	-0.26	-0.19	0.44	-0.26	-0.4109	0.0094	-9.9	0.9	-9.9	0.9			
READIN	6	512599	1	A.2.4.1	1	71542	0.74	0.74	0.17	0.02	0.07	0.00	0.31	0.31	-0.11	-0.18	-0.28	-0.3603	0.0093	9.9	1.1	9.9	1.1			
READIN	6	149000	1	B.2.1.3	1	71542	0.60	0.11	0.22	0.07	0.60	0.00	0.37	-0.15	-0.16	-0.26	0.37	0.4223	0.0084	8.3	1.0	4.6	1.0			
READIN	6	170102	1	B.3.1.1	3	71542	0.65	0.22	0.03	0.65	0.10	0.00	0.34	-0.18	-0.26	0.34	-0.14	0.1881	0.0086	9.9	1.1	9.9	1.1			
READIN	6	486898	1	A.2.3.1	3	71542	0.66	0.14	0.66	0.14	0.05	0.00	0.25	-0.10	0.25	-0.10	-0.22	0.0967	0.0087	9.9	1.2	9.9	1.2			
READIN	6	837636	1	B.3.3.3	2	71542	0.77	0.77	0.04	0.12	0.06	0.00	0.39	0.39	-0.24	-0.16	-0.26	-0.5479	0.0096	-5.0	1.0	-3.7	1.0			
READIN	6	729469	1	A.1.3.1	2	14593	0.54	0.07	0.54	0.34	0.05	0.00	0.30	-0.21	0.30	-0.15	-0.12	0.6934	0.0183	9.9	1.1	9.9	1.1	A-	B-	A-
READIN	6	744891	1	A.1.3.2	2	14593	0.64	0.09	0.11	0.64	0.16	0.00	0.46	-0.25	-0.28	0.46	-0.16	0.2036	0.0189	-8.6	0.9	-8.6	0.9	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

READIN	6	935899	1	A.1.4.1	2	14593	0.56	0.56	0.20	0.14	0.10	0.00	0.48	0.48	-0.25	-0.13	-0.30	0.6093	0.0183	-9.9	0.9	-9.9	0.9	A+	A-	A+
READIN	6	104363	1	B.1.1.1	2	14593	0.49	0.14	0.21	0.15	0.49	0.00	0.27	-0.13	-0.12	-0.09	0.27	0.9420	0.0182	9.9	1.1	9.9	1.2	A+	A+	A+
READIN	6	713200	1	A.1.1.1	2	14593	0.69	0.69	0.10	0.05	0.15	0.00	0.34	0.34	-0.17	-0.25	-0.13	-0.0660	0.0195	6.5	1.1	6.3	1.1	A-	A-	A-
READIN	6	329285	1	B.2.1.2	2	14593	0.75	0.08	0.10	0.75	0.07	0.00	0.48	-0.23	-0.22	0.48	-0.30	-0.4713	0.0208	-9.9	0.9	-8.6	0.9	A-	A-	B-
READIN	6	134493	1	B.1.1.1	3	14593	0.52	0.12	0.12	0.23	0.52	0.00	0.36	-0.20	-0.19	-0.12	0.36	0.7854	0.0182	5.7	1.0	6.4	1.1	A+	A-	A-
READIN	6	727367	1	B.1.1.1	3	14593	0.58	0.24	0.58	0.06	0.12	0.00	0.29	-0.02	0.29	-0.24	-0.23	0.5015	0.0184	9.9	1.1	9.9	1.2	A+	A-	A-
READIN	6	249226	1	B.2.2.1	2	14593	0.53	0.27	0.08	0.12	0.53	0.00	0.40	-0.22	-0.26	-0.09	0.40	0.7626	0.0182	-0.7	1.0	-0.2	1.0	A-	A-	A-
READIN	6	631271	1	A.1.3.1	2	14593	0.54	0.05	0.29	0.54	0.12	0.00	0.34	-0.29	-0.09	0.34	-0.19	0.7125	0.0182	9.2	1.1	9.9	1.1	A+	A-	A-
READIN	6	819089	2	B.1.1.1	2	14275	0.83	0.09	0.04	0.83	0.04	0.00	0.27	-0.19	-0.12	0.27	-0.12	-0.9687	0.0237	3.6	1.1	7.9	1.2	A-	A-	B-
READIN	6	891805	2	A.1.3.1	2	14275	0.55	0.21	0.55	0.12	0.12	0.00	0.35	-0.18	0.35	-0.14	-0.16	0.7190	0.0184	4.1	1.0	5.3	1.1	A-	A-	A-
READIN	6	849849	2	A.1.1.1	2	14275	0.81	0.81	0.03	0.08	0.08	0.00	0.35	0.35	-0.28	-0.14	-0.18	-0.8181	0.0228	-0.7	1.0	2.0	1.1	A-	A-	A-
READIN	6	965218	2	A.1.3.2	2	14275	0.71	0.05	0.06	0.18	0.71	0.00	0.52	-0.31	-0.31	-0.24	0.52	-0.1377	0.0200	-9.9	0.9	-9.9	0.8	A-	A-	A-
READIN	6	980100	2	B.1.1.1	3	14275	0.70	0.10	0.14	0.07	0.70	0.00	0.49	-0.22	-0.28	-0.24	0.49	-0.0592	0.0197	-9.9	0.9	-9.9	0.8	A-	A-	A-
READIN	6	636317	2	B.2.2.1	2	14275	0.25	0.23	0.25	0.21	0.31	0.00	0.17	-0.17	0.17	0.01	-0.01	2.2639	0.0207	9.3	1.1	9.9	1.6	A+	A-	A-
READIN	6	358665	2	B.1.1.1	3	14275	0.27	0.27	0.11	0.49	0.13	0.00	0.22	0.22	-0.07	-0.11	-0.06	2.1664	0.0203	5.4	1.1	9.9	1.4	A+	A-	A-
READIN	6	173866	2	B.1.1.1	2	14275	0.63	0.13	0.09	0.15	0.63	0.00	0.24	-0.04	-0.17	-0.14	0.24	0.2863	0.0189	9.9	1.2	9.9	1.3	A-	A-	A-
READIN	6	150912	2	B.1.1.1	2	14275	0.57	0.04	0.35	0.57	0.03	0.00	0.37	-0.24	-0.19	0.37	-0.28	0.5758	0.0185	3.2	1.0	5.3	1.1	A+	A-	A-
READIN	6	417448	2	B.1.1.1	2	14275	0.75	0.04	0.03	0.75	0.17	0.00	0.32	-0.20	-0.21	0.32	-0.15	-0.3763	0.0208	5.7	1.1	3.6	1.1	A+	A-	A-
READIN	6	206699	3	A.1.3.1	2	14241	0.41	0.41	0.17	0.20	0.22	0.00	0.20	0.20	-0.07	-0.05	-0.12	1.3989	0.0186	9.9	1.2	9.9	1.4	A-	A-	A-
READIN	6	861510	3	B.1.1.1	2	14241	0.78	0.07	0.78	0.07	0.08	0.00	0.31	-0.12	0.31	-0.21	-0.16	-0.6074	0.0219	4.7	1.1	8.0	1.2	A-	A-	A-
READIN	6	703567	3	B.2.2.2	3	14241	0.77	0.11	0.06	0.06	0.77	0.00	0.48	-0.26	-0.29	-0.22	0.48	-0.4956	0.0214	-9.9	0.9	-9.9	0.8	A+	A-	A-
READIN	6	954017	3	A.1.4.1	3	14241	0.85	0.04	0.07	0.85	0.03	0.00	0.43	-0.27	-0.25	0.43	-0.17	-1.1761	0.0251	-6.3	0.9	-5.6	0.8	A+	A-	A-
READIN	6	962626	3	B.1.1.1	3	14241	0.62	0.18	0.14	0.06	0.62	0.00	0.40	-0.17	-0.22	-0.23	0.40	0.3269	0.0190	-1.0	1.0	-0.4	1.0	A+	A-	A-
READIN	6	632505	3	A.1.2.2	2	14241	0.27	0.38	0.27	0.29	0.06	0.00	0.15	-0.04	0.15	-0.04	-0.11	2.1292	0.0202	9.9	1.2	9.9	1.6	A-	A-	A-
READIN	6	919843	3	A.1.4.1	1	14241	0.68	0.68	0.02	0.17	0.13	0.00	0.51	0.51	-0.20	-0.32	-0.27	0.0173	0.0197	-9.9	0.9	-9.9	0.8	A+	A-	A-
READIN	6	938506	3	B.1.1.1	3	14241	0.67	0.06	0.09	0.67	0.18	0.00	0.50	-0.31	-0.24	0.50	-0.24	0.0582	0.0195	-9.9	0.9	-9.9	0.8	A-	A-	A-
READIN	6	986537	3	B.2.1.2	2	14241	0.57	0.05	0.57	0.28	0.09	0.00	0.42	-0.24	0.42	-0.21	-0.20	0.5737	0.0186	-4.1	1.0	-3.8	1.0	A-	A-	A-
READIN	6	753317	3	A.1.1.1	2	14241	0.46	0.13	0.21	0.46	0.20	0.00	0.38	-0.12	-0.07	0.38	-0.28	1.1568	0.0184	-2.4	1.0	2.8	1.0	A-	A-	A-
READIN	6	982334	4	A.1.4.1	1	14200	0.75	0.75	0.09	0.09	0.08	0.00	0.52	0.52	-0.27	-0.24	-0.30	-0.3727	0.0212	-9.9	0.9	-9.9	0.7	A-	A-	A-
READIN	6	633445	4	B.1.1.1	2	14200	0.38	0.38	0.23	0.30	0.08	0.00	0.26	0.26	-0.28	0.11	-0.21	1.5543	0.0190	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	6	992448	4	B.1.1.1	2	14200	0.76	0.05	0.76	0.07	0.12	0.00	0.55	-0.26	0.55	-0.30	-0.32	-0.4924	0.0216	-9.9	0.8	-9.9	0.7	A-	A-	A-
READIN	6	881609	4	B.2.1.2	2	14200	0.62	0.05	0.08	0.62	0.25	0.00	0.27	-0.29	-0.19	0.27	-0.03	0.3462	0.0192	9.9	1.2	9.9	1.2	A-	A-	A-
READIN	6	553000	4	B.2.2.2	3	14200	0.51	0.14	0.07	0.28	0.51	0.00	0.32	-0.15	-0.27	-0.08	0.32	0.9197	0.0186	9.0	1.1	9.9	1.1	A+	A-	A-
READIN	6	468299	4	A.1.2.2	2	14200	0.78	0.07	0.78	0.11	0.04	0.00	0.50	-0.32	0.50	-0.25	-0.26	-0.6329	0.0223	-9.9	0.9	-9.9	0.7	B-	A-	A-
READIN	6	249687	4	A.1.3.1	2	14200	0.72	0.12	0.07	0.09	0.72	0.00	0.51	-0.20	-0.29	-0.31	0.51	-0.2120	0.0206	-9.9	0.9	-9.9	0.8	A-	A-	A-
READIN	6	299780	4	B.1.1.1	3	14200	0.74	0.10	0.07	0.74	0.09	0.00	0.53	-0.32	-0.31	0.53	-0.20	-0.3440	0.0211	-9.9	0.8	-9.9	0.7	A+	A-	A-
READIN	6	168104	4	A.1.3.1	2	14200	0.68	0.68	0.04	0.23	0.05	0.00	0.52	0.52	-0.28	-0.31	-0.27	0.0258	0.0199	-9.9	0.9	-9.9	0.8	A-	A-	A-
READIN	6	669800	4	B.1.1.1	2	14200	0.42	0.13	0.11	0.33	0.42	0.00	0.23	-0.19	-0.30	0.10	0.23	1.3420	0.0188	9.9	1.2	9.9	1.3	A-	A-	A-
READIN	6	596133	5	A.1.1.1	2	14233	0.70	0.05	0.10	0.70	0.16	0.00	0.45	-0.19	-0.16	0.45	-0.32	-0.0859	0.0199	-7.9	0.9	-8.3	0.9	A-	A-	A-
READIN	6	571129	5	B.1.1.1	2	14233	0.29	0.29	0.07	0.08	0.55	0.00	0.01	0.01	-0.26	-0.22	0.25	1.9908	0.0200	9.9	1.3	9.9	1.8	A-	A-	A-
READIN	6	475254	5	A.1.3.1	2	14233	0.51	0.16	0.25	0.08	0.51	0.00	0.22	-0.09	-0.09	-0.13	0.22	0.8870	0.0184	9.9	1.2	9.9	1.2	A-	A-	A-
READIN	6	404480	5	A.1.4.1	1	14233	0.72	0.06	0.12	0.72	0.09	0.00	0.31	-0.13	-0.14	0.31	-0.20	-0.2475	0.0205	6.4	1.1	6.3	1.1	A+	A-	A-
READIN	6	439993	5	B.1.2.1	3	14233	0.47	0.47	0.09	0.13	0.30	0.00	0.32	0.32	-0.25	-0.12	-0.10	1.0696	0.0184	4.5	1.0	8.3	1.1	A+	A-	A-
READIN	6	155657	5	A.1.3.1	2	14233	0.54	0.10	0.18	0.17	0.54	0.00	0.41	-0.21	-0.22	-0.14	0.41	0.7144	0.0185	-5.9	1.0	-4.5	1.0	A-	A-	A-
READIN	6	808728	5	B.1.1.1	3	14233	0.50	0.50	0.16	0.12	0.21	0.00	0.23	0.23	-0.04	-0.26	-0.04	0.9082	0.0184	9.9	1.2	9.9	1.2	A-	A-	A-
READIN	6	911492	5	B.2.1.1	2	14233	0.79	0.04	0.79	0.10	0.06	0.00	0.46	-0.26	0.46	-0.27	-0.20	-0.7096	0.0224	-8.3	0.9	-9.9	0.8	A-	A-	A-
READIN	6	334434	5	B.1.2.1	3	14233	0.24	0.20	0.24	0.34	0.21	0.00	0.09	-0.12	0.09	0.02	0.00	2.2667	0.0209	9.9	1.2	9.9	1.7	A+	A-	A-
READIN	6	424636	5	A.1.3.1	2	14233	0.86	0.07	0.86	0.05	0.03	0.00	0.39	-0.20	0.39	-0.21	-0.23	-1.2072	0.0254	-4.2	0.9	-5.2	0.9	A-	B-	B-
READIN	6	951249	6	A.1.1.2	1	56927	0.92	0.03	0.92	0.03	0.03	0.00	0.39	-0.19	0.39	-0.23	-0.23	-1.9402	0.0162	-9.9	0.9	-9.9	0.7			
READIN	6	563943	6	B.1.1.1	1	56927	0.63	0.63	0.02	0.13	0.22	0.00	0.31	0.31	-0.23	-0.17	-0.15	0.3145	0.0096	9.9	1.1	9.9	1.1			
READIN	6	281166	6	A.1.4.1	3	56927	0.93	0.02	0.02	0.93	0.02	0.00	0.40	-0.22	-0.23	0.40	-0.22	-2.1462	0.0174	-9.9	0.9	-9.9	0.6			

Appendix G: Item Statistics Multiple Choice

READIN	6	326029	6	A.1.4.1	1	56927	0.67	0.15	0.67	0.12	0.06	0.00	0.40	-0.19	0.40	-0.24	-0.16	0.0971	0.0099	0.9	1.0	-4.5	1.0			
READIN	6	329113	6	A.1.5.1	2	56927	0.79	0.79	0.15	0.02	0.04	0.00	0.47	0.47	-0.33	-0.23	-0.20	-0.6713	0.0113	-9.9	0.9	-9.9	0.8			
READIN	6	886011	6	B.1.1.1	2	56927	0.56	0.08	0.13	0.22	0.56	0.00	0.23	-0.03	-0.22	-0.07	0.23	0.6628	0.0094	9.9	1.2	9.9	1.3			
READIN	6	702603	6	A.1.3.1	2	56927	0.66	0.15	0.66	0.06	0.14	0.00	0.47	-0.20	0.47	-0.25	-0.28	0.1783	0.0098	-9.9	0.9	-9.9	0.9			
READIN	6	504641	6	A.1.4.1	1	56927	0.92	0.02	0.04	0.92	0.03	0.00	0.34	-0.17	-0.21	0.34	-0.20	-1.9295	0.0161	-6.8	0.9	-9.9	0.8			
READIN	6	710785	6	A.2.2.2	2	14291	0.40	0.15	0.07	0.40	0.38	0.00	0.40	-0.01	-0.20	0.40	-0.28	1.4681	0.0189	-7.8	0.9	5.3	1.1	A-	A+	A-
READIN	6	393073	6	A.2.3.1	2	14291	0.70	0.70	0.08	0.04	0.18	0.00	0.46	0.46	-0.29	-0.27	-0.21	-0.0968	0.0203	-6.9	0.9	-8.3	0.9	A-	A-	A-
READIN	6	320572	6	A.2.3.2	2	14291	0.70	0.16	0.05	0.09	0.70	0.00	0.52	-0.22	-0.31	-0.31	0.52	-0.0680	0.0202	-9.9	0.9	-9.9	0.8	A-	A-	A-
READIN	6	315212	6	A.2.4.1	1	14291	0.75	0.14	0.75	0.05	0.05	0.00	0.44	-0.20	0.44	-0.28	-0.25	-0.4123	0.0214	-5.1	0.9	-3.3	0.9	A+	B-	B-
READIN	6	256747	6	A.2.4.1	3	14291	0.79	0.06	0.06	0.79	0.09	0.00	0.43	-0.27	-0.30	0.43	-0.14	-0.6674	0.0225	-5.3	0.9	-4.0	0.9	A+	A-	A-
READIN	6	296015	6	B.3.1.1	1	14291	0.90	0.03	0.90	0.04	0.03	0.00	0.47	-0.26	0.47	-0.26	-0.27	-1.7323	0.0301	-8.3	0.8	-9.9	0.6	A+	B-	A-
READIN	6	807549	6	B.3.3.1	3	14291	0.77	0.12	0.05	0.77	0.06	0.00	0.42	-0.16	-0.30	0.42	-0.25	-0.5072	0.0218	-3.6	1.0	-1.9	1.0	A-	A-	A-
READIN	6	143676	6	B.2.2.2	3	14291	0.58	0.14	0.10	0.17	0.58	0.00	0.35	-0.21	-0.19	-0.10	0.35	0.5796	0.0189	7.5	1.1	6.6	1.1	A+	A-	A-
READIN	6	100416	6	A.2.3.1	2	14291	0.85	0.85	0.04	0.03	0.07	0.00	0.44	0.44	-0.26	-0.26	-0.22	-1.1666	0.0254	-5.9	0.9	-9.9	0.7	A-	A-	A-
READIN	6	512095	6	A.2.6.2	3	14291	0.41	0.41	0.38	0.05	0.16	0.00	0.23	0.23	-0.03	-0.26	-0.10	1.4471	0.0188	9.9	1.1	9.9	1.3	A-	A-	A-
READIN	6	302453	7	A.2.1.1	2	14263	0.74	0.17	0.06	0.74	0.03	0.00	0.45	-0.27	-0.22	0.45	-0.25	-0.3056	0.0211	-5.4	0.9	-6.5	0.9	A+	A-	A-
READIN	6	987212	7	A.2.3.1	2	14263	0.74	0.18	0.05	0.03	0.74	0.00	0.45	-0.24	-0.28	-0.27	0.45	-0.3322	0.0212	-6.0	0.9	-7.0	0.9	A+	A-	A-
READIN	6	368120	7	A.2.3.2	2	14263	0.83	0.05	0.83	0.07	0.05	0.00	0.52	-0.29	0.52	-0.29	-0.27	-0.9655	0.0242	-9.9	0.8	-9.9	0.7	A-	A-	A-
READIN	6	513014	7	A.2.4.1	2	14263	0.70	0.70	0.12	0.09	0.08	0.00	0.28	0.28	-0.16	-0.18	-0.08	-0.0628	0.0203	9.9	1.1	9.8	1.2	A-	A-	A-
READIN	6	613930	7	A.2.6.2	2	14263	0.76	0.76	0.04	0.03	0.16	0.00	0.35	0.35	-0.23	-0.27	-0.15	-0.4466	0.0216	2.6	1.0	6.3	1.1	A-	A-	A-
READIN	6	182808	7	B.3.1.1	2	14263	0.87	0.04	0.04	0.87	0.04	0.00	0.50	-0.28	-0.30	0.50	-0.25	-1.3855	0.0271	-9.9	0.8	-9.9	0.6	A+	B-	B-
READIN	6	507987	7	A.2.4.1	2	14263	0.82	0.82	0.09	0.05	0.04	0.00	0.48	0.48	-0.25	-0.30	-0.24	-0.9102	0.0239	-9.7	0.9	-9.9	0.7	A+	A-	A-
READIN	6	220315	7	A.2.3.1	2	14263	0.76	0.05	0.76	0.15	0.05	0.00	0.50	-0.28	0.50	-0.25	-0.30	-0.4204	0.0215	-9.9	0.9	-9.9	0.8	B-	B-	B-
READIN	6	296551	7	B.3.1.1	2	14263	0.72	0.11	0.06	0.11	0.72	0.00	0.48	-0.19	-0.25	-0.31	0.48	-0.1761	0.0206	-9.9	0.9	-9.5	0.8	A-	A-	A-
READIN	6	911430	7	A.2.3.2	2	14263	0.52	0.40	0.03	0.52	0.04	0.00	0.42	-0.27	-0.23	0.42	-0.17	0.9000	0.0187	-5.6	1.0	-1.3	1.0	A-	A-	A-
READIN	6	450448	8	A.2.3.1	2	14227	0.19	0.52	0.16	0.19	0.14	0.00	0.06	0.11	-0.14	0.06	-0.08	2.7145	0.0228	9.9	1.2	9.9	2.1	C-	A-	A-
READIN	6	191048	8	A.2.4.1	1	14227	0.64	0.03	0.27	0.64	0.06	0.00	0.39	-0.24	-0.19	0.39	-0.23	0.2837	0.0193	1.3	1.0	-0.4	1.0	A+	A-	A-
READIN	6	763768	8	A.2.6.1	3	14227	0.44	0.28	0.44	0.07	0.21	0.00	0.25	-0.03	0.25	-0.22	-0.13	1.2669	0.0186	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	6	314197	8	B.2.2.1	2	14227	0.63	0.09	0.23	0.05	0.63	0.00	0.45	-0.35	-0.12	-0.30	0.45	0.3049	0.0192	-5.5	1.0	-4.8	0.9	A-	A-	A-
READIN	6	993093	8	B.2.1.3	2	14227	0.89	0.89	0.05	0.05	0.02	0.00	0.48	0.48	-0.28	-0.29	-0.24	-1.4937	0.0280	-8.9	0.8	-9.9	0.6	A+	B-	B-
READIN	6	196588	8	A.2.3.1	2	14227	0.38	0.26	0.22	0.15	0.38	0.00	0.30	-0.12	-0.17	-0.06	0.30	1.5777	0.0190	5.6	1.0	9.9	1.2	A-	A-	A-
READIN	6	807088	8	B.3.1.1	2	14227	0.76	0.07	0.05	0.12	0.76	0.00	0.43	-0.28	-0.25	-0.18	0.43	-0.4516	0.0215	-4.9	0.9	-1.7	1.0	A-	A-	A-
READIN	6	936369	8	B.3.3.1	3	14227	0.71	0.71	0.06	0.18	0.05	0.00	0.45	0.45	-0.28	-0.20	-0.28	-0.1577	0.0204	-6.5	0.9	-6.3	0.9	A-	A-	B-
READIN	6	925881	8	A.2.3.1	2	14227	0.82	0.08	0.05	0.82	0.04	0.00	0.45	-0.24	-0.23	0.45	-0.27	-0.8805	0.0237	-6.5	0.9	-9.3	0.8	A+	A-	A-
READIN	6	702117	8	B.2.1.1	1	14227	0.69	0.07	0.69	0.10	0.14	0.00	0.43	-0.24	0.43	-0.24	-0.18	0.0127	0.0199	-3.9	1.0	-5.7	0.9	A+	A-	A-
READIN	6	972499	9	A.2.4.1	1	14146	0.69	0.69	0.19	0.04	0.08	0.00	0.37	0.37	-0.16	-0.27	-0.22	-0.0345	0.0201	1.8	1.0	2.1	1.0	A+	A-	A-
READIN	6	454946	9	B.3.3.2	2	14146	0.61	0.61	0.13	0.17	0.09	0.00	0.38	0.38	-0.19	-0.20	-0.16	0.3973	0.0191	1.2	1.0	0.4	1.0	A-	A-	A-
READIN	6	238320	9	A.2.3.1	3	14146	0.79	0.09	0.79	0.06	0.06	0.00	0.47	-0.25	0.47	-0.26	-0.24	-0.6280	0.0224	-8.5	0.9	-9.9	0.8	A+	A-	A-
READIN	6	283430	9	A.2.5.1	3	14146	0.57	0.18	0.15	0.10	0.57	0.00	0.41	-0.24	-0.17	-0.16	0.41	0.6287	0.0188	-2.8	1.0	-2.3	1.0	A+	A-	A+
READIN	6	336732	9	B.3.3.3	3	14146	0.28	0.29	0.24	0.19	0.28	0.00	0.19	-0.13	0.00	-0.08	0.19	2.1031	0.0203	9.9	1.1	9.9	1.4	A+	A-	A-
READIN	6	495676	9	B.3.3.1	3	14146	0.59	0.59	0.12	0.17	0.11	0.00	0.27	0.27	-0.15	-0.12	-0.11	0.4977	0.0190	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	6	424328	9	B.2.1.4	2	14146	0.42	0.14	0.42	0.05	0.39	0.00	0.20	-0.10	0.20	-0.19	-0.04	1.3747	0.0187	9.9	1.2	9.9	1.3	A-	A-	A-
READIN	6	764309	9	A.2.2.2	2	14146	0.72	0.06	0.17	0.72	0.05	0.00	0.36	-0.31	-0.09	0.36	-0.25	-0.2162	0.0207	3.0	1.0	4.2	1.1	A-	A-	A-
READIN	6	722415	9	A.2.3.1	2	14146	0.90	0.04	0.90	0.03	0.03	0.00	0.46	-0.24	0.46	-0.27	-0.26	-1.7077	0.0301	-8.1	0.8	-9.9	0.6	A+	A-	B-
READIN	6	483583	9	A.2.6.1	3	14146	0.83	0.09	0.05	0.83	0.03	0.00	0.51	-0.30	-0.28	0.51	-0.26	-0.9212	0.0240	-9.9	0.9	-9.9	0.7	A-	A-	A-
READIN	7	935200	0	A.1.3.1		130577	0.73	0.08	0.09	0.73	0.09	0.01	0.37	-0.16	-0.26	0.37	-0.13	-0.2664	0.0069	9.9	1.1	9.9	1.1			
READIN	7	292242	0	A.1.3.1		130577	0.62	0.09	0.62	0.22	0.06	0.01	0.33	-0.30	0.33	-0.02	-0.24	0.3754	0.0063	9.9	1.1	9.9	1.1			
READIN	7	102614	0	A.1.4.1		130577	0.80	0.03	0.80	0.10	0.06	0.01	0.52	-0.24	0.52	-0.37	-0.20	-0.6655	0.0075	-9.9	0.8	-9.9	0.7			
READIN	7	624516	0	A.1.6.1		130577	0.77	0.05	0.12	0.05	0.77	0.01	0.45	-0.24	-0.26	-0.20	0.45	-0.3941	0.0071	-9.9	0.9	-9.9	0.8			
READIN	7	534891	0	B.1.1.1		130577	0.78	0.10	0.05	0.06	0.78	0.01	0.52	-0.28	-0.27	-0.27	0.52	-0.4161	0.0071	-9.9	0.8	-9.9	0.7			
READIN	7	989224	0	A.1.4.1		130577	0.62	0.18	0.62	0.17	0.03	0.01	0.30	-0.12	0.30	-0.16	-0.18	0.4326	0.0063	9.9	1.1	9.9	1.1			

Appendix G: Item Statistics Multiple Choice

READIN	7	991865	0	A.2.3.1		130577	0.72	0.05	0.10	0.13	0.72	0.00	0.46	-0.24	-0.19	-0.29	0.46	-0.2022	0.0068	-9.9	1.0	-9.9	0.9				
READIN	7	196750	0	B.1.1.1		130577	0.71	0.08	0.13	0.71	0.08	0.00	0.26	-0.07	-0.15	0.26	-0.18	-0.1733	0.0068	9.9	1.2	9.9	1.3				
READIN	7	904385	0	A.2.3.1		130577	0.46	0.46	0.22	0.10	0.22	0.00	0.27	0.27	-0.11	-0.16	-0.10	1.2189	0.0061	9.9	1.1	9.9	1.2				
READIN	7	990153	0	B.2.1.1		130577	0.67	0.14	0.10	0.67	0.09	0.00	0.44	-0.29	-0.14	0.44	-0.22	0.2055	0.0064	-9.9	1.0	-9.9	0.9				
READIN	7	807175	0	A.2.3.1		130577	0.48	0.08	0.48	0.24	0.21	0.00	0.43	-0.19	0.43	-0.25	-0.14	1.0536	0.0061	-9.9	1.0	-6.4	1.0				
READIN	7	129105	0	B.3.3.2		130577	0.88	0.03	0.88	0.05	0.04	0.00	0.35	-0.25	0.35	-0.16	-0.18	-1.3353	0.0089	-9.1	1.0	-6.3	0.9				
READIN	7	592703	0	A.1.6.1	2	130577	0.84	0.05	0.04	0.07	0.84	0.00	0.54	-0.31	-0.30	-0.27	0.54	-1.0628	0.0082	-9.9	0.8	-9.9	0.6				
READIN	7	232451	0	B.2.1.1	2	130577	0.73	0.07	0.09	0.11	0.73	0.00	0.51	-0.20	-0.23	-0.34	0.51	-0.2834	0.0069	-9.9	0.9	-9.9	0.9				
READIN	7	918395	0	B.1.1.1	3	130577	0.71	0.07	0.71	0.05	0.17	0.00	0.44	-0.32	0.44	-0.31	-0.12	-0.0581	0.0067	-9.9	1.0	-4.8	1.0				
READIN	7	874675	0	A.1.4.1	1	130577	0.66	0.66	0.11	0.15	0.08	0.00	0.46	0.46	-0.27	-0.20	-0.23	0.2654	0.0064	-9.9	0.9	-9.9	0.9				
READIN	7	880369	0	A.1.3.1	2	130577	0.64	0.13	0.64	0.06	0.17	0.00	0.26	-0.21	0.26	-0.24	0.01	0.2105	0.0064	9.9	1.2	9.9	1.4				
READIN	7	593051	0	A.1.3.1	2	130577	0.72	0.07	0.12	0.72	0.08	0.00	0.47	-0.25	-0.23	0.47	-0.23	-0.1572	0.0068	-9.9	0.9	-9.9	0.9				
READIN	7	385857	0	A.2.4.1	2	130577	0.81	0.81	0.05	0.03	0.10	0.00	0.48	0.48	-0.32	-0.24	-0.24	-0.8203	0.0077	-9.9	0.9	-9.9	0.8				
READIN	7	762432	0	A.2.6.2	2	130577	0.72	0.12	0.04	0.11	0.72	0.00	0.51	-0.33	-0.31	-0.18	0.51	-0.1252	0.0067	-9.9	0.9	-9.9	0.8				
READIN	7	120997	0	B.3.1.1	2	130577	0.67	0.14	0.03	0.15	0.67	0.00	0.42	-0.23	-0.28	-0.19	0.42	0.1015	0.0065	-1.5	1.0	-2.5	1.0				
READIN	7	713814	0	B.3.3.2	2	130577	0.71	0.10	0.11	0.71	0.07	0.00	0.45	-0.22	-0.30	0.45	-0.15	-0.0946	0.0067	-9.9	1.0	-9.9	0.9				
READIN	7	277751	0	B.3.3.3	2	130577	0.61	0.26	0.61	0.06	0.06	0.00	0.40	-0.17	0.40	-0.26	-0.23	0.4728	0.0063	1.2	1.0	-1.2	1.0				
READIN	7	841826	0	A.2.2.1	2	130577	0.81	0.10	0.04	0.04	0.81	0.00	0.53	-0.30	-0.29	-0.28	0.53	-0.7787	0.0077	-9.9	0.8	-9.9	0.7				
READIN	7	577414	0	B.1.2.1	3	130577	0.70	0.70	0.05	0.10	0.15	0.00	0.37	0.37	-0.26	-0.17	-0.17	0.0485	0.0066	4.7	1.0	2.8	1.0				
READIN	7	566646	0	B.3.3.4	2	130577	0.59	0.13	0.59	0.15	0.12	0.00	0.37	-0.14	0.37	-0.21	-0.18	0.6378	0.0062	9.9	1.0	9.9	1.0				
READIN	7	494302	0	A.2.6.2	2	130577	0.62	0.12	0.05	0.20	0.62	0.00	0.49	-0.20	-0.21	-0.30	0.49	0.3594	0.0063	-9.9	0.9	-9.9	0.9				
READIN	7	788917	0	A.1.3.1	2	130577	0.70	0.70	0.14	0.06	0.09	0.00	0.32	0.32	-0.16	-0.26	-0.08	-0.0185	0.0066	9.9	1.1	9.9	1.1				
READIN	7	680110	0	B.2.1.1	3	130577	0.54	0.24	0.13	0.54	0.08	0.00	0.27	-0.10	-0.16	0.27	-0.12	0.7628	0.0062	9.9	1.2	9.9	1.2				
READIN	7	603124	0	A.1.1.2	1	130577	0.88	0.04	0.04	0.04	0.88	0.00	0.48	-0.25	-0.28	-0.25	0.48	-1.3589	0.0089	-9.9	0.8	-9.9	0.7				
READIN	7	522106	0	B.1.1.1	2	130577	0.55	0.08	0.06	0.31	0.55	0.00	0.40	-0.24	-0.23	-0.17	0.40	0.8341	0.0061	-1.0	1.0	0.0	1.0				
READIN	7	243887	0	A.1.4.1	1	130577	0.58	0.16	0.58	0.24	0.02	0.00	0.40	-0.26	0.40	-0.16	-0.21	0.5994	0.0062	5.3	1.0	4.6	1.0				
READIN	7	899020	0	B.2.1.1	2	130577	0.66	0.66	0.13	0.07	0.13	0.00	0.41	0.41	-0.16	-0.23	-0.21	0.2461	0.0064	-4.7	1.0	-6.6	1.0				
READIN	7	498501	0	A.2.1.2	2	130577	0.66	0.66	0.09	0.15	0.09	0.00	0.32	0.32	-0.14	-0.22	-0.10	0.1727	0.0065	9.9	1.1	9.9	1.1				
READIN	7	327747	0	A.2.2.2	2	130577	0.62	0.06	0.62	0.26	0.05	0.00	0.35	-0.28	0.35	-0.09	-0.28	0.3795	0.0063	9.9	1.1	9.9	1.1				
READIN	7	617522	0	A.2.4.1	1	130577	0.70	0.21	0.04	0.70	0.04	0.00	0.35	-0.20	-0.21	0.35	-0.18	-0.0577	0.0067	9.9	1.1	9.9	1.1				
READIN	7	289863	0	B.1.2.1	3	130577	0.47	0.27	0.09	0.17	0.47	0.00	0.38	-0.19	-0.14	-0.18	0.38	1.1750	0.0061	0.9	1.0	9.9	1.0				
READIN	7	232903	0	A.2.4.1	2	130577	0.83	0.05	0.83	0.04	0.07	0.00	0.42	-0.26	0.42	-0.26	-0.18	-0.9620	0.0080	-9.9	0.9	-9.9	0.8				
READIN	7	821177	0	B.2.1.1	2	130577	0.61	0.14	0.61	0.19	0.05	0.00	0.36	-0.25	0.36	-0.10	-0.21	0.4815	0.0063	9.9	1.1	9.9	1.1				
READIN	7	514265	0	B.1.2.1	3	130577	0.50	0.37	0.07	0.06	0.50	0.01	0.31	-0.04	-0.28	-0.26	0.31	1.0495	0.0061	9.9	1.1	9.9	1.2				
READIN	7	896940	1	A.1.4.1	1	72741	0.83	0.83	0.04	0.07	0.06	0.00	0.50	0.50	-0.25	-0.25	-0.33	-0.9171	0.0105	-9.9	0.9	-9.9	0.7				
READIN	7	575398	1	A.1.6.1	2	72741	0.71	0.04	0.07	0.17	0.71	0.00	0.43	-0.29	-0.27	-0.18	0.43	-0.1030	0.0090	-8.6	1.0	-7.8	0.9				
READIN	7	797899	1	B.1.1.1	2	72741	0.69	0.69	0.21	0.04	0.05	0.00	0.27	0.27	-0.12	-0.21	-0.14	-0.0005	0.0088	9.9	1.1	9.9	1.3				
READIN	7	192182	1	B.1.1.1	2	72741	0.74	0.05	0.11	0.10	0.74	0.00	0.45	-0.16	-0.26	-0.27	0.45	-0.2732	0.0092	-9.9	0.9	-9.9	0.9				
READIN	7	186701	1	B.1.1.1	3	72741	0.67	0.08	0.10	0.67	0.14	0.00	0.30	-0.14	-0.26	0.30	-0.06	0.1442	0.0087	9.9	1.1	9.9	1.2				
READIN	7	328344	1	B.2.2.1	2	72741	0.71	0.12	0.09	0.71	0.07	0.00	0.42	-0.26	-0.23	0.42	-0.14	-0.1203	0.0090	-3.5	1.0	-8.3	0.9				
READIN	7	282121	1	A.1.3.1	2	72741	0.61	0.17	0.61	0.15	0.07	0.00	0.40	-0.10	0.40	-0.26	-0.24	0.4511	0.0084	2.5	1.0	3.9	1.0				
READIN	7	120544	1	A.1.3.1	2	72741	0.70	0.10	0.05	0.70	0.15	0.00	0.49	-0.30	-0.29	0.49	-0.20	-0.0579	0.0089	-9.9	0.9	-9.9	0.8				
READIN	7	859585	1	A.2.4.1	1	14785	0.85	0.85	0.03	0.06	0.05	0.00	0.43	0.43	-0.28	-0.24	-0.20	-1.1581	0.0245	-5.9	0.9	-7.5	0.8	A+	A-	A-	
READIN	7	506282	1	B.2.1.1	2	14785	0.87	0.05	0.04	0.87	0.04	0.00	0.47	-0.23	-0.29	0.47	-0.25	-1.2966	0.0254	-9.5	0.9	-9.9	0.7	A+	A-	A-	
READIN	7	462030	1	A.2.3.2	2	14785	0.69	0.06	0.08	0.17	0.69	0.00	0.48	-0.23	-0.25	-0.26	0.48	-0.0419	0.0195	-8.8	0.9	-7.7	0.9	A-	A-	A-	
READIN	7	301679	1	A.2.4.1	3	14785	0.43	0.42	0.43	0.02	0.12	0.00	0.28	-0.15	0.28	-0.25	-0.08	1.3431	0.0182	9.9	1.1	9.9	1.2	A-	A+	A-	
READIN	7	327640	1	A.2.6.2	2	14785	0.68	0.11	0.68	0.16	0.04	0.00	0.32	-0.11	0.32	-0.17	-0.24	0.0050	0.0194	9.9	1.1	9.9	1.2	A+	A-	A-	
READIN	7	405389	1	A.2.4.1	2	14785	0.65	0.04	0.06	0.65	0.24	0.00	0.22	-0.25	-0.28	0.22	0.04	0.1711	0.0190	9.9	1.2	9.9	1.4	A+	A-	A-	
READIN	7	216772	1	A.2.3.1	2	14785	0.78	0.78	0.06	0.09	0.08	0.00	0.41	0.41	-0.22	-0.20	-0.24	-0.5570	0.0213	-3.4	1.0	-3.2	0.9	A+	A+	A-	
READIN	7	844079	1	B.2.1.1	2	14785	0.64	0.15	0.16	0.64	0.05	0.00	0.37	-0.06	-0.25	0.37	-0.28	0.2332	0.0189	6.5	1.1	7.6	1.1	A+	A-	A-	
READIN	7	940634	1	B.3.3.1	3	14785	0.61	0.20	0.06	0.12	0.61	0.00	0.44	-0.17	-0.28	-0.24	0.44	0.4032	0.0186	-3.3	1.0	-3.0	1.0	A+	A+	A+	

Appendix G: Item Statistics Multiple Choice

READIN	7	339224	1	A.2.2.1	1	14785	0.70	0.70	0.07	0.18	0.05	0.00	0.44	0.44	-0.28	-0.21	-0.22	-0.0816	0.0197	-2.8	1.0	-5.1	0.9	A-	A-	A-
READIN	7	654538	2	A.2.2.2	2	14505	0.69	0.69	0.05	0.17	0.10	0.00	0.34	0.34	-0.27	-0.09	-0.22	0.0036	0.0197	8.0	1.1	5.9	1.1	A-	A+	A+
READIN	7	990567	2	A.2.3.2	2	14505	0.55	0.35	0.04	0.55	0.07	0.00	0.38	-0.19	-0.20	0.38	-0.22	0.7939	0.0183	4.1	1.0	7.6	1.1	A-	A-	A-
READIN	7	671252	2	A.2.6.2	3	14505	0.77	0.77	0.09	0.05	0.09	0.00	0.42	0.42	-0.19	-0.33	-0.18	-0.4346	0.0212	-4.5	1.0	-1.3	1.0	A+	A+	A+
READIN	7	542863	2	A.2.4.1	2	14505	0.55	0.11	0.25	0.55	0.08	0.00	0.36	-0.30	-0.09	0.36	-0.15	0.7654	0.0184	7.0	1.1	6.6	1.1	A-	A+	A+
READIN	7	826760	2	A.2.1.2	2	14505	0.87	0.87	0.05	0.04	0.04	0.00	0.42	0.42	-0.18	-0.25	-0.27	-1.2614	0.0258	-6.7	0.9	-3.5	0.9	A-	A-	B-
READIN	7	521452	2	B.3.1.1	2	14505	0.76	0.05	0.76	0.16	0.04	0.00	0.47	-0.24	0.47	-0.27	-0.25	-0.3713	0.0209	-7.8	0.9	-9.6	0.8	A-	A-	A-
READIN	7	347192	2	B.3.3.2	3	14505	0.62	0.07	0.20	0.62	0.11	0.00	0.30	-0.24	-0.11	0.30	-0.14	0.4316	0.0188	9.9	1.1	9.9	1.2	A+	A-	A-
READIN	7	363490	2	B.3.3.3	2	14505	0.53	0.20	0.08	0.53	0.18	0.00	0.43	-0.25	-0.17	0.43	-0.17	0.8563	0.0183	-6.6	1.0	-3.7	1.0	A-	A-	A+
READIN	7	590402	2	B.3.3.3	2	14505	0.52	0.13	0.30	0.05	0.52	0.00	0.37	-0.25	-0.10	-0.24	0.37	0.9469	0.0183	3.4	1.0	4.1	1.0	A-	A+	A+
READIN	7	245184	2	A.2.1.2	2	14505	0.92	0.03	0.92	0.04	0.01	0.00	0.43	-0.27	0.43	-0.26	-0.18	-1.9258	0.0318	-7.1	0.8	-9.9	0.5	A+	A-	A-
READIN	7	764801	3	A.2.3.1	3	14509	0.48	0.06	0.48	0.18	0.28	0.00	0.23	-0.20	0.23	-0.06	-0.09	1.1038	0.0182	9.9	1.2	9.9	1.3	A-	A-	A-
READIN	7	359756	3	A.2.3.2	2	14509	0.59	0.11	0.13	0.17	0.59	0.00	0.38	-0.21	-0.26	-0.09	0.38	0.5467	0.0185	2.9	1.0	1.7	1.0	A-	A-	A-
READIN	7	650214	3	A.2.4.1	1	14509	0.58	0.22	0.08	0.58	0.11	0.00	0.45	-0.19	-0.27	0.45	-0.21	0.5773	0.0185	-7.6	0.9	-7.8	0.9	A+	A+	A+
READIN	7	647080	3	A.2.4.1	3	14509	0.57	0.22	0.07	0.57	0.14	0.00	0.41	-0.18	-0.29	0.41	-0.14	0.6715	0.0184	-1.0	1.0	-1.0	1.0	A-	A-	A-
READIN	7	441480	3	B.1.2.1	3	14509	0.80	0.05	0.04	0.10	0.80	0.00	0.47	-0.28	-0.26	-0.23	0.47	-0.7272	0.0224	-8.6	0.9	-9.9	0.8	A+	A-	A-
READIN	7	234672	3	B.1.2.1	3	14509	0.57	0.57	0.23	0.10	0.10	0.00	0.39	0.39	-0.14	-0.27	-0.16	0.6752	0.0184	0.9	1.0	1.6	1.0	A-	B-	A-
READIN	7	393352	3	B.3.1.1	2	14509	0.67	0.17	0.67	0.07	0.08	0.00	0.37	-0.07	0.37	-0.30	-0.25	0.1125	0.0193	2.7	1.0	5.0	1.1	A-	A-	A-
READIN	7	356515	3	B.3.2.1	2	14509	0.57	0.12	0.19	0.12	0.57	0.00	0.31	-0.18	-0.08	-0.19	0.31	0.6603	0.0184	9.9	1.1	9.9	1.1	A+	A+	A+
READIN	7	995391	3	A.2.2.2	2	14509	0.36	0.36	0.26	0.30	0.07	0.00	0.17	0.17	-0.06	-0.05	-0.13	1.6758	0.0187	9.9	1.2	9.9	1.4	A-	A+	A+
READIN	7	800305	3	A.2.2.2	2	14509	0.64	0.21	0.10	0.64	0.05	0.00	0.46	-0.22	-0.25	0.46	-0.24	0.2609	0.0190	-6.9	0.9	-9.2	0.9	B-	A-	A-
READIN	7	888504	4	A.2.2.2	2	14463	0.68	0.04	0.68	0.05	0.23	0.00	0.40	-0.27	0.40	-0.28	-0.18	0.0627	0.0198	-0.2	1.0	-2.7	1.0	A-	A-	A-
READIN	7	566940	4	A.2.3.1	2	14463	0.88	0.04	0.05	0.03	0.88	0.00	0.53	-0.28	-0.31	-0.29	0.53	-1.3996	0.0274	-9.9	0.8	-9.9	0.5	A-	C-	B-
READIN	7	704137	4	B.3.3.2	2	14463	0.58	0.13	0.08	0.58	0.21	0.00	0.32	-0.16	-0.28	0.32	-0.07	0.6055	0.0187	9.9	1.1	8.8	1.1	A-	B-	B-
READIN	7	862096	4	B.3.3.3	2	14463	0.57	0.07	0.57	0.24	0.12	0.00	0.31	-0.24	0.31	-0.04	-0.23	0.6591	0.0186	9.9	1.1	9.9	1.2	A+	A-	A-
READIN	7	537181	4	B.3.3.4	2	14463	0.57	0.57	0.17	0.13	0.13	0.00	0.41	0.41	-0.17	-0.32	-0.08	0.6793	0.0186	-1.9	1.0	-1.6	1.0	A-	A-	A-
READIN	7	551452	4	B.3.1.1	2	14463	0.32	0.10	0.17	0.32	0.41	0.00	0.13	-0.19	-0.19	0.13	0.14	1.9563	0.0195	9.9	1.2	9.9	1.5	A-	A+	A-
READIN	7	695408	4	A.2.6.2	2	14463	0.30	0.30	0.51	0.16	0.03	0.00	0.04	0.04	0.06	0.01	-0.26	2.0677	0.0198	9.9	1.3	9.9	1.8	A-	A-	A-
READIN	7	370181	4	A.2.4.1	1	14463	0.61	0.30	0.61	0.03	0.07	0.00	0.38	-0.17	0.38	-0.24	-0.26	0.4682	0.0189	3.4	1.0	3.0	1.0	A-	A-	A-
READIN	7	843934	4	A.2.3.1	2	14463	0.51	0.12	0.21	0.15	0.51	0.00	0.35	-0.12	-0.21	-0.14	0.35	0.9511	0.0184	5.5	1.0	5.9	1.1	A-	C-	A-
READIN	7	977644	4	A.2.4.1	1	14463	0.91	0.03	0.03	0.91	0.04	0.00	0.40	-0.19	-0.25	0.40	-0.23	-1.7071	0.0302	-5.9	0.9	-6.7	0.8	A+	A-	A-
READIN	7	707197	5	B.1.1.1	2	14479	0.83	0.08	0.83	0.03	0.06	0.00	0.54	-0.35	0.54	-0.23	-0.28	-0.8902	0.0239	-9.9	0.8	-9.9	0.6	A-	A-	A-
READIN	7	217446	5	B.1.1.1	2	14479	0.68	0.68	0.08	0.10	0.15	0.00	0.35	0.35	-0.28	-0.24	-0.05	0.1237	0.0198	7.0	1.1	7.7	1.1	A-	A-	A-
READIN	7	691724	5	B.1.1.1	3	14479	0.60	0.60	0.10	0.12	0.18	0.00	0.43	0.43	-0.17	-0.20	-0.24	0.5661	0.0189	-2.3	1.0	-1.1	1.0	A-	A-	A-
READIN	7	305799	5	A.2.2.2	2	14479	0.69	0.19	0.05	0.08	0.69	0.00	0.51	-0.27	-0.31	-0.24	0.51	0.0630	0.0199	-9.9	0.9	-9.9	0.8	B-	A-	A-
READIN	7	351539	5	A.2.3.1	2	14479	0.79	0.09	0.09	0.79	0.02	0.00	0.37	-0.17	-0.22	0.37	-0.24	-0.6259	0.0225	-0.8	1.0	5.6	1.1	A+	A-	A-
READIN	7	281956	5	A.2.3.2	2	14479	0.61	0.24	0.61	0.10	0.04	0.00	0.38	-0.14	0.38	-0.28	-0.19	0.4974	0.0190	4.3	1.0	2.2	1.0	A-	A-	A-
READIN	7	883889	5	A.2.5.1	3	14479	0.53	0.18	0.08	0.21	0.53	0.00	0.34	-0.03	-0.27	-0.20	0.34	0.9172	0.0186	9.0	1.1	9.7	1.1	A+	A+	A+
READIN	7	496624	5	A.2.4.1	1	14479	0.75	0.11	0.10	0.75	0.04	0.00	0.43	-0.20	-0.23	0.43	-0.26	-0.2956	0.0211	-3.3	1.0	-5.4	0.9	A+	A-	A-
READIN	7	799769	5	B.2.1.1	2	14479	0.46	0.15	0.27	0.13	0.46	0.00	0.36	-0.14	-0.14	-0.19	0.36	1.2633	0.0186	3.4	1.0	8.2	1.1	A+	A+	A-
READIN	7	169454	5	B.2.1.2	2	14479	0.73	0.11	0.73	0.06	0.09	0.00	0.43	-0.16	0.43	-0.28	-0.24	-0.2093	0.0208	-3.0	1.0	0.3	1.0	A-	A-	A-
READIN	7	228197	6	B.3.3.3	2	57836	0.55	0.55	0.04	0.33	0.07	0.00	0.36	0.36	-0.25	-0.11	-0.28	0.7621	0.0093	9.9	1.0	8.6	1.1			
READIN	7	463641	6	B.3.3.2	2	57836	0.83	0.05	0.83	0.05	0.07	0.00	0.47	-0.23	0.47	-0.23	-0.30	-0.9333	0.0120	-9.9	0.9	-9.9	0.8			
READIN	7	729270	6	A.2.4.1	2	57836	0.82	0.08	0.06	0.82	0.04	0.00	0.48	-0.29	-0.23	0.48	-0.27	-0.8523	0.0118	-9.9	0.9	-9.9	0.7			
READIN	7	969936	6	A.2.3.1	2	57836	0.65	0.19	0.12	0.65	0.04	0.00	0.41	-0.19	-0.24	0.41	-0.21	0.2743	0.0096	-1.6	1.0	-5.7	1.0			
READIN	7	942990	6	A.2.3.2	2	57836	0.39	0.12	0.34	0.39	0.15	0.00	0.19	-0.27	-0.02	0.19	0.01	1.5814	0.0094	9.9	1.2	9.9	1.4			
READIN	7	719014	6	A.2.2.2	2	57836	0.58	0.17	0.19	0.06	0.58	0.00	0.41	-0.23	-0.20	-0.16	0.41	0.6306	0.0093	-4.5	1.0	0.0	1.0			
READIN	7	811829	6	B.1.2.1	3	57836	0.58	0.07	0.16	0.19	0.58	0.00	0.32	-0.24	-0.14	-0.11	0.32	0.6387	0.0093	9.9	1.1	9.9	1.1			
READIN	7	857598	6	A.2.4.1	2	57836	0.87	0.87	0.04	0.03	0.06	0.00	0.46	0.46	-0.26	-0.25	-0.25	-1.2806	0.0132	-9.9	0.9	-9.9	0.7			
READIN	7	673996	6	B.2.1.1	2	14476	0.82	0.06	0.82	0.07	0.06	0.00	0.43	-0.28	0.43	-0.24	-0.17	-0.8387	0.0235	-6.4	0.9	-4.6	0.9	A+	A-	A-
READIN	7	917808	6	A.1.3.2	2	14476	0.73	0.12	0.10	0.73	0.05	0.00	0.42	-0.22	-0.20	0.42	-0.24	-0.2054	0.0206	-3.8	1.0	-5.3	0.9	A+	A-	A-

Appendix G: Item Statistics Multiple Choice

READIN	7	605424	6	A.1.2.2	2	14476	0.46	0.10	0.35	0.09	0.46	0.00	0.43	-0.17	-0.24	-0.16	0.43	1.2302	0.0184	-9.3	0.9	-2.9	1.0	B-	A-	A-
READIN	7	744682	6	B.1.1.1	2	14476	0.46	0.22	0.46	0.08	0.24	0.00	0.26	-0.07	0.26	-0.25	-0.07	1.2148	0.0184	9.9	1.1	9.9	1.2	A-	A-	A+
READIN	7	496531	6	A.1.4.1	2	14476	0.66	0.66	0.13	0.16	0.04	0.00	0.15	0.15	-0.04	-0.12	-0.06	0.1817	0.0195	9.9	1.3	9.9	1.4	A+	A-	A+
READIN	7	789182	6	B.1.1.1	3	14476	0.78	0.09	0.09	0.78	0.04	0.00	0.45	-0.28	-0.19	0.45	-0.27	-0.5375	0.0219	-7.3	0.9	-4.1	0.9	A+	A+	A-
READIN	7	234204	6	B.2.1.2	2	14476	0.42	0.45	0.08	0.06	0.42	0.00	0.31	-0.11	-0.13	-0.28	0.31	1.4295	0.0186	7.4	1.1	9.9	1.2	A-	B-	B-
READIN	7	120265	6	A.1.3.1	2	14476	0.31	0.25	0.31	0.12	0.32	0.00	0.14	0.00	0.14	-0.23	0.03	1.9907	0.0196	9.9	1.2	9.9	1.5	A+	A-	A-
READIN	7	115329	6	A.1.4.1	1	14476	0.79	0.79	0.08	0.05	0.09	0.00	0.47	0.47	-0.23	-0.27	-0.26	-0.5741	0.0221	-8.6	0.9	-9.9	0.8	A+	A+	A+
READIN	7	814450	6	A.1.4.1	1	14476	0.85	0.04	0.06	0.85	0.05	0.00	0.43	-0.25	-0.21	0.43	-0.25	-1.0444	0.0248	-6.7	0.9	-8.1	0.8	A+	A-	A-
READIN	7	609768	7	A.1.1.1	2	14413	0.71	0.06	0.09	0.14	0.71	0.00	0.35	-0.16	-0.19	-0.19	0.35	-0.0836	0.0204	5.1	1.1	3.9	1.1	B+	A+	A+
READIN	7	894840	7	A.1.2.2	2	14413	0.82	0.03	0.12	0.82	0.03	0.00	0.47	-0.28	-0.28	0.47	-0.24	-0.8329	0.0237	-7.4	0.9	-9.9	0.7	A-	A-	A-
READIN	7	219706	7	B.2.1.2	2	14413	0.64	0.20	0.64	0.13	0.03	0.00	0.24	-0.05	0.24	-0.17	-0.23	0.3089	0.0193	9.9	1.2	9.9	1.3	A+	A+	A+
READIN	7	191662	7	B.1.1.1	3	14413	0.62	0.18	0.12	0.08	0.62	0.00	0.27	-0.04	-0.15	-0.25	0.27	0.4271	0.0191	9.9	1.2	9.9	1.2	A+	A-	A-
READIN	7	493337	7	B.2.2.2	3	14413	0.79	0.05	0.79	0.08	0.07	0.00	0.48	-0.23	0.48	-0.27	-0.26	-0.6183	0.0225	-8.5	0.9	-9.9	0.8	A+	A-	A-
READIN	7	510879	7	B.1.1.1	2	14413	0.77	0.77	0.06	0.10	0.08	0.00	0.44	0.44	-0.23	-0.18	-0.29	-0.4170	0.0216	-5.1	0.9	-5.4	0.9	A-	A-	A-
READIN	7	871875	7	A.1.4.1	3	14413	0.57	0.11	0.19	0.57	0.13	0.00	0.34	-0.22	-0.09	0.34	-0.19	0.7015	0.0187	9.8	1.1	9.2	1.1	A+	A+	A-
READIN	7	382899	7	A.1.4.1	1	14413	0.91	0.91	0.03	0.05	0.02	0.00	0.44	0.44	-0.21	-0.32	-0.19	-1.7306	0.0306	-7.2	0.9	-9.9	0.6	A+	A-	A-
READIN	7	795936	7	A.1.3.1	2	14413	0.64	0.22	0.05	0.64	0.10	0.00	0.33	-0.07	-0.28	0.33	-0.23	0.3164	0.0193	9.9	1.1	9.9	1.2	A+	A+	A-
READIN	7	298504	7	A.1.3.1	2	14413	0.79	0.13	0.79	0.05	0.03	0.00	0.32	-0.11	0.32	-0.25	-0.24	-0.6102	0.0225	2.9	1.0	7.9	1.2	A+	A-	A-
READIN	7	749188	8	B.1.1.1	2	14468	0.36	0.07	0.08	0.49	0.36	0.00	0.31	-0.20	-0.23	-0.07	0.31	1.7211	0.0189	3.4	1.0	8.5	1.1	A-	A+	A-
READIN	7	177903	8	B.1.1.1	3	14468	0.36	0.36	0.41	0.06	0.17	0.00	0.12	0.12	-0.10	-0.23	0.12	1.7042	0.0189	9.9	1.2	9.9	1.5	A-	A+	A+
READIN	7	870137	8	B.2.2.2	3	14468	0.38	0.08	0.20	0.38	0.34	0.00	0.18	-0.27	-0.09	0.18	0.04	1.5692	0.0187	9.9	1.2	9.9	1.3	A+	A+	A-
READIN	7	753955	8	A.1.3.1	2	14468	0.55	0.17	0.55	0.21	0.07	0.00	0.20	-0.14	0.20	0.03	-0.23	0.7686	0.0184	9.9	1.2	9.9	1.3	A+	A-	A-
READIN	7	415432	8	B.2.1.1	2	14468	0.81	0.05	0.04	0.09	0.81	0.00	0.49	-0.24	-0.27	-0.28	0.49	-0.7798	0.0231	-9.9	0.9	-9.9	0.8	A+	A-	A-
READIN	7	852780	8	A.1.4.1	2	14468	0.70	0.10	0.70	0.12	0.07	0.00	0.25	-0.10	0.25	-0.15	-0.14	-0.0562	0.0200	9.9	1.1	9.9	1.2	A+	A-	A-
READIN	7	181779	8	A.1.3.2	2	14468	0.48	0.13	0.10	0.28	0.48	0.00	0.33	-0.21	-0.27	-0.02	0.33	1.1024	0.0183	6.7	1.1	9.0	1.1	A-	A-	A-
READIN	7	975126	8	A.1.4.1	1	14468	0.71	0.12	0.71	0.07	0.10	0.00	0.27	-0.11	0.27	-0.18	-0.14	-0.1017	0.0201	9.9	1.1	8.1	1.1	A-	A-	A-
READIN	7	111721	8	A.1.6.1	3	14468	0.87	0.03	0.03	0.87	0.06	0.00	0.35	-0.22	-0.25	0.35	-0.14	-1.2929	0.0264	-3.6	0.9	0.0	1.0	A+	A-	A-
READIN	7	845115	8	A.1.6.2	2	14468	0.48	0.48	0.10	0.12	0.30	0.00	0.23	0.23	-0.19	-0.15	-0.02	1.0876	0.0183	9.9	1.2	9.9	1.2	A+	A-	A-
READIN	7	734673	9	B.3.1.1	2	14479	0.53	0.15	0.07	0.25	0.53	0.00	0.37	-0.16	-0.27	-0.13	0.37	0.8620	0.0185	3.3	1.0	3.1	1.0	A+	A-	A-
READIN	7	674494	9	A.2.4.1	1	14479	0.52	0.09	0.52	0.12	0.27	0.00	0.31	-0.23	0.31	-0.23	-0.03	0.9150	0.0184	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	7	139772	9	A.2.4.1	3	14479	0.68	0.04	0.16	0.68	0.11	0.00	0.33	-0.20	-0.09	0.33	-0.25	0.0552	0.0198	7.1	1.1	8.0	1.1	A-	A-	A-
READIN	7	131923	9	A.2.2.2	2	14479	0.77	0.77	0.08	0.09	0.06	0.00	0.48	0.48	-0.33	-0.21	-0.23	-0.4929	0.0217	-9.5	0.9	-9.9	0.8	A-	A-	A-
READIN	7	468032	9	B.2.2.2	3	14479	0.66	0.13	0.07	0.66	0.14	0.00	0.42	-0.21	-0.21	0.42	-0.21	0.2035	0.0194	-2.9	1.0	-4.1	1.0	A+	A-	A-
READIN	7	729866	9	B.1.1.1	2	14479	0.41	0.41	0.19	0.27	0.13	0.00	0.26	0.26	-0.13	0.00	-0.22	1.4706	0.0186	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	7	780922	9	B.1.1.1	2	14479	0.29	0.44	0.29	0.13	0.14	0.00	-0.01	0.16	-0.01	-0.16	-0.06	2.1171	0.0199	9.9	1.4	9.9	1.9	A+	A-	A-
READIN	7	263527	9	A.2.3.2	2	14479	0.58	0.17	0.17	0.08	0.58	0.00	0.43	-0.32	-0.08	-0.23	0.43	0.6141	0.0187	-3.9	1.0	-0.9	1.0	A+	A-	A-
READIN	7	910911	9	B.3.3.1	3	14479	0.85	0.05	0.85	0.05	0.05	0.00	0.51	-0.30	0.51	-0.30	-0.24	-1.1119	0.0251	-9.9	0.8	-9.9	0.6	A+	A-	A-
READIN	7	259057	9	A.2.2.1	1	14479	0.76	0.10	0.02	0.76	0.11	0.00	0.47	-0.28	-0.22	0.47	-0.25	-0.4357	0.0215	-7.8	0.9	-9.9	0.8	A-	B-	C-
READIN	8	446353	0	B.2.1.1		129328	0.80	0.80	0.09	0.07	0.04	0.00	0.33	0.33	-0.16	-0.20	-0.17	-0.1091	0.0075	8.2	1.0	9.8	1.1			
READIN	8	602306	0	A.1.4.1		129328	0.75	0.18	0.75	0.04	0.04	0.00	0.40	-0.25	0.40	-0.24	-0.16	0.1318	0.0071	4.2	1.0	2.9	1.0			
READIN	8	703848	0	B.2.1.1		129328	0.75	0.12	0.03	0.09	0.75	0.00	0.40	-0.28	-0.25	-0.12	0.40	0.2446	0.0070	-9.9	1.0	-7.1	1.0			
READIN	8	266422	0	B.1.2.1		129328	0.58	0.11	0.13	0.58	0.17	0.00	0.30	-0.11	-0.13	0.30	-0.17	1.1818	0.0062	9.9	1.1	9.9	1.1			
READIN	8	661934	0	B.1.2.1		129328	0.73	0.09	0.08	0.10	0.73	0.00	0.42	-0.23	-0.20	-0.21	0.42	0.3066	0.0069	-6.5	1.0	-5.2	1.0			
READIN	8	343008	0	B.2.1.2	3	129328	0.90	0.03	0.90	0.04	0.03	0.00	0.43	-0.27	0.43	-0.25	-0.20	-0.9728	0.0095	-9.9	0.8	-9.9	0.6			
READIN	8	828223	0	A.1.6.1	2	129328	0.64	0.08	0.17	0.64	0.11	0.00	0.38	-0.15	-0.25	0.38	-0.16	1.0071	0.0063	-0.3	1.0	-0.1	1.0			
READIN	8	493589	0	B.1.1.1	2	129328	0.64	0.13	0.64	0.13	0.10	0.00	0.39	-0.28	0.39	-0.23	-0.05	1.1393	0.0062	-4.7	1.0	-4.0	1.0			
READIN	8	381672	0	B.1.1.1	2	129328	0.66	0.13	0.06	0.15	0.66	0.00	0.26	-0.04	-0.22	-0.16	0.26	0.8116	0.0064	9.9	1.2	9.9	1.2			
READIN	8	232211	0	B.1.1.1	2	129328	0.67	0.19	0.11	0.67	0.03	0.00	0.33	-0.22	-0.14	0.33	-0.14	0.6591	0.0065	9.9	1.1	9.9	1.1			
READIN	8	320066	0	B.2.1.1	3	129328	0.77	0.06	0.77	0.09	0.07	0.00	0.45	-0.25	0.45	-0.29	-0.17	0.0235	0.0073	-9.9	0.9	-9.9	0.9			
READIN	8	337673	0	A.1.3.1	2	129328	0.78	0.78	0.08	0.07	0.06	0.00	0.46	0.46	-0.19	-0.28	-0.26	-0.0227	0.0073	-9.9	0.9	-9.9	0.8			
READIN	8	331199	0	B.1.1.1	1	129328	0.82	0.09	0.05	0.04	0.82	0.00	0.49	-0.31	-0.28	-0.20	0.49	-0.2320	0.0077	-9.9	0.9	-9.9	0.7			

Appendix G: Item Statistics Multiple Choice

READIN	8	902175	0	A.2.2.2	2	129328	0.44	0.14	0.44	0.23	0.19	0.00	0.31	-0.18	0.31	-0.20	-0.01	1.9168	0.0062	9.9	1.1	9.9	1.2			
READIN	8	139096	0	A.2.6.1	2	129328	0.72	0.06	0.72	0.18	0.04	0.00	0.43	-0.30	0.43	-0.20	-0.20	0.4089	0.0068	-9.9	1.0	-7.9	1.0			
READIN	8	346921	0	A.2.4.1	1	129328	0.72	0.10	0.72	0.12	0.06	0.00	0.49	-0.24	0.49	-0.23	-0.29	0.4394	0.0067	-9.9	0.9	-9.9	0.8			
READIN	8	283794	0	A.2.4.1	1	129328	0.48	0.14	0.23	0.48	0.14	0.00	0.28	-0.04	-0.25	0.28	-0.05	1.6710	0.0061	9.9	1.1	9.9	1.2			
READIN	8	125735	0	B.3.3.3	3	129328	0.33	0.22	0.27	0.33	0.17	0.00	0.16	-0.01	-0.07	0.16	-0.09	2.4741	0.0064	9.9	1.2	9.9	1.5			
READIN	8	146064	0	A.2.3.1	2	129328	0.47	0.24	0.07	0.22	0.47	0.00	0.35	-0.05	-0.26	-0.20	0.35	1.6406	0.0061	9.9	1.0	9.9	1.1			
READIN	8	586345	0	B.1.2.1	3	129328	0.55	0.13	0.55	0.06	0.25	0.01	0.33	-0.33	0.33	-0.17	0.00	1.3499	0.0061	9.9	1.1	9.9	1.1			
READIN	8	354421	0	A.2.3.1	2	129328	0.46	0.05	0.15	0.46	0.33	0.00	0.34	-0.26	-0.19	0.34	-0.08	1.7362	0.0061	9.9	1.1	9.9	1.1			
READIN	8	826834	0	A.2.4.1	2	129328	0.54	0.21	0.11	0.13	0.54	0.00	0.45	-0.19	-0.17	-0.25	0.45	1.3532	0.0061	-9.9	1.0	-9.9	1.0			
READIN	8	530542	0	A.2.4.1	2	129328	0.47	0.04	0.47	0.44	0.04	0.00	0.39	-0.25	0.39	-0.18	-0.24	1.6971	0.0061	-3.9	1.0	8.7	1.0			
READIN	8	182415	0	A.2.6.1	2	129328	0.46	0.34	0.46	0.14	0.06	0.00	0.28	-0.13	0.28	-0.06	-0.22	1.6215	0.0061	9.9	1.1	9.9	1.2			
READIN	8	422217	0	B.3.1.1	2	129328	0.52	0.16	0.26	0.52	0.05	0.00	0.32	-0.07	-0.16	0.32	-0.27	1.5454	0.0061	9.9	1.1	9.9	1.1			
READIN	8	930938	0	B.3.3.1	2	129328	0.66	0.15	0.14	0.05	0.66	0.00	0.52	-0.17	-0.34	-0.28	0.52	0.6720	0.0065	-9.9	0.9	-9.9	0.8			
READIN	8	687667	0	A.1.2.2	2	129328	0.77	0.06	0.06	0.77	0.11	0.00	0.48	-0.25	-0.22	0.48	-0.29	0.0418	0.0072	-9.9	0.9	-9.9	0.8			
READIN	8	127733	0	B.2.1.1	2	129328	0.81	0.03	0.06	0.11	0.81	0.00	0.40	-0.25	-0.29	-0.14	0.40	-0.1480	0.0075	-9.9	0.9	-3.8	1.0			
READIN	8	285023	0	B.2.2.1	2	129328	0.80	0.06	0.12	0.80	0.02	0.00	0.41	-0.26	-0.24	0.41	-0.16	-0.1053	0.0075	-9.9	1.0	-7.6	0.9			
READIN	8	908916	0	A.1.3.2	2	129328	0.90	0.90	0.04	0.02	0.03	0.00	0.47	0.47	-0.29	-0.26	-0.23	-1.0561	0.0097	-9.9	0.8	-9.9	0.5			
READIN	8	233568	0	B.1.1.1	2	129328	0.52	0.52	0.04	0.34	0.10	0.00	0.21	0.21	-0.17	0.02	-0.26	1.5433	0.0061	9.9	1.2	9.9	1.3			
READIN	8	248187	0	A.1.4.1	1	129328	0.72	0.10	0.16	0.02	0.72	0.00	0.50	-0.21	-0.35	-0.21	0.50	0.4428	0.0067	-9.9	0.9	-9.9	0.8			
READIN	8	949977	0	B.3.1.1	2	129328	0.73	0.73	0.07	0.16	0.04	0.00	0.42	0.42	-0.25	-0.22	-0.19	0.4063	0.0068	-9.9	1.0	-9.9	0.9			
READIN	8	267566	0	B.2.1.1	3	129328	0.77	0.05	0.06	0.77	0.11	0.00	0.49	-0.30	-0.31	0.49	-0.20	0.0983	0.0072	-9.9	0.9	-9.9	0.8			
READIN	8	252469	0	A.2.3.1	2	129328	0.72	0.07	0.72	0.10	0.11	0.00	0.41	-0.23	0.41	-0.23	-0.16	0.4010	0.0068	-3.1	1.0	-6.4	1.0			
READIN	8	440806	0	A.2.4.1	2	129328	0.75	0.05	0.11	0.75	0.10	0.00	0.42	-0.29	-0.18	0.42	-0.20	0.1717	0.0071	-1.9	1.0	0.1	1.0			
READIN	8	730219	0	B.1.2.1	3	129328	0.75	0.04	0.13	0.07	0.75	0.00	0.45	-0.29	-0.20	-0.25	0.45	0.1952	0.0070	-9.9	0.9	-9.9	0.9			
READIN	8	435711	0	B.3.1.1	2	129328	0.50	0.50	0.06	0.33	0.10	0.00	0.36	0.36	-0.28	-0.13	-0.16	1.5619	0.0061	9.7	1.0	9.9	1.1			
READIN	8	514140	0	B.3.3.2	2	129328	0.39	0.32	0.09	0.19	0.39	0.00	0.32	-0.05	-0.22	-0.17	0.32	2.1031	0.0062	9.9	1.0	9.9	1.1			
READIN	8	579057	0	A.2.1.2	2	129328	0.73	0.07	0.73	0.15	0.06	0.00	0.42	-0.20	0.42	-0.22	-0.24	0.3375	0.0068	-5.7	1.0	-9.9	0.9			
READIN	8	235156	1	A.1.3.1	2	72044	0.78	0.09	0.78	0.07	0.06	0.00	0.38	-0.17	0.38	-0.25	-0.18	0.0268	0.0097	-2.9	1.0	3.8	1.0			
READIN	8	755371	1	A.1.3.1	2	72044	0.51	0.07	0.08	0.51	0.34	0.00	0.31	-0.28	-0.21	0.31	-0.05	1.5265	0.0082	9.9	1.1	9.9	1.2			
READIN	8	275020	1	A.1.6.1	2	72044	0.84	0.04	0.07	0.04	0.84	0.00	0.51	-0.28	-0.31	-0.25	0.51	-0.4753	0.0109	-9.9	0.8	-9.9	0.6			
READIN	8	269093	1	B.1.1.1	3	72044	0.66	0.22	0.66	0.03	0.09	0.00	0.37	-0.12	0.37	-0.25	-0.27	0.7610	0.0086	9.4	1.0	6.8	1.0			
READIN	8	601995	1	B.1.1.1	2	72044	0.51	0.21	0.51	0.06	0.22	0.00	0.27	-0.10	0.27	-0.28	-0.06	1.5313	0.0082	9.9	1.2	9.9	1.2			
READIN	8	675488	1	B.2.1.1	2	72044	0.85	0.09	0.03	0.85	0.03	0.00	0.47	-0.35	-0.21	0.47	-0.18	-0.5432	0.0111	-9.9	0.9	-9.9	0.7			
READIN	8	698889	1	B.2.1.1	2	72044	0.69	0.12	0.07	0.12	0.69	0.00	0.40	-0.14	-0.28	-0.20	0.40	0.5542	0.0088	-0.8	1.0	-4.8	1.0			
READIN	8	414404	1	A.1.2.1	2	72044	0.92	0.92	0.03	0.02	0.03	0.00	0.36	0.36	-0.21	-0.20	-0.18	-1.3625	0.0143	-9.5	0.9	-9.9	0.7			
READIN	8	428807	1	A.2.3.1	2	14695	0.79	0.09	0.08	0.04	0.79	0.00	0.52	-0.30	-0.28	-0.24	0.52	-0.0938	0.0217	-9.9	0.8	-9.9	0.7	B-	B-	B-
READIN	8	770160	1	A.2.3.2	2	14695	0.79	0.79	0.05	0.07	0.08	0.00	0.48	0.48	-0.26	-0.29	-0.23	-0.1231	0.0218	-8.9	0.9	-9.9	0.8	A+	A-	A-
READIN	8	908132	1	A.2.4.1	2	14695	0.58	0.24	0.08	0.58	0.09	0.00	0.30	-0.08	-0.24	0.30	-0.18	1.1186	0.0183	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	8	835043	1	B.3.2.1	3	14695	0.82	0.82	0.04	0.05	0.08	0.00	0.51	0.51	-0.26	-0.28	-0.30	-0.3574	0.0230	-9.9	0.8	-9.9	0.7	A-	A-	A-
READIN	8	714162	1	B.3.3.3	2	14695	0.75	0.04	0.75	0.18	0.03	0.00	0.52	-0.26	0.52	-0.35	-0.25	0.1477	0.0207	-9.9	0.9	-9.9	0.8	A-	A-	A-
READIN	8	554425	1	A.2.2.1	2	14695	0.75	0.75	0.13	0.09	0.04	0.00	0.39	0.39	-0.25	-0.18	-0.18	0.1918	0.0205	0.9	1.0	-1.9	1.0	A-	B-	B-
READIN	8	747932	1	B.3.3.4	2	14695	0.47	0.09	0.09	0.35	0.47	0.00	0.16	-0.18	-0.13	0.03	0.16	1.6923	0.0180	9.9	1.3	9.9	1.4	A+	A+	A-
READIN	8	251435	1	A.2.3.1	2	14695	0.47	0.20	0.26	0.07	0.47	0.00	0.30	-0.14	-0.11	-0.17	0.30	1.7098	0.0180	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	8	812512	1	B.3.3.4	2	14695	0.69	0.07	0.16	0.69	0.08	0.00	0.44	-0.24	-0.21	0.44	-0.24	0.5168	0.0195	-2.9	1.0	-5.2	0.9	A+	A-	A-
READIN	8	347261	1	A.2.4.1	1	14695	0.83	0.04	0.83	0.07	0.06	0.00	0.50	-0.23	0.50	-0.27	-0.31	-0.4303	0.0234	-9.9	0.9	-9.9	0.7	A+	A-	A-
READIN	8	616197	2	A.2.1.1	2	14341	0.77	0.07	0.06	0.10	0.77	0.00	0.43	-0.17	-0.26	-0.26	0.43	0.1006	0.0212	-5.8	0.9	-6.3	0.9	A-	A-	A-
READIN	8	206040	2	A.2.2.2	2	14341	0.41	0.23	0.27	0.41	0.08	0.00	0.17	-0.12	0.03	0.17	-0.16	2.0214	0.0184	9.9	1.2	9.9	1.4	A-	A-	A-
READIN	8	520976	2	A.2.3.1	2	14341	0.41	0.25	0.11	0.23	0.41	0.00	0.23	0.02	-0.27	-0.08	0.23	1.9913	0.0183	9.9	1.2	9.9	1.3	A+	A-	A-
READIN	8	370585	2	A.2.4.1	1	14341	0.83	0.06	0.07	0.05	0.83	0.00	0.42	-0.24	-0.22	-0.22	0.42	-0.3158	0.0233	-5.2	0.9	-8.5	0.8	A-	A-	A-
READIN	8	667243	2	A.2.6.1	3	14341	0.83	0.07	0.08	0.83	0.02	0.00	0.51	-0.29	-0.30	0.51	-0.24	-0.3629	0.0236	-9.9	0.8	-9.9	0.6	A-	A-	A-
READIN	8	186826	2	B.3.1.1	3	14341	0.67	0.67	0.05	0.24	0.03	0.00	0.21	0.21	-0.26	-0.02	-0.19	0.6915	0.0193	9.9	1.2	9.9	1.3	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

READIN	8	407891	2	B.3.3.1	2	14341	0.77	0.05	0.77	0.06	0.12	0.00	0.55	-0.28	0.55	-0.28	-0.31	0.1250	0.0211	-9.9	0.8	-9.9	0.7	A-	A-	A-
READIN	8	622143	2	B.3.3.2	2	14341	0.52	0.15	0.26	0.52	0.06	0.00	0.26	-0.08	-0.09	0.26	-0.24	1.4448	0.0182	9.9	1.2	9.9	1.2	A-	A-	A-
READIN	8	842915	2	A.2.3.2	2	14341	0.80	0.08	0.80	0.09	0.04	0.00	0.44	-0.27	0.44	-0.25	-0.16	-0.0868	0.0221	-6.7	0.9	-5.7	0.9	A+	A+	A-
READIN	8	689658	2	A.2.3.1	2	14341	0.55	0.55	0.10	0.20	0.14	0.00	0.46	0.46	-0.22	-0.20	-0.23	1.3156	0.0183	-9.7	0.9	-8.5	0.9	A-	A-	A-
READIN	8	104420	3	A.2.3.1	2	14342	0.78	0.13	0.05	0.04	0.78	0.00	0.48	-0.26	-0.27	-0.28	0.48	0.0358	0.0214	-9.9	0.9	-9.9	0.8	A+	A-	A-
READIN	8	733842	3	A.2.3.2	2	14342	0.51	0.51	0.25	0.18	0.06	0.00	0.22	0.22	0.05	-0.19	-0.26	1.4896	0.0182	9.9	1.2	9.9	1.3	A+	A-	A-
READIN	8	629351	3	A.2.4.1	1	14342	0.56	0.14	0.56	0.11	0.19	0.00	0.41	-0.28	0.41	-0.25	-0.07	1.2707	0.0183	-1.8	1.0	-1.3	1.0	A+	A+	A-
READIN	8	840112	3	A.2.4.1	1	14342	0.73	0.13	0.08	0.73	0.06	0.00	0.44	-0.20	-0.29	0.44	-0.21	0.3277	0.0203	-5.3	1.0	-6.8	0.9	A+	A+	A+
READIN	8	558985	3	A.1.3.1	2	14342	0.72	0.10	0.13	0.05	0.72	0.00	0.41	-0.25	-0.17	-0.23	0.41	0.3811	0.0201	-2.1	1.0	-2.6	1.0	A+	A-	A-
READIN	8	752744	3	A.2.4.1	2	14342	0.72	0.08	0.10	0.72	0.09	0.00	0.45	-0.16	-0.24	0.45	-0.28	0.4113	0.0200	-5.5	1.0	-7.6	0.9	A+	A+	A-
READIN	8	900853	3	B.3.1.1	3	14342	0.56	0.56	0.32	0.05	0.07	0.00	0.24	0.24	0.00	-0.29	-0.22	1.2694	0.0183	9.9	1.2	9.9	1.2	A+	A+	A+
READIN	8	354347	3	B.3.3.1	2	14342	0.80	0.06	0.80	0.08	0.06	0.00	0.50	-0.30	0.50	-0.26	-0.25	-0.1547	0.0223	-9.9	0.9	-9.9	0.7	A-	A-	A-
READIN	8	126353	3	A.2.2.1	2	14342	0.82	0.07	0.06	0.82	0.04	0.00	0.42	-0.24	-0.24	0.42	-0.20	-0.3487	0.0233	-5.4	0.9	-6.7	0.8	B-	A-	C-
READIN	8	969773	3	B.3.3.2	2	14342	0.62	0.13	0.62	0.06	0.19	0.00	0.19	-0.05	0.19	-0.21	-0.07	0.9505	0.0187	9.9	1.2	9.9	1.4	A-	A+	A-
READIN	8	385648	4	A.2.1.2	2	14319	0.65	0.16	0.09	0.09	0.65	0.00	0.44	-0.20	-0.22	-0.24	0.44	0.8018	0.0195	-4.7	1.0	-6.7	0.9	A-	A+	A-
READIN	8	951959	4	A.2.3.2	3	14319	0.80	0.13	0.80	0.04	0.03	0.00	0.45	-0.26	0.45	-0.26	-0.23	-0.0909	0.0226	-6.8	0.9	-9.2	0.8	A-	A-	A-
READIN	8	829323	4	A.2.3.1	2	14319	0.66	0.66	0.07	0.20	0.07	0.00	0.27	0.27	-0.24	0.00	-0.25	0.7830	0.0195	9.9	1.1	9.9	1.3	A+	A+	A+
READIN	8	456599	4	A.2.5.1	3	14319	0.69	0.07	0.12	0.69	0.12	0.00	0.44	-0.22	-0.23	0.44	-0.22	0.6269	0.0199	-4.1	1.0	-4.3	0.9	A+	A-	A-
READIN	8	483715	4	A.2.4.1	1	14319	0.76	0.07	0.76	0.08	0.09	0.00	0.49	-0.27	0.49	-0.29	-0.22	0.1577	0.0215	-9.9	0.9	-9.9	0.8	A-	A-	B-
READIN	8	374303	4	B.3.1.1	2	14319	0.52	0.23	0.52	0.20	0.05	0.00	0.38	-0.19	0.38	-0.13	-0.26	1.4792	0.0186	0.7	1.0	3.2	1.0	A-	B-	A-
READIN	8	639849	4	B.3.2.1	2	14319	0.50	0.13	0.26	0.50	0.11	0.00	0.38	-0.28	-0.23	0.38	0.01	1.5897	0.0186	1.9	1.0	3.9	1.0	A-	A-	A-
READIN	8	146235	4	A.2.4.1	1	14319	0.76	0.08	0.10	0.06	0.76	0.00	0.47	-0.23	-0.26	-0.27	0.47	0.1552	0.0215	-9.2	0.9	-9.9	0.8	A+	B-	A-
READIN	8	815025	4	B.3.3.2	2	14319	0.50	0.50	0.08	0.10	0.32	0.00	0.33	0.33	-0.25	-0.27	-0.03	1.6009	0.0186	9.2	1.1	9.9	1.1	A-	A-	A-
READIN	8	285641	4	A.2.6.1	3	14319	0.66	0.10	0.20	0.66	0.04	0.00	0.46	-0.24	-0.24	0.46	-0.25	0.7899	0.0195	-7.2	0.9	-7.7	0.9	A+	B-	A-
READIN	8	135907	5	A.2.3.2	3	14347	0.45	0.09	0.22	0.23	0.45	0.00	0.10	-0.13	-0.07	0.04	0.10	1.7915	0.0185	9.9	1.3	9.9	1.4	A+	A+	A+
READIN	8	824874	5	A.2.4.1	3	14347	0.56	0.25	0.03	0.56	0.16	0.00	0.16	-0.08	-0.24	0.16	-0.01	1.2911	0.0186	9.9	1.3	9.9	1.3	A+	A-	A-
READIN	8	917073	5	B.2.1.1	2	14347	0.80	0.04	0.08	0.80	0.00	0.00	0.48	-0.28	-0.26	-0.24	0.48	-0.0867	0.0224	-9.9	0.9	-9.9	0.8	A-	B-	B-
READIN	8	527060	5	B.3.2.1	2	14347	0.72	0.72	0.13	0.07	0.08	0.00	0.50	0.50	-0.27	-0.29	-0.22	0.3986	0.0204	-9.9	0.9	-9.9	0.8	A-	A-	A-
READIN	8	425778	5	B.3.3.2	2	14347	0.21	0.15	0.26	0.38	0.21	0.00	0.18	-0.01	-0.13	-0.03	0.18	3.1221	0.0218	6.2	1.1	9.9	1.6	A-	A-	A-
READIN	8	261453	5	B.3.3.3	3	14347	0.70	0.13	0.70	0.13	0.03	0.00	0.44	-0.26	0.44	-0.20	-0.26	0.5156	0.0200	-5.7	1.0	-7.7	0.9	A+	A-	A-
READIN	8	109980	5	A.2.2.1	2	14347	0.63	0.15	0.12	0.63	0.10	0.00	0.35	-0.13	-0.27	0.35	-0.12	0.9081	0.0191	4.8	1.0	4.0	1.1	A-	A-	B-
READIN	8	199393	5	A.2.3.1	3	14347	0.75	0.75	0.07	0.09	0.09	0.00	0.47	0.47	-0.25	-0.24	-0.24	0.2494	0.0210	-9.3	0.9	-9.9	0.8	A-	A-	A-
READIN	8	240844	5	A.2.3.1	2	14347	0.34	0.34	0.14	0.37	0.16	0.00	0.19	0.19	-0.20	0.02	-0.08	2.3903	0.0193	9.9	1.2	9.9	1.4	A-	A-	A-
READIN	8	543045	5	A.2.4.1	2	14347	0.73	0.16	0.73	0.04	0.06	0.00	0.46	-0.26	0.46	-0.26	-0.23	0.3303	0.0207	-8.4	0.9	-8.8	0.9	A-	A-	A-
READIN	8	142131	6	A.2.2.2	2	57284	0.67	0.09	0.67	0.18	0.06	0.00	0.40	-0.23	0.40	-0.17	-0.23	0.7162	0.0098	-3.0	1.0	-9.2	0.9			
READIN	8	644778	6	A.2.4.1	2	57284	0.52	0.16	0.52	0.28	0.04	0.00	0.35	-0.20	0.35	-0.11	-0.26	1.5001	0.0092	9.9	1.0	9.9	1.1			
READIN	8	104483	6	A.2.3.2	3	57284	0.60	0.60	0.11	0.15	0.14	0.00	0.32	0.32	-0.27	-0.16	-0.05	1.0753	0.0094	9.9	1.1	9.9	1.1			
READIN	8	618040	6	A.2.4.1	1	57284	0.49	0.49	0.16	0.05	0.29	0.00	0.37	0.37	-0.16	-0.24	-0.16	1.6168	0.0092	2.0	1.0	7.0	1.0			
READIN	8	125109	6	A.2.5.1	2	57284	0.75	0.09	0.11	0.75	0.05	0.00	0.41	-0.19	-0.26	0.41	-0.19	0.2719	0.0105	-7.1	1.0	-9.9	0.9			
READIN	8	589708	6	A.2.6.2	2	57284	0.65	0.04	0.20	0.11	0.65	0.00	0.42	-0.25	-0.14	-0.29	0.42	0.8434	0.0096	-6.5	1.0	-7.0	1.0			
READIN	8	464382	6	B.3.1.1	2	57284	0.73	0.09	0.10	0.73	0.08	0.00	0.35	-0.21	-0.16	0.35	-0.17	0.3792	0.0103	5.1	1.0	5.9	1.1			
READIN	8	765630	6	B.3.3.1	2	57284	0.80	0.80	0.02	0.14	0.05	0.00	0.29	0.29	-0.16	-0.19	-0.12	-0.0520	0.0112	9.9	1.1	9.9	1.1			
READIN	8	640626	6	B.2.1.2	2	14324	0.24	0.24	0.31	0.14	0.30	0.00	0.05	0.05	0.03	-0.18	0.07	2.9373	0.0209	9.9	1.2	9.9	1.8	A-	A-	A-
READIN	8	670093	6	A.1.3.1	2	14324	0.46	0.27	0.09	0.18	0.46	0.00	0.40	-0.20	-0.17	-0.16	0.40	1.7700	0.0184	-5.2	1.0	-2.8	1.0	A-	B-	B-
READIN	8	506770	6	A.1.3.1	2	14324	0.54	0.21	0.11	0.14	0.54	0.00	0.32	-0.15	-0.18	-0.12	0.32	1.3838	0.0185	9.0	1.1	8.8	1.1	A+	A-	A-
READIN	8	827425	6	A.1.3.2	2	14324	0.66	0.14	0.66	0.13	0.07	0.00	0.24	-0.07	0.24	-0.13	-0.17	0.7538	0.0194	9.9	1.2	9.9	1.3	A+	A-	A-
READIN	8	800612	6	B.1.1.1	2	14324	0.49	0.06	0.40	0.49	0.04	0.00	0.23	-0.19	-0.08	0.23	-0.15	1.6098	0.0184	9.9	1.2	9.9	1.2	A+	A-	A-
READIN	8	946442	6	B.1.1.1	2	14324	0.55	0.08	0.15	0.55	0.22	0.00	0.27	-0.12	-0.16	0.27	-0.11	1.3423	0.0185	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	8	731849	6	B.2.1.1	2	14324	0.31	0.31	0.28	0.25	0.15	0.00	0.16	0.16	-0.04	-0.05	-0.11	2.5238	0.0195	9.9	1.2	9.9	1.4	A+	A+	A+
READIN	8	621894	6	B.2.2.2	2	14324	0.52	0.28	0.11	0.52	0.09	0.00	0.27	-0.06	-0.16	0.27	-0.21	1.4675	0.0184	9.9	1.1	9.9	1.2	A+	A-	A-
READIN	8	620476	6	A.1.1.2	1	14324	0.66	0.17	0.66	0.06	0.11	0.00	0.36	-0.13	0.36	-0.24	-0.21	0.7724	0.0194	2.5	1.0	1.6	1.0	A+	A+	A-

Appendix G: Item Statistics Multiple Choice

READIN	8	804768	6	B.2.2.1	2	14324	0.88	0.04	0.04	0.03	0.88	0.00	0.50	-0.28	-0.30	-0.25	0.50	-0.7862	0.0272	-9.9	0.8	-9.9	0.6	A+	A-	A-
READIN	8	662655	7	B.1.1.1	2	14289	0.71	0.06	0.15	0.07	0.71	0.00	0.39	-0.23	-0.15	-0.26	0.39	0.4540	0.0203	-1.5	1.0	2.1	1.0	A+	A-	B-
READIN	8	104661	7	B.1.1.1	3	14289	0.78	0.06	0.12	0.78	0.03	0.00	0.47	-0.28	-0.24	0.47	-0.25	-0.0159	0.0221	-9.7	0.9	-8.8	0.8	A+	A-	A-
READIN	8	788663	7	B.1.1.1	3	14289	0.65	0.65	0.15	0.13	0.07	0.00	0.48	0.48	-0.20	-0.30	-0.21	0.7973	0.0194	-9.9	0.9	-9.9	0.9	A-	A-	A-
READIN	8	566158	7	B.2.1.1	2	14289	0.73	0.15	0.08	0.73	0.04	0.00	0.49	-0.29	-0.24	0.49	-0.24	0.3673	0.0206	-9.9	0.9	-9.9	0.8	A+	A-	A-
READIN	8	190007	7	B.2.1.2	2	14289	0.84	0.84	0.05	0.08	0.03	0.00	0.46	0.46	-0.22	-0.29	-0.24	-0.4864	0.0248	-9.7	0.9	-9.9	0.7	A+	B-	A-
READIN	8	962083	7	B.2.2.1	2	14289	0.63	0.12	0.18	0.63	0.07	0.00	0.33	-0.15	-0.13	0.33	-0.26	0.9257	0.0192	8.5	1.1	9.9	1.1	A+	A+	A+
READIN	8	975234	7	A.1.1.2	1	14289	0.50	0.07	0.50	0.38	0.04	0.00	0.19	-0.25	0.19	0.03	-0.24	1.5598	0.0185	9.9	1.2	9.9	1.3	A+	A+	A+
READIN	8	102886	7	A.1.3.1	2	14289	0.64	0.14	0.12	0.10	0.64	0.00	0.40	-0.27	-0.21	-0.11	0.40	0.8800	0.0192	-0.8	1.0	-2.0	1.0	A+	A+	A-
READIN	8	176535	7	B.2.1.2	2	14289	0.69	0.05	0.69	0.05	0.21	0.00	0.35	-0.19	0.35	-0.26	-0.15	0.6087	0.0199	4.9	1.1	4.5	1.1	A+	A-	A-
READIN	8	349187	7	B.1.1.1	3	14289	0.64	0.14	0.64	0.10	0.12	0.00	0.39	-0.15	0.39	-0.16	-0.26	0.8539	0.0193	1.1	1.0	3.2	1.0	A-	A-	A-
READIN	8	649196	8	A.1.3.1	2	14342	0.83	0.09	0.06	0.83	0.02	0.00	0.44	-0.25	-0.27	0.44	-0.21	-0.2627	0.0237	-7.7	0.9	-9.9	0.8	A+	A-	A-
READIN	8	190773	8	A.1.1.1	2	14342	0.60	0.60	0.08	0.06	0.26	0.00	0.37	0.37	-0.25	-0.30	-0.09	1.1500	0.0187	2.6	1.0	1.1	1.0	A+	A-	A-
READIN	8	432747	8	B.1.1.1	2	14342	0.68	0.08	0.12	0.68	0.12	0.00	0.41	-0.22	-0.17	0.41	-0.23	0.7039	0.0196	-3.2	1.0	-2.6	1.0	A-	A-	B-
READIN	8	801231	8	B.2.1.1	2	14342	0.46	0.37	0.10	0.07	0.46	0.00	0.34	-0.08	-0.22	-0.26	0.34	1.8219	0.0184	4.1	1.0	6.0	1.1	A-	A-	A-
READIN	8	222800	8	B.2.1.2	3	14342	0.31	0.29	0.20	0.20	0.31	0.00	0.12	0.02	-0.16	0.00	0.12	2.5706	0.0195	9.9	1.2	9.9	1.5	A+	A+	A-
READIN	8	337820	8	B.1.1.1	2	14342	0.39	0.28	0.39	0.13	0.19	0.00	0.25	0.02	0.25	-0.23	-0.14	2.1383	0.0187	9.9	1.1	9.9	1.2	A-	A-	A-
READIN	8	599223	8	B.1.1.1	2	14342	0.65	0.16	0.65	0.04	0.15	0.00	0.41	-0.18	0.41	-0.25	-0.22	0.8783	0.0192	-3.5	1.0	-3.8	1.0	A-	A-	A-
READIN	8	292978	8	B.2.2.2	3	14342	0.24	0.24	0.27	0.36	0.13	0.00	0.15	0.15	-0.06	0.05	-0.18	2.9975	0.0210	9.9	1.1	9.9	1.5	A-	A+	A+
READIN	8	100588	8	B.1.1.1	2	14342	0.65	0.08	0.13	0.65	0.13	0.00	0.32	-0.21	-0.21	0.32	-0.07	0.8760	0.0192	7.5	1.1	8.4	1.1	A-	A-	A-
READIN	8	551023	8	B.1.1.1	2	14342	0.44	0.07	0.44	0.40	0.08	0.00	0.05	-0.33	0.05	0.21	-0.14	1.9115	0.0184	9.9	1.4	9.9	1.5	A+	A+	A-
READIN	8	958832	9	A.1.1.2	1	14329	0.78	0.12	0.78	0.05	0.05	0.00	0.51	-0.33	0.51	-0.24	-0.23	0.0686	0.0218	-9.9	0.9	-9.9	0.7	A+	A+	A-
READIN	8	285590	9	A.1.4.1	1	14329	0.74	0.74	0.08	0.13	0.05	0.00	0.39	0.39	-0.23	-0.20	-0.20	0.2908	0.0209	-2.3	1.0	2.2	1.0	A+	A-	A-
READIN	8	378944	9	A.1.3.1	2	14329	0.76	0.04	0.06	0.76	0.14	0.00	0.44	-0.28	-0.27	0.44	-0.21	0.1470	0.0214	-7.1	0.9	-6.0	0.9	A-	A+	A-
READIN	8	989549	9	A.1.4.1	3	14329	0.64	0.22	0.64	0.05	0.09	0.00	0.26	-0.12	0.26	-0.19	-0.13	0.8526	0.0193	9.9	1.1	9.9	1.2	A+	A+	A+
READIN	8	380272	9	A.1.3.1	2	14329	0.94	0.02	0.94	0.03	0.02	0.00	0.37	-0.20	0.37	-0.23	-0.20	-1.6568	0.0365	-5.0	0.9	-9.9	0.6	A+	A-	B-
READIN	8	575240	9	B.1.1.1	2	14329	0.78	0.06	0.11	0.05	0.78	0.00	0.42	-0.35	-0.16	-0.17	0.42	0.0570	0.0218	-4.8	0.9	-4.1	0.9	A+	A+	A-
READIN	8	941501	9	B.1.1.1	3	14329	0.60	0.19	0.14	0.07	0.60	0.00	0.40	-0.19	-0.10	-0.32	0.40	1.0749	0.0189	-0.1	1.0	0.9	1.0	A+	A-	A-
READIN	8	730487	9	A.1.3.1	2	14329	0.78	0.14	0.05	0.78	0.03	0.00	0.41	-0.22	-0.23	0.41	-0.23	0.0546	0.0218	-4.0	1.0	-3.4	0.9	A+	A+	A-
READIN	8	375054	9	B.2.2.1	2	14329	0.61	0.61	0.07	0.25	0.07	0.00	0.28	0.28	-0.22	-0.05	-0.22	1.0540	0.0189	9.9	1.1	9.9	1.2	A+	A+	A-
READIN	8	437981	9	B.1.1.1	2	14329	0.44	0.10	0.41	0.05	0.44	0.00	0.13	-0.20	0.08	-0.21	0.13	1.9003	0.0186	9.9	1.3	9.9	1.4	A+	A+	A+
SCIENCE	4	102190	0	D.2.1.1		125724	0.41	0.14	0.38	0.07	0.41	0.00	0.19	-0.12	-0.01	-0.18	0.19	1.6661	0.0063	9.9	1.2	9.9	1.4			
SCIENCE	4	537831	0	A.2.1.4	2	125724	0.76	0.07	0.76	0.08	0.09	0.00	0.41	-0.29	0.41	-0.26	-0.11	-0.3531	0.0073	2.5	1.0	6.8	1.1			
SCIENCE	4	419598	0	B.3.3.1	2	125724	0.79	0.05	0.79	0.05	0.11	0.00	0.41	-0.16	0.41	-0.19	-0.28	-0.4844	0.0076	-5.4	1.0	-3.8	1.0			
SCIENCE	4	270362	0	B.2.2.1	1	125724	0.85	0.05	0.85	0.05	0.05	0.00	0.46	-0.24	0.46	-0.27	-0.23	-0.9436	0.0085	-9.9	0.9	-9.9	0.8			
SCIENCE	4	121495	0	C.2.1.3	2	125724	0.73	0.11	0.07	0.73	0.09	0.00	0.39	-0.19	-0.22	0.39	-0.19	-0.0773	0.0070	2.7	1.0	-0.5	1.0			
SCIENCE	4	108524	0	A.1.3.5	2	125724	0.70	0.09	0.15	0.70	0.06	0.00	0.54	-0.25	-0.35	0.54	-0.21	0.1669	0.0067	-9.9	0.9	-9.9	0.8			
SCIENCE	4	403295	0	A.3.3.1	2	125724	0.87	0.87	0.05	0.04	0.03	0.00	0.41	0.41	-0.21	-0.21	-0.25	-1.0756	0.0088	-9.9	0.9	-9.9	0.8			
SCIENCE	4	258836	0	D.1.1.3	2	125724	0.71	0.04	0.15	0.09	0.71	0.00	0.42	-0.24	-0.25	-0.18	0.42	-0.1117	0.0070	9.9	1.0	2.3	1.0			
SCIENCE	4	427454	0	B.3.1.2	2	125724	0.64	0.08	0.11	0.18	0.64	0.00	0.48	-0.24	-0.24	-0.23	0.48	0.4975	0.0065	-9.9	0.9	-9.9	0.9			
SCIENCE	4	529781	0	D.1.3.1	2	125724	0.55	0.16	0.22	0.55	0.07	0.00	0.33	-0.11	-0.17	0.33	-0.21	0.9826	0.0063	9.9	1.1	9.9	1.1			
SCIENCE	4	230341	0	C.2.1.2	2	125724	0.50	0.05	0.50	0.30	0.15	0.00	0.30	-0.21	0.30	-0.04	-0.24	1.3427	0.0063	9.9	1.1	9.9	1.2			
SCIENCE	4	542509	0	C.2.1.4	2	125724	0.74	0.14	0.06	0.07	0.74	0.00	0.50	-0.34	-0.23	-0.20	0.50	-0.0668	0.0070	-9.9	0.9	-9.9	0.8			
SCIENCE	4	468916	0	A.1.3.1	2	125724	0.57	0.57	0.08	0.32	0.02	0.00	0.48	0.48	-0.33	-0.26	-0.17	0.8307	0.0063	-9.9	0.9	-9.9	0.9			
SCIENCE	4	150982	0	A.2.1.3	3	125724	0.55	0.55	0.20	0.13	0.12	0.00	0.36	0.36	-0.07	-0.30	-0.16	0.8302	0.0063	9.9	1.1	9.9	1.1			
SCIENCE	4	491938	0	A.2.1.1	2	125724	0.42	0.11	0.36	0.11	0.42	0.00	0.35	-0.27	-0.05	-0.20	0.35	1.5586	0.0063	9.9	1.0	9.9	1.1			
SCIENCE	4	773351	0	C.1.1.2	2	125724	0.78	0.08	0.08	0.78	0.06	0.00	0.40	-0.22	-0.20	0.40	-0.21	-0.1861	0.0071	-9.9	0.9	-9.9	0.9			
SCIENCE	4	698019	0	A.1.1.1	2	125724	0.87	0.04	0.87	0.05	0.05	0.00	0.45	-0.27	0.45	-0.23	-0.25	-1.1735	0.0090	-9.9	0.9	-9.9	0.8			
SCIENCE	4	378436	0	A.1.3.5	2	125724	0.60	0.12	0.15	0.12	0.60	0.00	0.42	-0.16	-0.16	-0.29	0.42	0.7583	0.0063	-7.7	1.0	-9.9	1.0			
SCIENCE	4	156402	0	A.3.2.1	2	125724	0.57	0.20	0.13	0.57	0.09	0.00	0.42	-0.12	-0.23	0.42	-0.28	0.8212	0.0063	-6.6	1.0	-4.6	1.0			
SCIENCE	4	911602	0	D.1.2.3	1	125724	0.75	0.10	0.05	0.75	0.09	0.00	0.50	-0.27	-0.26	0.50	-0.26	-0.3733	0.0074	-7.4	1.0	-9.9	0.9			

Appendix G: Item Statistics Multiple Choice

SCIENCE	4	102353	0	C.2.1.4	2	125724	0.64	0.64	0.10	0.15	0.10	0.00	0.38	0.38	-0.20	-0.15	-0.22	0.4651	0.0065	8.6	1.0	4.9	1.0				
SCIENCE	4	471331	0	A.1.3.3	2	125724	0.68	0.03	0.14	0.68	0.15	0.00	0.44	-0.22	-0.20	0.44	-0.27	0.2581	0.0066	-9.9	1.0	-9.9	0.9				
SCIENCE	4	991474	0	A.1.3.4	3	125724	0.62	0.18	0.62	0.13	0.06	0.00	0.48	-0.26	0.48	-0.19	-0.27	0.4933	0.0065	-9.9	1.0	-9.9	0.9				
SCIENCE	4	239348	0	B.3.2.3	2	125724	0.75	0.06	0.05	0.13	0.75	0.00	0.36	-0.21	-0.29	-0.11	0.36	-0.1821	0.0071	5.3	1.0	9.9	1.1				
SCIENCE	4	395158	0	C.3.1.3	1	125724	0.89	0.03	0.89	0.03	0.06	0.00	0.28	-0.18	0.28	-0.12	-0.16	-1.3485	0.0095	6.9	1.1	9.9	1.2				
SCIENCE	4	731177	0	D.1.2.1	1	125724	0.92	0.03	0.03	0.92	0.03	0.00	0.43	-0.25	-0.23	0.43	-0.23	-1.7235	0.0108	-9.9	0.9	-9.9	0.6				
SCIENCE	4	622194	0	A.2.2.1	2	125724	0.71	0.11	0.10	0.07	0.71	0.00	0.44	-0.24	-0.20	-0.25	0.44	0.0973	0.0068	-9.9	1.0	-9.9	0.9				
SCIENCE	4	593114	0	A.1.1.2	2	125724	0.77	0.08	0.10	0.05	0.77	0.00	0.40	-0.21	-0.23	-0.20	0.40	-0.3752	0.0074	3.7	1.0	-3.3	1.0				
SCIENCE	4	542200	0	A.2.1.2	2	125724	0.67	0.05	0.67	0.11	0.16	0.00	0.42	-0.27	0.42	-0.18	-0.21	0.3409	0.0066	-8.3	1.0	-7.6	1.0				
SCIENCE	4	650642	0	D.1.1.1	2	125724	0.56	0.56	0.19	0.14	0.10	0.00	0.39	0.39	-0.16	-0.22	-0.17	0.8577	0.0063	9.9	1.0	9.9	1.0				
SCIENCE	4	743869	0	B.3.2.1	2	125724	0.57	0.57	0.09	0.10	0.23	0.00	0.44	0.44	-0.28	-0.23	-0.16	0.7621	0.0063	-9.9	1.0	-9.1	1.0				
SCIENCE	4	509737	0	D.3.1.2	2	125724	0.53	0.53	0.15	0.04	0.28	0.00	0.33	0.33	-0.16	-0.23	-0.13	1.0453	0.0063	9.9	1.1	9.9	1.1				
SCIENCE	4	611201	0	A.3.1.3	3	125724	0.51	0.51	0.15	0.22	0.11	0.00	0.29	0.29	-0.11	-0.17	-0.11	1.1108	0.0062	9.9	1.1	9.9	1.2				
SCIENCE	4	183999	0	A.3.1.1	2	125724	0.80	0.07	0.80	0.07	0.06	0.00	0.55	-0.30	0.55	-0.29	-0.29	-0.5078	0.0076	-9.9	0.8	-9.9	0.6				
SCIENCE	4	161698	0	A.3.3.2	2	125724	0.68	0.08	0.11	0.68	0.13	0.00	0.35	-0.21	-0.13	0.35	-0.20	0.3437	0.0066	9.9	1.0	9.9	1.1				
SCIENCE	4	933930	0	A.3.3.1	2	125724	0.71	0.09	0.71	0.11	0.08	0.00	0.39	-0.24	0.39	-0.17	-0.19	0.1474	0.0067	-3.0	1.0	-9.9	0.9				
SCIENCE	4	624237	0	A.3.2.2	2	125724	0.57	0.22	0.57	0.10	0.11	0.00	0.38	-0.19	0.38	-0.15	-0.20	0.7841	0.0063	9.9	1.0	9.9	1.0				
SCIENCE	4	234154	0	D.1.3.2	2	125724	0.70	0.70	0.08	0.07	0.15	0.00	0.41	0.41	-0.23	-0.24	-0.18	0.0744	0.0068	2.9	1.0	-6.2	1.0				
SCIENCE	4	212642	0	D.2.1.2	2	125724	0.84	0.04	0.08	0.84	0.04	0.00	0.41	-0.26	-0.22	0.41	-0.20	-0.8088	0.0082	-9.9	0.9	-9.9	0.9				
SCIENCE	4	122444	0	C.3.1.2	3	125724	0.87	0.03	0.87	0.05	0.04	0.00	0.44	-0.24	0.44	-0.24	-0.24	-1.1681	0.0090	-9.9	0.9	-9.9	0.8				
SCIENCE	4	879425	0	A.1.3.1	2	125724	0.82	0.03	0.11	0.82	0.03	0.00	0.49	-0.24	-0.31	0.49	-0.25	-0.7419	0.0080	-9.9	0.9	-9.9	0.8				
SCIENCE	4	957544	0	A.1.3.3	2	125724	0.67	0.67	0.22	0.07	0.05	0.00	0.32	0.32	-0.14	-0.21	-0.20	0.3784	0.0065	9.9	1.1	9.9	1.1				
SCIENCE	4	585577	0	A.2.1.4	2	125724	0.69	0.10	0.09	0.69	0.12	0.00	0.40	-0.25	-0.20	0.40	-0.15	0.1822	0.0067	1.6	1.0	1.9	1.0				
SCIENCE	4	805551	0	A.2.1.1	2	125724	0.66	0.09	0.66	0.05	0.20	0.00	0.37	-0.14	0.37	-0.19	-0.24	0.2395	0.0067	9.9	1.1	9.9	1.1				
SCIENCE	4	985486	0	B.1.1.3	2	125724	0.89	0.04	0.04	0.04	0.89	0.00	0.39	-0.23	-0.19	-0.21	0.39	-1.1047	0.0089	-9.9	0.8	-9.9	0.7				
SCIENCE	4	221019	0	B.2.1.1	1	125724	0.85	0.05	0.05	0.05	0.85	0.00	0.47	-0.26	-0.30	-0.21	0.47	-0.8319	0.0082	-9.9	0.8	-9.9	0.7				
SCIENCE	4	697209	0	A.1.3.2	2	125724	0.77	0.02	0.08	0.77	0.13	0.00	0.45	-0.19	-0.17	0.45	-0.34	-0.3381	0.0073	-9.9	1.0	-8.5	0.9				
SCIENCE	4	149792	0	C.1.1.1	1	125724	0.83	0.03	0.83	0.04	0.09	0.00	0.41	-0.21	0.41	-0.22	-0.25	-0.8240	0.0082	-9.9	1.0	-9.9	0.9				
SCIENCE	4	175310	0	C.2.1.1	2	125724	0.59	0.10	0.07	0.24	0.59	0.00	0.39	-0.21	-0.16	-0.20	0.39	0.7069	0.0064	9.9	1.0	5.1	1.0				
SCIENCE	4	242404	0	D.1.1.2	2	125724	0.70	0.14	0.07	0.09	0.70	0.00	0.33	-0.17	-0.17	-0.16	0.33	0.2127	0.0067	9.9	1.1	9.9	1.1				
SCIENCE	4	575293	0	D.1.3.3	2	125724	0.65	0.21	0.09	0.06	0.65	0.00	0.42	-0.13	-0.28	-0.28	0.42	0.2194	0.0067	9.9	1.1	9.9	1.1				
SCIENCE	4	809331	0	B.3.1.1	2	125724	0.74	0.13	0.09	0.05	0.74	0.00	0.49	-0.27	-0.23	-0.28	0.49	-0.1425	0.0071	-9.9	0.9	-9.9	0.8				
SCIENCE	4	177393	0	A.3.1.2	2	125724	0.71	0.71	0.07	0.14	0.07	0.00	0.41	0.41	-0.24	-0.21	-0.19	0.0384	0.0068	1.6	1.0	-5.6	1.0				
SCIENCE	4	611740	0	A.1.1.1	2	125724	0.75	0.11	0.75	0.07	0.07	0.00	0.51	-0.27	0.51	-0.32	-0.21	-0.2890	0.0073	-9.9	0.9	-9.9	0.8				
SCIENCE	4	439983	0	A.3.2.1	1	125724	0.84	0.08	0.04	0.84	0.04	0.00	0.50	-0.29	-0.27	0.50	-0.26	-0.8112	0.0082	-9.9	0.9	-9.9	0.7				
SCIENCE	4	548772	0	A.3.2.3	2	125724	0.63	0.09	0.22	0.63	0.06	0.00	0.34	-0.31	-0.07	0.34	-0.19	0.5998	0.0064	9.9	1.1	9.9	1.1				
SCIENCE	4	692855	0	C.3.1.1	2	125724	0.36	0.25	0.12	0.27	0.36	0.00	0.36	-0.20	-0.13	-0.10	0.36	1.9201	0.0065	-8.5	1.0	9.9	1.1				
SCIENCE	4	887528	0	D.1.3.4	2	125724	0.49	0.49	0.12	0.15	0.23	0.00	0.39	0.39	-0.17	-0.26	-0.11	1.1855	0.0062	0.8	1.0	9.9	1.0				
SCIENCE	4	374230	1	A.2.1.1	2	10822	0.54	0.13	0.54	0.19	0.14	0.00	0.40	-0.24	0.40	-0.19	-0.12	0.9336	0.0212	0.9	1.0	1.3	1.0				
SCIENCE	4	793801	1	A.1.3.1	2	10822	0.62	0.07	0.11	0.20	0.62	0.00	0.42	-0.30	-0.23	-0.14	0.42	0.5186	0.0217	1.2	1.0	1.2	1.0				
SCIENCE	4	182597	1	A.1.3.3	2	10822	0.80	0.80	0.08	0.07	0.05	0.00	0.53	0.53	-0.30	-0.29	-0.26	-0.6191	0.0258	-9.9	0.8	-9.9	0.7	A+	A-	A-	
SCIENCE	4	747035	1	B.2.1.2	2	10822	0.80	0.07	0.04	0.09	0.80	0.00	0.46	-0.27	-0.27	-0.21	0.46	-0.6018	0.0257	-6.5	0.9	-5.1	0.9	A-	A-	A-	
SCIENCE	4	639613	1	B.3.3.4	2	10822	0.35	0.29	0.16	0.20	0.35	0.00	0.21	-0.01	-0.15	-0.10	0.21	1.8773	0.0219	9.9	1.2	9.9	1.4	A-	A+	A-	
SCIENCE	4	712186	1	A.3.2.1	2	10822	0.69	0.11	0.69	0.08	0.12	0.00	0.48	-0.26	0.48	-0.23	-0.23	0.0936	0.0227	-6.2	0.9	-7.7	0.9	A+	A-	A-	
SCIENCE	4	925288	1	A.3.2.1	2	10822	0.38	0.20	0.22	0.38	0.20	0.00	0.08	-0.07	-0.03	0.08	0.01	1.7255	0.0216	9.9	1.4	9.9	1.6	A-	A+	A-	
SCIENCE	4	418227	1	C.3.1.2	2	10822	0.93	0.93	0.02	0.02	0.02	0.01	0.29	0.29	-0.13	-0.18	-0.20	-1.9485	0.0383	-1.6	1.0	-1.1	0.9	A+	B-	A-	
SCIENCE	4	772739	1	D.1.3.4	3	10822	0.51	0.51	0.11	0.22	0.16	0.00	0.39	0.39	-0.28	-0.12	-0.15	1.0544	0.0211	4.0	1.0	5.9	1.1	A-	A-	A-	
SCIENCE	4	246552	1	A.2.1.1	3	10822	0.31	0.38	0.18	0.12	0.31	0.00	0.25	0.05	-0.16	-0.24	0.25	2.0860	0.0224	9.9	1.1	9.9	1.4	A-	A-	A-	
SCIENCE	4	335924	2	B.3.3.2	2	10480	0.80	0.07	0.07	0.80	0.06	0.00	0.50	-0.26	-0.28	0.50	-0.25	-0.5251	0.0261	-9.1	0.9	-9.9	0.8	A+	A-	A-	
SCIENCE	4	780842	2	B.3.1.2	2	10480	0.76	0.76	0.07	0.04	0.13	0.00	0.51	0.51	-0.25	-0.24	-0.31	-0.2754	0.0247	-9.5	0.9	-9.9	0.8				
SCIENCE	4	130383	2	C.1.1.1	2	10480	0.75	0.07	0.11	0.06	0.75	0.01	0.41	-0.23	-0.14	-0.30	0.41	-0.2248	0.0245	-1.7	1.0	-1.3	1.0				

Appendix G: Item Statistics Multiple Choice

SCIENCE	4	513734	2	D.1.3.3	2	10480	0.66	0.11	0.12	0.10	0.66	0.00	0.46	-0.26	-0.25	-0.17	0.46	0.3111	0.0225	-5.5	1.0	-5.7	0.9	A-	A-	A-
SCIENCE	4	451342	2	B.1.1.5	1	10480	0.92	0.03	0.03	0.92	0.02	0.00	0.38	-0.21	-0.24	0.38	-0.19	-1.7337	0.0370	-4.2	0.9	-6.6	0.7	A+	B-	A-
SCIENCE	4	725372	2	A.1.3.2	2	10480	0.84	0.05	0.84	0.09	0.02	0.00	0.27	-0.17	0.27	-0.11	-0.20	-0.8424	0.0281	3.0	1.1	9.2	1.3	A+	A-	A+
SCIENCE	4	565930	2	C.3.1.2	2	10480	0.51	0.33	0.05	0.51	0.11	0.00	0.22	-0.09	-0.23	0.22	-0.05	1.0946	0.0214	9.9	1.2	9.9	1.3	A+	C-	C-
SCIENCE	4	822921	2	B.3.3.3	2	10480	0.48	0.48	0.13	0.12	0.26	0.01	0.36	0.36	-0.20	-0.21	-0.10	1.2448	0.0214	5.2	1.0	7.3	1.1	A+	A-	A-
SCIENCE	4	216573	2	A.3.2.2	3	10480	0.40	0.40	0.33	0.07	0.20	0.00	0.25	0.25	0.03	-0.29	-0.15	1.6805	0.0217	9.9	1.1	9.9	1.3	A-	A-	A-
SCIENCE	4	793932	2	A.3.1.3	2	10480	0.40	0.19	0.40	0.32	0.09	0.00	0.21	-0.12	0.21	0.04	-0.26	1.6677	0.0217	9.9	1.2	9.9	1.4	A-	A-	A+
SCIENCE	4	556915	3	A.1.3.2	2	10433	0.86	0.05	0.05	0.04	0.86	0.00	0.52	-0.29	-0.30	-0.25	0.52	-1.0965	0.0304	-9.0	0.8	-9.9	0.6			
SCIENCE	4	783412	3	A.3.1.4	2	10433	0.85	0.04	0.04	0.85	0.06	0.00	0.51	-0.28	-0.30	0.51	-0.26	-1.0139	0.0297	-8.5	0.9	-9.9	0.6			
SCIENCE	4	539113	3	A.1.3.4	2	10433	0.64	0.11	0.09	0.64	0.16	0.00	0.49	-0.17	-0.32	0.49	-0.23	0.4551	0.0224	-7.2	0.9	-7.9	0.9	A+	A-	A-
SCIENCE	4	941439	3	A.1.3.5	2	10433	0.21	0.16	0.21	0.33	0.30	0.00	0.03	-0.06	0.03	0.03	0.00	2.8094	0.0256	9.9	1.3	9.9	2.2	A-	A+	A+
SCIENCE	4	608521	3	A.1.3.1	2	10433	0.55	0.05	0.55	0.13	0.26	0.01	0.45	-0.12	0.45	-0.17	-0.32	0.9389	0.0217	-4.3	1.0	-3.6	1.0	A-	A-	B-
SCIENCE	4	912657	3	B.1.1.5	2	10433	0.68	0.68	0.18	0.11	0.04	0.00	0.29	0.29	-0.12	-0.18	-0.18	0.2521	0.0230	9.9	1.1	9.4	1.2	A-	A-	A+
SCIENCE	4	602129	3	A.3.1.4	2	10433	0.75	0.10	0.09	0.06	0.75	0.00	0.55	-0.31	-0.29	-0.26	0.55	-0.2120	0.0247	-9.9	0.8	-9.9	0.7	A+	A-	B-
SCIENCE	4	722432	3	A.3.1.4	2	10433	0.73	0.08	0.07	0.73	0.12	0.00	0.47	-0.22	-0.29	0.47	-0.22	-0.0521	0.0240	-5.9	0.9	-8.3	0.8	A+	A-	A-
SCIENCE	4	413845	3	C.3.1.1	2	10433	0.68	0.68	0.07	0.15	0.10	0.00	0.41	0.41	-0.28	-0.16	-0.21	0.2649	0.0229	0.4	1.0	-1.2	1.0	A-	A-	A-
SCIENCE	4	315428	3	D.1.3.2	2	10433	0.67	0.07	0.09	0.16	0.67	0.00	0.45	-0.28	-0.27	-0.16	0.45	0.2901	0.0229	-3.9	1.0	-3.5	0.9	A+	A-	A-
SCIENCE	4	453102	4	D.2.1.3	1	10450	0.76	0.05	0.07	0.76	0.11	0.00	0.35	-0.21	-0.18	0.35	-0.18	-0.2285	0.0249	2.5	1.0	2.1	1.1			
SCIENCE	4	934500	4	A.3.1.4	1	10450	0.50	0.50	0.46	0.02	0.01	0.01	0.40	0.40	-0.30	-0.19	-0.18	1.2057	0.0218	1.1	1.0	2.5	1.0			
SCIENCE	4	346622	4	A.3.1.3	2	10450	0.69	0.14	0.69	0.13	0.03	0.00	0.38	-0.34	0.38	-0.06	-0.21	0.1509	0.0235	2.2	1.0	2.8	1.1	A-	A-	A-
SCIENCE	4	556121	4	B.1.1.4	3	10450	0.26	0.26	0.16	0.24	0.33	0.00	0.22	0.22	-0.23	-0.02	-0.01	2.4533	0.0244	6.3	1.1	9.9	1.5	A-	A-	A-
SCIENCE	4	564012	4	C.3.1.1	2	10450	0.58	0.12	0.16	0.58	0.14	0.00	0.45	-0.24	-0.21	0.45	-0.19	0.7405	0.0221	-4.5	1.0	-3.6	1.0	A-	A-	A-
SCIENCE	4	614971	4	B.3.3.1	2	10450	0.67	0.20	0.09	0.05	0.67	0.00	0.44	-0.24	-0.22	-0.23	0.44	0.2984	0.0230	-3.2	1.0	-4.7	0.9	A+	C-	C-
SCIENCE	4	175161	4	A.3.1.2	2	10450	0.46	0.13	0.30	0.11	0.46	0.00	0.41	-0.26	-0.09	-0.22	0.41	1.3693	0.0219	-2.9	1.0	1.1	1.0	A-	A-	A-
SCIENCE	4	755459	4	A.1.1.2	2	10450	0.55	0.27	0.10	0.55	0.07	0.00	0.48	-0.25	-0.24	0.48	-0.20	0.9383	0.0219	-9.9	0.9	-8.9	0.9	A-	A+	A-
SCIENCE	4	347600	4	A.1.3.3	2	10450	0.68	0.68	0.10	0.11	0.11	0.00	0.46	0.46	-0.26	-0.24	-0.19	0.2388	0.0232	-5.1	1.0	-4.2	0.9	A-	A-	A-
SCIENCE	4	615642	4	D.1.3.1	2	10450	0.41	0.16	0.27	0.41	0.16	0.00	0.34	-0.13	-0.13	0.34	-0.16	1.6230	0.0221	2.2	1.0	9.3	1.1	A-	A-	A-
SCIENCE	4	193861	5	A.2.1.1	2	10454	0.54	0.25	0.16	0.05	0.54	0.00	0.36	-0.08	-0.24	-0.25	0.36	0.9937	0.0218	6.3	1.1	7.0	1.1			
SCIENCE	4	978453	5	A.1.3.1	3	10454	0.50	0.17	0.50	0.21	0.12	0.01	0.37	-0.16	0.37	-0.10	-0.24	1.2044	0.0218	5.1	1.0	5.4	1.1			
SCIENCE	4	622908	5	B.1.1.3	2	10454	0.84	0.07	0.04	0.04	0.84	0.00	0.46	-0.25	-0.27	-0.24	0.46	-0.8797	0.0289	-7.2	0.9	-7.6	0.8	A+	A-	A-
SCIENCE	4	441639	5	A.1.1.1	3	10454	0.35	0.26	0.29	0.10	0.35	0.00	0.26	-0.09	-0.05	-0.21	0.26	1.9519	0.0226	9.9	1.1	9.9	1.3	A+	A+	A+
SCIENCE	4	843921	5	A.3.1.2	2	10454	0.31	0.40	0.31	0.16	0.14	0.00	0.25	-0.14	0.25	-0.05	-0.07	2.1630	0.0232	7.8	1.1	9.9	1.4	A-	A+	A+
SCIENCE	4	105441	5	D.1.2.3	2	10454	0.56	0.23	0.56	0.15	0.06	0.00	0.39	-0.15	0.39	-0.21	-0.22	0.8980	0.0219	3.3	1.0	2.4	1.0	A-	A-	B-
SCIENCE	4	321340	5	A.3.1.1	2	10454	0.84	0.06	0.05	0.05	0.84	0.00	0.55	-0.30	-0.27	-0.33	0.55	-0.8789	0.0289	-9.9	0.8	-9.9	0.6	A+	A-	A-
SCIENCE	4	386318	5	B.3.2.3	3	10454	0.37	0.08	0.37	0.23	0.32	0.01	0.24	-0.28	0.24	-0.09	-0.01	1.8438	0.0224	9.9	1.1	9.9	1.3	A-	A-	A+
SCIENCE	4	195798	5	A.1.3.2	3	10454	0.59	0.12	0.59	0.17	0.12	0.00	0.41	-0.25	0.41	-0.16	-0.18	0.7302	0.0221	0.3	1.0	1.0	1.0	A+	A-	A-
SCIENCE	4	126021	5	C.2.1.4	2	10454	0.66	0.66	0.07	0.14	0.12	0.00	0.41	0.41	-0.23	-0.19	-0.20	0.3632	0.0228	0.8	1.0	0.5	1.0	A-	A-	A-
SCIENCE	4	132875	6	B.2.2.1	2	10463	0.36	0.36	0.25	0.19	0.20	0.01	0.31	0.31	-0.05	-0.15	-0.16	1.8554	0.0223	3.8	1.0	9.9	1.2	A+	A-	A-
SCIENCE	4	884038	6	C.3.1.3	2	10463	0.77	0.07	0.77	0.06	0.10	0.00	0.40	-0.23	0.40	-0.20	-0.19	-0.3293	0.0254	-1.5	1.0	-0.8	1.0			
SCIENCE	4	266974	6	A.1.3.3	2	10463	0.78	0.05	0.09	0.78	0.08	0.00	0.48	-0.27	-0.24	0.48	-0.24	-0.3452	0.0255	-7.1	0.9	-8.9	0.8			
SCIENCE	4	153373	6	A.2.1.1	2	10463	0.18	0.29	0.36	0.18	0.16	0.00	0.00	0.01	0.11	0.00	-0.15	2.9905	0.0272	9.9	1.2	9.9	2.2	A+	A+	A-
SCIENCE	4	171891	6	A.3.2.3	3	10463	0.51	0.51	0.11	0.16	0.21	0.00	0.41	0.41	-0.17	-0.12	-0.25	1.1261	0.0216	-2.6	1.0	-0.7	1.0	A-	A-	A-
SCIENCE	4	551085	6	D.2.1.1	2	10463	0.30	0.30	0.07	0.11	0.51	0.01	0.13	0.13	-0.12	-0.16	0.05	2.1781	0.0232	9.9	1.2	9.9	1.6	A-	A-	A-
SCIENCE	4	730442	6	A.1.3.4	2	10463	0.34	0.07	0.43	0.34	0.16	0.00	0.11	-0.27	0.13	0.11	-0.12	1.9928	0.0226	9.9	1.3	9.9	1.5	A-	A-	A-
SCIENCE	4	854517	6	B.2.1.1	2	10463	0.62	0.62	0.12	0.17	0.09	0.00	0.27	0.27	-0.12	-0.05	-0.25	0.5884	0.0222	9.9	1.2	9.9	1.2	A+	A+	A+
SCIENCE	4	892862	6	B.3.3.5	2	10463	0.76	0.76	0.06	0.06	0.12	0.00	0.52	0.52	-0.27	-0.29	-0.27	-0.2426	0.0250	-9.9	0.9	-9.9	0.8	A+	A-	A-
SCIENCE	4	846456	6	C.3.1.3	2	10463	0.58	0.09	0.58	0.19	0.14	0.00	0.37	-0.23	0.37	-0.13	-0.18	0.7949	0.0219	4.4	1.0	4.4	1.1	A-	A-	A-
SCIENCE	4	655990	7	B.3.3.4	1	10441	0.78	0.05	0.09	0.78	0.07	0.00	0.51	-0.26	-0.30	0.51	-0.25	-0.3807	0.0256	-9.9	0.9	-9.9	0.8			
SCIENCE	4	415055	7	A.1.3.4	2	10441	0.60	0.11	0.60	0.06	0.23	0.00	0.35	-0.18	0.35	-0.26	-0.12	0.6592	0.0220	6.2	1.1	4.8	1.1			
SCIENCE	4	899155	7	A.2.1.3	3	10441	0.44	0.21	0.44	0.22	0.13	0.00	0.24	-0.13	0.24	-0.05	-0.14	1.4447	0.0217	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	4	985700	7	D.2.1.2	2	10441	0.48	0.11	0.48	0.09	0.33	0.00	0.21	-0.24	0.21	-0.28	0.11	1.2732	0.0216	9.9	1.2	9.9	1.3	A+	A-	A-

Appendix G: Item Statistics Multiple Choice

SCIENCE	4	909799	7	D.1.1.1	2	10441	0.33	0.12	0.08	0.33	0.46	0.00	0.26	-0.22	-0.22	0.26	0.02	1.9875	0.0227	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	4	975284	7	A.3.3.1	2	10441	0.38	0.38	0.15	0.20	0.26	0.00	0.23	0.23	-0.12	-0.11	-0.05	1.7351	0.0221	9.9	1.1	9.9	1.3	A-	A-	A-
SCIENCE	4	416151	7	A.3.2.3	2	10441	0.52	0.14	0.05	0.29	0.52	0.00	0.37	-0.28	-0.21	-0.08	0.37	1.0771	0.0216	4.1	1.0	4.4	1.1	A-	A-	A-
SCIENCE	4	944657	7	A.1.3.5	2	10441	0.35	0.18	0.26	0.35	0.21	0.00	0.20	-0.10	-0.08	0.20	-0.04	1.9020	0.0225	9.9	1.1	9.9	1.4	A+	A-	A-
SCIENCE	4	579358	7	A.2.1.2	3	10441	0.53	0.53	0.22	0.16	0.10	0.00	0.39	0.39	-0.10	-0.24	-0.22	1.0272	0.0217	-0.1	1.0	0.3	1.0	A+	A-	A-
SCIENCE	4	524742	7	C.1.1.1	2	10441	0.31	0.07	0.54	0.07	0.31	0.00	-0.01	-0.07	0.15	-0.18	-0.01	2.1084	0.0230	9.9	1.4	9.9	1.8	A-	A+	A+
SCIENCE	4	251601	8	D.2.1.2	2	10435	0.63	0.63	0.09	0.19	0.08	0.00	0.39	0.39	-0.26	-0.15	-0.20	0.5180	0.0224	1.4	1.0	0.9	1.0			
SCIENCE	4	170451	8	D.2.1.3	2	10435	0.34	0.19	0.37	0.34	0.10	0.00	0.19	-0.15	0.08	0.19	-0.22	1.9993	0.0226	9.9	1.2	9.9	1.4	A+	A+	A+
SCIENCE	4	974812	8	D.1.2.3	2	10435	0.54	0.54	0.12	0.19	0.14	0.00	0.45	0.45	-0.18	-0.22	-0.22	0.9948	0.0217	-7.4	0.9	-5.3	0.9			
SCIENCE	4	852874	8	A.3.3.1	2	10435	0.60	0.60	0.06	0.07	0.27	0.00	0.29	0.29	-0.26	-0.27	-0.02	0.7075	0.0221	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	4	437267	8	A.2.1.1	2	10435	0.48	0.48	0.06	0.10	0.35	0.00	0.08	0.08	-0.25	-0.17	0.15	1.2761	0.0217	9.9	1.4	9.9	1.5	A+	A+	A+
SCIENCE	4	714352	8	A.2.1.2	2	10435	0.40	0.17	0.27	0.40	0.16	0.00	0.26	-0.24	-0.02	0.26	-0.08	1.6727	0.0220	9.9	1.1	9.9	1.3	A+	A-	A-
SCIENCE	4	642309	8	A.3.3.1	2	10435	0.72	0.11	0.08	0.72	0.08	0.00	0.45	-0.22	-0.25	0.45	-0.23	0.0302	0.0239	-5.5	0.9	-6.4	0.9	A+	A-	A-
SCIENCE	4	937536	8	B.3.1.1	2	10435	0.48	0.19	0.15	0.48	0.18	0.00	0.41	-0.12	-0.20	0.41	-0.23	1.2874	0.0217	-5.0	1.0	-1.2	1.0	A+	A-	A-
SCIENCE	4	506920	8	D.1.1.1	2	10435	0.44	0.44	0.21	0.24	0.11	0.00	0.25	0.25	-0.13	-0.01	-0.22	1.4716	0.0218	9.9	1.2	9.9	1.2	A-	A-	A-
SCIENCE	4	652951	8	C.1.1.2	2	10435	0.79	0.05	0.10	0.79	0.05	0.01	0.52	-0.30	-0.29	0.52	-0.27	-0.4293	0.0261	-9.9	0.9	-9.9	0.7	A+	A-	A-
SCIENCE	4	784929	9	C.1.1.2	2	10432	0.61	0.10	0.08	0.21	0.61	0.00	0.39	-0.21	-0.28	-0.12	0.39	0.6731	0.0223	2.9	1.0	1.8	1.0			
SCIENCE	4	351468	9	A.1.3.5	2	10432	0.61	0.11	0.11	0.16	0.61	0.00	0.48	-0.21	-0.25	-0.24	0.48	0.6384	0.0223	-8.7	0.9	-7.5	0.9			
SCIENCE	4	543405	9	D.3.1.2	2	10432	0.60	0.23	0.07	0.60	0.10	0.00	0.40	-0.14	-0.28	0.40	-0.20	0.7257	0.0222	1.5	1.0	-0.7	1.0	A-	A-	A-
SCIENCE	4	857478	9	A.2.1.4	2	10432	0.67	0.67	0.15	0.12	0.05	0.00	0.43	0.43	-0.16	-0.24	-0.28	0.3015	0.0231	-2.1	1.0	-2.3	1.0	A+	A+	A-
SCIENCE	4	579770	9	A.3.2.2	3	10432	0.43	0.43	0.18	0.22	0.16	0.00	0.31	0.31	-0.05	-0.17	-0.17	1.5526	0.0219	8.1	1.1	9.9	1.2	A-	A+	A-
SCIENCE	4	527250	9	B.3.1.2	2	10432	0.43	0.26	0.43	0.13	0.18	0.00	0.15	0.00	0.15	-0.13	-0.08	1.5719	0.0220	9.9	1.3	9.9	1.4	A+	A+	A+
SCIENCE	4	140201	9	B.1.1.1	2	10432	0.14	0.63	0.09	0.14	0.14	0.00	0.00	0.17	-0.17	0.00	-0.09	3.3722	0.0299	9.9	1.2	9.9	2.7	A-	A+	A+
SCIENCE	4	256578	9	A.1.1.1	2	10432	0.82	0.04	0.82	0.08	0.06	0.00	0.46	-0.25	0.46	-0.26	-0.23	-0.6574	0.0276	-6.4	0.9	-6.0	0.8	A+	A-	A-
SCIENCE	4	819927	9	D.1.1.3	2	10432	0.67	0.14	0.09	0.67	0.10	0.00	0.44	-0.18	-0.23	0.44	-0.25	0.3182	0.0231	-3.0	1.0	-3.5	0.9	A+	A-	A-
SCIENCE	4	584858	9	C.2.1.2	2	10432	0.58	0.13	0.15	0.13	0.58	0.00	0.42	-0.27	-0.14	-0.18	0.42	0.7980	0.0221	-1.4	1.0	-1.9	1.0	A-	A-	A-
SCIENCE	4	949285	10	A.2.1.2	3	10434	0.55	0.27	0.55	0.08	0.09	0.00	0.33	-0.16	0.33	-0.14	-0.17	0.9213	0.0218	8.5	1.1	7.3	1.1			
SCIENCE	4	540820	10	B.3.3.3	2	10434	0.64	0.64	0.18	0.04	0.13	0.01	0.46	0.46	-0.22	-0.26	-0.24	0.4762	0.0225	-5.3	1.0	-2.8	1.0			
SCIENCE	4	239711	10	A.2.1.2	2	10434	0.67	0.14	0.09	0.67	0.09	0.00	0.39	-0.13	-0.28	0.39	-0.19	0.3170	0.0229	1.2	1.0	-0.9	1.0	A-	A-	A-
SCIENCE	4	572563	10	A.1.1.2	2	10434	0.68	0.08	0.68	0.10	0.15	0.00	0.43	-0.27	0.43	-0.21	-0.17	0.2665	0.0231	-2.2	1.0	-2.2	1.0	A+	A-	A-
SCIENCE	4	872240	10	C.2.1.2	2	10434	0.31	0.25	0.23	0.22	0.31	0.00	0.15	-0.03	-0.06	-0.07	0.15	2.1810	0.0232	9.9	1.2	9.9	1.5	A-	A+	A+
SCIENCE	4	957121	10	A.2.1.3	2	10434	0.32	0.32	0.22	0.26	0.20	0.00	0.15	0.15	-0.14	-0.04	0.02	2.0745	0.0229	9.9	1.2	9.9	1.5	A-	A-	A-
SCIENCE	4	673191	10	D.3.1.1	2	10434	0.60	0.16	0.09	0.60	0.15	0.00	0.43	-0.19	-0.27	0.43	-0.17	0.6822	0.0221	-2.5	1.0	-4.0	1.0	A-	A-	A-
SCIENCE	4	257105	10	B.3.1.2	2	10434	0.63	0.03	0.63	0.14	0.19	0.00	0.33	-0.22	0.33	-0.17	-0.15	0.5236	0.0224	7.9	1.1	4.4	1.1	A+	A-	A-
SCIENCE	4	892947	10	C.2.1.1	2	10434	0.85	0.85	0.04	0.07	0.03	0.00	0.39	0.39	-0.23	-0.19	-0.23	-0.8967	0.0292	-3.4	0.9	-2.2	0.9	A+	A-	A-
SCIENCE	4	651773	10	D.1.1.2	2	10434	0.60	0.60	0.22	0.06	0.11	0.01	0.26	0.26	-0.12	-0.17	-0.12	0.6669	0.0222	9.9	1.2	9.9	1.2	A-	A-	A-
SCIENCE	4	126979	11	A.2.1.4	3	10471	0.69	0.13	0.69	0.09	0.09	0.00	0.39	-0.13	0.39	-0.23	-0.23	0.2256	0.0232	1.3	1.0	-0.1	1.0			
SCIENCE	4	177179	11	C.2.1.4	2	10471	0.51	0.17	0.19	0.51	0.12	0.00	0.40	-0.17	-0.19	0.40	-0.19	1.1424	0.0217	-0.5	1.0	1.9	1.0			
SCIENCE	4	907730	11	A.2.2.1	2	10471	0.67	0.10	0.15	0.67	0.08	0.00	0.47	-0.20	-0.19	0.47	-0.34	0.3153	0.0230	-6.3	0.9	-5.8	0.9	A-	B-	A-
SCIENCE	4	855391	11	A.3.3.2	2	10471	0.37	0.05	0.47	0.37	0.10	0.00	0.14	-0.28	0.10	0.14	-0.16	1.8232	0.0223	9.9	1.3	9.9	1.5	A-	A+	A+
SCIENCE	4	532305	11	A.2.2.1	2	10471	0.65	0.65	0.14	0.08	0.13	0.00	0.29	0.29	-0.15	-0.18	-0.11	0.4158	0.0227	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	4	718956	11	A.3.3.2	2	10471	0.71	0.03	0.10	0.71	0.14	0.01	0.25	-0.21	-0.14	0.25	-0.10	0.0719	0.0237	9.9	1.2	9.9	1.2	A+	A-	A-
SCIENCE	4	927507	11	D.3.1.2	2	10471	0.54	0.27	0.54	0.12	0.08	0.00	0.37	-0.11	0.37	-0.18	-0.28	1.0048	0.0218	4.1	1.0	3.4	1.0	A-	A-	A-
SCIENCE	4	724973	11	B.3.2.2	2	10471	0.62	0.11	0.13	0.62	0.14	0.00	0.48	-0.22	-0.30	0.48	-0.17	0.5887	0.0223	-8.1	0.9	-7.6	0.9	A+	A-	A-
SCIENCE	4	744461	11	B.1.1.3	2	10471	0.80	0.05	0.10	0.05	0.80	0.00	0.48	-0.25	-0.25	-0.27	0.48	-0.5114	0.0265	-8.3	0.9	-7.5	0.8	A+	A-	A-
SCIENCE	4	696857	11	C.2.1.3	1	10471	0.62	0.25	0.62	0.07	0.06	0.00	0.21	-0.06	0.21	-0.16	-0.13	0.5606	0.0224	9.9	1.2	9.9	1.3	A-	A-	A-
SCIENCE	4	810082	12	B.3.2.1	2	10409	0.81	0.05	0.06	0.81	0.07	0.00	0.51	-0.29	-0.28	0.51	-0.25	-0.5882	0.0272	-9.1	0.9	-9.9	0.7	A+	A-	A-
SCIENCE	4	902303	12	D.1.3.1	2	10409	0.57	0.17	0.06	0.57	0.20	0.01	0.44	-0.17	-0.22	0.44	-0.25	0.8723	0.0220	-3.8	1.0	-2.8	1.0			
SCIENCE	4	615699	12	B.1.1.4	2	10409	0.59	0.17	0.12	0.59	0.12	0.00	0.49	-0.25	-0.27	0.49	-0.17	0.7461	0.0222	-9.5	0.9	-9.8	0.9			
SCIENCE	4	723971	12	A.3.1.1	2	10409	0.86	0.06	0.04	0.04	0.86	0.00	0.53	-0.36	-0.24	-0.26	0.53	-0.9620	0.0299	-9.9	0.8	-9.9	0.6	A+	A-	A-
SCIENCE	4	733658	12	A.2.1.4	2	10409	0.71	0.71	0.09	0.14	0.06	0.00	0.52	0.52	-0.17	-0.36	-0.27	0.1034	0.0238	-9.9	0.9	-9.9	0.8	A+	A-	A-

Appendix G: Item Statistics Multiple Choice

SCIENCE	4	193544	12	B.1.1.2	2	10409	0.56	0.25	0.16	0.03	0.56	0.00	0.17	-0.06	-0.09	-0.13	0.17	0.8774	0.0220	9.9	1.3	9.9	1.4	A-	A+	A+
SCIENCE	4	492983	12	D.3.1.3	2	10409	0.37	0.31	0.14	0.18	0.37	0.00	0.28	-0.07	-0.17	-0.11	0.28	1.8495	0.0224	9.9	1.1	9.9	1.2	A+	A-	A+
SCIENCE	4	516507	12	A.1.3.1	2	10409	0.39	0.32	0.39	0.08	0.21	0.00	0.32	0.00	0.32	-0.22	-0.23	1.7697	0.0223	5.1	1.1	9.9	1.2	A-	A-	A-
SCIENCE	4	801206	12	D.1.2.1	2	10409	0.53	0.16	0.53	0.14	0.17	0.00	0.36	-0.13	0.36	-0.23	-0.13	1.0603	0.0219	5.6	1.1	5.8	1.1	A-	A-	A+
SCIENCE	4	699955	12	D.1.2.2	2	10409	0.56	0.56	0.17	0.13	0.14	0.00	0.30	0.30	-0.13	-0.14	-0.16	0.8940	0.0220	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	8	944605	0	B.3.1.2	2	127878	0.80	0.06	0.07	0.80	0.07	0.00	0.50	-0.28	-0.29	0.50	-0.24	-1.1468	0.0076	-9.9	0.9	-9.9	0.8			
SCIENCE	8	996635	0	C.1.1.1	2	127878	0.71	0.09	0.09	0.71	0.10	0.00	0.41	-0.20	-0.24	0.41	-0.19	-0.4349	0.0067	-6.8	1.0	-9.9	0.9			
SCIENCE	8	256203	0	D.1.3.4	2	127878	0.70	0.70	0.09	0.09	0.12	0.00	0.50	0.50	-0.29	-0.23	-0.25	-0.3798	0.0066	-9.9	0.9	-9.9	0.8			
SCIENCE	8	454355	0	A.3.1.4	2	127878	0.52	0.09	0.52	0.22	0.17	0.00	0.33	-0.23	0.33	-0.17	-0.08	0.5028	0.0061	9.9	1.1	9.9	1.1			
SCIENCE	8	356234	0	C.2.1.3	2	127878	0.73	0.06	0.73	0.16	0.05	0.00	0.45	-0.28	0.45	-0.23	-0.22	-0.6701	0.0069	-9.8	1.0	-9.9	0.9			
SCIENCE	8	323252	0	A.2.2.1	2	127878	0.62	0.05	0.08	0.24	0.62	0.00	0.32	-0.20	-0.21	-0.13	0.32	0.0196	0.0063	9.9	1.1	9.9	1.1			
SCIENCE	8	587572	0	C.2.2.2	2	127878	0.49	0.05	0.49	0.37	0.09	0.00	0.37	-0.29	0.37	-0.16	-0.15	0.6209	0.0061	9.3	1.0	9.9	1.0			
SCIENCE	8	725216	0	D.1.3.2	2	127878	0.79	0.08	0.08	0.79	0.05	0.00	0.56	-0.30	-0.33	0.56	-0.26	-1.1146	0.0076	-9.9	0.9	-9.9	0.7			
SCIENCE	8	347000	0	A.1.2.1	2	127878	0.55	0.15	0.19	0.55	0.11	0.00	0.44	-0.11	-0.26	0.44	-0.23	0.3450	0.0062	-9.9	1.0	-9.9	1.0			
SCIENCE	8	624838	0	A.2.1.5	2	127878	0.70	0.09	0.70	0.17	0.04	0.00	0.35	-0.17	0.35	-0.20	-0.19	-0.3687	0.0066	9.9	1.1	9.9	1.1			
SCIENCE	8	638630	0	A.1.1.3	3	127878	0.58	0.25	0.58	0.11	0.05	0.00	0.30	-0.06	0.30	-0.21	-0.24	0.2095	0.0062	9.9	1.1	9.9	1.1			
SCIENCE	8	775606	0	B.2.2.2	2	127878	0.78	0.09	0.78	0.06	0.07	0.00	0.52	-0.26	0.52	-0.30	-0.27	-0.8443	0.0072	-9.9	0.8	-9.9	0.8			
SCIENCE	8	971134	0	C.2.2.3	1	127878	0.63	0.12	0.12	0.13	0.63	0.00	0.48	-0.25	-0.26	-0.20	0.48	0.0054	0.0063	-9.9	0.9	-9.9	0.9			
SCIENCE	8	215792	0	D.2.1.2	2	127878	0.71	0.71	0.15	0.09	0.04	0.00	0.49	0.49	-0.26	-0.26	-0.26	-0.5890	0.0068	-9.9	0.9	-9.9	0.9			
SCIENCE	8	202536	0	A.1.1.2	2	127878	0.74	0.04	0.05	0.18	0.74	0.00	0.37	-0.25	-0.27	-0.15	0.37	-0.5445	0.0068	-7.1	1.0	6.4	1.0			
SCIENCE	8	136854	0	A.3.2.2	2	127878	0.75	0.08	0.06	0.11	0.75	0.00	0.53	-0.26	-0.31	-0.27	0.53	-0.7523	0.0070	-9.9	0.9	-9.9	0.8			
SCIENCE	8	219249	0	A.3.3.1	2	127878	0.81	0.14	0.81	0.03	0.02	0.00	0.32	-0.20	0.32	-0.18	-0.19	-1.0800	0.0075	1.2	1.0	9.2	1.1			
SCIENCE	8	692961	0	B.1.1.1	2	127878	0.59	0.15	0.59	0.07	0.18	0.00	0.47	-0.34	0.47	-0.15	-0.17	0.1385	0.0063	-9.9	1.0	-9.9	0.9			
SCIENCE	8	995754	0	B.2.1.5	2	127878	0.78	0.12	0.04	0.06	0.78	0.00	0.40	-0.20	-0.26	-0.20	0.40	-0.7935	0.0071	-9.9	0.9	-9.9	0.9			
SCIENCE	8	150424	0	C.2.1.1	2	127878	0.70	0.70	0.11	0.06	0.13	0.00	0.43	0.43	-0.14	-0.29	-0.25	-0.4302	0.0067	-7.4	1.0	-9.9	0.9			
SCIENCE	8	801052	0	D.1.1.4	2	127878	0.84	0.09	0.05	0.84	0.03	0.00	0.41	-0.25	-0.21	0.41	-0.22	-1.4300	0.0082	-9.1	1.0	-9.9	0.9			
SCIENCE	8	886481	0	A.3.1.2	2	127878	0.72	0.09	0.09	0.72	0.09	0.00	0.48	-0.24	-0.29	0.48	-0.20	-0.3878	0.0066	-9.9	0.9	-9.9	0.8			
SCIENCE	8	756527	0	A.3.3.2	2	127878	0.72	0.07	0.04	0.17	0.72	0.00	0.34	-0.16	-0.24	-0.16	0.34	-0.5216	0.0068	9.9	1.1	9.9	1.2			
SCIENCE	8	856657	0	D.2.1.1	3	127878	0.59	0.19	0.05	0.16	0.59	0.00	0.30	-0.09	-0.21	-0.18	0.30	0.1457	0.0063	9.9	1.1	9.9	1.2			
SCIENCE	8	605777	0	D.3.1.3	2	127878	0.59	0.12	0.08	0.21	0.59	0.00	0.40	-0.17	-0.24	-0.18	0.40	0.2616	0.0062	2.7	1.0	-0.5	1.0			
SCIENCE	8	884456	0	C.1.1.1	2	127878	0.71	0.08	0.71	0.10	0.10	0.00	0.41	-0.21	0.41	-0.24	-0.19	-0.4814	0.0067	-6.9	1.0	-6.9	1.0			
SCIENCE	8	422865	0	A.2.2.2	2	127878	0.69	0.13	0.06	0.69	0.12	0.00	0.38	-0.12	-0.26	0.38	-0.22	-0.3309	0.0066	5.7	1.0	-3.9	1.0			
SCIENCE	8	720123	0	A.2.1.1	2	127878	0.66	0.66	0.09	0.21	0.03	0.00	0.47	0.47	-0.22	-0.28	-0.24	-0.1686	0.0064	-9.9	0.9	-9.9	0.9			
SCIENCE	8	780508	0	A.3.1.1	2	127878	0.48	0.25	0.12	0.15	0.48	0.00	0.28	0.04	-0.24	-0.21	0.28	0.7836	0.0061	9.9	1.1	9.9	1.2			
SCIENCE	8	805275	0	A.3.2.1	2	127878	0.80	0.03	0.04	0.13	0.80	0.00	0.39	-0.25	-0.21	-0.22	0.39	-1.1807	0.0077	1.6	1.0	7.3	1.1			
SCIENCE	8	205948	0	D.1.2.1	2	127878	0.61	0.61	0.12	0.13	0.14	0.00	0.44	0.44	-0.22	-0.25	-0.17	0.1144	0.0063	-9.9	1.0	-9.9	0.9			
SCIENCE	8	195439	0	C.1.1.3	2	127878	0.44	0.44	0.14	0.18	0.23	0.00	0.35	0.35	-0.08	-0.26	-0.11	0.9202	0.0062	9.9	1.0	9.9	1.1			
SCIENCE	8	280369	0	C.2.1.1	1	127878	0.66	0.07	0.04	0.66	0.24	0.00	0.30	-0.20	-0.19	0.30	-0.13	-0.1944	0.0065	9.9	1.1	9.9	1.2			
SCIENCE	8	573303	0	C.2.2.1	2	127878	0.53	0.24	0.16	0.07	0.53	0.00	0.49	-0.18	-0.28	-0.25	0.49	0.5134	0.0061	-9.9	0.9	-9.9	0.9			
SCIENCE	8	269803	0	A.1.1.1	2	127878	0.75	0.05	0.15	0.75	0.05	0.00	0.33	-0.16	-0.17	0.33	-0.21	-0.7082	0.0070	9.9	1.1	9.9	1.3			
SCIENCE	8	313977	0	A.1.1.2	2	127878	0.80	0.80	0.06	0.04	0.10	0.00	0.51	0.51	-0.28	-0.29	-0.26	-1.0130	0.0074	-9.9	0.8	-9.9	0.7			
SCIENCE	8	753644	0	A.1.1.4	2	127878	0.82	0.06	0.82	0.06	0.05	0.00	0.44	-0.25	0.44	-0.25	-0.20	-1.1949	0.0077	-9.9	0.9	-9.9	0.8			
SCIENCE	8	269152	0	B.2.1.2	2	127878	0.65	0.65	0.06	0.19	0.09	0.00	0.44	0.44	-0.21	-0.24	-0.22	-0.0063	0.0063	-9.9	0.9	-9.9	0.9			
SCIENCE	8	498920	0	B.2.1.4	2	127878	0.71	0.04	0.22	0.71	0.03	0.00	0.42	-0.28	-0.24	0.42	-0.21	-0.4225	0.0067	-9.9	1.0	-9.9	0.9			
SCIENCE	8	364097	0	A.2.1.6	2	127878	0.50	0.07	0.36	0.50	0.06	0.00	0.30	-0.30	-0.04	0.30	-0.21	0.6453	0.0061	9.9	1.1	9.9	1.2			
SCIENCE	8	833944	0	A.2.2.3	2	127878	0.71	0.11	0.71	0.10	0.08	0.00	0.45	-0.20	0.45	-0.24	-0.25	-0.4477	0.0067	-9.9	0.9	-9.9	0.9			
SCIENCE	8	871067	0	A.2.1.5	2	127878	0.68	0.13	0.68	0.08	0.10	0.00	0.43	-0.16	0.43	-0.29	-0.22	-0.2732	0.0065	-9.9	1.0	-8.6	1.0			
SCIENCE	8	790458	0	D.1.3.1	2	127878	0.75	0.05	0.13	0.08	0.75	0.00	0.44	-0.24	-0.21	-0.26	0.44	-0.5872	0.0068	-9.9	0.9	-9.9	0.9			
SCIENCE	8	926438	0	A.1.3.1	2	127878	0.58	0.16	0.10	0.58	0.16	0.00	0.51	-0.26	-0.21	0.51	-0.26	0.2288	0.0062	-9.9	0.9	-9.9	0.8			
SCIENCE	8	370711	0	A.1.3.2	2	127878	0.40	0.40	0.23	0.25	0.12	0.00	0.28	0.28	-0.17	-0.03	-0.16	1.1787	0.0062	9.9	1.1	9.9	1.2			
SCIENCE	8	465521	0	A.2.1.2	2	127878	0.64	0.10	0.07	0.20	0.64	0.00	0.45	-0.21	-0.28	-0.20	0.45	-0.1135	0.0064	-9.9	1.0	-9.7	1.0			

Appendix G: Item Statistics Multiple Choice

SCIENCE	8	560928	0	A.2.1.4	2	127878	0.56	0.56	0.20	0.13	0.12	0.00	0.34	0.34	-0.16	-0.17	-0.15	0.4301	0.0062	9.9	1.1	9.9	1.1			
SCIENCE	8	538549	0	B.2.2.2	2	127878	0.47	0.18	0.47	0.26	0.09	0.00	0.29	-0.14	0.29	-0.06	-0.22	0.7981	0.0061	9.9	1.1	9.9	1.2			
SCIENCE	8	165542	0	B.3.2.1	2	127878	0.66	0.11	0.12	0.11	0.66	0.00	0.51	-0.21	-0.28	-0.27	0.51	-0.1390	0.0064	-9.9	0.9	-9.9	0.8			
SCIENCE	8	670616	0	C.3.1.1	3	127878	0.60	0.16	0.09	0.60	0.15	0.00	0.37	-0.12	-0.27	0.37	-0.16	0.1576	0.0062	9.9	1.0	9.9	1.1			
SCIENCE	8	554759	0	D.3.1.3	2	127878	0.59	0.21	0.09	0.11	0.59	0.00	0.48	-0.15	-0.30	-0.28	0.48	0.1952	0.0062	-9.9	0.9	-9.9	0.9			
SCIENCE	8	510143	0	A.1.1.4	2	127878	0.77	0.07	0.77	0.07	0.09	0.00	0.50	-0.27	0.50	-0.30	-0.22	-0.8104	0.0071	-9.9	0.9	-9.9	0.8			
SCIENCE	8	785148	0	A.2.2.3	2	127878	0.75	0.09	0.09	0.07	0.75	0.00	0.53	-0.27	-0.26	-0.29	0.53	-0.7359	0.0070	-9.9	0.9	-9.9	0.8			
SCIENCE	8	369769	0	A.3.1.1	2	127878	0.68	0.09	0.11	0.68	0.12	0.00	0.40	-0.20	-0.25	0.40	-0.16	-0.2563	0.0065	-2.6	1.0	0.4	1.0			
SCIENCE	8	336691	0	D.3.1.2	2	127878	0.73	0.13	0.06	0.07	0.73	0.00	0.47	-0.16	-0.30	-0.32	0.47	-0.7255	0.0070	-9.9	1.0	-9.9	0.9			
SCIENCE	8	749301	0	C.2.2.2	2	127878	0.51	0.51	0.11	0.22	0.16	0.00	0.43	0.43	-0.25	-0.24	-0.10	0.5124	0.0061	-9.9	1.0	-9.9	1.0			
SCIENCE	8	523144	0	A.1.2.4	1	127878	0.70	0.13	0.70	0.08	0.09	0.00	0.35	-0.20	0.35	-0.15	-0.18	-0.3398	0.0066	9.9	1.0	7.2	1.0			
SCIENCE	8	856537	0	A.3.1.5	2	127878	0.67	0.13	0.09	0.67	0.11	0.00	0.49	-0.24	-0.28	0.49	-0.21	-0.2984	0.0065	-9.9	0.9	-9.9	0.9			
SCIENCE	8	425110	1	A.1.3.1	2	11058	0.36	0.24	0.24	0.36	0.16	0.00	0.19	-0.04	-0.03	0.19	-0.15	1.3262	0.0209	9.9	1.2	9.9	1.4	A-	A+	A-
SCIENCE	8	529504	1	A.1.2.3	2	11058	0.70	0.10	0.10	0.10	0.70	0.00	0.58	-0.29	-0.33	-0.26	0.58	-0.4322	0.0218	-9.9	0.8	-9.9	0.7			
SCIENCE	8	969748	1	A.1.2.2	2	11058	0.61	0.13	0.15	0.11	0.61	0.00	0.45	-0.20	-0.18	-0.29	0.45	0.0501	0.0207	-5.4	1.0	-4.3	1.0	A+	A-	A-
SCIENCE	8	545681	1	B.3.1.3	2	11058	0.43	0.08	0.19	0.29	0.43	0.00	0.22	-0.31	-0.14	0.08	0.22	0.9682	0.0204	9.9	1.2	9.9	1.3	A+	A-	A-
SCIENCE	8	412375	1	C.2.1.3	2	11058	0.33	0.21	0.21	0.33	0.25	0.00	0.15	-0.14	-0.10	0.15	0.07	1.4302	0.0212	9.9	1.2	9.9	1.5	A-	A+	A-
SCIENCE	8	723254	1	A.1.1.3	2	11058	0.57	0.14	0.22	0.57	0.07	0.00	0.37	-0.11	-0.20	0.37	-0.24	0.2720	0.0204	4.4	1.0	1.6	1.0	A-	A-	A-
SCIENCE	8	374997	1	A.3.1.5	2	11058	0.65	0.09	0.08	0.17	0.65	0.00	0.45	-0.20	-0.25	-0.23	0.45	-0.1902	0.0212	-5.2	1.0	-4.8	0.9			
SCIENCE	8	440569	1	C.3.1.3	2	11058	0.29	0.32	0.29	0.23	0.16	0.00	0.14	-0.04	0.14	-0.08	-0.02	1.7027	0.0219	9.9	1.2	9.9	1.6	A-	A-	A-
SCIENCE	8	167161	1	B.3.3.1	2	11058	0.38	0.38	0.11	0.39	0.11	0.00	0.22	0.22	-0.25	0.01	-0.10	1.1958	0.0207	9.9	1.2	9.9	1.3	A-	A-	A-
SCIENCE	8	999204	1	A.3.1.1	2	11058	0.72	0.08	0.11	0.72	0.08	0.00	0.52	-0.30	-0.27	0.52	-0.25	-0.5125	0.0221	-9.9	0.9	-9.9	0.8	A+	A+	A-
SCIENCE	8	219974	1	D.3.1.1	2	11058	0.30	0.11	0.30	0.22	0.37	0.00	-0.04	-0.28	-0.04	-0.09	0.30	1.6485	0.0218	9.9	1.4	9.9	1.8	A+	A+	A-
SCIENCE	8	297667	1	A.1.2.4	2	11058	0.63	0.14	0.15	0.09	0.63	0.00	0.59	-0.28	-0.28	-0.30	0.59	-0.0529	0.0209	-9.9	0.8	-9.9	0.7	A+	A-	A-
SCIENCE	8	585550	2	B.1.1.4	2	10598	0.52	0.13	0.52	0.22	0.13	0.00	0.32	-0.20	0.32	-0.12	-0.13	0.5698	0.0208	9.9	1.1	9.9	1.1			
SCIENCE	8	711096	2	B.1.1.4	2	10598	0.35	0.23	0.18	0.35	0.23	0.00	0.15	-0.05	-0.12	0.15	0.00	1.4120	0.0216	9.9	1.2	9.9	1.5	A+	A-	A-
SCIENCE	8	199521	2	A.1.3.2	2	10598	0.49	0.28	0.14	0.09	0.49	0.00	0.44	-0.10	-0.29	-0.27	0.44	0.6958	0.0208	-5.9	1.0	-4.2	1.0	A+	A-	A-
SCIENCE	8	998092	2	B.3.3.3	2	10598	0.52	0.17	0.20	0.11	0.52	0.00	0.50	-0.24	-0.15	-0.31	0.50	0.5512	0.0208	-9.9	0.9	-9.9	0.9	A-	A-	A-
SCIENCE	8	227255	2	C.2.2.3	2	10598	0.52	0.52	0.17	0.19	0.12	0.00	0.43	0.43	-0.23	-0.16	-0.20	0.5586	0.0208	-3.4	1.0	-2.2	1.0	A-	A-	A-
SCIENCE	8	169408	2	A.1.1.4	2	10598	0.75	0.75	0.08	0.09	0.07	0.00	0.52	0.52	-0.28	-0.31	-0.21	-0.6995	0.0235	-9.9	0.9	-9.9	0.8	A+	A-	A-
SCIENCE	8	350244	2	A.2.1.4	2	10598	0.67	0.10	0.12	0.67	0.10	0.00	0.41	-0.30	-0.28	0.41	-0.04	-0.2565	0.0220	-2.0	1.0	3.0	1.1			
SCIENCE	8	700304	2	B.3.2.3	2	10598	0.51	0.30	0.09	0.10	0.51	0.00	0.31	0.00	-0.28	-0.25	0.31	0.5984	0.0208	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	8	678295	2	C.3.1.1	2	10598	0.60	0.17	0.60	0.09	0.14	0.00	0.29	-0.07	0.29	-0.21	-0.16	0.1636	0.0211	9.9	1.1	9.4	1.1	A-	A-	A-
SCIENCE	8	209317	2	D.2.1.3	2	10598	0.35	0.19	0.17	0.29	0.35	0.00	0.17	-0.08	-0.11	-0.01	0.17	1.4129	0.0216	9.9	1.2	9.9	1.4	A-	A-	A-
SCIENCE	8	364264	2	A.2.1.5	3	10598	0.54	0.16	0.17	0.54	0.12	0.00	0.37	-0.12	-0.17	0.37	-0.23	0.4665	0.0208	4.9	1.0	4.9	1.1	A-	A-	A-
SCIENCE	8	317911	2	A.3.2.2	2	10598	0.67	0.67	0.11	0.09	0.13	0.00	0.45	0.45	-0.29	-0.30	-0.09	-0.2183	0.0219	-5.1	1.0	-2.4	1.0	B+	A-	A-
SCIENCE	8	178549	3	D.1.1.1	2	10622	0.52	0.15	0.13	0.52	0.19	0.00	0.27	-0.12	-0.17	0.27	-0.08	0.5166	0.0206	9.9	1.1	9.9	1.2	A+	A+	A-
SCIENCE	8	244879	3	A.1.3.2	2	10622	0.60	0.06	0.14	0.60	0.20	0.00	0.25	-0.26	-0.22	0.25	0.05	0.1501	0.0210	9.9	1.2	9.9	1.2	A-	A-	A-
SCIENCE	8	329296	3	C.2.2.1	1	10622	0.68	0.09	0.14	0.68	0.08	0.00	0.30	-0.27	-0.12	0.30	-0.08	-0.3205	0.0220	9.8	1.1	9.9	1.2			
SCIENCE	8	797649	3	C.3.1.2	2	10622	0.59	0.09	0.10	0.22	0.59	0.00	0.29	-0.25	-0.22	-0.01	0.29	0.1694	0.0209	9.9	1.1	9.9	1.2			
SCIENCE	8	842904	3	A.1.1.4	2	10622	0.66	0.14	0.09	0.66	0.11	0.00	0.46	-0.20	-0.21	0.46	-0.28	-0.1811	0.0216	-6.1	0.9	-6.6	0.9	A+	A-	A-
SCIENCE	8	613242	3	B.2.1.5	2	10622	0.51	0.21	0.12	0.16	0.51	0.00	0.22	-0.11	-0.18	-0.01	0.22	0.5980	0.0206	9.9	1.2	9.9	1.3	B+	A-	A-
SCIENCE	8	979580	3	D.1.2.2	2	10622	0.52	0.25	0.52	0.11	0.11	0.00	0.35	-0.08	0.35	-0.24	-0.20	0.5546	0.0206	4.9	1.0	4.0	1.0	A+	A-	A-
SCIENCE	8	495723	3	A.1.3.2	2	10622	0.58	0.15	0.15	0.58	0.13	0.00	0.38	-0.17	-0.25	0.38	-0.10	0.2614	0.0208	2.5	1.0	2.1	1.0	A+	A-	A-
SCIENCE	8	712990	3	B.1.1.3	2	10622	0.33	0.30	0.18	0.33	0.19	0.00	0.09	0.05	-0.14	0.09	-0.03	1.5239	0.0217	9.9	1.3	9.9	1.5	A+	A+	A-
SCIENCE	8	852902	3	A.1.1.1	2	10622	0.56	0.27	0.56	0.11	0.07	0.00	0.29	-0.01	0.29	-0.24	-0.26	0.3705	0.0207	9.9	1.1	9.9	1.2	A+	A-	A-
SCIENCE	8	703847	3	B.3.3.4	2	10622	0.65	0.10	0.11	0.14	0.65	0.00	0.51	-0.24	-0.23	-0.28	0.51	-0.1130	0.0215	-9.9	0.9	-9.9	0.9	A+	A-	A+
SCIENCE	8	149653	3	A.2.2.3	2	10622	0.52	0.25	0.52	0.08	0.15	0.00	0.28	-0.02	0.28	-0.24	-0.18	0.5285	0.0206	9.9	1.1	9.9	1.2	A-	A-	A+
SCIENCE	8	235080	4	A.2.1.1	2	10652	0.60	0.60	0.12	0.14	0.14	0.00	0.42	0.42	-0.19	-0.24	-0.19	0.1361	0.0218	-3.3	1.0	-4.3	1.0			
SCIENCE	8	107676	4	A.3.3.2	2	10652	0.61	0.61	0.11	0.08	0.19	0.00	0.30	0.30	-0.23	-0.24	-0.02	0.0746	0.0219	9.9	1.1	9.9	1.2			
SCIENCE	8	839688	4	A.2.1.2	2	10652	0.36	0.13	0.36	0.24	0.27	0.00	0.22	-0.15	0.22	-0.05	-0.07	1.3279	0.0221	9.9	1.1	9.9	1.3	A+	A+	A+

Appendix G: Item Statistics Multiple Choice

SCIENCE	8	418141	4	B.2.1.3	2	10652	0.19	0.48	0.19	0.11	0.22	0.00	-0.12	0.17	-0.12	-0.27	0.11	2.3816	0.0265	9.9	1.3	9.9	2.5	A-	A+	A+
SCIENCE	8	195440	4	D.1.1.2	2	10652	0.60	0.09	0.14	0.16	0.60	0.00	0.38	-0.20	-0.19	-0.16	0.38	0.1428	0.0218	1.8	1.0	1.9	1.0	A+	A+	A-
SCIENCE	8	984681	4	D.1.3.3	2	10652	0.48	0.08	0.35	0.48	0.10	0.00	0.28	-0.26	-0.03	0.28	-0.19	0.7524	0.0214	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	8	786438	4	D.2.1.1	2	10652	0.48	0.20	0.48	0.18	0.13	0.00	0.27	-0.09	0.27	-0.14	-0.14	0.7121	0.0214	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	8	483115	4	C.2.2.1	2	10652	0.27	0.27	0.42	0.19	0.11	0.00	0.12	0.12	0.06	-0.07	-0.16	1.8391	0.0236	9.9	1.2	9.9	1.6	A-	A+	A+
SCIENCE	8	841838	4	B.3.3.2	2	10652	0.45	0.13	0.45	0.23	0.18	0.00	0.24	-0.16	0.24	-0.12	-0.04	0.8715	0.0214	9.9	1.1	9.9	1.2	A-	A-	A-
SCIENCE	8	406939	4	A.2.2.1	2	10652	0.48	0.06	0.18	0.28	0.48	0.00	0.27	-0.22	-0.06	-0.12	0.27	0.7308	0.0214	9.9	1.1	9.9	1.2	A+	B-	A-
SCIENCE	8	214453	4	A.3.3.1	2	10652	0.46	0.15	0.21	0.46	0.17	0.00	0.23	-0.14	0.01	0.23	-0.17	0.8176	0.0214	9.9	1.2	9.9	1.2	A+	A-	A+
SCIENCE	8	266229	4	C.1.1.3	2	10652	0.61	0.61	0.23	0.08	0.08	0.00	0.41	0.41	-0.14	-0.29	-0.22	0.0791	0.0219	-1.2	1.0	-2.1	1.0	A+	A-	A-
SCIENCE	8	123131	5	A.1.1.3	2	10629	0.65	0.11	0.06	0.19	0.65	0.00	0.45	-0.23	-0.28	-0.19	0.45	-0.1035	0.0225	-4.7	1.0	-6.4	0.9			
SCIENCE	8	833129	5	A.1.2.1	2	10629	0.61	0.22	0.07	0.61	0.09	0.00	0.46	-0.20	-0.26	0.46	-0.25	0.0881	0.0221	-6.2	0.9	-7.1	0.9			
SCIENCE	8	122367	5	D.3.1.2	2	10629	0.42	0.30	0.17	0.11	0.42	0.00	0.29	0.08	-0.28	-0.22	0.29	1.0652	0.0218	9.9	1.1	9.9	1.2	A+	A-	A-
SCIENCE	8	222939	5	B.3.3.3	2	10629	0.69	0.10	0.69	0.14	0.07	0.00	0.40	-0.21	0.40	-0.15	-0.26	-0.2991	0.0230	0.3	1.0	1.4	1.0	A+	A-	A-
SCIENCE	8	742815	5	B.3.1.2	2	10629	0.51	0.51	0.15	0.22	0.11	0.00	0.32	0.32	-0.17	-0.15	-0.11	0.5913	0.0216	9.9	1.1	9.9	1.1	A+	A-	A+
SCIENCE	8	581546	5	D.1.1.2	2	10629	0.31	0.16	0.09	0.31	0.44	0.00	0.09	-0.16	-0.30	0.09	0.22	1.6425	0.0230	9.9	1.3	9.9	1.6	A-	A+	A-
SCIENCE	8	518634	5	A.3.2.3	2	10629	0.46	0.18	0.19	0.46	0.17	0.00	0.35	-0.17	-0.19	0.35	-0.08	0.8653	0.0216	4.6	1.0	6.9	1.1	A+	A-	A-
SCIENCE	8	715083	5	A.1.1.4	2	10629	0.56	0.56	0.21	0.13	0.09	0.00	0.43	0.43	-0.18	-0.20	-0.24	0.3683	0.0217	-3.4	1.0	-4.1	1.0	A+	A-	A-
SCIENCE	8	475384	5	A.3.3.2	2	10629	0.70	0.06	0.09	0.14	0.70	0.00	0.48	-0.28	-0.31	-0.18	0.48	-0.3919	0.0233	-8.0	0.9	-4.7	0.9	A+	A-	A-
SCIENCE	8	317840	5	A.1.3.1	2	10629	0.68	0.14	0.09	0.68	0.08	0.00	0.48	-0.22	-0.26	0.48	-0.25	-0.2938	0.0230	-7.6	0.9	-9.9	0.8	A-	A+	A-
SCIENCE	8	437094	5	C.3.1.2	2	10629	0.31	0.30	0.20	0.31	0.19	0.00	0.10	-0.11	-0.07	0.10	0.08	1.6478	0.0230	9.9	1.3	9.9	1.6	A-	A+	A-
SCIENCE	8	405777	5	A.2.2.2	2	10629	0.83	0.83	0.05	0.08	0.03	0.00	0.44	0.44	-0.24	-0.25	-0.22	-1.2606	0.0277	-6.2	0.9	-7.1	0.8	B+	A-	A-
SCIENCE	8	643162	6	C.2.2.2	1	10626	0.36	0.17	0.14	0.36	0.33	0.00	0.31	-0.07	-0.19	0.31	-0.12	1.3513	0.0222	3.7	1.0	9.7	1.2	B-	A-	A-
SCIENCE	8	517795	6	A.1.2.3	2	10626	0.54	0.54	0.08	0.13	0.25	0.00	0.45	0.45	-0.30	-0.18	-0.18	0.4387	0.0215	-7.3	0.9	-7.2	0.9			
SCIENCE	8	599352	6	D.1.1.2	2	10626	0.54	0.13	0.54	0.12	0.21	0.00	0.39	-0.24	0.39	-0.24	-0.08	0.4608	0.0215	1.2	1.0	1.5	1.0			
SCIENCE	8	193978	6	D.1.1.1	2	10626	0.28	0.26	0.28	0.19	0.27	0.00	0.08	-0.03	0.08	-0.11	0.06	1.7552	0.0234	9.9	1.3	9.9	1.6	A-	A-	A+
SCIENCE	8	364157	6	A.1.1.3	2	10626	0.37	0.21	0.21	0.20	0.37	0.00	0.37	-0.13	-0.12	-0.20	0.37	1.2688	0.0220	-2.7	1.0	2.9	1.0	A-	A-	A-
SCIENCE	8	392828	6	A.2.1.5	2	10626	0.69	0.05	0.19	0.07	0.69	0.00	0.42	-0.25	-0.16	-0.29	0.42	-0.3499	0.0230	-2.6	1.0	-0.5	1.0	B+	A-	A-
SCIENCE	8	997351	6	B.2.1.1	2	10626	0.56	0.22	0.56	0.16	0.05	0.00	0.36	-0.06	0.36	-0.27	-0.23	0.3238	0.0216	5.8	1.1	5.8	1.1	A+	A-	A-
SCIENCE	8	209839	6	A.3.2.1	2	10626	0.33	0.25	0.33	0.33	0.08	0.00	0.13	0.01	0.13	-0.02	-0.19	1.5248	0.0226	9.9	1.2	9.9	1.5	A-	A+	A+
SCIENCE	8	687595	6	A.3.2.3	2	10626	0.56	0.11	0.17	0.56	0.15	0.00	0.43	-0.25	-0.19	0.43	-0.17	0.3285	0.0216	-4.7	1.0	-4.7	0.9	A+	A-	A-
SCIENCE	8	475253	6	A.1.2.3	2	10626	0.53	0.15	0.10	0.53	0.22	0.00	0.36	-0.17	-0.27	0.36	-0.09	0.4971	0.0215	4.0	1.0	4.1	1.1	A-	A-	A-
SCIENCE	8	557798	6	A.2.1.5	3	10626	0.22	0.17	0.22	0.22	0.38	0.00	0.01	-0.11	0.01	-0.06	0.13	2.1261	0.0250	9.9	1.3	9.9	1.9	A-	A-	A-
SCIENCE	8	536976	6	A.2.1.6	3	10626	0.54	0.14	0.16	0.54	0.16	0.00	0.30	-0.19	-0.13	0.30	-0.09	0.4270	0.0215	9.9	1.1	9.9	1.1	A-	A-	A-
SCIENCE	8	401435	7	C.2.1.2	2	10619	0.48	0.31	0.08	0.48	0.13	0.00	0.23	0.04	-0.26	0.23	-0.19	0.7865	0.0216	9.9	1.2	9.9	1.3			
SCIENCE	8	685757	7	B.1.1.1	2	10619	0.65	0.07	0.06	0.65	0.22	0.00	0.44	-0.25	-0.31	0.44	-0.17	-0.1382	0.0225	-3.5	1.0	-3.3	1.0	A+	A-	A-
SCIENCE	8	909259	7	A.3.3.2	2	10619	0.49	0.49	0.18	0.10	0.22	0.00	0.31	0.31	-0.20	-0.28	0.02	0.6756	0.0215	9.9	1.1	9.9	1.2	A-	A+	A+
SCIENCE	8	273493	7	A.1.1.3	2	10619	0.65	0.10	0.16	0.65	0.09	0.00	0.45	-0.27	-0.24	0.45	-0.16	-0.0977	0.0224	-5.4	1.0	-5.0	0.9	A+	A-	A-
SCIENCE	8	370367	7	D.3.1.1	2	10619	0.49	0.17	0.49	0.24	0.10	0.00	0.30	-0.15	0.30	-0.16	-0.07	0.6747	0.0215	9.9	1.1	9.9	1.2	A+	A-	A-
SCIENCE	8	654040	7	D.1.1.4	2	10619	0.56	0.08	0.18	0.18	0.56	0.00	0.52	-0.25	-0.23	-0.25	0.52	0.3470	0.0217	-9.9	0.9	-9.9	0.8			
SCIENCE	8	814821	7	B.3.1.3	2	10619	0.40	0.38	0.40	0.08	0.14	0.00	0.36	-0.02	0.36	-0.28	-0.26	1.1411	0.0219	-1.3	1.0	6.6	1.1	A-	A-	A-
SCIENCE	8	977357	7	A.1.2.2	2	10619	0.62	0.11	0.62	0.19	0.08	0.00	0.42	-0.26	0.42	-0.15	-0.23	0.0475	0.0221	-1.3	1.0	-1.3	1.0	A+	A+	A-
SCIENCE	8	675989	7	D.1.3.4	2	10619	0.25	0.33	0.10	0.25	0.32	0.00	0.05	-0.01	-0.25	0.05	0.12	2.0006	0.0244	9.9	1.3	9.9	1.8	A-	A+	A+
SCIENCE	8	674898	7	A.3.1.5	2	10619	0.56	0.11	0.16	0.56	0.16	0.00	0.35	-0.22	-0.20	0.35	-0.08	0.3265	0.0217	6.3	1.1	3.3	1.0	A-	A+	A-
SCIENCE	8	736803	7	C.2.1.3	2	10619	0.39	0.31	0.21	0.39	0.08	0.00	0.13	0.03	-0.04	0.13	-0.23	1.1811	0.0219	9.9	1.3	9.9	1.4	A+	A+	A-
SCIENCE	8	219721	7	A.2.1.4	2	10619	0.62	0.22	0.09	0.62	0.07	0.00	0.42	-0.19	-0.25	0.42	-0.20	0.0363	0.0221	-1.3	1.0	-2.9	1.0	A+	A+	A-
SCIENCE	8	246709	8	A.2.1.6	2	10613	0.51	0.18	0.23	0.51	0.07	0.00	0.35	-0.15	-0.16	0.35	-0.18	0.5999	0.0215	4.7	1.0	4.9	1.1			
SCIENCE	8	614073	8	B.3.3.1	2	10613	0.64	0.64	0.19	0.06	0.11	0.00	0.43	0.43	-0.15	-0.25	-0.27	-0.0542	0.0222	-3.3	1.0	-3.7	1.0			
SCIENCE	8	420721	8	A.1.3.1	2	10613	0.16	0.26	0.48	0.16	0.09	0.00	0.04	-0.04	0.03	0.04	-0.04	2.5685	0.0278	8.1	1.1	9.9	2.1	A-	A+	A+
SCIENCE	8	304398	8	B.3.1.2	2	10613	0.35	0.28	0.35	0.16	0.21	0.00	0.23	0.02	0.23	-0.16	-0.14	1.4119	0.0223	9.9	1.1	9.9	1.3	A-	A-	A-
SCIENCE	8	754729	8	A.1.1.4	2	10613	0.38	0.31	0.38	0.15	0.16	0.00	0.18	0.05	0.18	-0.20	-0.11	1.2511	0.0220	9.9	1.2	9.9	1.4	A-	A+	A-
SCIENCE	8	293365	8	C.3.1.1	2	10613	0.64	0.16	0.07	0.13	0.64	0.00	0.54	-0.24	-0.26	-0.31	0.54	-0.0458	0.0222	-9.9	0.9	-9.9	0.8	A-	A-	A+

Appendix G: Item Statistics Multiple Choice

SCIENCE	8	639238	8	B.3.1.1	2	10613	0.77	0.06	0.07	0.09	0.77	0.00	0.55	-0.28	-0.30	-0.30	0.55	-0.8360	0.0250	-9.9	0.8	-9.9	0.7	A+	A-	A-
SCIENCE	8	968988	8	D.1.3.3	2	10613	0.26	0.22	0.30	0.26	0.21	0.00	0.02	-0.04	0.02	0.02	0.00	1.8966	0.0239	9.9	1.3	9.9	1.8	A-	A-	A-
SCIENCE	8	907086	8	A.1.2.1	2	10613	0.24	0.24	0.55	0.12	0.08	0.00	0.09	0.09	0.24	-0.27	-0.26	2.0052	0.0244	9.9	1.2	9.9	1.7	A-	A+	A+
SCIENCE	8	849086	8	C.2.1.2	2	10613	0.29	0.25	0.24	0.21	0.29	0.00	0.24	-0.11	-0.05	-0.09	0.24	1.7060	0.0232	7.9	1.1	9.9	1.3	A-	A-	A-
SCIENCE	8	706249	8	A.1.1.4	2	10613	0.41	0.07	0.13	0.41	0.40	0.00	0.16	-0.25	-0.17	0.16	0.09	1.1002	0.0218	9.9	1.2	9.9	1.4	A-	A-	A-
SCIENCE	8	409753	8	A.2.1.3	2	10613	0.38	0.24	0.15	0.22	0.38	0.00	0.34	-0.10	-0.13	-0.18	0.34	1.2244	0.0220	1.0	1.0	6.8	1.1	A+	A-	A-
SCIENCE	8	243603	9	A.3.1.4	3	10627	0.48	0.16	0.22	0.14	0.48	0.00	0.31	-0.17	-0.07	-0.19	0.31	0.7829	0.0214	9.9	1.1	9.4	1.1	A+	A-	A-
SCIENCE	8	718854	9	D.3.1.3	2	10627	0.50	0.10	0.50	0.10	0.30	0.00	0.31	-0.15	0.31	-0.23	-0.08	0.6728	0.0214	9.9	1.1	9.9	1.1			
SCIENCE	8	687422	9	A.2.2.2	2	10627	0.46	0.21	0.46	0.19	0.13	0.00	0.37	-0.11	0.37	-0.18	-0.19	0.8577	0.0215	0.9	1.0	3.8	1.0			
SCIENCE	8	499151	9	B.2.1.1	2	10627	0.53	0.15	0.10	0.21	0.53	0.00	0.43	-0.17	-0.25	-0.19	0.43	0.4960	0.0215	-4.7	1.0	-5.0	0.9	A+	A-	A-
SCIENCE	8	775294	9	A.2.1.2	2	10627	0.62	0.08	0.21	0.62	0.09	0.00	0.40	-0.22	-0.19	0.40	-0.21	0.0827	0.0220	-0.8	1.0	-1.8	1.0	A+	A+	A+
SCIENCE	8	210869	9	B.2.1.3	2	10627	0.26	0.26	0.17	0.32	0.25	0.00	0.01	0.01	-0.18	0.06	0.08	1.9238	0.0239	9.9	1.3	9.9	1.8	A+	A-	A-
SCIENCE	8	989464	9	C.2.1.2	2	10627	0.28	0.23	0.26	0.22	0.28	0.00	0.10	-0.01	0.03	-0.12	0.10	1.7862	0.0234	9.9	1.2	9.9	1.5	A+	A+	A+
SCIENCE	8	994120	9	A.3.1.4	2	10627	0.39	0.32	0.39	0.17	0.12	0.00	0.11	-0.01	0.11	-0.06	-0.07	1.2060	0.0218	9.9	1.3	9.9	1.5	A-	A-	A-
SCIENCE	8	655223	9	A.1.1.3	3	10627	0.30	0.36	0.30	0.09	0.26	0.00	0.14	-0.03	0.14	-0.23	0.03	1.6851	0.0230	9.9	1.2	9.9	1.5	A-	A+	A+
SCIENCE	8	653218	9	B.2.1.4	2	10627	0.26	0.25	0.26	0.25	0.24	0.00	0.09	0.04	0.09	-0.19	0.06	1.9434	0.0240	9.9	1.2	9.9	1.6	A-	A+	A+
SCIENCE	8	994473	9	C.2.1.1	2	10627	0.67	0.19	0.08	0.67	0.06	0.00	0.39	-0.10	-0.31	0.39	-0.25	-0.2182	0.0227	0.3	1.0	0.8	1.0	A+	A-	A-
SCIENCE	8	723424	9	A.2.1.2	2	10627	0.50	0.13	0.22	0.15	0.50	0.00	0.46	-0.20	-0.15	-0.29	0.46	0.6380	0.0214	-9.8	0.9	-8.1	0.9	A+	A-	A-
SCIENCE	8	294192	10	C.2.1.2	2	10623	0.63	0.12	0.09	0.15	0.63	0.00	0.46	-0.23	-0.31	-0.16	0.46	-0.0156	0.0224	-5.6	1.0	-4.8	0.9			
SCIENCE	8	701514	10	B.3.1.3	2	10623	0.80	0.06	0.06	0.80	0.08	0.00	0.53	-0.27	-0.26	0.53	-0.32	-1.0767	0.0265	-9.9	0.8	-9.9	0.7			
SCIENCE	8	113445	10	B.2.1.3	2	10623	0.53	0.17	0.16	0.14	0.53	0.00	0.42	-0.13	-0.17	-0.28	0.42	0.5207	0.0217	-0.7	1.0	0.0	1.0	A-	A-	A-
SCIENCE	8	399906	10	A.1.1.1	2	10623	0.69	0.10	0.11	0.69	0.10	0.00	0.50	-0.23	-0.28	0.50	-0.24	-0.3108	0.0231	-9.5	0.9	-9.9	0.8	B+	A+	A+
SCIENCE	8	819711	10	A.2.1.1	2	10623	0.50	0.20	0.12	0.18	0.50	0.00	0.39	-0.17	-0.25	-0.12	0.39	0.6544	0.0216	2.5	1.0	2.3	1.0	A+	A-	A-
SCIENCE	8	457599	10	A.2.2.3	2	10623	0.71	0.13	0.09	0.71	0.06	0.00	0.51	-0.24	-0.31	0.51	-0.23	-0.4647	0.0236	-9.9	0.9	-9.9	0.8	A+	A+	A+
SCIENCE	8	632005	10	B.1.1.1	2	10623	0.51	0.12	0.09	0.29	0.51	0.00	0.38	-0.24	-0.24	-0.10	0.38	0.6267	0.0216	3.0	1.0	3.0	1.0	A+	A+	A+
SCIENCE	8	807499	10	D.1.3.1	1	10623	0.71	0.71	0.09	0.13	0.08	0.00	0.51	0.51	-0.26	-0.26	-0.27	-0.4207	0.0235	-9.9	0.9	-9.9	0.8	A-	A-	A-
SCIENCE	8	478245	10	B.3.2.2	2	10623	0.49	0.16	0.49	0.19	0.16	0.00	0.26	-0.22	0.26	-0.07	-0.04	0.7278	0.0216	9.9	1.2	9.9	1.3	A+	A+	A-
SCIENCE	8	412569	10	A.2.1.1	2	10623	0.47	0.21	0.47	0.20	0.11	0.00	0.29	-0.09	0.29	-0.09	-0.21	0.8050	0.0217	9.9	1.1	9.9	1.2	A+	A-	A-
SCIENCE	8	255905	10	A.3.1.3	2	10623	0.64	0.12	0.12	0.12	0.64	0.00	0.48	-0.19	-0.24	-0.27	0.48	-0.0504	0.0224	-7.4	0.9	-8.1	0.9	A-	A-	A-
SCIENCE	8	345891	10	C.1.1.2	2	10623	0.67	0.08	0.08	0.67	0.17	0.00	0.36	-0.18	-0.25	0.36	-0.12	-0.2175	0.0228	5.1	1.1	1.9	1.0	A+	A-	A-
SCIENCE	8	947847	11	A.3.1.2	2	10628	0.67	0.67	0.07	0.15	0.10	0.00	0.51	0.51	-0.29	-0.23	-0.26	-0.2180	0.0227	-9.9	0.9	-9.9	0.8	A+	A-	A-
SCIENCE	8	881635	11	A.1.1.3	2	10628	0.46	0.06	0.11	0.37	0.46	0.00	0.37	-0.27	-0.30	-0.05	0.37	0.8859	0.0216	3.1	1.0	4.8	1.1			
SCIENCE	8	632024	11	D.1.1.1	1	10628	0.49	0.49	0.15	0.19	0.18	0.00	0.34	0.34	-0.14	-0.16	-0.15	0.7416	0.0216	6.8	1.1	7.7	1.1			
SCIENCE	8	760624	11	B.3.2.2	2	10628	0.48	0.17	0.21	0.48	0.13	0.00	0.36	-0.21	-0.06	0.36	-0.21	0.7562	0.0216	4.7	1.0	6.3	1.1	A-	A+	A-
SCIENCE	8	257663	11	C.3.1.1	2	10628	0.61	0.12	0.12	0.15	0.61	0.00	0.54	-0.24	-0.28	-0.26	0.54	0.1006	0.0220	-9.9	0.9	-9.9	0.8	A-	B-	C-
SCIENCE	8	741597	11	A.1.3.2	2	10628	0.37	0.25	0.21	0.37	0.17	0.00	0.26	0.00	-0.16	0.26	-0.15	1.2863	0.0221	9.9	1.1	9.9	1.3	A+	A-	A-
SCIENCE	8	426463	11	A.2.1.3	2	10628	0.37	0.37	0.29	0.22	0.12	0.00	0.27	0.27	0.00	-0.17	-0.19	1.2917	0.0222	9.8	1.1	9.9	1.2	A+	A-	A-
SCIENCE	8	556467	11	B.2.1.2	2	10628	0.23	0.43	0.09	0.25	0.23	0.00	0.09	0.13	-0.27	-0.04	0.09	2.1418	0.0251	9.9	1.2	9.9	1.7	A+	A-	A+
SCIENCE	8	214114	11	A.1.1.3	2	10628	0.39	0.39	0.17	0.12	0.31	0.00	0.23	0.23	-0.13	-0.23	0.03	1.1900	0.0220	9.9	1.2	9.9	1.3	A+	A-	A-
SCIENCE	8	476000	11	A.1.3.4	2	10628	0.42	0.42	0.18	0.15	0.25	0.00	0.26	0.26	-0.16	-0.14	-0.03	1.0434	0.0218	9.9	1.1	9.9	1.2	A-	A+	A-
SCIENCE	8	350417	11	D.1.1.4	2	10628	0.60	0.10	0.60	0.09	0.20	0.00	0.36	-0.23	0.36	-0.26	-0.06	0.1317	0.0220	6.0	1.1	6.2	1.1	A-	A-	A-
SCIENCE	8	745686	11	D.1.2.2	2	10628	0.60	0.09	0.19	0.12	0.60	0.00	0.51	-0.28	-0.31	-0.15	0.51	0.1729	0.0219	-9.9	0.9	-9.9	0.9	A-	A-	A-
SCIENCE	8	335799	12	B.1.1.3	2	10583	0.53	0.27	0.07	0.13	0.53	0.00	0.46	-0.18	-0.20	-0.29	0.46	0.4977	0.0217	-6.3	1.0	-6.3	0.9			
SCIENCE	8	478259	12	A.3.1.2	1	10583	0.67	0.17	0.07	0.67	0.10	0.00	0.50	-0.30	-0.25	0.50	-0.20	-0.2228	0.0228	-9.5	0.9	-9.9	0.8			
SCIENCE	8	477776	12	B.3.1.3	2	10583	0.60	0.17	0.60	0.14	0.09	0.00	0.47	-0.24	0.47	-0.22	-0.22	0.1547	0.0221	-7.5	0.9	-7.7	0.9	A+	A-	A-
SCIENCE	8	754629	12	A.1.1.4	2	10583	0.58	0.12	0.15	0.15	0.58	0.00	0.45	-0.26	-0.24	-0.14	0.45	0.2576	0.0219	-4.2	1.0	-3.6	1.0	A-	A-	A-
SCIENCE	8	126521	12	B.2.1.5	2	10583	0.53	0.15	0.53	0.21	0.10	0.00	0.33	-0.07	0.33	-0.17	-0.22	0.5099	0.0217	9.9	1.1	9.9	1.2	A+	A+	A-
SCIENCE	8	679317	12	A.2.2.3	2	10583	0.60	0.16	0.14	0.60	0.10	0.00	0.37	-0.13	-0.22	0.37	-0.19	0.1527	0.0221	4.7	1.0	5.8	1.1	A+	A-	A-
SCIENCE	8	234398	12	D.1.1.2	2	10583	0.52	0.11	0.13	0.52	0.25	0.00	0.38	-0.24	-0.22	0.38	-0.10	0.5596	0.0217	3.8	1.0	3.4	1.0	A-	A-	A-
SCIENCE	8	842358	12	A.1.1.2	2	10583	0.50	0.50	0.10	0.13	0.26	0.00	0.32	0.32	-0.28	-0.29	0.06	0.6357	0.0217	9.9	1.1	9.9	1.2	A+	A-	A-
SCIENCE	8	521461	12	D.2.1.2	2	10583	0.47	0.25	0.12	0.47	0.15	0.00	0.31	-0.08	-0.22	0.31	-0.12	0.7723	0.0217	9.9	1.1	9.9	1.2	A-	A-	A-

Appendix G: Item Statistics Multiple Choice

SCIENCE	8	231217	12	A.1.2.3	2	10583	0.44	0.34	0.11	0.11	0.44	0.00	0.34	-0.04	-0.20	-0.27	0.34	0.9491	0.0218	7.4	1.1	9.8	1.1	A-	A-	A-
SCIENCE	8	358411	12	A.1.3.3	3	10583	0.69	0.69	0.13	0.11	0.07	0.00	0.52	0.52	-0.30	-0.27	-0.21	-0.3278	0.0231	-9.9	0.9	-9.9	0.8	A+	A-	A-
SCIENCE	8	865411	12	C.1.1.1	1	10583	0.46	0.25	0.11	0.19	0.46	0.00	0.38	-0.03	-0.29	-0.21	0.38	0.8676	0.0217	2.1	1.0	4.3	1.1	A+	A+	A+
WRITING	5	365716	0	B.5	3	123608	0.73	0.07	0.13	0.73	0.06	0.00	0.31	-0.10	-0.16	0.31	-0.22	0.5265	0.0081	9.9	1.6	9.9	9.9			
WRITING	5	259577	0	B.6	1	123608	0.75	0.17	0.75	0.04	0.04	0.00	0.35	-0.22	0.35	-0.16	-0.19	0.3418	0.0083	9.9	1.5	9.9	9.9			
WRITING	5	481427	0	B.6	1	123608	0.43	0.11	0.36	0.09	0.43	0.00	0.30	-0.14	-0.12	-0.17	0.30	2.8111	0.0075	9.9	1.7	9.9	9.5			
WRITING	5	788538	0	B.5	3	123608	0.84	0.84	0.06	0.06	0.04	0.00	0.43	0.43	-0.21	-0.23	-0.25	-0.5469	0.0097	9.9	1.4	9.9	6.1			
WRITING	5	271681	0	B.6	2	123608	0.88	0.03	0.88	0.03	0.06	0.00	0.31	-0.24	0.31	-0.22	-0.09	-1.0590	0.0110	9.9	1.5	9.9	9.9			
WRITING	5	636721	0	B.6	2	123608	0.63	0.11	0.19	0.63	0.07	0.00	0.21	-0.16	0.00	0.21	-0.21	1.3485	0.0075	9.9	1.9	9.9	9.9			
WRITING	5	692814	0	B.5	2	123608	0.76	0.09	0.10	0.76	0.04	0.00	0.39	-0.20	-0.22	0.39	-0.20	0.2192	0.0084	9.9	1.4	9.9	9.9			
WRITING	5	378579	0	B.5	2	123608	0.73	0.02	0.15	0.09	0.73	0.00	0.26	-0.15	-0.10	-0.19	0.26	0.5182	0.0081	9.9	1.7	9.9	9.9			
WRITING	5	401654	0	B.5	3	123608	0.74	0.14	0.06	0.05	0.74	0.00	0.39	-0.19	-0.22	-0.21	0.39	0.4237	0.0082	9.9	1.5	9.9	9.9			
WRITING	5	545891	0	B.6	2	123608	0.68	0.68	0.10	0.07	0.15	0.00	0.34	0.34	-0.18	-0.21	-0.14	0.9490	0.0077	9.9	1.6	9.9	9.9			
WRITING	5	416129	0	B.6	2	123608	0.75	0.75	0.08	0.10	0.07	0.00	0.33	0.33	-0.25	-0.12	-0.15	0.3642	0.0082	9.9	1.6	9.9	9.9			
WRITING	5	983159	0	B.5	3	123608	0.73	0.18	0.05	0.73	0.04	0.00	0.37	-0.19	-0.19	0.37	-0.23	0.5293	0.0081	9.9	1.5	9.9	9.9			
WRITING	5	926334	1	B.5	2	123608	0.64	0.14	0.05	0.64	0.16	0.00	0.26	-0.11	-0.19	0.26	-0.11	1.2447	0.0075	9.9	1.8	9.9	9.9	A-	A-	A-
WRITING	5	253608	1	B.5	2	123608	0.39	0.04	0.23	0.34	0.39	0.00	0.21	-0.20	-0.12	-0.02	0.21	2.9944	0.0075	9.9	1.9	9.9	9.9	A+	A-	A-
WRITING	5	100394	1	B.6	1	123608	0.92	0.92	0.02	0.03	0.03	0.00	0.43	0.43	-0.24	-0.24	-0.24	-1.4987	0.0123	9.9	1.2	9.9	2.9	A+	A-	B-
WRITING	5	354919	1	B.6	2	123608	0.56	0.11	0.56	0.12	0.21	0.00	0.34	-0.15	0.34	-0.18	-0.14	1.8615	0.0073	9.9	1.6	9.9	8.2	A-	A-	A-
WRITING	5	188292	1	B.6	2	123608	0.50	0.21	0.50	0.19	0.11	0.00	0.23	-0.11	0.23	-0.07	-0.13	2.2559	0.0073	9.9	1.9	9.9	9.9	A-	A-	A-
WRITING	5	662234	1	B.5	2	123608	0.41	0.05	0.31	0.41	0.23	0.00	0.17	-0.24	-0.08	0.17	0.02	2.8575	0.0075	9.9	2.0	9.9	9.9	A-	A-	A-
WRITING	5	823029	1	B.5	2	123608	0.69	0.25	0.03	0.03	0.69	0.00	0.43	-0.28	-0.27	-0.19	0.43	0.8850	0.0077	9.9	1.4	9.9	6.0	A-	A-	A-
WRITING	5	286757	1	B.6	2	123608	0.65	0.27	0.05	0.65	0.02	0.00	0.33	-0.17	-0.20	0.33	-0.23	1.2152	0.0075	9.9	1.6	9.9	9.9	A+	A-	A-
WRITING	8	619158	0	B.5	3	127854	0.68	0.11	0.16	0.05	0.68	0.00	0.34	-0.16	-0.15	-0.23	0.34	1.3415	0.0075	9.9	1.6	9.9	9.5			
WRITING	8	490703	0	B.6	2	127854	0.33	0.43	0.33	0.20	0.03	0.00	0.30	-0.01	0.30	-0.25	-0.18	4.0397	0.0079	9.9	1.8	9.9	9.9			
WRITING	8	595700	0	B.5	3	127854	0.66	0.08	0.21	0.66	0.05	0.00	0.35	-0.24	-0.16	0.35	-0.16	1.5190	0.0074	9.9	1.6	9.9	8.8			
WRITING	8	779630	0	B.6	2	127854	0.92	0.92	0.02	0.03	0.02	0.00	0.40	0.40	-0.21	-0.28	-0.17	-1.5032	0.0134	9.9	1.4	9.9	3.9			
WRITING	8	897968	0	B.6	1	127854	0.84	0.02	0.06	0.07	0.84	0.00	0.28	-0.17	-0.20	-0.11	0.28	-0.2889	0.0098	9.9	1.6	9.9	9.9			
WRITING	8	100912	0	B.5	2	127854	0.59	0.12	0.06	0.59	0.24	0.00	0.19	-0.14	-0.19	0.19	-0.02	2.0709	0.0072	9.9	1.9	9.9	9.9			
WRITING	8	946344	0	B.5	2	127854	0.80	0.08	0.09	0.80	0.03	0.00	0.34	-0.15	-0.22	0.34	-0.17	0.2302	0.0088	9.9	1.6	9.9	9.2			
WRITING	8	101932	0	B.5	3	127854	0.76	0.14	0.76	0.01	0.09	0.00	0.22	-0.11	0.22	-0.15	-0.14	0.6241	0.0082	9.9	1.7	9.9	9.9			
WRITING	8	641620	0	B.5	3	127854	0.58	0.25	0.58	0.05	0.12	0.00	0.24	-0.11	0.24	-0.21	-0.07	2.1759	0.0072	9.9	1.8	9.9	9.9			
WRITING	8	535325	0	B.6	2	127854	0.86	0.08	0.03	0.86	0.03	0.00	0.36	-0.17	-0.26	0.36	-0.19	-0.4658	0.0102	9.9	1.5	9.9	8.8			
WRITING	8	697743	0	B.5	1	127854	0.60	0.60	0.16	0.18	0.07	0.00	0.31	0.31	-0.19	-0.12	-0.15	1.9993	0.0072	9.9	1.7	9.9	8.2			
WRITING	8	898150	0	B.6	1	127854	0.75	0.09	0.06	0.09	0.75	0.00	0.42	-0.19	-0.29	-0.18	0.42	0.6779	0.0082	9.9	1.4	9.9	9.2			
WRITING	8	876872	1	B.5	2	21396	0.45	0.10	0.35	0.45	0.10	0.00	0.25	-0.27	0.02	0.25	-0.16	2.9988	0.0178	9.9	1.9	9.9	9.9	A+	A+	A-
WRITING	8	802817	1	B.6	1	21396	0.15	0.09	0.16	0.60	0.15	0.00	-0.06	-0.14	-0.22	0.29	-0.06	5.6010	0.0252	9.9	2.6	9.9	9.9	A-	A+	A+
WRITING	8	834095	1	B.5	2	21396	0.79	0.79	0.07	0.08	0.05	0.00	0.38	0.38	-0.23	-0.17	-0.20	0.3622	0.0210	9.9	1.5	9.9	9.9	A-	B-	B-
WRITING	8	701519	1	B.6	1	21396	0.64	0.03	0.64	0.25	0.08	0.00	0.33	-0.22	0.33	-0.16	-0.19	1.6691	0.0183	9.9	1.7	9.9	8.6	A-	A-	A-
WRITING	8	994599	1	B.5	2	21396	0.68	0.08	0.16	0.07	0.68	0.00	0.39	-0.20	-0.16	-0.25	0.39	1.3038	0.0188	9.9	1.6	9.9	9.1	A-	A-	A-
WRITING	8	859653	1	B.6	1	21396	0.28	0.19	0.34	0.28	0.19	0.00	0.19	-0.05	-0.12	0.19	-0.02	4.2498	0.0196	9.9	1.9	9.9	9.9	A+	A-	A-
WRITING	8	195074	1	B.6	1	21396	0.52	0.52	0.09	0.14	0.25	0.00	0.23	0.23	-0.13	-0.09	-0.10	2.4992	0.0178	9.9	2.0	9.9	9.9	B-	A-	A-
WRITING	8	728655	1	B.5	2	21396	0.62	0.13	0.62	0.18	0.07	0.00	0.22	-0.14	0.22	-0.07	-0.11	1.8081	0.0181	9.9	2.0	9.9	9.9	A-	A-	A-
WRITING	8	556108	2	B.5	2	21288	0.76	0.10	0.76	0.08	0.06	0.00	0.31	-0.26	0.31	-0.17	-0.04	0.6561	0.0202	9.9	1.6	9.9	9.9	A+	A-	A-
WRITING	8	471767	2	B.6	2	21288	0.62	0.62	0.12	0.17	0.09	0.00	0.44	0.44	-0.22	-0.22	-0.21	1.7930	0.0183	9.9	1.5	9.9	7.1	A+	A-	A-
WRITING	8	318479	2	B.6	1	21288	0.74	0.03	0.74	0.07	0.16	0.00	0.39	-0.21	0.39	-0.22	-0.22	0.8616	0.0197	9.9	1.5	9.9	9.9	A+	A-	A-
WRITING	8	264434	2	B.5	2	21288	0.73	0.11	0.04	0.12	0.73	0.00	0.36	-0.22	-0.22	-0.14	0.36	0.9171	0.0196	9.9	1.6	9.9	9.9	A-	A-	A-
WRITING	8	337595	2	B.6	2	21288	0.86	0.01	0.86	0.01	0.12	0.00	0.21	-0.14	0.21	-0.11	-0.14	-0.3728	0.0240	9.9	1.7	9.9	9.9	A+	A+	A-
WRITING	8	567084	2	B.5	2	21288	0.68	0.17	0.68	0.08	0.07	0.00	0.27	-0.12	0.27	-0.21	-0.08	1.3464	0.0188	9.9	1.8	9.9	9.9	A+	A-	A-
WRITING	8	341890	2	B.5	2	21288	0.70	0.70	0.06	0.06	0.19	0.00	0.37	0.37	-0.19	-0.19	-0.21	1.2139	0.0190	9.9	1.6	9.9	9.9	A+	A-	A-
WRITING	8	483984	2	B.6	1	21288	0.83	0.06	0.06	0.06	0.83	0.00	0.46	-0.24	-0.22	-0.29	0.46	0.0280	0.0222	9.9	1.2	9.9	6.3	A+	B-	A-

Appendix G: Item Statistics Multiple Choice

WRITING	8	433394	3	B.6	2	21308	0.31	0.21	0.25	0.23	0.31	0.00	0.23	-0.12	-0.09	-0.05	0.23	4.0103	0.0190	9.9	1.8	9.9	9.9	A-	A-	A-
WRITING	8	405222	3	B.5	2	21308	0.76	0.76	0.10	0.04	0.09	0.00	0.23	0.23	-0.10	-0.20	-0.10	0.7004	0.0201	9.9	1.8	9.9	9.9	A-	A-	A-
WRITING	8	414851	3	B.6	2	21308	0.19	0.32	0.22	0.19	0.28	0.00	0.12	0.13	-0.10	0.12	-0.15	5.1730	0.0229	9.9	2.1	9.9	9.9	A+	A-	A+
WRITING	8	330197	3	B.5	2	21308	0.55	0.55	0.19	0.21	0.05	0.00	0.35	0.35	-0.19	-0.14	-0.19	2.3132	0.0179	9.9	1.7	9.9	7.2	A+	A-	A-
WRITING	8	809342	3	B.5	1	21308	0.62	0.14	0.12	0.62	0.11	0.00	0.34	-0.16	-0.18	0.34	-0.15	1.7880	0.0183	9.9	1.7	9.9	8.1	A-	A-	A-
WRITING	8	299660	3	B.6	1	21308	0.39	0.15	0.39	0.30	0.17	0.00	0.21	-0.12	0.21	-0.15	0.02	3.4670	0.0182	9.9	1.9	9.9	9.9	A-	A-	A-
WRITING	8	414129	3	B.5	2	21308	0.49	0.15	0.05	0.49	0.30	0.00	0.27	-0.17	-0.23	0.27	-0.05	2.7120	0.0178	9.9	1.9	9.9	9.9	A-	A-	A-
WRITING	8	371941	3	B.6	1	21308	0.83	0.04	0.83	0.06	0.07	0.00	0.45	-0.25	0.45	-0.26	-0.22	0.0327	0.0223	9.9	1.3	9.9	3.2	A-	B-	B-
WRITING	8	154625	4	B.6	2	21316	0.24	0.24	0.24	0.05	0.46	0.00	0.10	0.06	0.10	-0.19	-0.05	4.6646	0.0208	9.9	2.1	9.9	9.9	A+	A-	A-
WRITING	8	236612	4	B.5	2	21316	0.79	0.08	0.05	0.79	0.08	0.00	0.39	-0.20	-0.23	0.39	-0.19	0.4479	0.0214	9.9	1.5	9.9	7.3	A+	B-	A-
WRITING	8	835541	4	B.6	2	21316	0.87	0.05	0.04	0.05	0.87	0.00	0.43	-0.24	-0.22	-0.24	0.43	-0.4421	0.0252	9.9	1.4	9.7	3.5	A+	A-	A-
WRITING	8	879260	4	B.5	2	21316	0.22	0.22	0.20	0.14	0.43	0.00	0.11	0.11	-0.04	-0.16	0.05	4.8648	0.0216	9.9	2.1	9.9	9.9	A-	A-	A-
WRITING	8	163613	4	B.5	2	21316	0.55	0.28	0.55	0.13	0.03	0.00	0.23	-0.02	0.23	-0.21	-0.21	2.3215	0.0183	9.9	2.0	9.9	9.9	A+	A-	A-
WRITING	8	418944	4	B.5	2	21316	0.69	0.69	0.05	0.06	0.21	0.00	0.26	0.26	-0.22	-0.20	-0.07	1.3231	0.0193	9.9	1.9	9.9	9.9	A+	A-	A-
WRITING	8	153565	4	B.6	2	21316	0.25	0.33	0.27	0.25	0.14	0.00	0.09	-0.01	-0.02	0.09	-0.06	4.5850	0.0206	9.9	2.1	9.9	9.9	A-	A-	A-
WRITING	8	527529	4	B.6	2	21316	0.23	0.15	0.06	0.56	0.23	0.00	0.00	-0.14	-0.16	0.18	0.00	4.8152	0.0214	9.9	2.4	9.9	9.9	A-	A+	A+
WRITING	8	509823	5	B.5	2	21292	0.64	0.06	0.18	0.64	0.12	0.00	0.35	-0.23	-0.18	0.35	-0.13	1.6658	0.0187	9.9	1.7	9.9	9.9	A+	A-	A-
WRITING	8	266797	5	B.6	1	21292	0.73	0.09	0.73	0.15	0.03	0.00	0.38	-0.16	0.38	-0.26	-0.18	0.9609	0.0198	9.9	1.6	9.9	7.9	A+	B-	A-
WRITING	8	545537	5	B.5	2	21292	0.69	0.22	0.02	0.07	0.69	0.00	0.32	-0.19	-0.21	-0.16	0.32	1.2641	0.0193	9.9	1.7	9.9	9.9	A-	A+	A-
WRITING	8	927269	5	B.6	1	21292	0.64	0.14	0.64	0.15	0.08	0.00	0.40	-0.21	0.40	-0.20	-0.18	1.6641	0.0187	9.9	1.6	9.9	7.4	A-	A-	A-
WRITING	8	439676	5	B.6	2	21292	0.62	0.20	0.07	0.62	0.12	0.00	0.34	-0.12	-0.25	0.34	-0.17	1.8138	0.0186	9.9	1.7	9.9	9.9	A+	A-	A-
WRITING	8	715831	5	B.6	2	21292	0.50	0.16	0.20	0.13	0.50	0.00	0.44	-0.19	-0.16	-0.24	0.44	2.6581	0.0182	9.9	1.5	9.9	6.2	A+	A-	A-
WRITING	8	313440	5	B.5	2	21292	0.54	0.17	0.25	0.03	0.54	0.00	0.25	-0.14	-0.09	-0.17	0.25	2.3603	0.0182	9.9	1.9	9.9	9.9	A-	A-	A-
WRITING	8	584027	5	B.5	2	21292	0.84	0.09	0.84	0.04	0.03	0.00	0.45	-0.33	0.45	-0.23	-0.15	-0.1189	0.0234	9.9	1.3	9.9	6.1	A-	A-	C-
WRITING	8	229444	6	B.5	2	21254	0.85	0.03	0.85	0.06	0.07	0.00	0.33	-0.23	0.33	-0.17	-0.16	-0.1909	0.0238	9.9	1.5	9.9	9.9	A+	A-	A-
WRITING	8	602395	6	B.6	2	21254	0.59	0.08	0.18	0.59	0.15	0.00	0.39	-0.22	-0.26	0.39	-0.09	2.0232	0.0184	9.9	1.6	9.9	6.9	A-	B-	B-
WRITING	8	598991	6	B.5	2	21254	0.46	0.46	0.05	0.09	0.40	0.00	0.38	0.38	-0.04	-0.24	-0.23	2.9722	0.0182	9.9	1.6	9.9	7.3	A-	B-	A-
WRITING	8	644388	6	B.6	1	21254	0.54	0.08	0.35	0.54	0.03	0.00	0.25	-0.21	-0.06	0.25	-0.20	2.4097	0.0182	9.9	2.0	9.9	9.9	A+	A-	A-
WRITING	8	580118	6	B.6	2	21254	0.70	0.14	0.09	0.06	0.70	0.00	0.33	-0.27	-0.09	-0.12	0.33	1.1794	0.0195	9.9	1.7	9.9	9.9	A-	A-	A-
WRITING	8	206361	6	B.5	2	21254	0.82	0.06	0.06	0.06	0.82	0.00	0.36	-0.17	-0.20	-0.22	0.36	0.0781	0.0226	9.9	1.5	9.9	9.9	A+	A-	A-
WRITING	8	525880	6	B.5	2	21254	0.41	0.41	0.12	0.26	0.21	0.00	0.29	0.29	-0.24	-0.05	-0.10	3.3353	0.0184	9.9	1.8	9.9	9.1	A-	A-	A-
WRITING	8	198469	6	B.6	2	21254	0.23	0.23	0.17	0.37	0.22	0.00	0.17	0.17	-0.20	0.06	-0.06	4.7257	0.0213	9.9	2.0	9.9	9.9	A+	A-	A-

Appendix G: Item Statistics Open Ended

Item Information						Classical														Rasch		Infit		Outfit		DIF			
Cont	Grade	PubID	Form	Std	DOK	N	Mean	P(0)	P(1)	P(2)	P(3)	P(4)	P(B)	PtBis	PT(0)	PT(1)	PT(2)	PT(3)	PT(4)	Meas	MeasSE	t	MS	t	MS	M/F	W/B	W/H	
MATH	3	926386	0	E.1	2	126454	3.01	0.02	0.09	0.20	0.23	0.46	0.00	0.67	-0.24	-0.51	-0.23	0.07	0.50	1.0118	0.0038	9.9	1.1	9.9	1.1				
MATH	3	142135	0	A.3	3	126454	2.14	0.13	0.20	0.21	0.33	0.13	0.00	0.70	-0.62	-0.22	0.08	0.34	0.30	2.6051	0.0034	-0.8	1.0	-2.3	1.0				
MATH	3	880373	0	B.1	3	126454	2.35	0.05	0.20	0.34	0.17	0.24	0.00	0.62	-0.40	-0.36	-0.02	0.20	0.39	2.0273	0.0035	9.9	1.1	9.9	1.1				
MATH	3	204117	2	B-O.1	3	1099	1.26	0.14	0.60	0.14	0.08	0.04	0.00	0.55	-0.59	0.06	0.26	0.19	0.19	3.5966	0.0433	-1.6	0.9	-0.6	1.0	A-	A-	B-	
MATH	3	668142	3	D-M.3	3	1100	0.42	0.79	0.06	0.10	0.03	0.02	0.01	0.26	-0.23	0.05	0.12	0.15	0.14	4.8637	0.0456	3.5	1.3	9.9	6.1	A+	A-	A+	
MATH	3	291533	4	A-F.1	2	1100	1.19	0.39	0.26	0.18	0.11	0.06	0.00	0.53	-0.51	0.07	0.22	0.25	0.23	3.6764	0.0349	-1.1	1.0	0.5	1.0	A+	A-	B-	
MATH	3	590895	5	A-T.1	2	1099	1.79	0.05	0.47	0.20	0.23	0.06	0.00	0.62	-0.41	-0.43	0.23	0.38	0.21	2.7828	0.0403	-2.4	0.9	-3.3	0.9	A+	B-	A-	
MATH	3	328221	6	D-M.4	3	1100	0.82	0.44	0.38	0.11	0.07	0.00	0.00	0.48	-0.45	0.16	0.26	0.24	0.07	4.9479	0.0450	0.6	1.0	0.9	1.1	A+	A-	B-	
MATH	3	834075	7	A-F.1	3	1098	1.07	0.40	0.27	0.19	0.12	0.01	0.00	0.54	-0.53	0.11	0.27	0.29	0.10	4.3420	0.0394	0.5	1.0	0.9	1.1	A+	B-	A-	
MATH	3	709837	8	D-M.4	3	1100	0.69	0.48	0.41	0.05	0.05	0.01	0.00	0.41	-0.40	0.24	0.15	0.20	0.10	4.6110	0.0456	-0.4	1.0	0.6	1.0	A+	A-	A-	
MATH	3	555826	9	B-O.3	2	1100	0.87	0.53	0.24	0.11	0.09	0.03	0.00	0.53	-0.54	0.21	0.22	0.27	0.19	4.1713	0.0376	-3.5	0.8	-2.0	0.9	A+	A-	A-	
MATH	3	558519	10	D-M.1	3	1100	1.30	0.15	0.50	0.29	0.05	0.02		0.60	-0.53	-0.09	0.38	0.20	0.15	3.9093	0.0477	-2.1	0.9	-2.5	0.9	A-	C-	A-	
MATH	3	273449	11	A-F.1	3	1099	0.91	0.40	0.36	0.18	0.06	0.00	0.00	0.54	-0.55	0.21	0.29	0.22	0.07	4.9292	0.0448	-0.5	1.0	-1.1	0.9	A+	A-	A-	
MATH	3	392611	12	B-O.1	2	1100	1.08	0.29	0.49	0.12	0.06	0.04	0.00	0.55	-0.58	0.20	0.22	0.21	0.19	3.9319	0.0413	-1.3	0.9	-2.1	0.9	A+	A-	A-	
MATH	3	346529	13	B-O.3	3	1100	0.37	0.77	0.13	0.07	0.02	0.01	0.00	0.28	-0.25	0.11	0.15	0.15	0.10	5.1511	0.0509	1.5	1.1	7.1	2.4	B-	A-	A-	
MATH	3	532233	14	B-O.2	3	1100	1.28	0.29	0.32	0.23	0.13	0.03	0.00	0.61	-0.58	0.03	0.30	0.30	0.16	3.8296	0.0386	-2.0	0.9	-2.5	0.9	A+	A-	A-	
MATH	3	396706	15	D-M.2	3	1099	1.43	0.30	0.24	0.18	0.27	0.01	0.00	0.62	-0.59	-0.01	0.21	0.42	0.07	4.1889	0.0372	0.3	1.0	1.4	1.1	A-	A-	C-	
MATH	3	254780	16	B-O.1	2	1101	1.42	0.29	0.35	0.12	0.15	0.09	0.00	0.56	-0.50	-0.04	0.19	0.29	0.26	3.3639	0.0341	0.1	1.0	0.4	1.0	A+	A-	B-	
MATH	3	643491	17	B-O.3	3	1100	0.82	0.38	0.47	0.12	0.03	0.01	0.00	0.48	-0.46	0.21	0.26	0.16	0.09	4.7437	0.0486	-0.7	1.0	-0.1	1.0	A+	A-	A-	
MATH	3	126815	18	D-M.2	3	1100	1.30	0.23	0.45	0.17	0.11	0.05		0.58	-0.53	-0.01	0.26	0.29	0.20	3.6789	0.0398	-2.4	0.9	-2.1	0.9	A+	B-	B-	
MATH	3	577571	19	D-M.1	2	1099	1.35	0.18	0.44	0.24	0.12	0.02	0.00	0.60	-0.54	-0.07	0.28	0.31	0.13	3.8224	0.0425	-3.1	0.9	-3.1	0.9	A+	B-	A-	
MATH	3	445957	20	A-T.1	2	1100	0.73	0.53	0.33	0.05	0.06	0.03	0.00	0.47	-0.49	0.26	0.18	0.21	0.18	4.4028	0.0418	-1.8	0.9	-0.5	1.0	A-	B-	A-	
MATH	4	685707	0	C.3	2	126311	2.32	0.09	0.14	0.23	0.43	0.11	0.01	0.57	-0.38	-0.27	-0.09	0.32	0.26	1.0060	0.0036	9.9	1.3	9.9	1.3				
MATH	4	922315	0	A.2	3	126311	1.19	0.32	0.39	0.11	0.13	0.05	0.04	0.58	-0.50	0.00	0.22	0.32	0.24	2.3765	0.0035	9.9	1.1	5.6	1.0				
MATH	4	705911	0	E.3	3	126311	2.55	0.04	0.10	0.35	0.26	0.24	0.00	0.64	-0.32	-0.30	-0.26	0.18	0.47	0.4499	0.0036	9.9	1.0	9.1	1.0				
MATH	4	509006	1	D-M.1	2	1100	0.79	0.52	0.29	0.09	0.07	0.03	0.01	0.49	-0.40	0.06	0.24	0.27	0.22	2.9237	0.0402	1.8	1.1	3.0	1.2	A-	A-	A-	
MATH	4	377393	2	B-O.2	2	1100	0.37	0.69	0.27	0.03	0.01	0.00	0.01	0.41	-0.40	0.30	0.20	0.13	0.10	3.9631	0.0577	-1.6	0.9	0.0	1.0	A+	A+	A+	
MATH	4	798413	3	A-T.2	2	1100	1.62	0.12	0.27	0.52	0.05	0.04	0.00	0.63	-0.51	-0.18	0.29	0.24	0.26	1.9491	0.0441	-2.5	0.9	-2.7	0.9	A+	B-	A-	
MATH	4	278571	4	A-F.1	2	1100	1.18	0.45	0.20	0.16	0.11	0.08	0.00	0.65	-0.62	0.07	0.28	0.28	0.33	2.2857	0.0344	-1.2	0.9	-1.7	0.9	A-	A-	A-	
MATH	4	185650	5	A-F.2	3	1100	0.33	0.77	0.15	0.06	0.02	0.00	0.01	0.41	-0.40	0.23	0.26	0.16	0.09	4.0263	0.0551	-1.3	0.9	-0.6	0.9	A+	A-	A-	
MATH	4	382227	6	B-O.3	3	1100	0.64	0.54	0.33	0.07	0.05	0.01	0.00	0.45	-0.42	0.20	0.23	0.24	0.08	3.4685	0.0456	1.1	1.1	0.9	1.1	A+	A-	A-	
MATH	4	469104	7	B-O.3	2	1099	1.18	0.36	0.25	0.26	0.11	0.02	0.00	0.64	-0.63	0.09	0.33	0.31	0.15	2.6078	0.0379	-1.3	1.0	-2.2	0.9	B+	A-	A-	
MATH	4	573696	8	A-T.2	2	1100	1.14	0.44	0.19	0.24	0.05	0.08	0.01	0.63	-0.62	0.11	0.31	0.21	0.31	2.3388	0.0354	-0.3	1.0	-1.0	0.9	A-	A-	A+	
MATH	4	262551	9	A-F.3	3	1099	1.11	0.41	0.32	0.10	0.10	0.07	0.01	0.56	-0.48	0.04	0.16	0.30	0.30	2.3415	0.0354	1.2	1.1	2.1	1.1	A-	A-	A-	
MATH	4	514177	10	A-F.1	2	1100	0.71	0.60	0.18	0.13	0.08	0.01	0.01	0.54	-0.50	0.12	0.31	0.31	0.12	3.4659	0.0418	-1.1	0.9	0.6	1.1	A-	A-	A-	
MATH	4	591083	11	A-F.1	2	1099	0.50	0.65	0.24	0.07	0.03	0.01	0.00	0.46	-0.46	0.26	0.25	0.19	0.12	3.5552	0.0475	-0.8	1.0	-0.2	1.0	A+	A+	A-	
MATH	4	401547	12	D-M.1	2	1099	0.68	0.66	0.14	0.09	0.08	0.03	0.00	0.53	-0.53	0.20	0.22	0.32	0.20	3.0092	0.0387	-0.5	1.0	-0.2	1.0	A-	A-	A-	
MATH	4	828882	13	B-O.1	3	1099	1.28	0.27	0.39	0.14	0.16	0.03	0.01	0.65	-0.60	0.04	0.22	0.37	0.20	2.3560	0.0374	-2.6	0.9	-2.6	0.9	A+	A-	A-	
MATH	4	302795	14	B-O.1	3	1100	1.51	0.23	0.24	0.34	0.17	0.02	0.00	0.63	-0.58	-0.06	0.27	0.32	0.16	2.2614	0.0385	1.3	1.1	1.2	1.1	A+	A-	A+	
MATH	4	149559	15	A-T.1	2	1100	2.46	0.07	0.12	0.24	0.45	0.13	0.01	0.67	-0.43	-0.31	-0.16	0.31	0.37	0.7962	0.0390	-1.2	1.0	-0.5	1.0	A-	B-	A-	
MATH	4	972940	16	A-F.2	2	1100	1.23	0.32	0.22	0.38	0.08	0.00	0.00	0.52	-0.49	0.03	0.31	0.23	0.04	3.4491	0.0408	6.0	1.3	5.1	1.3	A+	B-	A-	
MATH	4	907890	17	A-F.3	3	1099	1.02	0.53	0.19	0.09	0.13	0.06	0.01	0.59	-0.57	0.12	0.18	0.33	0.29	2.4715	0.0344	-0.2	1.0	0.0	1.0	A+	A-	A-	
MATH	4	120004	18	A-T.1	3	1100	0.58	0.55	0.36	0.05	0.02	0.01	0.00	0.45	-0.40	0.21	0.26	0.18	0.13	3.4119	0.0489	-0.2	1.0	-0.1	1.0	A+	A-	A-	
MATH	4	486239	19	D-M.2	2	1100	1.88	0.13	0.24	0.34	0.20	0.09	0.01	0.61	-0.48	-0.22	0.12	0.28	0.30	1.4702	0.0369	2.8	1.1	2.4	1.1	A+	A-	C-	A-
MATH	4	727758	20	B-O.1	2	1100	2.45	0.11	0.12	0.20	0.35	0.22	0.01	0.72	-0.54	-0.31	-0.08	0.29	0.40	0.8244	0.0353	-2.0	0.9	-1.5	0.9	A-	A-	A-	
MATH	5	374124	0	E.2		125346	1.83	0.16	0.27	0.25	0.21	0.11	0.05	0.58	-0.39	-0.28	0.12	0.33	0.27	1.7525	0.0033	9.9	1.3	9.9	1.3				
MATH	5	610026	0	D.1	3	125346	2.12	0.05	0.12	0.54	0.23	0.06	0.01	0.62	-0.35	-0.25	-0.17	0.42	0.28	1.4116	0.0041	-9.9	0.9	-9.9	0.9				
MATH	5	824371	0	A.2	3	125346	1.45	0.27	0.32	0.17	0.18	0.07	0.00	0.67	-0.59	-0.07	0.23	0.37	0.27	2.2674	0.0033	-9.3	1.0	-9.9	0.9				
MATH	5	101283	1	C-G.1	2	1100	1.80	0.14	0.33	0.20	0.25	0.08	0.00	0.58	-0.34														

Appendix G: Item Statistics Open Ended

MATH	5	531823	5	C-G.2	2	1100	0.76	0.40	0.48	0.09	0.03	0.00	0.00	0.59	-0.54	0.26	0.32	0.23	0.06	3.8625	0.0489	-3.4	0.9	-3.8	0.8	A+	B-	A-
MATH	5	747939	6	B-O.2	3	1100	1.46	0.20	0.32	0.33	0.12	0.03	0.00	0.59	-0.48	-0.15	0.31	0.25	0.21	2.3815	0.0387	1.2	1.1	0.5	1.0	B+	A+	A-
MATH	5	511761	7	A-T.1	2	1100	1.64	0.20	0.28	0.26	0.21	0.06	0.01	0.64	-0.47	-0.21	0.14	0.39	0.28	2.1108	0.0359	0.0	1.0	-0.3	1.0	A+	A-	A-
MATH	5	979759	8	D-M.3	3	1100	0.59	0.59	0.29	0.09	0.03	0.01	0.01	0.57	-0.54	0.27	0.34	0.22	0.13	3.6522	0.0465	-3.1	0.8	-3.7	0.8	A-	A-	A-
MATH	5	273160	9	D-M.3	3	1100	0.91	0.46	0.33	0.11	0.07	0.04	0.01	0.60	-0.57	0.17	0.30	0.25	0.26	2.9219	0.0386	-1.9	0.9	-2.8	0.9	A+	A-	A-
MATH	5	912227	10	B-O.2	2	1100	1.55	0.09	0.49	0.26	0.07	0.08	0.00	0.55	-0.39	-0.24	0.23	0.20	0.31	1.9183	0.0395	2.1	1.1	1.7	1.1	A+	A-	A+
MATH	5	430569	11	C-G.1	3	1101	0.75	0.45	0.41	0.09	0.05	0.01	0.00	0.58	-0.58	0.30	0.26	0.25	0.12	3.5500	0.0456	-1.6	0.9	-2.7	0.9	A+	A-	A-
MATH	5	915680	12	D-M.2	3	1099	0.49	0.61	0.33	0.04	0.01	0.01	0.00	0.45	-0.42	0.28	0.23	0.14	0.14	3.8157	0.0521	-0.6	1.0	-0.6	1.0	A+	A+	A-
MATH	5	258540	13	A-T.2	2	1100	1.57	0.16	0.45	0.14	0.18	0.08	0.00	0.69	-0.52	-0.22	0.18	0.39	0.32	2.0245	0.0362	-3.2	0.9	-3.6	0.8	A+	A+	A-
MATH	5	118734	14	A-T.2	1	1100	2.55	0.12	0.12	0.17	0.28	0.31	0.00	0.71	-0.55	-0.23	-0.11	0.13	0.51	0.9474	0.0331	-1.3	1.0	-0.5	1.0	A+	B-	A-
MATH	5	220494	15	A-F.2	2	1100	0.45	0.70	0.22	0.04	0.03	0.01	0.01	0.48	-0.49	0.32	0.20	0.20	0.17	3.5830	0.0472	-1.7	0.9	-1.3	0.9	A-	A+	A-
MATH	5	380789	16	B-O.1	2	1100	0.92	0.40	0.34	0.22	0.04	0.01	0.00	0.57	-0.49	0.04	0.40	0.22	0.12	3.3836	0.0432	0.0	1.0	-0.1	1.0	A+	A-	A-
MATH	5	874006	17	D-M.1	2	1100	0.65	0.58	0.26	0.10	0.06	0.00	0.01	0.62	-0.62	0.30	0.32	0.31	0.08	3.9043	0.0442	-5.6	0.7	-5.9	0.7	A-	A-	A-
MATH	5	590941	18	D-M.1	3	1100	0.90	0.38	0.45	0.07	0.09	0.01	0.00	0.64	-0.65	0.30	0.23	0.34	0.14	3.2118	0.0415	-4.1	0.8	-4.9	0.8	A-	A-	A-
MATH	5	215954	19	C-G.2	2	1099	1.52	0.06	0.55	0.24	0.14	0.02	0.00	0.56	-0.33	-0.33	0.22	0.35	0.17	2.1980	0.0445	-0.2	1.0	0.1	1.0	A+	A-	A-
MATH	5	763263	20	A-F.1	2	1100	1.48	0.22	0.31	0.33	0.05	0.09		0.55	-0.40	-0.13	0.18	0.22	0.34	2.0923	0.0359	2.3	1.1	3.0	1.1	A-	A+	A+
MATH	6	591902	0	B.2		128528	2.57	0.06	0.12	0.14	0.53	0.14	0.01	0.57	-0.42	-0.27	-0.12	0.28	0.26	0.6529	0.0036	9.9	1.2	9.9	1.3			
MATH	6	261960	0	D.2	2	128528	1.64	0.16	0.32	0.27	0.23	0.02	0.05	0.64	-0.47	-0.25	0.19	0.42	0.17	2.1284	0.0037	9.9	1.1	9.9	1.0			
MATH	6	514973	0	A.1	2	128528	2.14	0.16	0.20	0.16	0.29	0.18	0.00	0.72	-0.55	-0.25	0.01	0.30	0.43	1.1677	0.0031	-2.5	1.0	-3.2	1.0			
MATH	6	294966	1	D.1	3	1100	1.49	0.17	0.49	0.11	0.17	0.07	0.00	0.66	-0.57	-0.10	0.18	0.34	0.31	1.9484	0.0381	0.9	1.0	0.3	1.0	A-	A-	A-
MATH	6	867971	2	C.1	2	1099	0.65	0.58	0.25	0.11	0.05	0.01	0.01	0.60	-0.59	0.26	0.35	0.27	0.11	3.5937	0.0449	-5.0	0.8	-5.3	0.7	A-	A-	B-
MATH	6	454754	3	E.3	2	1099	0.91	0.33	0.51	0.08	0.07	0.01	0.01	0.43	-0.34	0.06	0.20	0.26	0.13	3.2657	0.0464	4.4	1.2	4.6	1.2	A-	A-	A+
MATH	6	472310	4	C.3	2	1100	1.58	0.13	0.43	0.22	0.15	0.06	0.00	0.65	-0.50	-0.20	0.18	0.32	0.32	1.8356	0.0390	-1.3	0.9	-1.4	0.9	A-	A-	A-
MATH	6	540877	5	C.3	3	1100	2.01	0.09	0.26	0.28	0.29	0.08	0.00	0.65	-0.45	-0.36	0.10	0.38	0.25	1.3541	0.0385	1.5	1.1	1.4	1.1	A-	C-	A-
MATH	6	124849	6	C.1	3	1100	1.27	0.21	0.49	0.14	0.12	0.03	0.00	0.67	-0.55	-0.07	0.30	0.38	0.20	2.4128	0.0411	-4.0	0.8	-4.4	0.8	A+	A-	A-
MATH	6	843773	7	B.1	2	1100	1.52	0.30	0.28	0.16	0.13	0.13	0.00	0.68	-0.59	-0.10	0.24	0.29	0.38	1.8360	0.0335	0.6	1.0	-0.6	1.0	A-	A-	A-
MATH	6	515912	8	C.3	2	1100	1.34	0.24	0.37	0.21	0.16	0.01	0.01	0.64	-0.54	-0.07	0.25	0.39	0.15	2.5789	0.0398	0.0	1.0	-0.6	1.0	A+	B-	C-
MATH	6	769123	9	A.2	2	1099	0.58	0.57	0.29	0.12	0.02	0.00	0.01	0.47	-0.46	0.24	0.31	0.12	0.03	4.2387	0.0505	2.7	1.1	1.7	1.1	A+	A-	A+
MATH	7	389329	0	B.1	3	130652	1.58	0.17	0.31	0.32	0.16	0.04	0.01	0.72	-0.56	-0.21	0.24	0.41	0.25	2.1086	0.0037	-9.9	0.8	-9.9	0.8			
MATH	7	916993	0	D.3	2	130652	1.64	0.28	0.24	0.18	0.12	0.17	0.05	0.66	-0.53	-0.13	0.14	0.25	0.44	1.7194	0.0031	9.9	1.2	9.9	1.2			
MATH	7	321694	0	A.2	2	130652	2.24	0.15	0.08	0.25	0.41	0.11	0.01	0.68	-0.55	-0.16	-0.08	0.34	0.34	1.2264	0.0034	9.9	1.1	9.9	1.1			
MATH	7	834103	1	E.2	2	1100	1.18	0.33	0.38	0.13	0.10	0.06	0.00	0.64	-0.56	0.03	0.25	0.30	0.31	2.3914	0.0379	-0.1	1.0	-0.3	1.0	A+	A-	A-
MATH	7	776806	2	E.1	3	1100	1.81	0.14	0.33	0.22	0.19	0.12	0.00	0.72	-0.50	-0.31	0.14	0.36	0.39	1.5354	0.0361	-1.9	0.9	-2.1	0.9	A+	A-	B-
MATH	7	444913	3	E.2	3	1100	1.42	0.16	0.45	0.28	0.03	0.08	0.01	0.60	-0.52	-0.09	0.26	0.17	0.32	1.9930	0.0405	1.8	1.1	1.9	1.1	A+	A-	A-
MATH	7	434918	4	E.1	2	1099	1.50	0.12	0.43	0.32	0.11	0.02	0.01	0.60	-0.47	-0.21	0.29	0.30	0.18	2.2487	0.0439	1.0	1.0	0.9	1.0	A+	B-	A-
MATH	7	739109	5	D.3	2	1099	1.44	0.14	0.52	0.18	0.06	0.09	0.01	0.63	-0.52	-0.15	0.27	0.24	0.34	1.9139	0.0396	0.5	1.0	0.4	1.0	A-	A-	A-
MATH	7	190810	6	E.3	3	1100	1.20	0.21	0.55	0.09	0.12	0.03	0.01	0.62	-0.53	0.00	0.24	0.35	0.22	2.5497	0.0422	-0.9	1.0	-1.0	1.0	A+	B-	A-
MATH	7	959914	7	E.4	2	1100	1.36	0.27	0.33	0.22	0.13	0.05	0.01	0.65	-0.51	-0.10	0.19	0.38	0.29	2.3134	0.0384	0.7	1.0	0.3	1.0	A+	A-	A-
MATH	7	369338	8	E.4	2	1100	1.56	0.17	0.37	0.25	0.15	0.06	0.00	0.64	-0.51	-0.21	0.29	0.30	0.26	1.9846	0.0387	2.3	1.1	2.0	1.1	A+	B-	A-
MATH	7	759345	9	E.3	3	1100	1.20	0.34	0.38	0.10	0.13	0.06	0.00	0.63	-0.58	0.07	0.23	0.31	0.29	2.3923	0.0375	2.0	1.1	1.6	1.1	A+	A-	A+
MATH	8	157731	0	E.3	3	129460	1.90	0.13	0.31	0.22	0.22	0.12	0.01	0.69	-0.57	-0.24	0.11	0.35	0.33	1.4355	0.0033	-2.1	1.0	-3.3	1.0			
MATH	8	525100	0	D.1	2	129460	2.32	0.18	0.06	0.25	0.25	0.25	0.05	0.62	-0.47	-0.14	-0.10	0.15	0.45	1.0686	0.0030	9.9	1.3	9.9	1.4			
MATH	8	999681	0	B.2	3	129460	2.23	0.13	0.21	0.13	0.35	0.18	0.01	0.68	-0.54	-0.26	0.05	0.26	0.39	1.1165	0.0031	9.9	1.1	9.9	1.1			
MATH	8	928738	1	C.1	3	1100	0.47	0.69	0.22	0.06	0.02	0.02	0.01	0.48	-0.48	0.28	0.26	0.19	0.16	3.4406	0.0469	-1.6	0.9	-1.8	0.9	A+	A-	A-
MATH	8	975621	3	C.1	3	1100	1.32	0.22	0.43	0.20	0.11	0.04	0.01	0.65	-0.50	-0.15	0.31	0.34	0.26	2.3260	0.0395	-3.7	0.8	-4.1	0.8	A-	C-	C-
MATH	8	598875	4	D.1	2	1100	2.12	0.21	0.20	0.12	0.20	0.27	0.01	0.73	-0.60	-0.18	0.00	0.20	0.53	1.2395	0.0309	-1.4	0.9	-2.3	0.9	A+	A-	A-
MATH	8	305315	5	C.3	3	1100	1.70	0.02	0.43	0.39	0.15	0.01	0.00	0.60	-0.24	-0.51	0.32	0.34	0.11	1.8651	0.0487	-1.7	0.9	-1.6	0.9	A+	A-	A-
MATH	8	163311	6	C.3	3	1100	1.62	0.05	0.47	0.32	0.11	0.04	0.00	0.61	-0.37	-0.37	0.25	0.31	0.26	1.7371	0.0435	-3.7	0.8	-3.3	0.9	A+	A-	C-
MATH	8	619172	7	C.1	2	1099	1.43	0.44	0.13	0.06	0.28	0.08	0.00	0.63	-0.60	0.01	0.10	0.43	0.28	2.1528	0.0315	3.3	1.2	2.4	1.2	A+	A+	A-
MATH	8	214624	9	D.4	2	1100	2.47	0.10	0.15	0.14	0.41	0.20	0.00	0.76	-0.55	-0.34	-0.06	0.23	0.48	0.8674	0.0354	-5.2	0.8	-4.7	0.8	B+	A-	B-
READING	3	134519	0	A.1.4.1	2	126408	1.49	0.11	0.43	0.34	0.13		0.01	0.48	-0.38	-0.15	0.20	0.30		0.9565	0.0							

Appendix G: Item Statistics Open Ended

ELA	3	971699	4	A-K.1.1	3	1500	1.14	0.25	0.43	0.24	0.07		0.02	0.61	-0.59	0.07	0.37	0.24		1.7561	0.0385	-2.0	0.9	-2.9	0.9	B+	A-	B-
ELA	3	268002	5	A-K.1.1	2	1500	1.55	0.13	0.34	0.36	0.16		0.01	0.62	-0.53	-0.18	0.30	0.33		0.9064	0.0371	-1.8	0.9	-2.1	0.9	A+	A-	A-
ELA	3	491952	6	A-K.1.1	3	1500	1.20	0.16	0.55	0.23	0.06		0.01	0.57	-0.53	0.01	0.31	0.24		1.5956	0.0419	-1.1	1.0	-1.3	1.0	A+	A-	A-
ELA	3	206554	7	A-K.1.1	3	1499	0.89	0.36	0.44	0.16	0.04		0.01	0.55	-0.50	0.14	0.34	0.21		2.2591	0.0398	-1.5	0.9	-1.5	0.9	A+	A-	A+
ELA	3	871850	8	A-K.1.1	3	1500	1.24	0.21	0.39	0.36	0.04		0.01	0.60	-0.51	-0.09	0.44	0.20		1.7583	0.0401	-0.9	1.0	-1.2	1.0	A+	A-	A-
ELA	3	420468	9	A-K.1.1	3	1499	1.16	0.20	0.49	0.25	0.06		0.01	0.61	-0.54	-0.02	0.40	0.23		1.7203	0.0400	-3.6	0.9	-3.8	0.9	B+	A-	A-
ELA	3	419198	10	A-K.1.1	3	1499	1.57	0.20	0.30	0.23	0.27		0.01	0.64	-0.55	-0.11	0.15	0.46		0.8761	0.0335	0.3	1.0	-0.3	1.0	A+	A-	A-
ELA	3	330376	11	B-C.3.1	3	1500	0.83	0.36	0.46	0.16	0.01		0.02	0.50	-0.44	0.14	0.35	0.12		2.7116	0.0429	-0.3	1.0	-0.3	1.0	A+	A-	A-
ELA	3	120180	12	B-K.1.1	2	1500	1.63	0.18	0.26	0.31	0.25		0.01	0.57	-0.52	-0.12	0.24	0.33		0.8024	0.0339	4.7	1.2	4.2	1.2	A-	B-	B-
ELA	3	806727	13	B-C.3.1	3	1500	1.14	0.32	0.31	0.28	0.09		0.02	0.59	-0.57	0.07	0.36	0.25		1.6971	0.0347	-1.7	0.9	-1.2	1.0	A+	A-	A+
ELA	3	265053	14	B-K.1.1	3	1499	1.15	0.20	0.49	0.27	0.04		0.01	0.54	-0.44	-0.06	0.37	0.21		1.8718	0.0415	-0.4	1.0	-0.3	1.0	A+	A-	A-
ELA	3	463014	15	B-K.1.1	2	1499	1.25	0.22	0.41	0.27	0.10		0.01	0.55	-0.43	-0.11	0.33	0.28		1.4781	0.0369	0.7	1.0	0.3	1.0	A+	A-	A-
ELA	3	992574	16	B-K.1.1	3	1500	1.20	0.24	0.43	0.22	0.11		0.01	0.62	-0.51	-0.05	0.33	0.35		1.5455	0.0369	-3.8	0.9	-3.8	0.9	A+	A+	A-
ELA	3	773395	17	B-K.1.1	3	1498	1.36	0.16	0.43	0.32	0.10		0.02	0.55	-0.47	-0.11	0.33	0.25		1.2849	0.0386	1.0	1.0	1.1	1.0	C+	A+	A-
ELA	3	647697	18	B-C.3.1	3	1500	1.27	0.20	0.39	0.34	0.07		0.02	0.55	-0.44	-0.12	0.37	0.24		1.5372	0.0381	0.6	1.0	0.4	1.0	A+	A-	A+
ELA	3	667004	19	B-C.3.1	3	1498	1.51	0.11	0.36	0.42	0.10		0.01	0.59	-0.47	-0.22	0.34	0.28		1.0465	0.0400	-0.3	1.0	-0.2	1.0	A+	A-	A-
ELA	3	823056	20	B-K.1.1	3	1499	1.44	0.19	0.36	0.28	0.18		0.01	0.62	-0.49	-0.16	0.27	0.39		1.0941	0.0354	-0.2	1.0	-0.7	1.0	A+	A-	A-
READING	4	320650	0	A.2.3.1	2	126253	2.03	0.08	0.14	0.45	0.33		0.01	0.55	-0.39	-0.26	0.02	0.40		0.0932	0.0041	9.9	1.1	9.9	1.1			
READING	4	960880	0	B.1.2.1	2	126253	1.54	0.08	0.53	0.16	0.23		0.01	0.49	-0.38	-0.18	0.10	0.37		0.6113	0.0039	9.9	1.2	9.9	1.2			
READING	4	567931	0	A.2.5.1	3	126253	1.63	0.14	0.31	0.34	0.21		0.01	0.57	-0.43	-0.22	0.20	0.37		0.7292	0.0038	9.9	1.1	9.9	1.1			
READING	4	822215	0	B.1.1.1	2	126253	2.01	0.06	0.21	0.40	0.34		0.01	0.53	-0.39	-0.27	0.04	0.38		-0.0050	0.0041	9.9	1.1	9.9	1.1			
ELA	4	220399	1	B-K.1.1	3	1500	1.77	0.08	0.31	0.37	0.24		0.00	0.68	-0.49	-0.34	0.21	0.45		0.4222	0.0367	-5.9	0.8	-5.5	0.8	A+	A-	B-
ELA	4	870138	1	E.1.1	3	1500	1.23	0.15	0.50	0.32	0.03	0.00	0.02	0.55	-0.45	-0.10	0.39	0.18	0.03	3.0302	0.0427	-1.6	1.0	-1.7	0.9	A+	A-	A-
ELA	4	886415	2	E.1.1	3	1500	1.24	0.13	0.54	0.28	0.04	0.00	0.04	0.56	-0.41	-0.17	0.39	0.22	0.06	2.5432	0.0419	-3.0	0.9	-3.3	0.9	B+	B-	A+
ELA	4	503738	2	B-C.3.1	3	1500	1.12	0.15	0.63	0.17	0.05		0.01	0.50	-0.41	-0.02	0.25	0.28		1.6342	0.0428	-2.1	0.9	-2.2	0.9	A+	A-	A+
ELA	4	155352	3	B-K.1.1	3	1500	1.32	0.12	0.53	0.27	0.08		0.01	0.42	-0.35	-0.10	0.24	0.21		1.2505	0.0399	4.4	1.2	4.8	1.2	A+	A+	A-
ELA	4	217157	3	E.1.1	3	1500	1.46	0.06	0.51	0.35	0.08	0.01	0.02	0.52	-0.30	-0.34	0.36	0.24	0.09	1.9396	0.0414	-0.6	1.0	-1.0	1.0	B+	B-	A-
ELA	4	541453	4	B-K.1.1	3	1499	1.44	0.05	0.56	0.28	0.10		0.00	0.49	-0.39	-0.22	0.25	0.28		0.7942	0.0414	-0.1	1.0	0.4	1.0	A+	A-	A-
ELA	4	335652	4	E.1.1	3	1499	1.48	0.09	0.45	0.38	0.08	0.01	0.02	0.56	-0.36	-0.32	0.38	0.25	0.09	1.9821	0.0398	-2.2	0.9	-2.4	0.9	B+	B-	B-
ELA	4	356678	5	E.1.1	3	1500	1.46	0.08	0.47	0.34	0.09	0.00	0.02	0.55	-0.34	-0.31	0.33	0.30	0.08	2.1074	0.0398	-2.1	0.9	-2.4	0.9	C+	A-	A-
ELA	4	339919	5	B-C.3.1	3	1500	1.33	0.17	0.43	0.28	0.11		0.01	0.50	-0.45	-0.05	0.24	0.27		1.2645	0.0368	3.0	1.1	3.4	1.1	A+	A-	A-
ELA	4	414755	6	B-K.1.1	3	1499	1.22	0.13	0.57	0.24	0.06		0.01	0.52	-0.39	-0.13	0.34	0.23		1.5198	0.0424	-0.3	1.0	-0.3	1.0	A+	A-	A+
ELA	4	366481	6	E.1.1	3	1499	1.25	0.16	0.50	0.29	0.05	0.01	0.03	0.56	-0.44	-0.15	0.40	0.22	0.07	2.4400	0.0401	-1.5	0.9	-1.8	0.9	A+	A-	A-
ELA	4	911520	7	B-K.1.1	3	1500	1.56	0.09	0.39	0.39	0.13		0.01	0.63	-0.45	-0.30	0.34	0.33		0.8170	0.0387	-4.0	0.9	-4.0	0.9	C+	A-	A+
ELA	4	198286	7	E.1.1	3	1500	1.22	0.16	0.50	0.28	0.05	0.00	0.04	0.55	-0.41	-0.14	0.36	0.26	0.06	2.7810	0.0404	-2.3	0.9	-2.6	0.9	B+	B-	A-
ELA	4	777775	8	B-K.1.1	3	1499	1.37	0.16	0.42	0.31	0.11		0.01	0.65	-0.54	-0.16	0.40	0.31		1.2058	0.0372	-5.8	0.8	-6.0	0.8	B+	A-	A-
ELA	4	928742	8	E.1.1	3	1499	1.42	0.11	0.42	0.41	0.05	0.01	0.03	0.60	-0.43	-0.27	0.43	0.23	0.07	2.2460	0.0407	-3.4	0.9	-3.3	0.9	B+	A-	A-
ELA	4	395834	9	E.1.1	3	1499	1.18	0.15	0.55	0.27	0.03	0.00	0.03	0.59	-0.50	-0.07	0.40	0.20	0.05	3.0151	0.0435	-3.9	0.9	-4.0	0.9	A+	A-	A-
ELA	4	699736	9	B-C.3.1	3	1499	1.58	0.14	0.30	0.40	0.16		0.01	0.67	-0.49	-0.29	0.32	0.39		0.9005	0.0363	-5.2	0.8	-5.5	0.8	A+	A-	B-
ELA	4	646784	10	B-C.2.1	3	1500	1.57	0.07	0.40	0.41	0.12		0.01	0.57	-0.40	-0.29	0.29	0.31		0.7580	0.0398	-2.0	0.9	-2.1	0.9	C+	A-	A-
ELA	4	618826	10	E.1.1	3	1500	1.33	0.09	0.55	0.31	0.05	0.00	0.02	0.54	-0.35	-0.26	0.36	0.26	0.05	2.5759	0.0431	-2.8	0.9	-3.1	0.9	B+	A-	A-
ELA	4	197690	11	B-K.1.1	3	1500	1.65	0.09	0.36	0.38	0.18		0.00	0.65	-0.49	-0.29	0.26	0.39		0.6196	0.0373	-5.2	0.8	-5.0	0.8	A+	B-	A-
ELA	4	640552	11	E.1.1	3	1500	1.44	0.09	0.48	0.35	0.08	0.01	0.03	0.58	-0.36	-0.31	0.35	0.30	0.10	2.0304	0.0399	-3.5	0.9	-3.9	0.9	B+	C-	B-
ELA	4	458831	12	E.1.1	3	1499	1.30	0.09	0.57	0.29	0.04	0.00	0.03	0.54	-0.37	-0.22	0.37	0.23	0.07	2.3978	0.0434	-2.7	0.9	-3.0	0.9	B+	A-	A-
ELA	4	796700	12	A-K.1.1	3	1499	1.67	0.09	0.34	0.37	0.19		0.00	0.61	-0.45	-0.29	0.24	0.38		0.6060	0.0368	-2.9	0.9	-3.2	0.9	C+	A-	A+
ELA	4	824801	12	A-K.1.1	3	1498	1.61	0.13	0.31	0.36	0.19		0.01	0.63	-0.51	-0.24	0.29	0.36		0.7766	0.0355	-2.7	0.9	-2.7	0.9	B+	A-	A+
ELA	4	656657	13	E.1.1	3	1498	1.49	0.07	0.45	0.40	0.08	0.00	0.03	0.55	-0.32	-0.35	0.37	0.27	0.06	2.2703	0.0417	-2.1	0.9	-2.2	0.9	C+	A-	A-
ELA	4	486694	13	A-K.1.1	3	1500	1.52	0.12	0.36	0.40	0.12		0.01	0.64	-0.48	-0.27	0.38	0.32		0.9898	0.0381	-4.6	0.9	-4.7	0.9	A+	A-	B-
ELA	4	750175	14	E.1.1	3	1500	0.93	0.34	0.40	0.24	0.01	0.00	0.04	0.47	-0.37	-0.01	0.38	0.14	0.07	3.2209	0.0399	2.9	1.1	2.5	1.1	B+	C-	B-
ELA	4	934705	14	E.1.1	3	1500	1.39	0.10	0.51	0.30	0.09	0.00	0.03	0.58	-0.40	-0.27	0.37	0.28	0.09	2.2422	0.0399	-2.8	0.9	-3.3	0.9	B+	A-	A-
ELA	4	295998	15	A-K.1.1	3	1500	1.82	0.13	0.25	0.29	0.33		0.00	0.71	-0.55	-0.29	0.15	0.52		0.4635	0.0337	-7.0	0.8	-6.7	0.8	A+	A-	C-
ELA	4	147108	15	A-K.1.1	3	1500	1.50	0.08	0.48	0.30	0.14		0.00	0.52	-0.42	-0.21	0.25											

Appendix G: Item Statistics Open Ended

ELA	4	676197	17	A-K.1.1	3	1499	1.26	0.10	0.60	0.23	0.06		0.00	0.49	-0.37	-0.14	0.28	0.26		1.3124	0.0429	-0.9	1.0	-0.5	1.0	A+	A-	A-
ELA	4	604299	18	E.1.1	3	1499	1.43	0.10	0.44	0.38	0.07	0.00	0.01	0.59	-0.46	-0.24	0.39	0.25	0.06	2.5391	0.0408	-3.1	0.9	-3.1	0.9	A+	A-	A-
ELA	4	673142	18	A-C.3.1	3	1501	1.48	0.13	0.39	0.36	0.13		0.01	0.61	-0.48	-0.19	0.28	0.35		1.0037	0.0377	-3.0	0.9	-3.1	0.9	A+	A-	A-
ELA	4	960881	19	E.1.1	3	1501	1.51	0.08	0.41	0.44	0.07	0.00	0.01	0.60	-0.45	-0.28	0.37	0.26	0.06	2.2949	0.0421	-4.0	0.9	-3.9	0.9	A+	A+	A-
ELA	4	756510	19	A-K.1.1	3	1500	1.41	0.14	0.43	0.32	0.12		0.01	0.65	-0.56	-0.16	0.35	0.33		1.1120	0.0378	-5.5	0.8	-5.5	0.8	A+	B-	B-
ELA	4	705923	20	E.1.1	3	1497	1.64	0.09	0.38	0.35	0.17	0.02	0.02	0.64	-0.39	-0.38	0.29	0.38	0.14	1.6894	0.0363	-4.4	0.9	-4.7	0.9	A+	C-	B-
READING	4	459665	20	A.2.3.1		125284	1.76	0.05	0.26	0.57	0.12		0.00	0.56	-0.40	-0.32	0.27	0.28		0.6399	0.0048	-9.3	1.0	-8.6	1.0			
READING	5	857096	0	B.1.1.1	2	125284	1.73	0.07	0.27	0.53	0.14		0.01	0.57	-0.43	-0.29	0.29	0.28		0.7484	0.0045	-2.8	1.0	-0.9	1.0			
READING	5	468777	0	B.1.1.1	3	125284	1.75	0.08	0.29	0.43	0.20		0.00	0.61	-0.42	-0.34	0.24	0.37		0.6638	0.0042	-9.9	0.9	-9.9	0.9			
READING	5	119709	0	B.1.2.1	3	125284	1.40	0.13	0.47	0.28	0.13		0.01	0.50	-0.41	-0.12	0.21	0.30		1.2520	0.0041	9.9	1.1	9.9	1.1			
ELA	5	722054	0	A-K.1.1	3	1500	1.64	0.09	0.30	0.49	0.12		0.00	0.59	-0.47	-0.24	0.30	0.29		0.9341	0.0401	-1.7	0.9	-1.7	0.9	A+	A-	A-
ELA	5	849210	1	E.1.1	3	1500	1.87	0.06	0.23	0.51	0.18	0.02	0.02	0.59	-0.30	-0.41	0.17	0.36	0.15	1.6008	0.0388	-1.1	1.0	-0.7	1.0	C+	A-	A+
ELA	5	595276	1	A-C.3.1	3	1500	1.58	0.13	0.32	0.38	0.17		0.01	0.68	-0.57	-0.21	0.30	0.38		1.0386	0.0362	-6.6	0.8	-6.8	0.8	A+	A-	A+
ELA	5	343860	2	E.1.1	3	1500	1.60	0.11	0.31	0.45	0.12	0.01	0.02	0.62	-0.44	-0.30	0.33	0.33	0.07	2.1553	0.0378	-3.3	0.9	-3.3	0.9	B+	C-	A-
ELA	5	121705	2	A-K.1.1	3	1500	0.94	0.39	0.36	0.19	0.07		0.01	0.54	-0.49	0.11	0.30	0.27		2.1716	0.0359	-0.7	1.0	-1.1	1.0	A+	A-	B-
ELA	5	667729	3	E.1.1	3	1500	1.51	0.15	0.34	0.36	0.14	0.01	0.02	0.64	-0.50	-0.23	0.33	0.34	0.11	2.2087	0.0354	-4.5	0.9	-4.7	0.9	A+	B-	A-
ELA	5	261951	3	A-K.1.1	3	1500	1.70	0.07	0.33	0.42	0.17		0.00	0.55	-0.43	-0.24	0.19	0.33		0.7191	0.0389	1.2	1.0	1.2	1.0	B+	A+	A+
ELA	5	690803	4	E.1.1	3	1500	1.93	0.03	0.22	0.55	0.18	0.02	0.02	0.58	-0.30	-0.40	0.12	0.36	0.15	1.3677	0.0412	-2.9	0.9	-2.8	0.9	C+	A+	A+
ELA	5	384327	4	A-K.1.1	3	1500	1.70	0.14	0.23	0.44	0.20		0.01	0.63	-0.46	-0.29	0.26	0.38		0.9131	0.0361	-1.4	1.0	-1.5	1.0	A+	A-	A-
ELA	5	157470	5	E.1.1	3	1500	1.73	0.04	0.37	0.43	0.16	0.01	0.02	0.57	-0.23	-0.45	0.23	0.38	0.09	1.8883	0.0403	-2.2	0.9	-2.5	0.9	C+	C-	A-
ELA	5	355864	5	A-K.1.1	3	1500	1.80	0.07	0.29	0.40	0.23		0.00	0.61	-0.42	-0.32	0.17	0.40		0.5604	0.0373	-2.5	0.9	-2.7	0.9	B+	A+	A-
ELA	5	375791	6	E.1.1	3	1500	1.65	0.07	0.32	0.51	0.09	0.00	0.02	0.59	-0.32	-0.41	0.35	0.30	0.07	2.1740	0.0415	-2.9	0.9	-2.8	0.9	C+	A+	A-
ELA	5	747836	6	A-K.1.1	3	1500	1.49	0.19	0.26	0.42	0.13		0.00	0.65	-0.52	-0.22	0.39	0.32		1.3187	0.0360	-4.0	0.9	-3.8	0.9	A+	A-	A+
ELA	5	937654	7	E.1.1	3	1500	1.56	0.11	0.39	0.35	0.15	0.01	0.01	0.61	-0.37	-0.36	0.31	0.36	0.10	2.1471	0.0367	-3.1	0.9	-3.5	0.9	A+	A-	A-
ELA	5	643887	7	A-K.1.1	3	1499	1.63	0.07	0.34	0.47	0.11		0.00	0.62	-0.43	-0.35	0.36	0.30		0.9068	0.0410	-3.9	0.9	-3.9	0.9	C+	A+	A-
ELA	5	651837	8	E.1.1	3	1499	1.79	0.05	0.32	0.43	0.17	0.02	0.02	0.61	-0.36	-0.41	0.24	0.34	0.17	1.5840	0.0378	-3.6	0.9	-3.7	0.9	B+	A+	A-
ELA	5	307086	8	A-V.4.1	3	1501	1.67	0.09	0.29	0.50	0.13		0.00	0.55	-0.42	-0.24	0.25	0.30		0.8911	0.0395	-0.6	1.0	-0.6	1.0	B+	A+	A+
ELA	5	671092	9	E.1.1	3	1501	1.40	0.12	0.45	0.34	0.08	0.01	0.02	0.57	-0.42	-0.22	0.34	0.27	0.10	2.3790	0.0385	-2.4	0.9	-2.6	0.9	A+	A-	A-
ELA	5	375461	9	A-K.1.1	3	1500	1.27	0.09	0.57	0.32	0.02		0.00	0.51	-0.38	-0.18	0.39	0.13		1.9124	0.0471	-1.7	0.9	-1.7	0.9	C+	A+	A-
ELA	5	641945	10	E.1.1	3	1500	1.38	0.18	0.39	0.31	0.10	0.01	0.02	0.58	-0.41	-0.22	0.32	0.31	0.14	2.2247	0.0352	-1.7	0.9	-1.9	0.9	C+	A+	A-
ELA	5	187945	10	B-C.3.1	3	1500	1.46	0.23	0.25	0.34	0.18		0.01	0.64	-0.59	-0.08	0.31	0.35		1.3215	0.0336	-2.4	0.9	-3.0	0.9	A+	A+	A-
ELA	5	453435	11	E.1.1	3	1500	1.54	0.07	0.42	0.41	0.09	0.00	0.02	0.53	-0.25	-0.39	0.34	0.28	0.06	2.3988	0.0412	-0.4	1.0	-0.8	1.0	A+	B-	A-
ELA	5	759510	11	B-C.3.1	3	1500	1.23	0.16	0.52	0.26	0.07		0.00	0.55	-0.50	-0.03	0.32	0.23		1.6738	0.0401	-1.0	1.0	-0.9	1.0	B+	A-	A-
ELA	5	171926	12	E.1.1	3	1500	1.67	0.09	0.36	0.37	0.17	0.02	0.02	0.62	-0.46	-0.29	0.24	0.36	0.13	1.8403	0.0363	-3.6	0.9	-3.7	0.9	B+	A-	A-
ELA	5	367993	12	B-C.3.1	3	1500	1.46	0.09	0.41	0.45	0.05		0.00	0.47	-0.35	-0.19	0.29	0.23		1.3991	0.0433	2.1	1.1	2.0	1.1	A+	A+	A+
ELA	5	650312	13	E.1.1	3	1500	1.72	0.06	0.33	0.43	0.16	0.01	0.02	0.56	-0.32	-0.37	0.25	0.31	0.11	1.8932	0.0390	0.1	1.0	0.0	1.0	C+	A-	B-
ELA	5	820297	13	B-K.1.1	3	1498	1.64	0.09	0.32	0.43	0.15		0.00	0.56	-0.44	-0.23	0.24	0.33		0.9058	0.0383	-0.2	1.0	-0.2	1.0	A+	A-	A+
ELA	5	664082	14	E.1.1	3	1498	1.69	0.07	0.35	0.43	0.14	0.01	0.02	0.60	-0.39	-0.36	0.29	0.31	0.14	1.8005	0.0382	-3.2	0.9	-3.3	0.9	C+	A-	A-
ELA	5	188634	14	B-K.1.1	3	1500	1.72	0.13	0.22	0.44	0.20		0.00	0.68	-0.61	-0.18	0.27	0.37		0.8770	0.0363	-5.2	0.8	-5.3	0.8	A+	B-	A-
ELA	5	140996	15	E.1.1	3	1500	1.41	0.14	0.42	0.35	0.09	0.00	0.02	0.57	-0.45	-0.17	0.31	0.29	0.07	2.5712	0.0383	-1.1	1.0	-1.3	1.0	B+	B-	A-
ELA	5	512301	15	B-C.3.1	3	1497	1.37	0.10	0.50	0.32	0.08		0.01	0.52	-0.43	-0.15	0.30	0.25		1.3845	0.0408	-0.9	1.0	-0.5	1.0	A+	A-	A-
ELA	5	134134	16	E.1.1	3	1497	1.40	0.14	0.41	0.36	0.08	0.01	0.02	0.50	-0.35	-0.21	0.31	0.25	0.07	2.3739	0.0381	1.6	1.1	1.6	1.1	A+	A-	A-
ELA	5	918460	16	B-K.1.1	3	1500	1.49	0.06	0.49	0.34	0.11		0.01	0.49	-0.36	-0.24	0.26	0.27		1.0175	0.0411	1.6	1.1	1.4	1.1	B+	A-	A+
ELA	5	510765	17	E.1.1	3	1500	1.63	0.06	0.38	0.42	0.13	0.00	0.02	0.56	-0.32	-0.36	0.30	0.31	0.03	2.5946	0.0403	-1.0	1.0	-1.1	1.0	C+	A-	A-
ELA	5	935685	17	B-K.1.1	3	1499	1.69	0.07	0.28	0.53	0.12		0.01	0.63	-0.46	-0.31	0.31	0.33		0.8599	0.0412	-4.5	0.9	-4.5	0.8	B+	A-	A-
ELA	5	530390	18	E.1.1	3	1499	1.76	0.07	0.26	0.52	0.15	0.00	0.03	0.61	-0.39	-0.35	0.24	0.36	0.03	2.3186	0.0403	-3.5	0.9	-3.4	0.9	A+	A-	A-
ELA	5	374129	18	B-C.3.1	3	1500	1.18	0.16	0.51	0.33	0.00		0.00	0.53	-0.49	-0.01	0.38	0.07		2.6336	0.0448	-0.9	1.0	-0.6	1.0	A-	C-	B-
ELA	5	352233	19	E.1.1	3	1500	1.48	0.12	0.38	0.39	0.10	0.01	0.02	0.64	-0.42	-0.32	0.39	0.33	0.10	2.3075	0.0379	-5.0	0.8	-5.1	0.8	A+	A-	B-
ELA	5	506291	19	B-C.3.1	3	1500	1.60	0.08	0.38	0.40	0.14		0.00	0.65	-0.47	-0.35	0.38	0.33		0.8972	0.0388	-5.7	0.8	-5.6	0.8	A+	B-	A-
READING	5	868146	20	B.1.1.1		128469	1.75	0.08	0.28	0.46	0.19		0.01	0.60	-0.43	-0.31	0.24	0.35		0.4376	0.0041	-9.9	0.9	-9.9	0.9			
READING	6	875738	0	B.1.1.1	3	128469	1.54	0.08	0.42	0.37	0.13		0.00	0.61	-0.44	-0.30	0.33	0.32		0.7484	0.0042	-9.9	0.9	-9.9	0.9			
READING	6	750087	0	B.1.2.1	3	128469	1.69	0.04	0.33																			

Appendix G: Item Statistics Open Ended

READING	6	246649	2	A.1.5.1	3	1100	1.86	0.02	0.33	0.42	0.23		0.00	0.47	-0.24	-0.32	0.08	0.35		-0.0742	0.0457	1.9	1.1	2.0	1.1	B+	A+	A+
READING	6	364056	3	B.1.1.1	3	1100	1.59	0.15	0.25	0.47	0.14		0.01	0.64	-0.44	-0.34	0.36	0.35		0.9120	0.0428	-3.8	0.9	-3.8	0.9	C+	A-	A-
READING	6	298622	4	B.1.2.1	3	1100	1.91	0.04	0.25	0.48	0.23		0.00	0.42	-0.32	-0.29	0.20	0.21		0.0404	0.0457	3.4	1.1	3.3	1.1	C+	A-	A-
READING	6	590185	5	B.1.1.1	3	1100	1.79	0.05	0.31	0.45	0.20		0.00	0.64	-0.35	-0.47	0.29	0.37		0.2157	0.0461	-4.7	0.8	-4.7	0.8	B+	A+	A+
READING	6	462866	6	A.2.3.1	3	1100	1.85	0.04	0.30	0.44	0.23		0.00	0.51	-0.33	-0.34	0.16	0.33		0.0846	0.0458	1.2	1.1	0.9	1.0	B+	A+	A+
READING	6	638194	7	A.2.3.1	3	1100	1.38	0.08	0.52	0.34	0.06		0.00	0.59	-0.44	-0.24	0.38	0.25		1.1323	0.0495	-3.9	0.8	-4.0	0.8	B+	A-	A-
READING	6	838622	8	A.2.3.2	3	1099	1.64	0.05	0.37	0.47	0.11		0.00	0.49	-0.35	-0.27	0.26	0.26		0.5507	0.0486	0.2	1.0	0.1	1.0	B+	A+	A+
READING	6	516438	9	B.1.1.1		130577	1.84	0.08	0.19	0.55	0.19		0.01	0.64	-0.47	-0.31	0.21	0.37		0.4255	0.0042	-9.9	0.9	-9.9	0.9			
READING	7	612072	0	A.2.3.1	3	130577	1.71	0.09	0.29	0.45	0.17		0.00	0.56	-0.40	-0.28	0.24	0.32		0.5940	0.0041	1.8	1.0	1.1	1.0			
READING	7	782559	0	B.1.2.1	3	130577	1.74	0.02	0.44	0.31	0.23		0.01	0.56	-0.27	-0.45	0.23	0.38		0.0639	0.0041	-9.9	1.0	-9.9	1.0			
READING	7	528845	0	B.1.2.1	3	130577	1.62	0.10	0.39	0.30	0.21		0.01	0.48	-0.36	-0.19	0.12	0.35		0.6749	0.0038	9.9	1.2	9.9	1.2			
READING	7	613533	0	B.1.1.1	3	1100	1.89	0.09	0.23	0.39	0.29		0.00	0.63	-0.41	-0.37	0.15	0.44		0.3278	0.0419	-2.5	0.9	-2.7	0.9	C+	A+	A+
READING	7	915590	1	A.2.3.1	3	1100	1.57	0.16	0.29	0.38	0.18		0.01	0.59	-0.50	-0.16	0.26	0.34		0.9291	0.0410	-0.2	1.0	-0.4	1.0	C+	A-	A-
READING	7	531292	2	B.1.2.1	3	1100	1.64	0.10	0.37	0.34	0.20		0.00	0.53	-0.42	-0.19	0.16	0.35		0.6699	0.0420	0.9	1.0	1.1	1.0	C+	A+	A+
READING	7	111727	3	B.3.3.1	3	1099	1.56	0.12	0.38	0.32	0.18		0.01	0.51	-0.50	-0.06	0.17	0.29		0.8330	0.0412	2.9	1.1	3.1	1.1	A+	A+	A+
READING	7	549013	4	A.2.3.1	3	1099	1.65	0.09	0.37	0.34	0.20		0.00	0.57	-0.48	-0.22	0.22	0.34		0.6185	0.0423	-0.4	1.0	-0.2	1.0	C+	A+	A+
READING	7	631501	5	B.1.1.1	3	1100	1.69	0.05	0.39	0.38	0.18		0.01	0.61	-0.36	-0.40	0.26	0.38		0.4176	0.0452	-3.2	0.9	-3.4	0.9	C+	A-	A+
READING	7	613329	6	B.1.1.1	3	1100	1.73	0.10	0.35	0.28	0.27		0.00	0.53	-0.36	-0.28	0.17	0.37		0.5100	0.0401	2.0	1.1	1.5	1.1	C+	A-	A+
READING	7	160026	7	B.1.1.1	3	1100	1.95	0.04	0.26	0.42	0.28		0.00	0.46	-0.28	-0.30	0.07	0.33		0.0205	0.0442	2.5	1.1	2.4	1.1	C+	A+	A+
READING	7	485314	8	B.1.1.1	3	1100	1.85	0.04	0.28	0.46	0.22		0.01	0.65	-0.38	-0.45	0.24	0.39		0.2040	0.0456	-4.9	0.8	-4.6	0.8	B+	A-	A+
READING	7	293316	9	A.2.4.1	3	129328	1.59	0.09	0.36	0.42	0.13		0.01	0.61	-0.41	-0.32	0.31	0.35		1.3568	0.0041	-9.9	0.9	-9.9	0.9			
READING	8	797230	0	B.1.2.1	3	129328	2.14	0.06	0.17	0.35	0.42		0.01	0.67	-0.40	-0.43	0.01	0.50		0.4048	0.0040	-9.9	0.8	-9.9	0.8			
READING	8	960786	0	B.1.1.1	3	129328	1.83	0.07	0.25	0.46	0.22		0.01	0.59	-0.41	-0.33	0.18	0.37		0.9028	0.0041	-9.9	1.0	-9.9	1.0			
READING	8	989786	0	B.1.2.1	3	129328	1.60	0.11	0.39	0.30	0.20		0.01	0.56	-0.45	-0.22	0.23	0.35		1.2688	0.0038	7.5	1.0	7.8	1.0			
READING	8	655963	0	B.3.3.1	3	1099	1.80	0.04	0.26	0.56	0.14		0.01	0.53	-0.35	-0.33	0.23	0.29		0.8992	0.0499	-0.7	1.0	-0.8	1.0	C+	A+	A-
READING	8	446305	1	A.2.5.1	3	1100	2.10	0.01	0.11	0.65	0.23		0.00	0.57	-0.21	-0.39	-0.09	0.44		0.1238	0.0560	-3.4	0.9	-3.5	0.9	B+	A+	A-
READING	8	606666	2	A.2.3.1	3	1100	1.98	0.02	0.14	0.69	0.16		0.00	0.57	-0.27	-0.41	0.09	0.37		0.4800	0.0564	-3.3	0.9	-3.3	0.8	C+	A+	B-
READING	8	468973	3	A.2.4.1	3	1098	2.04	0.02	0.15	0.59	0.23		0.00	0.59	-0.25	-0.46	0.07	0.39		0.2936	0.0523	-3.5	0.9	-3.5	0.9	A+	A+	A-
READING	8	758004	4	A.2.6.1	3	1100	2.07	0.03	0.11	0.61	0.24		0.00	0.60	-0.31	-0.41	0.01	0.41		0.4439	0.0513	-3.7	0.8	-3.3	0.9	A+	A-	C-
READING	8	343562	5	B.1.1.1	3	1100	1.88	0.07	0.21	0.51	0.22		0.01	0.62	-0.37	-0.36	0.12	0.44		0.8964	0.0446	-3.9	0.8	-3.9	0.9	C+	A-	A-
READING	8	355317	6	A.1.3.1	3	1100	1.78	0.06	0.23	0.58	0.13		0.01	0.65	-0.40	-0.39	0.26	0.38		1.0870	0.0487	-5.1	0.8	-5.0	0.8	C+	A+	A+
READING	8	677527	7	B.2.1.1	3	1099	1.67	0.09	0.25	0.54	0.11		0.01	0.62	-0.43	-0.32	0.33	0.33		1.3867	0.0458	-4.2	0.8	-3.9	0.8	B+	A-	A+
READING	8	267343	8	B.1.1.1	3	1100	1.96	0.04	0.16	0.60	0.20		0.00	0.59	-0.26	-0.43	0.10	0.40		0.6440	0.0500	-3.7	0.8	-3.4	0.9	C+	A+	A-
SCIENCE	8	759380	9	B.1.1.4	3	125724	0.88	0.36	0.41	0.24			0.01	0.46	-0.45	0.18	0.31		1.4789	0.0045	9.9	1.1	9.9	1.1				
SCIENCE	4	390993	0	A.3.1.2	3	125724	1.17	0.28	0.27	0.45			0.02	0.52	-0.43	-0.11	0.49		0.7894	0.0042	9.9	1.1	9.9	1.1				
SCIENCE	4	906704	0	A.3.1.4	2	125724	1.12	0.25	0.37	0.37			0.01	0.52	-0.48	0.01	0.42		0.8806	0.0044	9.9	1.0	9.9	1.0				
SCIENCE	4	383485	0	B.3.2.2	2	125724	1.26	0.18	0.39	0.44			0.01	0.52	-0.45	-0.07	0.42		0.4981	0.0046	8.2	1.0	8.0	1.0				
SCIENCE	4	327723	0	C.1.1.2	3	125724	1.04	0.34	0.27	0.38			0.01	0.43	-0.44	0.13	0.31		1.0892	0.0041	9.9	1.3	9.9	1.4				
SCIENCE	4	932964	0	A.1.3.5	2	1099	1.19	0.20	0.41	0.39			0.02	0.60	-0.53	-0.05	0.48		0.6750	0.0490	-3.0	0.9	-2.5	0.9	A+	A+	A-	
SCIENCE	4	930699	1	A.3.3.1	3	1100	0.50	0.61	0.29	0.11			0.02	0.39	-0.38	0.23	0.27		2.4365	0.0519	1.2	1.1	2.0	1.1	A+	A-	B-	
SCIENCE	4	582464	2	A.3.2.2	3	1099	0.71	0.38	0.53	0.09			0.01	0.36	-0.39	0.30	0.13		2.1397	0.0562	3.8	1.2	4.1	1.2	A-	A-	A-	
SCIENCE	4	621157	3	B.3.1.2	2	1100	1.39	0.16	0.29	0.55			0.01	0.52	-0.43	-0.16	0.46		0.2217	0.0495	1.0	1.0	2.3	1.1	A+	B-	C-	
SCIENCE	4	592110	4	A.2.1.4	3	1099	0.65	0.47	0.40	0.13			0.02	0.40	-0.39	0.23	0.24		2.1346	0.0518	3.6	1.1	3.6	1.2	A+	B-	A-	
SCIENCE	4	707848	5	D.1.2.3	2	1100	1.00	0.35	0.30	0.35			0.02	0.51	-0.49	0.08	0.41		1.1822	0.0443	1.1	1.0	1.0	1.1	A-	C-	A-	
SCIENCE	4	685879	6	B.2.1.2	2	1099	1.27	0.27	0.19	0.54			0.02	0.47	-0.40	-0.14	0.46		0.6184	0.0440	4.2	1.2	4.2	1.3	A-	A-	A-	
SCIENCE	4	982041	7	C.2.1.2	2	1100	1.38	0.06	0.50	0.44			0.01	0.33	-0.27	-0.13	0.26		-0.1595	0.0576	3.9	1.2	4.1	1.2	A+	C-	A-	
SCIENCE	4	167730	8	B.3.1.2	2	1100	1.46	0.18	0.18	0.64			0.02	0.59	-0.48	-0.24	0.58		0.1449	0.0482	-1.2	1.0	-1.7	0.9	A+	C-	A-	
SCIENCE	4	600078	9	D.2.1.2	2	1100	0.84	0.38	0.41	0.22			0.02	0.48	-0.46	0.17	0.34		1.5844	0.0483	1.8	1.1	2.1	1.1	A+	A-	A+	
SCIENCE	4	216292	10	A.1.1.1	2	1099	0.70	0.45	0.40	0.15			0.02	0.39	-0.35	0.15	0.29		1.9755	0.0502	3.1	1.1	4.0	1.2	A+	A-	A+	
SCIENCE	4	833826	11	B.3.3.4	2	1100	1.00	0.30	0.40	0.30			0.02	0.53	-0.47	0.05	0.42		1.1870	0.0474	0.3	1.0	0.2	1.0	A+	A-	A+	
SCIENCE	4	255445	12	B.2.2.1	2	127878	1.51	0.15	0.19	0.66			0.01	0.57	-0.50	-0.18	0.52		-0.5412	0.0046	-9.9	0.9	-9.9	0.9				
SCIENCE	8	721625	0	A.3.2.1	2	127878	1.05	0.15	0.65	0.20			0.02	0.37	-0.32	0.03	0.26		0.4638	0.0054	9.9	1.1	9.9	1.1				
SCIENCE	8	624163	0	B.1.1.2	2	127878	0.92	0.26	0.56	0.18			0.01	0.28	-0.23	0.03	0.22		0.9018	0.0049	9.9	1.3	9.9	1.3				
SCIENCE	8	746974	0	A.2.2.1	2	127878																						

Appendix G: Item Statistics Open Ended

SCIENCE	8	529020	0	A.2.2.2	2	1099	0.39	0.71	0.19	0.10			0.04	0.46	-0.46	0.30	0.32			2.0899	0.0527	-2.0	0.9	-2.6	0.8	A+	A-	A-
SCIENCE	8	551512	1	A.1.1.4	3	1100	0.50	0.60	0.30	0.10			0.02	0.38	-0.38	0.24	0.24			1.9469	0.0523	2.6	1.1	1.9	1.1	A+	A+	A-
SCIENCE	8	156756	2	A.3.2.2	2	1100	1.26	0.18	0.38	0.44			0.01	0.50	-0.43	-0.09	0.42			-0.0040	0.0484	0.9	1.0	0.3	1.0	B+	A-	A-
SCIENCE	8	368948	3	B.2.2.1	3	1100	1.51	0.14	0.22	0.64			0.01	0.52	-0.48	-0.13	0.45			-0.5165	0.0497	-0.5	1.0	0.1	1.0	B+	C-	C-
SCIENCE	8	224132	4	B.3.2.2	3	1099	0.40	0.66	0.29	0.05			0.02	0.50	-0.51	0.42	0.23			2.3942	0.0581	-2.6	0.9	-4.1	0.8	C+	A-	A-
SCIENCE	8	202679	5	A.1.2.1	2	1100	0.38	0.69	0.24	0.07			0.03	0.38	-0.38	0.28	0.22			2.3243	0.0570	1.1	1.1	0.9	1.1	A-	A-	A+
SCIENCE	8	215406	6	A.1.3.3	3	1100	1.14	0.29	0.27	0.44			0.01	0.64	-0.58	-0.03	0.56			0.3462	0.0447	-3.8	0.9	-3.9	0.8	A-	B-	C-
SCIENCE	8	145790	7	D.2.1.3	3	1100	0.80	0.36	0.49	0.15			0.02	0.32	-0.23	0.01	0.30			1.2205	0.0512	5.0	1.2	5.0	1.2	A-	A-	A+
SCIENCE	8	594420	8	A.1.3.2	3	1100	1.00	0.28	0.44	0.28			0.02	0.57	-0.49	0.03	0.46			0.6505	0.0479	-2.5	0.9	-2.4	0.9	A+	C-	B-
SCIENCE	8	463827	9	D.1.1.2	2	1100	0.80	0.45	0.31	0.25			0.03	0.58	-0.59	0.25	0.41			1.1466	0.0464	-1.4	1.0	-1.9	0.9	A-	C-	B-
SCIENCE	8	221230	10	C.3.1.3	2	1100	0.74	0.44	0.38	0.18			0.01	0.47	-0.45	0.22	0.32			1.3231	0.0489	1.9	1.1	2.0	1.1	B-	C-	C-
SCIENCE	8	872148	11	C.2.1.1	3	1100	0.65	0.51	0.32	0.17			0.03	0.52	-0.50	0.24	0.37			1.5265	0.0489	-0.3	1.0	-0.8	1.0	A-	A-	A-
WRITING	8	140921	12	A.1	3	123608	2.68		0.03	0.34	0.55	0.08		0.66		-0.33	-0.49	0.40	0.34	1.6432	0.0064	-9.9	0.7	-9.9	0.6			
WRITING	5	140921	0	B.6	3	123608	2.63		0.04	0.36	0.53	0.07		0.69		-0.39	-0.46	0.42	0.34	1.9722	0.0062	-9.9	0.8	-9.9	0.7			
WRITING	5	504276	0	A.2	3	123608	2.51		0.04	0.45	0.47	0.04		0.66		-0.39	-0.43	0.48	0.27	2.5599	0.0064	-9.9	0.7	-9.9	0.6			
WRITING	5	504276	0	B.6	3	123608	2.50		0.05	0.45	0.46	0.04		0.67		-0.40	-0.43	0.48	0.28	2.5974	0.0064	-9.9	0.7	-9.9	0.7			
WRITING	5	757690	0	A.2	3	127854	2.68		0.03	0.32	0.57	0.07		0.68		-0.37	-0.48	0.43	0.32	2.1165	0.0064	-9.9	0.8	-9.9	0.7			
WRITING	8	757690	0	B.6	3	127854	2.64		0.04	0.34	0.56	0.06		0.69		-0.39	-0.47	0.44	0.33	2.3261	0.0063	-9.9	0.9	-9.9	0.9			
WRITING	8	133857	0	A.3	3	127854	2.63		0.05	0.35	0.52	0.08		0.70		-0.41	-0.45	0.43	0.35	2.3116	0.0061	-9.9	0.7	-9.9	0.7			
WRITING	8	133857	0	B.6	3	127854	2.60		0.05	0.36	0.51	0.07		0.72		-0.44	-0.45	0.45	0.35	2.4847	0.0061	-9.9	0.8	-9.9	0.8			
WRITING	8	658593	0	A.2	3	1095	2.67		0.04	0.32	0.56	0.08		0.65		-0.39	-0.43	0.41	0.31	2.2197	0.0660	-9.0	0.7	-9.0	0.6	C+	A-	A-
WRITING	8	658593	1	B.6	3	1095	2.65		0.05	0.32	0.56	0.07		0.67		-0.42	-0.43	0.42	0.31	2.3548	0.0656	-6.8	0.7	-6.6	0.7	C+	A-	A-
WRITING	8	837444	1	A.3	3	1098	2.68		0.04	0.35	0.50	0.11		0.67		-0.38	-0.44	0.33	0.39	2.0491	0.0647	-9.9	0.6	-9.9	0.6	B+	A-	A-
WRITING	8	837444	2	B.6	3	1098	2.65		0.05	0.36	0.48	0.11		0.70		-0.43	-0.43	0.36	0.39	2.2495	0.0635	-5.6	0.8	-3.4	0.8	B+	A-	A-
WRITING	8	731824	2	A.2	3	1099	2.62		0.03	0.39	0.49	0.08		0.64		-0.37	-0.45	0.41	0.31	2.1883	0.0661	-9.1	0.7	-9.7	0.6	B+	A-	A-
WRITING	8	731824	3	B.6	3	1099	2.59		0.04	0.40	0.48	0.08		0.65		-0.37	-0.44	0.43	0.30	2.3655	0.0653	-5.2	0.8	-5.8	0.7	B+	A-	A-
WRITING	8	696868	3	A.3	3	1098	2.61		0.03	0.40	0.49	0.07		0.66		-0.34	-0.46	0.39	0.35	2.2562	0.0667	-9.7	0.6	-9.9	0.6	A+	A-	A-
WRITING	8	696868	4	B.6	3	1098	2.57		0.04	0.42	0.47	0.07		0.66		-0.37	-0.45	0.41	0.34	2.3948	0.0666	-5.0	0.8	-5.0	0.8	A+	A-	C-
WRITING	8	373131	4	A.2	3	1100	2.64		0.03	0.38	0.51	0.08		0.65		-0.33	-0.47	0.38	0.34	2.1620	0.0671	-8.6	0.7	-8.7	0.6	A+	C-	A-
WRITING	8	373131	5	B.6	3	1100	2.62		0.04	0.37	0.51	0.08		0.66		-0.42	-0.40	0.37	0.34	2.3619	0.0661	-5.8	0.8	-6.0	0.7	C+	B-	A-
WRITING	8	905121	5	A.3	3	1089	2.58		0.04	0.41	0.46	0.09		0.66		-0.36	-0.46	0.41	0.34	2.4637	0.0646	-9.4	0.6	-9.7	0.6	A+	A-	A-
WRITING	8	905121	6	B.6	3	1089	2.60		0.05	0.39	0.46	0.10		0.67		-0.37	-0.45	0.39	0.36	2.4392	0.0629	-4.7	0.8	-4.8	0.8	B+	A-	A-

Appendix G: Item Statistics Evidence-based Selected Response

Item Information						Classical											Rasch		Infit		Outfit		DIF			
Cont	Grade	PubID	Form	Std	DOK	N	Mean	P(0)	P(1)	P(2)	P(3)	P(B)	PtBis	PT(0)	PT(1)	PT(2)	PT(3)	Meas	MeasSE	t	MS	t	MS	M/F	W/B	W/H
ELA	3	754605	1	A-K.1.1.3	2	6471	1.12	0.27	0.33	0.39		0.00	0.51	-0.43	-0.06	0.45		0.6618	0.0199	9.1	1.2	9.9	1.2	A+	A-	A-
ELA	3	208867	1	A-K.1.1.2	3	6471	1.63	0.13	0.25	0.47	0.15	0.00	0.55	-0.35	-0.36	0.38	0.25	0.7938	0.0185	7.4	1.1	6.2	1.1	A+	A-	A+
ELA	3	213074	2	A-C.2.1.1	2	6377	0.56	0.52	0.40	0.08		0.01	-0.11	0.09	-0.05	-0.08		2.3257	0.0230	9.9	1.9	9.9	2.6	A-	A-	A-
ELA	3	233562	2	A-C.3.1.1	3	6377	1.85	0.11	0.23	0.36	0.30	0.00	0.56	-0.38	-0.30	0.13	0.40	0.3461	0.0173	9.3	1.2	8.6	1.2	A+	A-	A-
ELA	3	969021	3	A-K.1.1.2	3	6313	1.61	0.19	0.29	0.23	0.29	0.00	0.46	-0.17	-0.34	0.02	0.47	0.8020	0.0162	9.9	1.4	9.9	1.5	A-	A+	A+
ELA	3	974613	3	A-K.1.1.1	2	6313	1.34	0.20	0.27	0.54		0.00	0.58	-0.42	-0.28	0.58		0.1662	0.0207	1.6	1.0	0.8	1.0	A+	A-	A-
ELA	3	451960	4	A-V.4.1.2	2	6309	1.85	0.09	0.27	0.35	0.29	0.00	0.56	-0.32	-0.36	0.13	0.41	0.2976	0.0180	7.4	1.1	7.0	1.1	A-	B-	A-
ELA	3	952316	4	A-K.1.1.3	2	6309	0.97	0.31	0.42	0.28		0.00	0.35	-0.29	0.00	0.30		1.1200	0.0208	9.9	1.4	9.9	1.5	A+	A-	A-
ELA	3	217901	5	A-K.1.1.2	2	6344	1.76	0.13	0.28	0.27	0.31	0.00	0.41	-0.14	-0.30	-0.03	0.42	0.4753	0.0168	9.9	1.5	9.9	1.6	A+	A-	A-
ELA	3	540039	5	A-V.4.1.1	2	6344	1.17	0.23	0.36	0.40		0.00	0.49	-0.37	-0.13	0.45		0.5262	0.0205	9.6	1.2	7.5	1.2	A-	A-	A-
ELA	3	647863	6	A-K.1.1.3	3	6359	1.06	0.29	0.37	0.35		0.00	0.47	-0.38	-0.05	0.41		0.8914	0.0201	9.9	1.2	9.9	1.2	A+	A-	A+
ELA	3	234580	6	A-C.2.1.1	2	6359	1.64	0.11	0.37	0.29	0.23	0.00	0.48	-0.24	-0.27	0.06	0.43	0.6675	0.0175	9.9	1.2	9.9	1.2	A+	A-	A-
ELA	3	389736	7	A-K.1.1.2	3	6289	1.95	0.08	0.22	0.35	0.34	0.00	0.50	-0.30	-0.30	0.06	0.38	0.1615	0.0179	9.9	1.3	9.9	1.3	A+	A-	A-
ELA	3	523619	7	A-C.2.1.1	2	6289	0.93	0.37	0.34	0.29		0.00	0.34	-0.22	-0.12	0.37		1.2264	0.0199	9.9	1.4	9.9	1.6	A+	A-	A-
ELA	3	803003	8	A-V.4.1.1	2	6304	2.05	0.06	0.21	0.36	0.38	0.00	0.62	-0.32	-0.42	0.00	0.51	-0.0825	0.0187	-0.9	1.0	-1.9	1.0	A+	B-	A-
ELA	3	597256	8	A-K.1.1.3	2	6304	0.94	0.38	0.29	0.32		0.00	0.46	-0.36	-0.09	0.46		1.1902	0.0196	9.9	1.2	9.9	1.4	A+	A+	A-
ELA	3	857052	9	A-V.4.1.2	2	6282	1.14	0.24	0.38	0.38		0.01	0.51	-0.42	-0.08	0.45		0.6789	0.0205	5.7	1.1	7.3	1.1	A+	A-	A-
ELA	3	761956	9	A-C.2.1.1	3	6282	1.25	0.17	0.46	0.32	0.05	0.00	0.23	-0.16	-0.07	0.16	0.10	1.6382	0.0199	9.9	1.6	9.9	1.6	A-	A-	A-
ELA	3	855984	10	A-K.1.1.3	2	6294	2.03	0.08	0.22	0.30	0.41	0.01	0.59	-0.28	-0.40	-0.03	0.52	0.0104	0.0179	6.4	1.1	3.9	1.1	A+	A-	A-
ELA	3	865773	10	A-C.3.1.1	3	6294	1.26	0.22	0.30	0.48		0.00	0.52	-0.37	-0.22	0.51		0.3894	0.0206	8.5	1.2	5.5	1.1	A-	B-	A-
ELA	3	404459	11	B-K.1.1.2	3	6315	1.50	0.17	0.37	0.26	0.20	0.00	0.33	-0.07	-0.26	-0.01	0.38	0.9272	0.0169	9.9	1.6	9.9	1.6	A-	A-	A-
ELA	3	803281	11	B-C.2.1.2	2	6315	0.70	0.52	0.26	0.22		0.00	0.34	-0.23	-0.10	0.38		1.7129	0.0196	9.9	1.3	9.9	1.7	A+	A-	A-
ELA	3	784620	12	B-C.2.1.2	2	6327	1.01	0.33	0.33	0.34		0.00	0.50	-0.41	-0.05	0.46		1.0553	0.0196	5.1	1.1	6.8	1.1	A-	A-	A-
ELA	3	943997	12	B-K.1.1.2	3	6327	0.10	0.91	0.07	0.02	0.00	0.00	-0.34	0.35	-0.30	-0.17		3.9951	0.0384	9.9	1.5	9.9	9.9	A+	B+	A+
ELA	3	868043	13	B-K.1.1.2	3	6294	0.12	0.90	0.08	0.02	0.00	0.00	-0.36	0.36	-0.31	-0.19		3.7445	0.0353	9.9	1.5	9.9	9.9	A+	B+	A+
ELA	3	916147	13	B-C.2.1.2	2	6294	0.40	0.62	0.35	0.03		0.00	-0.10	0.08	-0.06	-0.08		3.1609	0.0262	9.9	1.6	9.9	2.4	A+	A-	A-
ELA	3	984447	14	B-K.1.1.3	2	6307	1.01	0.34	0.32	0.34		0.00	0.34	-0.22	-0.16	0.38		1.0218	0.0193	9.9	1.4	9.9	1.5	A-	A-	A-
ELA	3	882704	14	B-V.4.1.1	2	6307	0.12	0.89	0.09	0.01	0.00	0.00	-0.25	0.26	-0.23	-0.09		3.9372	0.0369	9.9	1.5	9.9	8.4	A-	C+	A+
ELA	3	717267	15	B-C.2.1.1	2	6313	1.62	0.11	0.36	0.31	0.22	0.00	0.37	-0.08	-0.27	-0.04	0.42	0.7079	0.0175	9.9	1.4	9.9	1.4	A+	A-	A-
ELA	3	559268	15	B-V.4.1.2	2	6313	0.96	0.34	0.36	0.30		0.00	0.42	-0.30	-0.10	0.42		1.1332	0.0198	9.9	1.2	9.9	1.3	A+	A+	A-
ELA	3	842571	16	B-K.1.1.2	3	6327	1.97	0.08	0.25	0.31	0.37	0.00	0.57	-0.31	-0.34	-0.02	0.50	0.0974	0.0178	6.6	1.1	5.4	1.1	A+	A-	A-
ELA	3	836554	16	B-V.4.1.1	2	6327	1.40	0.10	0.41	0.50		0.00	0.58	-0.44	-0.24	0.50		-0.2081	0.0233	-4.1	0.9	-4.4	0.9	A+	A-	A-
ELA	3	118604	17	B-K.1.1.1	2	6345	1.05	0.23	0.50	0.27		0.00	0.43	-0.37	0.01	0.33		0.8892	0.0218	9.5	1.2	9.9	1.2	A+	A-	A-
ELA	3	673247	17	B-K.1.1.1	2	6345	1.88	0.11	0.28	0.23	0.38	0.00	0.57	-0.28	-0.35	-0.04	0.54	0.3349	0.0166	7.6	1.1	4.9	1.1	A+	A-	A-
ELA	3	117086	18	B-C.2.1.1	3	6300	1.47	0.20	0.36	0.23	0.22	0.00	0.44	-0.19	-0.26	0.04	0.44	1.0077	0.0166	9.9	1.3	9.9	1.4	A+	A-	A-
ELA	3	606559	18	B-C.2.1.2	2	6300	1.03	0.34	0.29	0.37		0.01	0.46	-0.32	-0.17	0.48		0.9520	0.0194	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	3	753095	19	B-V.4.1.1	2	6292	1.35	0.13	0.40	0.48		0.00	0.50	-0.44	-0.11	0.41		0.0382	0.0224	4.9	1.1	4.2	1.1	A-	A-	B-
ELA	3	212296	19	B-C.3.1.2	3	6292	1.80	0.10	0.26	0.37	0.27	0.00	0.52	-0.28	-0.33	0.10	0.41	0.4749	0.0178	9.9	1.2	9.9	1.2	A-	A-	A-
ELA	3	578841	20	B-C.3.1.1	3	6247	1.57	0.12	0.40	0.27	0.21	0.00	0.40	-0.19	-0.19	-0.03	0.41	0.7764	0.0174	9.9	1.3	9.9	1.4	A+	A-	A+
ELA	3	426762	20	B-C.3.1.3	2	6247	0.84	0.45	0.27	0.28		0.00	0.31	-0.19	-0.17	0.38		1.4017	0.0192	9.9	1.4	9.9	1.7	A-	A-	A+

Appendix G: Item Statistics Evidence-based Selected Response

ELA	4	467137	1	B-K.1.1.2	3	6581	1.97	0.08	0.21	0.39	0.33	0.00	0.63	-0.33	-0.46	0.12	0.46	-0.0007	0.0176	-2.5	1.0	-2.4	1.0	A+	A-	A-
ELA	4	810297	1	B-C.3.1.1	2	6581	1.09	0.27	0.36	0.37		0.00	0.54	-0.43	-0.10	0.50		0.6603	0.0195	1.9	1.0	3.4	1.1	A-	A-	A-
ELA	4	589320	2	B-V.4.1.1	2	6300	1.87	0.13	0.20	0.36	0.32	0.00	0.61	-0.41	-0.32	0.11	0.45	0.3764	0.0167	1.6	1.0	1.2	1.0	A-	A-	A-
ELA	4	548988	2	B-C.3.1.3	2	6300	0.87	0.37	0.39	0.24		0.00	0.38	-0.33	0.04	0.33		1.3058	0.0199	9.9	1.2	9.9	1.4	A-	A-	A-
ELA	4	664533	3	B-V.4.1.1	2	6331	1.34	0.21	0.24	0.55		0.00	0.51	-0.40	-0.20	0.50		0.1808	0.0197	7.3	1.1	6.0	1.2	A+	B-	A-
ELA	4	910566	3	B-K.1.1.3	3	6331	1.35	0.20	0.37	0.32	0.11	0.00	0.40	-0.21	-0.21	0.19	0.30	1.2394	0.0176	9.9	1.3	9.9	1.4	A+	A-	A+
ELA	4	783378	4	B-K.1.1.2	3	6315	1.65	0.12	0.26	0.46	0.16	0.00	0.57	-0.39	-0.31	0.31	0.31	0.7609	0.0182	0.4	1.0	0.0	1.0	A-	A-	A-
ELA	4	909135	4	B-C.3.1.1	2	6315	1.35	0.17	0.31	0.52		0.00	0.48	-0.30	-0.30	0.50		0.1027	0.0207	6.2	1.1	7.3	1.2	A-	A-	A-
ELA	4	773574	5	B-C.3.1.3	3	6313	1.88	0.10	0.25	0.34	0.32	0.00	0.55	-0.29	-0.33	0.03	0.47	0.2744	0.0170	5.6	1.1	4.8	1.1	A-	A-	A-
ELA	4	736274	5	B-V.4.1.1	2	6313	1.02	0.29	0.40	0.31		0.00	0.33	-0.24	-0.07	0.32		0.9138	0.0200	9.9	1.3	9.9	1.4	A-	A-	A-
ELA	4	303282	6	B-V.4.1.2	2	6284	1.32	0.19	0.31	0.50		0.00	0.62	-0.50	-0.19	0.57		0.2104	0.0204	-8.7	0.9	-9.0	0.8	A-	B-	A-
ELA	4	956471	6	B-C.2.1.2	3	6284	1.39	0.17	0.41	0.28	0.14	0.00	0.38	-0.16	-0.24	0.14	0.33	1.1312	0.0175	9.9	1.3	9.9	1.3	A+	A-	A-
ELA	4	530637	7	B-K.1.1.1	2	6318	1.31	0.28	0.14	0.59		0.00	0.57	-0.45	-0.26	0.60		0.3994	0.0186	1.3	1.0	0.0	1.0	A+	A-	A-
ELA	4	341634	7	B-C.2.1.2	3	6318	1.53	0.16	0.37	0.25	0.22	0.00	0.42	-0.16	-0.27	0.04	0.41	0.8885	0.0166	9.9	1.3	9.9	1.3	A+	A-	A-
ELA	4	427357	8	B-C.2.1.2	3	6268	1.20	0.25	0.43	0.21	0.12	0.00	0.24	-0.05	-0.17	0.03	0.30	1.4741	0.0172	9.9	1.5	9.9	1.6	A-	A-	A-
ELA	4	351498	8	B-V.4.1.1	2	6268	1.06	0.25	0.44	0.31		0.00	0.47	-0.40	-0.02	0.39		0.8494	0.0205	3.8	1.1	4.5	1.1	A+	A-	A-
ELA	4	187140	9	B-K.1.1.1	2	6325	0.90	0.34	0.41	0.25		0.00	0.26	-0.16	-0.10	0.29		1.2713	0.0200	9.9	1.4	9.9	1.5	A+	A-	A-
ELA	4	196265	9	B-C.3.1.2	3	6325	1.93	0.09	0.19	0.42	0.30	0.00	0.59	-0.36	-0.35	0.08	0.44	0.3058	0.0175	-0.6	1.0	-1.3	1.0	A-	B-	A-
ELA	4	676403	10	B-K.1.1.3	2	6281	1.15	0.30	0.25	0.45		0.00	0.24	-0.12	-0.22	0.30		0.7129	0.0185	9.9	1.6	9.9	2.1	A+	A-	A-
ELA	4	371510	10	B-C.3.1.3	3	6281	1.41	0.28	0.28	0.19	0.25	0.00	0.38	-0.11	-0.33	0.03	0.43	1.1164	0.0149	9.9	1.4	9.9	1.6	A+	A-	A+
ELA	4	630971	11	B-K.1.1.2	3	6301	1.42	0.16	0.33	0.43	0.08	0.00	0.37	-0.25	-0.19	0.28	0.16	1.3285	0.0185	9.9	1.3	9.9	1.3	A-	B-	A-
ELA	4	261273	11	B-K.1.1.3	2	6301	1.47	0.14	0.26	0.60		0.00	0.60	-0.47	-0.25	0.55		-0.1228	0.0213	-7.2	0.9	-6.5	0.8	A-	C-	B-
ELA	4	623999	12	A-V.4.1.2	2	6320	1.38	0.24	0.15	0.62		0.00	0.57	-0.45	-0.26	0.59		0.2239	0.0191	0.7	1.0	-0.4	1.0	A+	A-	A-
ELA	4	654223	12	A-K.1.1.3	2	6320	1.63	0.08	0.33	0.47	0.12	0.00	0.43	-0.28	-0.24	0.22	0.24	0.7785	0.0194	9.9	1.2	9.9	1.2	A+	A-	A-
ELA	4	484933	13	A-V.4.1.1	2	6298	0.24	0.78	0.21	0.01		0.00	-0.29	0.27	-0.24	-0.15		3.7052	0.0303	9.9	1.6	9.9	3.7	A-	A-	A+
ELA	4	378240	13	A-K.1.1.2	3	6298	1.42	0.16	0.41	0.28	0.15	0.00	0.44	-0.25	-0.22	0.17	0.35	1.0454	0.0171	8.4	1.1	9.8	1.2	A+	A-	A-
ELA	4	190241	14	A-K.1.1.2	3	6287	1.69	0.14	0.28	0.31	0.26	0.00	0.53	-0.28	-0.32	0.11	0.44	0.6712	0.0164	6.4	1.1	6.8	1.1	A-	A-	A-
ELA	4	992940	14	A-K.1.1.3	2	6287	1.17	0.29	0.26	0.46		0.00	0.45	-0.34	-0.17	0.45		0.6411	0.0188	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	4	964968	15	A-K.1.1.2	3	6256	1.32	0.15	0.39	0.46		0.00	0.50	-0.47	-0.06	0.39		0.1304	0.0215	2.6	1.0	2.7	1.1	A-	A-	A-
ELA	4	127812	15	A-V.4.1.2	2	6256	1.96	0.07	0.17	0.50	0.27	0.00	0.53	-0.29	-0.38	0.14	0.34	0.1314	0.0191	3.8	1.1	4.0	1.1	A-	A-	A-
ELA	4	934018	16	A-K.1.1.1	2	6263	1.92	0.12	0.20	0.32	0.36	0.00	0.58	-0.35	-0.35	0.06	0.48	0.3505	0.0167	4.0	1.1	5.2	1.1	A-	B-	A-
ELA	4	298457	16	A-K.1.1.3	2	6263	1.19	0.21	0.39	0.40		0.00	0.52	-0.40	-0.14	0.47		0.5338	0.0205	0.1	1.0	0.1	1.0	A-	A-	A-
ELA	4	990604	17	A-K.1.1.1	2	6311	1.80	0.11	0.24	0.39	0.26	0.00	0.56	-0.39	-0.28	0.14	0.39	0.4399	0.0173	2.7	1.1	3.6	1.1	A+	A-	A-
ELA	4	876234	17	A-K.1.1.3	2	6311	1.27	0.24	0.24	0.51		0.00	0.45	-0.29	-0.30	0.50		0.3795	0.0192	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	4	786286	18	A-K.1.1.3	2	6313	1.66	0.08	0.18	0.74		0.00	0.59	-0.41	-0.38	0.58		-0.7474	0.0245	-7.9	0.8	-6.7	0.8	A+	B-	A-
ELA	4	329120	18	A-C.3.1.1	3	6313	2.00	0.09	0.20	0.32	0.38	0.00	0.63	-0.37	-0.40	0.06	0.49	0.1500	0.0172	-2.5	1.0	-2.8	1.0	A+	A-	A-
ELA	4	897036	19	A-V.4.1.1	2	6316	1.47	0.18	0.35	0.28	0.19	0.00	0.46	-0.28	-0.21	0.15	0.36	1.0000	0.0165	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	4	543524	19	A-K.1.1.2	3	6316	1.33	0.15	0.37	0.48		0.00	0.51	-0.47	-0.07	0.41		0.1347	0.0210	0.6	1.0	3.3	1.1	A+	A-	A-
ELA	4	518239	20	A-C.2.1.1	3	6272	1.20	0.22	0.46	0.21	0.11	0.00	0.24	-0.06	-0.16	0.04	0.28	1.4452	0.0176	9.9	1.5	9.9	1.6	A+	A-	A-
ELA	4	400120	20	A-V.4.1.1	2	6272	1.42	0.19	0.20	0.61		0.00	0.44	-0.33	-0.24	0.46		0.0536	0.0200	9.9	1.2	9.9	1.4	A-	A-	A-

Appendix G: Item Statistics Evidence-based Selected Response

ELA	5	990631	1	A-K.1.1.3	2	6559	1.70	0.13	0.30	0.32	0.25	0.00	0.55	-0.38	-0.23	0.11	0.42	0.6615	0.0166	9.5	1.2	9.9	1.2	A+	A-	A-
ELA	5	626766	1	A-V.4.1.2	2	6559	1.34	0.15	0.37	0.48		0.00	0.58	-0.43	-0.24	0.54		0.1431	0.0209	-3.7	0.9	-5.2	0.9	A+	A-	A-
ELA	5	632768	2	A-K.1.1.1	2	6260	1.48	0.13	0.27	0.61		0.00	0.57	-0.40	-0.32	0.56		-0.0790	0.0219	-1.9	1.0	-2.9	0.9	A+	A-	A-
ELA	5	480977	2	A-K.1.1.3	3	6260	1.99	0.07	0.21	0.38	0.34	0.00	0.60	-0.29	-0.46	0.11	0.44	0.2142	0.0181	-0.6	1.0	0.0	1.0	A+	B-	A-
ELA	5	879680	3	A-V.4.1.1	2	6259	1.68	0.06	0.20	0.74		0.00	0.55	-0.39	-0.34	0.52		-0.8022	0.0256	-4.8	0.9	-4.1	0.9	A+	A-	A-
ELA	5	361343	3	A-K.1.1.1	2	6259	1.44	0.18	0.38	0.26	0.18	0.00	0.50	-0.28	-0.26	0.17	0.40	1.2310	0.0169	7.0	1.1	8.3	1.2	A-	A-	A-
ELA	5	184501	4	A-K.1.1.3	3	6261	2.21	0.07	0.10	0.39	0.44	0.00	0.54	-0.29	-0.37	-0.08	0.44	-0.0552	0.0188	5.8	1.1	7.8	1.2	A+	B-	A-
ELA	5	201303	4	A-K.1.1.2	3	6261	1.33	0.18	0.31	0.51		0.00	0.54	-0.42	-0.20	0.50		0.3566	0.0207	2.3	1.0	1.7	1.0	A+	A-	A-
ELA	5	414726	5	A-K.1.1.2	3	6210	1.02	0.34	0.31	0.35		0.00	0.43	-0.31	-0.13	0.43		1.1732	0.0193	9.9	1.2	9.9	1.3	A-	A-	A-
ELA	5	266737	5	A-K.1.1.3	3	6210	1.83	0.07	0.29	0.39	0.25	0.00	0.55	-0.32	-0.34	0.13	0.40	0.5061	0.0183	2.0	1.0	1.7	1.0	A+	B-	B-
ELA	5	109226	6	A-K.1.1.3	3	6222	1.96	0.09	0.22	0.34	0.35	0.00	0.53	-0.32	-0.33	0.07	0.40	0.3482	0.0176	9.3	1.2	9.4	1.2	A-	A-	A-
ELA	5	904521	6	A-V.4.1.1	3	6222	1.44	0.16	0.24	0.60		0.00	0.61	-0.43	-0.34	0.62		0.1008	0.0213	-4.8	0.9	-5.0	0.9	A-	A-	A-
ELA	5	190928	7	A-K.1.1.3	3	6223	2.02	0.08	0.19	0.37	0.36	0.00	0.58	-0.32	-0.33	-0.07	0.51	0.2342	0.0180	1.9	1.0	0.4	1.0	A-	A-	A-
ELA	5	948197	7	A-V.4.1.1	2	6223	1.50	0.07	0.36	0.57		0.00	0.48	-0.37	-0.22	0.41		-0.3455	0.0240	1.8	1.0	4.0	1.1	A+	A-	A-
ELA	5	964852	8	A-K.1.1.1	2	6237	1.07	0.32	0.28	0.40		0.00	0.35	-0.21	-0.24	0.42		1.0379	0.0189	9.9	1.4	9.9	1.5	A+	A+	A-
ELA	5	661611	8	A-K.1.1.3	3	6237	1.97	0.08	0.25	0.29	0.38	0.00	0.56	-0.29	-0.34	-0.04	0.50	0.3258	0.0171	4.5	1.1	3.7	1.1	A-	A-	B-
ELA	5	900877	9	A-V.4.1.2	2	6256	1.92	0.10	0.18	0.43	0.29	0.00	0.48	-0.27	-0.31	0.06	0.37	0.4855	0.0179	9.9	1.2	9.9	1.2	A-	A-	A-
ELA	5	326139	9	A-K.1.1.1	2	6256	1.12	0.35	0.19	0.47		0.00	0.42	-0.30	-0.23	0.46		0.9637	0.0183	9.9	1.3	9.9	1.5	A+	A-	A-
ELA	5	897282	10	A-C.2.1.1	3	6237	0.84	0.43	0.29	0.28		0.00	0.36	-0.26	-0.07	0.37		1.5605	0.0192	9.9	1.3	9.9	1.5	A+	A-	A+
ELA	5	248477	10	A-K.1.1.3	2	6237	1.71	0.08	0.33	0.38	0.21	0.00	0.46	-0.26	-0.28	0.14	0.33	0.7031	0.0182	9.9	1.2	9.9	1.2	A+	A+	A-
ELA	5	401490	11	B-V.4.1.1	2	6283	1.11	0.23	0.42	0.35		0.00	0.51	-0.45	0.00	0.40		0.9074	0.0206	1.9	1.0	3.2	1.1	A-	C-	A-
ELA	5	359259	11	B-C.3.1.2	3	6283	1.57	0.17	0.38	0.17	0.28	0.00	0.37	-0.14	-0.20	-0.10	0.42	0.9912	0.0159	9.9	1.5	9.9	1.6	A+	A-	A-
ELA	5	607983	12	B-K.1.1.1	3	6250	1.15	0.29	0.26	0.44		0.00	0.53	-0.40	-0.19	0.53		0.8647	0.0193	4.9	1.1	5.8	1.1	A-	A-	A+
ELA	5	265484	12	B-K.1.1.2	3	6250	1.99	0.05	0.22	0.42	0.32	0.00	0.61	-0.32	-0.44	0.10	0.43	0.1582	0.0189	-2.5	1.0	-3.0	1.0	A+	A-	A-
ELA	5	137253	13	B-C.3.1.1	2	6244	1.13	0.30	0.28	0.43		0.00	0.36	-0.23	-0.20	0.40		0.9188	0.0191	9.9	1.4	9.9	1.5	A-	A-	A-
ELA	5	392585	13	B-K.1.1.2	3	6244	1.71	0.17	0.24	0.33	0.27	0.00	0.60	-0.39	-0.28	0.12	0.47	0.8807	0.0164	1.2	1.0	1.2	1.0	A+	A-	A-
ELA	5	141817	14	B-K.1.1.2	3	6264	1.18	0.23	0.41	0.31	0.05	0.00	0.34	-0.18	-0.20	0.29	0.17	1.9219	0.0186	9.9	1.3	9.9	1.4	A+	A-	A-
ELA	5	612666	14	B-C.3.1.1	2	6264	0.85	0.48	0.19	0.33		0.00	0.25	-0.14	-0.22	0.33		1.5186	0.0180	9.9	1.5	9.9	2.2	A-	A-	A-
ELA	5	437834	15	B-C.3.1.1	2	6244	1.33	0.21	0.34	0.36	0.09	0.00	0.38	-0.20	-0.25	0.27	0.23	1.6347	0.0181	9.9	1.3	9.9	1.4	A-	A-	A-
ELA	5	796357	15	B-K.1.1.3	2	6244	1.22	0.27	0.24	0.49		0.00	0.48	-0.32	-0.29	0.53		0.7584	0.0192	9.1	1.2	7.6	1.2	A-	A-	B-
ELA	5	724061	16	B-K.1.1.2	3	6248	1.87	0.07	0.25	0.43	0.25	0.00	0.53	-0.26	-0.39	0.15	0.36	0.4548	0.0186	4.9	1.1	4.4	1.1	A-	B-	A-
ELA	5	666834	16	B-C.3.1.1	3	6248	0.59	0.51	0.38	0.11		0.00	0.13	-0.05	-0.08	0.21		2.3724	0.0223	9.9	1.4	9.9	1.8	A-	A+	A-
ELA	5	338031	17	B-V.4.1.2	2	6262	1.03	0.30	0.36	0.33		0.00	0.40	-0.32	-0.05	0.36		1.1604	0.0197	9.9	1.2	9.9	1.3	A+	A-	A-
ELA	5	796289	17	B-K.1.1.2	3	6262	1.57	0.16	0.34	0.29	0.22	0.00	0.50	-0.29	-0.24	0.10	0.42	1.0578	0.0167	8.5	1.1	9.1	1.2	A+	A-	A-
ELA	5	576687	18	B-K.1.1.1	2	6285	0.53	0.61	0.25	0.14		0.00	0.19	-0.13	-0.01	0.20		2.3228	0.0208	9.9	1.4	9.9	2.4	B-	A-	A-
ELA	5	234202	18	B-C.3.1.2	3	6285	1.71	0.20	0.21	0.26	0.33	0.00	0.52	-0.33	-0.29	0.09	0.45	0.8831	0.0156	9.9	1.3	9.9	1.3	A+	A-	A-
ELA	5	568112	19	B-K.1.1.1	2	6248	1.44	0.17	0.23	0.61		0.00	0.63	-0.48	-0.30	0.62		0.1374	0.0210	-6.7	0.9	-6.9	0.8	A-	A-	A-
ELA	5	155917	19	B-C.3.1.2	3	6248	1.44	0.19	0.35	0.29	0.17	0.00	0.39	-0.18	-0.26	0.18	0.31	1.2714	0.0170	9.9	1.4	9.9	1.4	A-	A-	A+
ELA	5	568997	20	B-C.3.1.1	3	6233	0.82	0.50	0.18	0.32		0.00	0.10	0.05	-0.35	0.24		1.5963	0.0181	9.9	1.9	9.9	2.8	A-	A-	A-
ELA	5	639577	20	B-C.3.1.1	3	6233	1.65	0.11	0.30	0.41	0.18	0.00	0.50	-0.25	-0.33	0.20	0.35	0.9170	0.0181	7.8	1.1	8.0	1.1	A-	A-	A-

Appendix H:
Test Book Section Layout Plans

Mathematics and Reading Test/Answer Book Section Layout for Grades 4, 5, 6, 7, and 8

Mathematics Core

Core/common MC items	60 (16 core linking)
3 core 4 pt OE items	12 (8 core linking)
Total	72 points

Reading Core

Core/common MC items	40 (16 core linking)
4 core 3 pt OE items	12 (6 core linking)
Total	52 points

The estimated testing time for mathematics is approximately 155–185 minutes. The estimated testing time for reading is approximately 165–255 minutes (including equating block items and embedded field test items). [Timing assumes 5 to 10 min per OE/SA, 30 min per TDA; 3 to 5 min per SR; 1½ to 2 min per MC, and 7 min per reading passage set.]

Section	Content	Number of MC/SR	MC/SR Item Breakdown	Number of OE/SA/TDA	OE/SA/TDA Item Breakdown	Estimated Number of Passages	Section Time (in minutes)
1	Mathematics	24	23–common (core) items (includes 4 non–calc) 1–non–calc field test item	2	2–common (core) items	N/A	55–65
2	Reading	19–24	19–24–common (core) items	2	2–common (core) items	3	65–85
3	Mathematics	24	13–common (core) items 2–equating block items 9–field test items	1	1–field test	N/A	50–60
4	Reading	18	8–equating block items 10–field test items	1	1–field test	2	50–95
5	Mathematics	24	24–common (core) items	1	1–common (core) item	N/A	50–60
6	Reading	16–21	16–21–common (core) items	2	2–common (core) items	2 or 3	50–75

Notes: 1) There will be twenty forms in Grades 3 and 4. There will be nine forms in Grades 6 through 8. 2) The ruler items may fall in Section 1, 3, or 5. 3) Sections 2 and 6 must equal a combined total of 40 MC items. 4) Section 2 cannot be more than 24 MC items. Section 6 cannot be less than 16 MC items.

Mathematics and Reading Test/Answer Book Section Layout for Grade 3

Mathematics Core

Core/common MC items	60 (16 core linking)
3 core 4 pt OE items	12 (8 core linking)
Total	72 points

Reading Core

Core/common MC items	40 (16 core linking)
2 core 3 pt OE items	6 (3 core linking)
Total	46 points

The estimated testing time for mathematics is approximately 130–185 minutes. The estimated testing time for reading is approximately 160–215 minutes (including equating block items and embedded field test items). [Timing assumes 5 to 10 min per OE, 1½ to 2 min per MC, and 7 min per reading passage set.]

Section	Content	Number of MC/SR	MC Item Breakdown	Number of OE/SA	OE/SA Item Breakdown	Estimated Number of Passages	Section Time (in minutes)
1	Mathematics	24	24–common (core) items	2	2–common (core) item	N/A	55–65
2	Reading	23	23–common (core) items	1	1–common (core) item	3	70–80
3	Mathematics	24	12–common (core) items 2–equating block items 10–field test items	1	1–field test	N/A	50–60
4	Reading	18	8–equating block items 10–field test items	1	1–field test	2	55–65
5	Mathematics	24	24–common (core) items	1	1–common (core) item	N/A	50–60
6	Reading	17	17–common (core) items	1	1–common (core) item	2	45–55

Notes: 1) There will be twenty forms. 2) The ruler items may fall in Section 1, 3, or 5. 3) Sections 2 and 6 must equal a combined total of 40 MC items. 4) Section 2 cannot be more than 24 MC items. Section 6 cannot be less than 16 MC items.

Science Test/Answer Book Section Layout

General Information (see grade level page for specifics)

- Timing Key: MC = 1 to 1½ min; 2 pt OE = 5 min; 4 pt OE = 10 min; G8 Scenario stimulus = 3 min; G11 Scenario stimulus = 6 min
- There are 12 forms per grade.
- Within a section at grade 4, MC *most likely* will precede OE items.
- Within a section at grades 8 & 11, non-scenario MC items *most likely* will precede scenario-based MC items which will precede OE items.
- Grade 4 and 8 will have both Test Booklets and scannable Answer Booklets; G11 will have one consumable science booklet.
- *Generally*, core items will precede equating block items, which will precede field test items.

Science: Grade 4

Core/common MC items	58 (16 core linking)
5 core 2 pt OE items	10 (2 core linking)
Total	68 points

The estimated grade 4 testing time for science is approximately 95–100 minutes or 110–115 minutes administration time (including equating block items and embedded field test items). [Timing assumes 5 min per 2 pt OE and 1 min per MC.]

Grade	Section	Number of MC	Estimated MC Item Breakdown	Number of OE	Estimated OE Item Breakdown	Testing Time
4	1	34	29-common (core) items 1-equating block item 4-embedded field test item	3	3-common (core) items	45–55
4	2	34	29-common (core) items 1-equating block item 4- embedded field test items	3	2-common (core) items 1-embedded field test item	45–55

Appendix H: Test Book Section Layout Plans

Science: Grade 8

Core/common MC items	58 (16 core linking)
5 core 2 pt OE items	10 (2 core linking)
Total	68 points

The estimated grade 8 testing time is 105–110 minutes per grade for science or 120–125 minutes administration time (including equating block items and embedded field test items). [Timing assumes 5 min per 2 pt OE, 1 min per MC, and 3 min per grade 8 scenario.]

Grade	Section	Number of MC	Estimated MC Item Breakdown	Number of OE	Estimated OE Item Breakdown	Testing Time
8	1	35	27-common (core) items 4-embedded field test scenario-based items 1-equating block item 3-embedded field test item	3	3-common (core) items	50–60
8	2	35	27-common (core) items 4-common (core) scenario-based items 1-equating block item 3-embedded field test item	3	2-common (core) items 1-embedded field test item	50–60

Writing Book Section Layout

General Information

- There is 1 form for Grade 5 and 6 forms for Grade 8.
- All grades will have one consumable writing booklet.
- Writing assessments fall within two categories:
 - Composition – Academic Standard 1.4, Types of Writing
 - Revising and Editing – Academic Standard 1.5, Quality of Writing

Writing: Both Grades

Core/common MC items 12 (weighted x1)
 2 core 4 pt (Mode) WP items 80 (weighted x10)
2 core 4 pt (Conv.) WP items 8 (weighted x1)
 Total 100 points

Section	Contents	Core Points Distribution by Academic Standards	Core/FT Item Breakdown	Testing Time
1	20 Multiple-choice	12 points within 1.5.E & 1.5.F	12-common (core) MC items 8-embedded field test MC items	45–55
2	1 Writing Prompt	8 points within 1.5.E & 1.5.F 80 points within 1.4.A, 1.4.B, & 1.4.C	2-common (core) WP items 1-embedded field test WP item*	55–65
3	1 Writing Prompt			55–65
4*	1 Writing Prompt			55–65

* Grade 5 does not have an embedded field test WP, and therefore has only 3 sections.

Appendix H: Test Book Section Layout Plans

Appendix I:
Mean Raw Scores by Form

Column Heading	Definition
Form	Form
N	N students
L	Length
Pts	Points possible
Min	Minimum
Max	Maximum
Mean	Mean
Med	Median
<i>SD</i>	Standard deviation

Appendix I: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD		Form	N	L	Pts	Min	Max	Mean	Med	SD
Mathematics 3	0	126734	63	72	5	72	56.8	61.0	12.55	Mathematics 4	0	126550	63	72	2	72	48.8	51.0	14.29
	1	6672	63	72	6	72	55.7	60.0	13.19		1	6713	63	72	2	72	47.4	50.0	15.00
	2	6468	63	72	9	72	56.4	60.0	12.80		2	6361	63	72	5	72	48.5	51.0	14.51
	3	6395	63	72	10	72	56.6	61.0	12.73		3	6390	63	72	7	72	48.3	51.0	14.57
	4	6309	63	72	5	72	56.5	61.0	12.82		4	6318	63	72	6	72	48.7	51.0	14.34
	5	6335	63	72	7	72	56.6	61.0	12.65		5	6314	63	72	7	72	48.3	51.0	14.44
	6	6350	63	72	7	72	57.0	61.0	12.49		6	6292	63	72	7	72	48.8	52.0	14.24
	7	6282	63	72	10	72	56.9	61.0	12.49		7	6322	63	72	7	72	49.0	52.0	14.11
	8	6306	63	72	9	72	56.9	61.0	12.47		8	6272	63	72	5	72	49.0	52.0	14.22
	9	6285	63	72	6	72	56.9	61.0	12.57		9	6325	63	72	6	72	49.4	52.0	14.04
	10	6291	63	72	10	72	56.9	61.0	12.56		10	6276	63	72	6	72	49.0	52.0	14.19
	11	6308	63	72	9	72	56.7	61.0	12.58		11	6305	63	72	5	72	49.1	52.0	14.12
	12	6325	63	72	5	72	57.2	61.0	12.30		12	6316	63	72	8	72	48.9	51.0	14.22
	13	6280	63	72	8	72	57.2	61.0	12.13		13	6298	63	72	8	72	49.0	52.0	14.19
	14	6306	63	72	10	72	57.2	61.0	12.22		14	6292	63	72	7	72	49.0	52.0	14.21
	15	6316	63	72	7	72	57.0	61.0	12.40		15	6260	63	72	7	72	49.2	52.0	14.27
	16	6316	63	72	9	72	56.8	61.0	12.55		16	6268	63	72	7	72	49.0	52.0	14.32
	17	6351	63	72	10	72	57.1	61.0	12.39		17	6317	63	72	5	72	48.9	51.0	14.05
	18	6298	63	72	8	72	56.6	61.0	12.66		18	6321	63	72	4	72	48.7	51.0	14.33
	19	6295	63	72	10	72	57.0	61.0	12.40		19	6318	63	72	7	72	49.0	52.0	14.12
20	6246	63	72	7	72	56.8	61.0	12.46	20	6272	63	72	7	72	49.1	52.0	14.09		

Appendix I: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD	Form	N	L	Pts	Min	Max	Mean	Med	SD	
Mathematics 5	0	125790	63	72	6	72	46.3	48.0	13.82	0	129366	63	72	3	72	48.5	51.0	14.35	
	1	6776	63	72	8	72	44.8	46.0	14.40	1	14924	63	72	6	72	47.9	51.0	14.70	
	2	6379	63	72	9	72	46.2	48.0	13.72	2	14536	63	72	3	72	48.7	51.0	14.37	
	3	6379	63	72	8	72	46.0	48.0	13.85	3	14509	63	72	7	72	48.5	51.0	14.37	
	4	6258	63	72	8	72	46.3	48.0	13.76	4	14206	63	72	6	72	48.5	51.0	14.25	
	5	6220	63	72	6	72	46.5	48.0	13.64	5	14248	63	72	7	72	48.6	51.0	14.20	
	6	6222	63	72	7	72	46.4	48.0	13.91	6	14293	63	72	7	72	48.5	51.0	14.30	
	7	6222	63	72	7	72	46.6	48.0	13.79	7	14270	63	72	3	72	48.8	51.0	14.22	
	8	6236	63	72	10	71	46.3	48.0	13.73	8	14229	63	72	7	72	48.9	51.0	14.33	
	9	6265	63	72	6	72	46.5	48.0	13.75	9	14151	63	72	8	72	48.6	51.0	14.34	
	10	6243	63	72	7	72	46.5	49.0	13.82										
	11	6292	63	72	8	72	46.4	48.0	13.89										
	12	6252	63	72	8	72	46.4	48.0	13.80										
	13	6242	63	72	6	71	46.6	48.0	13.73										
	14	6263	63	72	6	72	46.3	48.0	13.77										
	15	6241	63	72	7	71	46.8	49.0	13.74										
	16	6250	63	72	7	72	46.5	48.0	13.76										
	17	6262	63	72	7	71	46.7	49.0	13.72										
	18	6289	63	72	6	72	46.3	48.0	13.88										
	19	6257	63	72	8	72	46.2	48.0	13.71										
20	6242	63	72	8	71	46.3	48.0	13.91											
Mathematics 6	0	131842	63	72	0	72	47.2	49.0	14.64	0	131143	63	72	5	72	48.4	51.0	14.40	
	1	15235	63	72	5	72	46.5	48.0	14.92	1	15333	63	72	6	72	47.6	50.0	14.72	
	2	14887	63	72	7	72	47.2	49.0	14.67	2	14876	63	72	6	72	48.3	51.0	14.42	
	3	14904	63	72	2	72	47.2	49.0	14.70	3	14887	63	72	7	72	48.2	51.0	14.45	
	4	14459	63	72	6	72	47.2	49.0	14.66	4	14337	63	72	6	72	48.6	51.0	14.29	
	5	14496	63	72	8	72	47.1	49.0	14.62	5	14352	63	72	5	72	48.4	51.0	14.34	
	6	14488	63	72	0	72	47.4	50.0	14.51	6	14342	63	72	6	72	48.3	51.0	14.37	
	7	14416	63	72	6	72	47.4	50.0	14.57	7	14310	63	72	7	72	48.5	51.0	14.39	
	8	14474	63	72	7	72	47.3	49.0	14.66	8	14356	63	72	7	72	48.9	51.0	14.18	
	9	14483	63	72	7	72	47.5	50.0	14.38	9	14350	63	72	7	72	48.5	51.0	14.35	
Mathematics 7																			

Appendix I: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD	Form	N	L	Pts	Min	Max	Mean	Med	SD
Reading 3	0	126685	42	46	2	46	30.9	33.0	9.34	0	126491	44	52	0	52	34.7	37.0	10.19
	1	6578	42	46	2	46	30.3	32.0	9.63	1	6703	44	52	2	52	33.5	36.0	10.83
	2	6466	42	46	4	46	30.6	33.0	9.53	2	6359	44	52	4	52	34.5	37.0	10.26
	3	6393	42	46	4	46	30.8	33.0	9.42	3	6388	44	52	3	52	34.3	36.0	10.47
	4	6309	42	46	4	46	30.9	33.0	9.40	4	6315	44	52	5	52	34.6	37.0	10.20
	5	6344	42	46	3	46	30.5	33.0	9.45	5	6313	44	52	4	52	34.4	36.0	10.26
	6	6359	42	46	3	46	30.9	33.0	9.27	6	6284	44	52	3	52	34.7	37.0	10.11
	7	6289	42	46	4	46	30.9	33.0	9.34	7	6318	44	52	2	52	35.0	37.0	10.18
	8	6304	42	46	3	46	30.9	33.0	9.37	8	6268	44	52	4	52	35.0	37.0	10.11
	9	6282	42	46	3	46	31.1	33.0	9.23	9	6325	44	52	3	52	35.0	37.0	9.97
	10	6294	42	46	3	46	31.0	33.0	9.32	10	6281	44	52	4	52	35.0	37.0	10.11
	11	6315	42	46	4	46	30.8	33.0	9.34	11	6301	44	52	3	52	35.0	37.0	9.94
	12	6327	42	46	5	46	31.2	33.0	9.28	12	6320	44	52	0	52	35.0	37.0	10.09
	13	6294	42	46	4	46	31.3	33.0	9.13	13	6298	44	52	3	52	34.8	37.0	10.11
	14	6307	42	46	3	46	31.0	33.0	9.17	14	6287	44	52	4	52	34.9	37.0	10.07
	15	6313	42	46	5	46	31.0	33.0	9.24	15	6256	44	52	3	52	34.7	37.0	10.27
	16	6327	42	46	3	46	31.0	33.0	9.37	16	6263	44	52	4	52	35.0	37.0	10.17
	17	6345	42	46	4	46	31.1	33.0	9.24	17	6311	44	52	5	52	34.5	36.0	10.10
	18	6300	42	46	2	46	30.8	33.0	9.42	18	6313	44	52	5	52	34.9	37.0	10.23
	19	6292	42	46	3	46	31.1	34.0	9.38	19	6316	44	52	5	52	34.8	37.0	9.97
20	6247	42	46	3	46	30.9	33.0	9.27	20	6272	44	52	4	52	34.7	37.0	10.13	

Reading 4

Appendix I: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD		Form	N	L	Pts	Min	Max	Mean	Med	SD	
Reading 5	0	125727	44	52	2	52	34.4	37.0	10.00	Reading 6	0	129305	44	52	2	52	34.7	37.0	9.39	
	1	6763	44	52	4	52	33.1	35.0	10.63		1	14906	44	52	5	52	34.2	36.0	9.72	
	2	6377	44	52	4	52	34.2	36.0	10.01		2	14534	44	52	2	52	34.6	37.0	9.32	
	3	6380	44	52	4	52	34.1	36.0	10.10		3	14502	44	52	4	52	34.6	37.0	9.44	
	4	6261	44	52	2	52	34.3	36.0	10.06		4	14200	44	52	4	52	34.7	37.0	9.35	
	5	6210	44	52	3	52	34.6	37.0	9.84		5	14234	44	52	4	52	34.5	36.0	9.43	
	6	6222	44	52	4	52	34.3	37.0	10.03		6	14292	44	52	2	52	34.8	37.0	9.36	
	7	6223	44	52	5	52	34.4	36.0	9.94		7	14263	44	52	5	52	34.9	37.0	9.31	
	8	6237	44	52	5	52	34.5	36.0	9.78		8	14228	44	52	3	52	34.9	37.0	9.26	
	9	6256	44	52	4	52	34.5	37.0	10.01		9	14146	44	52	4	52	34.8	37.0	9.29	
	10	6237	44	52	4	52	34.4	37.0	10.07											
	11	6283	44	52	4	52	34.6	37.0	9.92											
	12	6250	44	52	3	52	34.4	37.0	10.09											
	13	6244	44	52	4	52	34.6	37.0	9.78											
	14	6264	44	52	2	52	34.5	37.0	9.91											
	15	6244	44	52	4	52	34.7	37.0	9.95											
	16	6248	44	52	4	52	34.7	37.0	9.94											
	17	6262	44	52	4	52	34.8	37.0	9.74											
	18	6285	44	52	3	52	34.4	37.0	9.93											
	19	6248	44	52	2	52	34.5	37.0	9.90											
20	6233	44	52	5	52	34.5	37.0	10.12												
Reading 7	0	131767	44	52	0	52	34.0	36.0	10.06	Reading 8	0	131006	44	52	0	52	33.3	35.0	9.90	
	1	15221	44	52	1	52	33.5	36.0	10.33		1	15308	44	52	2	52	32.9	35.0	10.18	
	2	14876	44	52	4	52	33.9	36.0	10.01		2	14870	44	52	1	52	33.2	35.0	9.89	
	3	14888	44	52	0	52	33.8	36.0	10.08		3	14874	44	52	4	52	33.0	35.0	9.95	
	4	14463	44	52	4	52	34.0	36.0	10.03		4	14320	44	52	3	52	33.4	35.0	9.82	
	5	14480	44	52	4	52	34.2	36.0	10.00		5	14348	44	52	0	52	33.2	35.0	9.84	
	6	14475	44	52	1	52	34.1	36.0	9.96		6	14324	44	52	2	52	33.4	35.0	9.87	
	7	14415	44	52	2	52	34.2	36.0	10.05		7	14291	44	52	3	52	33.2	35.0	9.87	
	8	14469	44	52	4	52	33.9	36.0	10.06		8	14341	44	52	4	52	33.8	36.0	9.74	
	9	14480	44	52	4	52	34.0	36.0	9.98		9	14330	44	52	4	52	33.4	35.0	9.87	

Appendix I: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD		Form	N	L	Pts	Min	Max	Mean	Med	SD
Science 4	0	126729	63	68	1	68	45.5	48.0	13.20	Science 8	0	130637	63	68	4	68	44.0	47.0	13.52
	1	11214	63	68	2	68	44.7	47.0	13.60		1	12031	63	68	6	68	43.5	46.0	13.75
	2	10786	63	68	5	68	45.3	48.0	13.09		2	11500	63	68	5	68	44.0	47.0	13.60
	3	10741	63	68	1	68	45.6	48.0	13.23		3	11506	63	68	4	68	44.0	47.0	13.45
	4	10450	63	68	5	68	45.4	48.0	13.18		4	10652	63	68	6	68	44.0	47.0	13.55
	5	10454	63	68	1	68	45.5	48.0	13.20		5	10629	63	68	6	68	44.2	47.0	13.46
	6	10463	63	68	5	68	45.5	48.0	13.07		6	10626	63	68	7	68	44.1	47.0	13.36
	7	10441	63	68	7	68	45.3	48.0	13.19		7	10619	63	68	8	68	44.0	47.0	13.56
	8	10435	63	68	8	68	45.7	48.0	13.07		8	10613	63	68	7	68	44.0	47.0	13.50
	9	10431	63	68	1	68	45.8	48.0	13.18		9	10627	63	68	6	68	44.3	47.0	13.57
	10	10434	63	68	7	68	45.6	48.0	13.14		10	10623	63	68	6	68	44.2	47.0	13.31
	11	10471	63	68	6	68	45.6	48.0	13.22		11	10628	63	68	6	67	44.1	47.0	13.50
12	10409	63	68	8	68	45.7	48.0	13.16	12	10583	63	68	6	67	44.0	47.0	13.54		

Appendix I: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD		Form	N	L	Pts	Min	Max	Mean	Med	SD
Writing 5	0	124041	16	28	22	100	65.6	65.0	13.93	Writing 8	0	129823	16	28	22	100	66.6	71.0	14.49
	1	124041	16	28	22	100	65.6	65.0	13.93		1	22055	16	28	22	100	66.4	70.0	14.59
											2	21943	16	28	22	100	66.7	71.0	14.37
											3	21957	16	28	22	100	66.6	71.0	14.46
											4	21320	16	28	22	100	66.7	71.0	14.54
											5	21295	16	28	22	100	66.7	71.0	14.56
											6	21253	16	28	22	100	66.7	71.0	14.41

Appendix J:
Demographic Characteristics of Students

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Mathematics

Demographic or Educational Characteristic	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8			
	PPT	CBT	Total	PPT	CBT	Total													
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct												
Gender																			
Female	61,807 48.9	128 46.0	61,935 48.9	62,006 49.1	116 48.5	62,122 49.1	60,978 48.6	206 46.5	61,184 48.6	62,795 48.9	399 48.0	63,194 48.8	63,656 48.7	583 49.2	64,239 48.7	63,135 48.8	785 46.8	63,920 48.7	
Male	64,603 51.1	150 54.0	64,753 51.1	64,249 50.9	123 51.5	64,372 50.9	64,310 51.3	237 53.5	64,547 51.3	65,662 51.1	432 52.0	66,094 51.1	66,884 51.2	601 50.8	67,485 51.2	66,230 51.2	892 53.2	67,122 51.2	
Race/Ethnicity																			
American Indian/ Alaskan Native (not Hispanic)	184 0.1	0 0.0	184 0.1	183 0.1	0 0.0	183 0.1	187 0.1	0 0.0	187 0.1	188 0.1	1 0.1	189 0.1	194 0.1	0 0.0	194 0.1	199 0.2	2 0.1	201 0.2	
Asian (not Hispanic)	4,548 3.6	5 1.8	4,553 3.6	4,481 3.5	3 1.3	4,484 3.5	4,354 3.5	2 0.5	4,356 3.5	4,313 3.4	12 1.4	4,325 3.3	4,272 3.3	7 0.6	4,279 3.2	4,015 3.1	8 0.5	4,023 3.1	
Black or African American (not Hispanic)	18,523 14.6	48 17.3	18,571 14.7	18,744 14.8	45 18.8	18,789 14.8	18,841 15.0	76 17.2	18,917 15.0	19,045 14.8	138 16.6	19,183 14.8	19,314 14.8	137 11.6	19,451 14.8	19,196 14.8	143 8.5	19,339 14.7	
Hispanic (any race)	11,896 9.4	6 2.2	11,902 9.4	11,412 9.0	1 0.4	11,413 9.0	11,224 9.0	30 6.8	11,254 8.9	11,397 8.9	72 8.7	11,469 8.9	10,991 8.4	62 5.2	11,053 8.4	10,980 8.5	75 4.5	11,055 8.4	
Multi-Racial (not Hispanic)	3,698 2.9	28 10.1	3,726 2.9	3,088 2.4	28 11.7	3,116 2.5	2,594 2.1	21 4.7	2,615 2.1	2,289 1.8	35 4.2	2,324 1.8	2,324 1.8	47 4.0	2,371 1.8	2,059 1.6	60 3.6	2,119 1.6	
White (not Hispanic)	87,438 69.1	188 67.6	87,626 69.1	88,214 69.8	159 66.5	88,373 69.8	87,976 70.2	313 70.7	88,289 70.2	91,116 70.9	570 68.6	91,686 70.9	93,301 71.4	928 78.4	94,229 71.5	92,809 71.7	1,387 82.7	94,196 71.8	
Native Hawaiian or Other Pacific Islander (not Hispanic)	76 0.1	3 1.1	79 0.1	67 0.1	3 1.3	70 0.1	69 0.1	1 0.2	70 0.1	89 0.1	3 0.4	92 0.1	112 0.1	3 0.3	115 0.1	84 0.1	2 0.1	86 0.1	

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Mathematics (continued)

Demographic or Educational Characteristic	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8			
	PPT	CBT	Total																
	N/Pct	N/Pct	N/Pct	N/Pct															
Educational Category and Other Demographic Groups																			
IEP (not gifted)	18,757 14.8	51 18.3	18,808 14.8	19,673 15.6	83 34.7	19,756 15.6	19,425 15.5	119 26.9	19,544 15.5	19,697 15.3	220 26.5	19,917 15.4	19,666 15.1	310 26.2	19,976 15.2	19,427 15.0	343 20.5	19,770 15.1	
Student exited IEP in last 2 years	2,576 2.0	4 1.4	2,580 2.0	3,238 2.6	4 1.7	3,242 2.6	3,537 2.8	10 2.3	3,547 2.8	3,588 2.8	15 1.8	3,603 2.8	3,334 2.6	32 2.7	3,366 2.6	2,703 2.1	40 2.4	2,743 2.1	
Title I	49,680 39.3	177 63.7	49,857 39.3	47,582 37.7	199 83.3	47,781 37.8	44,031 35.1	286 64.6	44,317 35.2	36,202 28.2	253 30.4	36,455 28.2	28,396 21.7	131 11.1	28,527 21.6	27,252 21.0	145 8.6	27,397 20.9	
Title III Served	3,479 2.8	2 0.7	3,481 2.7	2,856 2.3	1 0.4	2,857 2.3	2,520 2.0	1 0.2	2,521 2.0	2,462 1.9	1 0.1	2,463 1.9	2,487 1.9	2 0.2	2,489 1.9	2,512 1.9	2 0.1	2,514 1.9	
Title III Not Served	199 0.2	0 0.0	199 0.2	170 0.1	0 0.0	170 0.1	147 0.1	8 1.8	155 0.1	140 0.1	16 1.9	156 0.1	137 0.1	11 0.9	148 0.1	156 0.1	21 1.3	177 0.1	
Migrant Student	50 0.0	0 0.0	50 0.0	61 0.0	0 0.0	61 0.0	45 0.0	0 0.0	45 0.0	60 0.0	0 0.0	60 0.0	55 0.0	0 0.0	55 0.0	47 0.0	0 0.0	47 0.0	
ELL (enrolled after 3/31/12)	0 0.0	0 0.0	0 0.0																
ELL (enrolled on or before 3/31/12)	3,689 2.9	2 0.7	3,691 2.9	3,029 2.4	1 0.4	3,030 2.4	2,672 2.1	9 2.0	2,681 2.1	2,607 2.0	17 2.0	2,624 2.0	2,634 2.0	12 1.0	2,646 2.0	2,671 2.1	24 1.4	2,695 2.1	
Exited ESL/bilingual program and in first year of monitoring	837 0.7	0 0.0	837 0.7	1,174 0.9	0 0.0	1,174 0.9	798 0.6	3 0.7	801 0.6	657 0.5	1 0.1	658 0.5	411 0.3	2 0.2	413 0.3	402 0.3	4 0.2	406 0.3	
Exited ESL/bilingual program and in 2nd year of monitoring	421 0.3	0 0.0	421 0.3	874 0.7	0 0.0	874 0.7	1,055 0.8	2 0.5	1,057 0.8	857 0.7	11 1.3	868 0.7	642 0.5	4 0.3	646 0.5	402 0.3	0 0.0	402 0.3	
Former ELL no longer monitored	328 0.3	2 0.7	330 0.3	761 0.6	0 0.0	761 0.6	1,584 1.3	1 0.2	1,585 1.3	2,322 1.8	6 0.7	2,328 1.8	2,561 2.0	7 0.6	2,568 1.9	2,581 2.0	3 0.2	2,584 2.0	
Economically Disadvantaged	58,319 46.1	145 52.2	58,464 46.1	57,197 45.3	164 68.6	57,361 45.3	56,062 44.7	254 57.3	56,316 44.8	56,147 43.7	431 51.9	56,578 43.7	55,473 42.5	597 50.4	56,070 42.5	53,843 41.6	719 42.9	54,562 41.6	
Historically Underperforming Subgroup	67,144 53.1	161 57.9	67,305 53.1	66,189 52.4	186 77.8	66,375 52.4	64,560 51.5	293 66.1	64,853 51.6	64,658 50.3	505 60.8	65,163 50.4	63,998 49.0	714 60.3	64,712 49.1	62,249 48.1	843 50.3	63,092 48.1	

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Mathematics (continued)

Demographic or Educational Characteristic	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8			
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Enrollment																			
Current Enrollment in school of residence after 10/1/12	3,715 2.9	7 2.5	3,722 2.9	3,526 2.8	4 1.7	3,530 2.8	3,290 2.6	8 1.8	3,298 2.6	3,290 2.6	25 3.0	3,315 2.6	3,746 2.9	34 2.9	3,780 2.9	3,874 3.0	48 2.9	3,922 3.0	
Current Enrollment in district of residence after 10/1/12	1,965 1.6	6 2.2	1,971 1.6	1,859 1.5	3 1.3	1,862 1.5	1,795 1.4	8 1.8	1,803 1.4	1,963 1.5	22 2.6	1,985 1.5	2,265 1.7	31 2.6	2,296 1.7	2,475 1.9	36 2.1	2,511 1.9	
Current Enrollment as PA resident after 10/1/12	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Enrolled in school of residence after 10/1/11 but on/before 10/1/12	25,452 20.1	28 10.1	25,480 20.1	25,485 20.2	26 10.9	25,511 20.2	24,897 19.9	66 14.9	24,963 19.8	32,976 25.7	148 17.8	33,124 25.6	26,506 20.3	152 12.8	26,658 20.2	20,494 15.8	181 10.8	20,675 15.8	
Enrolled in district of residence after 10/1/11 but on/before 10/1/12	10,350 8.2	27 9.7	10,377 8.2	10,111 8.0	25 10.5	10,136 8.0	10,435 8.3	66 14.9	10,501 8.3	11,229 8.7	144 17.3	11,373 8.8	11,276 8.6	145 12.2	11,421 8.7	8,947 6.9	172 10.3	9,119 7.0	
Education in Non-Traditional Settings																			
Court/agency placed	67 0.1	0 0.0	67 0.1	68 0.1	0 0.0	68 0.1	87 0.1	0 0.0	87 0.1	89 0.1	8 1.0	97 0.1	176 0.1	8 0.7	184 0.1	345 0.3	11 0.7	356 0.3	
Students with scores used in state summaries	126,456	278	126,734	126,311	239	126,550	125,347	443	125,790	128,535	831	129,366	130,658	1,184	131,842	129,466	1,677	131,143	

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Reading

Demographic or Educational Characteristic	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8			
	PPT	CBT	Total	PPT	CBT	Total													
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct												
Gender																			
Female	61,807 48.9	127 46.0	61,934 48.9	61,982 49.1	116 48.7	62,098 49.1	60,955 48.7	205 46.4	61,160 48.6	62,775 48.9	399 48.1	63,174 48.9	63,620 48.7	583 49.2	64,203 48.7	63,057 48.8	783 46.8	63,840 48.7	
Male	64,557 51.1	149 54.0	64,706 51.1	64,216 50.9	122 51.3	64,338 50.9	64,272 51.3	237 53.6	64,509 51.3	65,623 51.1	430 51.9	66,053 51.1	66,846 51.2	601 50.8	67,447 51.2	66,176 51.2	889 53.2	67,065 51.2	
Race/Ethnicity																			
American Indian/ Alaskan Native (not Hispanic)	183 0.1	0 0.0	183 0.1	183 0.1	0 0.0	183 0.1	188 0.2	0 0.0	188 0.1	188 0.1	1 0.1	189 0.1	193 0.1	0 0.0	193 0.1	199 0.2	2 0.1	201 0.2	
Asian (not Hispanic)	4,541 3.6	5 1.8	4,546 3.6	4,479 3.5	3 1.3	4,482 3.5	4,345 3.5	2 0.5	4,347 3.5	4,310 3.4	12 1.4	4,322 3.3	4,271 3.3	7 0.6	4,278 3.2	4,014 3.1	8 0.5	4,022 3.1	
Black or African American (not Hispanic)	18,520 14.7	47 17.0	18,567 14.7	18,710 14.8	45 18.9	18,755 14.8	18,831 15.0	76 17.2	18,907 15.0	19,032 14.8	138 16.6	19,170 14.8	19,292 14.8	137 11.6	19,429 14.7	19,154 14.8	142 8.5	19,296 14.7	
Hispanic (any race)	11,889 9.4	6 2.2	11,895 9.4	11,395 9.0	1 0.4	11,396 9.0	11,208 8.9	30 6.8	11,238 8.9	11,387 8.9	70 8.4	11,457 8.9	10,964 8.4	62 5.2	11,026 8.4	10,944 8.5	75 4.5	11,019 8.4	
Multi-Racial (not Hispanic)	3,700 2.9	28 10.1	3,728 2.9	3,093 2.4	28 11.8	3,121 2.5	2,594 2.1	21 4.8	2,615 2.1	2,290 1.8	35 4.2	2,325 1.8	2,324 1.8	47 4.0	2,371 1.8	2,055 1.6	60 3.6	2,115 1.6	
White (not Hispanic)	87,409 69.1	187 67.8	87,596 69.1	88,205 69.9	158 66.4	88,363 69.9	87,950 70.2	312 70.6	88,262 70.2	91,082 70.9	570 68.8	91,652 70.9	93,279 71.4	928 78.4	94,207 71.5	92,760 71.7	1,383 82.7	94,143 71.9	
Native Hawaiian or Other Pacific Islander (not Hispanic)	76 0.1	3 1.1	79 0.1	67 0.1	3 1.3	70 0.1	69 0.1	1 0.2	70 0.1	89 0.1	3 0.4	92 0.1	112 0.1	3 0.3	115 0.1	84 0.1	2 0.1	86 0.1	

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Reading (continued)

Demographic or Educational Characteristic	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8			
	PPT	CBT	Total																
	N/Pct	N/Pct	N/Pct	N/Pct															
Educational Category and Other Demographic Groups																			
IEP (not gifted)	18,723 14.8	51 18.5	18,774 14.8	19,644 15.6	82 34.5	19,726 15.6	19,402 15.5	117 26.5	19,519 15.5	19,678 15.3	218 26.3	19,896 15.4	19,644 15.0	310 26.2	19,954 15.1	19,393 15.0	341 20.4	19,734 15.1	
Student exited IEP in last 2 years	2,576 2.0	4 1.4	2,580 2.0	3,240 2.6	4 1.7	3,244 2.6	3,535 2.8	10 2.3	3,545 2.8	3,588 2.8	15 1.8	3,603 2.8	3,333 2.6	32 2.7	3,365 2.6	2,703 2.1	40 2.4	2,743 2.1	
Title I	49,656 39.3	176 63.8	49,832 39.3	47,541 37.7	199 83.6	47,740 37.7	43,997 35.1	286 64.7	44,283 35.2	36,185 28.2	253 30.5	36,438 28.2	28,367 21.7	131 11.1	28,498 21.6	27,214 21.0	144 8.6	27,358 20.9	
Title III Served	3,459 2.7	2 0.7	3,461 2.7	2,840 2.2	1 0.4	2,841 2.2	2,505 2.0	1 0.2	2,506 2.0	2,446 1.9	1 0.1	2,447 1.9	2,470 1.9	2 0.2	2,472 1.9	2,501 1.9	2 0.1	2,503 1.9	
Title III Not Served	197 0.2	0 0.0	197 0.2	170 0.1	0 0.0	170 0.1	146 0.1	8 1.8	154 0.1	139 0.1	16 1.9	155 0.1	136 0.1	11 0.9	147 0.1	152 0.1	21 1.3	173 0.1	
Migrant Student	49 0.0	0 0.0	49 0.0	61 0.0	0 0.0	61 0.0	45 0.0	0 0.0	45 0.0	60 0.0	0 0.0	60 0.0	55 0.0	0 0.0	55 0.0	47 0.0	0 0.0	47 0.0	
ELL (enrolled after 3/31/12)	0 0.0	0 0.0	0 0.0																
ELL (enrolled on or before 3/31/12)	3,667 2.9	2 0.7	3,669 2.9	3,011 2.4	1 0.4	3,012 2.4	2,656 2.1	9 2.0	2,665 2.1	2,589 2.0	17 2.1	2,606 2.0	2,615 2.0	12 1.0	2,627 2.0	2,655 2.1	24 1.4	2,679 2.0	
Exited ESL/bilingual program and in first year of monitoring	836 0.7	0 0.0	836 0.7	1,174 0.9	0 0.0	1,174 0.9	796 0.6	3 0.7	799 0.6	658 0.5	1 0.1	659 0.5	412 0.3	2 0.2	414 0.3	402 0.3	4 0.2	406 0.3	
Exited ESL/bilingual program and in 2nd year of monitoring	421 0.3	0 0.0	421 0.3	874 0.7	0 0.0	874 0.7	1,055 0.8	2 0.5	1,057 0.8	857 0.7	11 1.3	868 0.7	642 0.5	4 0.3	646 0.5	402 0.3	0 0.0	402 0.3	
Former ELL no longer monitored	328 0.3	2 0.7	330 0.3	761 0.6	0 0.0	761 0.6	1,585 1.3	1 0.2	1,586 1.3	2,324 1.8	6 0.7	2,330 1.8	2,560 2.0	7 0.6	2,567 1.9	2,581 2.0	3 0.2	2,584 2.0	
Economically Disadvantaged	58,293 46.1	144 52.2	58,437 46.1	57,134 45.3	163 68.5	57,297 45.3	56,025 44.7	254 57.5	56,279 44.8	56,105 43.7	429 51.7	56,534 43.7	55,425 42.4	597 50.4	56,022 42.5	53,742 41.6	714 42.7	54,456 41.6	
Historically Underperforming Subgroup	67,102 53.1	160 58.0	67,262 53.1	66,122 52.4	185 77.7	66,307 52.4	64,510 51.5	292 66.1	64,802 51.5	64,605 50.3	503 60.7	65,108 50.4	63,944 49.0	714 60.3	64,658 49.1	62,139 48.0	838 50.1	62,977 48.1	

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Reading (continued)

Demographic or Educational Characteristic	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8			
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Enrollment																			
Current Enrollment in school of residence after 10/1/12	3,701 2.9	7 2.5	3,708 2.9	3,516 2.8	4 1.7	3,520 2.8	3,282 2.6	8 1.8	3,290 2.6	3,281 2.6	25 3.0	3,306 2.6	3,728 2.9	34 2.9	3,762 2.9	3,844 3.0	49 2.9	3,893 3.0	
Current Enrollment in district of residence after 10/1/12	1,960 1.6	6 2.2	1,966 1.6	1,857 1.5	3 1.3	1,860 1.5	1,787 1.4	8 1.8	1,795 1.4	1,962 1.5	22 2.7	1,984 1.5	2,251 1.7	31 2.6	2,282 1.7	2,460 1.9	36 2.2	2,496 1.9	
Current Enrollment as PA resident after 10/1/12	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Enrolled in school of residence after 10/1/11 but on/before 10/1/12	25,426 20.1	28 10.1	25,454 20.1	25,448 20.2	25 10.5	25,473 20.1	24,860 19.8	65 14.7	24,925 19.8	32,959 25.7	149 18.0	33,108 25.6	26,477 20.3	152 12.8	26,629 20.2	20,450 15.8	179 10.7	20,629 15.7	
Enrolled in district of residence after 10/1/11 but on/before 10/1/12	10,319 8.2	27 9.8	10,346 8.2	10,094 8.0	24 10.1	10,118 8.0	10,407 8.3	65 14.7	10,472 8.3	11,217 8.7	145 17.5	11,362 8.8	11,257 8.6	145 12.2	11,402 8.7	8,924 6.9	170 10.2	9,094 6.9	
Education in Non-Traditional Settings																			
Court/agency placed	67 0.1	0 0.0	67 0.1	69 0.1	0 0.0	69 0.1	86 0.1	0 0.0	86 0.1	86 0.1	8 1.0	94 0.1	177 0.1	8 0.7	185 0.1	337 0.3	11 0.7	348 0.3	
Students with scores used in state summaries	126,409	276	126,685	126,253	238	126,491	125,285	442	125,727	128,476	829	129,305	130,583	1,184	131,767	129,334	1,672	131,006	

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Science

Demographic or Educational Characteristic	Grade 4			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Gender						
Female	61,684 49.1	505 50.2	62,189 49.1	62,298 48.7	1,326 48.1	63,624 48.7
Male	63,983 50.9	501 49.8	64,484 50.9	65,480 51.2	1,433 51.9	66,913 51.2
Race/Ethnicity						
American Indian/ Alaskan Native (not Hispanic)	180 0.1	2 0.2	182 0.1	199 0.2	4 0.1	203 0.2
Asian (not Hispanic)	4,584 3.6	10 1.0	4,594 3.6	4,110 3.2	18 0.7	4,128 3.2
Black or African American (not Hispanic)	18,731 14.9	53 5.3	18,784 14.8	19,026 14.9	176 6.4	19,202 14.7
Hispanic (any race)	11,578 9.2	31 3.1	11,609 9.2	11,049 8.6	102 3.7	11,151 8.5
Multi-Racial (not Hispanic)	3,087 2.5	40 4.0	3,127 2.5	2,011 1.6	80 2.9	2,091 1.6
White (not Hispanic)	87,381 69.5	867 86.2	88,248 69.6	91,282 71.4	2,377 86.2	93,659 71.7
Native Hawaiian or Other Pacific Islander (not Hispanic)	68 0.1	3 0.3	71 0.1	84 0.1	2 0.1	86 0.1

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Science (continued)

Demographic or Educational Characteristic	Grade 4			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Educational Category and Other Demographic Groups						
IEP (not gifted)	19,567 15.6	167 16.6	19,734 15.6	19,107 14.9	476 17.3	19,583 15.0
Student exited IEP in last 2 years	3,211 2.6	30 3.0	3,241 2.6	2,679 2.1	51 1.8	2,730 2.1
Title I	47,507 37.8	419 41.7	47,926 37.8	27,085 21.2	154 5.6	27,239 20.9
Title III Served	3,213 2.6	5 0.5	3,218 2.5	2,814 2.2	4 0.1	2,818 2.2
Title III Not Served	238 0.2	0 0.0	238 0.2	207 0.2	22 0.8	229 0.2
Migrant Student	66 0.1	0 0.0	66 0.1	51 0.0	0 0.0	51 0.0
ELL (enrolled after 3/31/12)	429 0.3	0 0.0	429 0.3	375 0.3	0 0.0	375 0.3
ELL (enrolled on or before 3/31/12)	3,026 2.4	5 0.5	3,031 2.4	2,652 2.1	27 1.0	2,679 2.1
Exited ESL/bilingual program and in first year of monitoring	1,170 0.9	4 0.4	1,174 0.9	398 0.3	5 0.2	403 0.3
Exited ESL/bilingual program and in 2nd year of monitoring	876 0.7	0 0.0	876 0.7	401 0.3	1 0.0	402 0.3
Former ELL no longer monitored	758 0.6	0 0.0	758 0.6	2,566 2.0	9 0.3	2,575 2.0
Economically Disadvantaged	57,076 45.4	468 46.5	57,544 45.4	53,294 41.7	1,031 37.4	54,325 41.6
Historically Underperforming Subgroup	66,102 52.6	537 53.4	66,639 52.6	61,645 48.2	1,229 44.5	62,874 48.1

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Science (continued)

Demographic or Educational Characteristic	Grade 4			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Enrollment						
Current Enrollment in school of residence after 10/1/12	3,528 2.8	20 2.0	3,548 2.8	3,777 3.0	70 2.5	3,847 2.9
Current Enrollment in district of residence after 10/1/12	1,839 1.5	15 1.5	1,854 1.5	2,412 1.9	55 2.0	2,467 1.9
Current Enrollment as PA resident after 10/1/12	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Enrolled in school of residence after 10/1/11 but on/before 10/1/12	25,672 20.4	79 7.9	25,751 20.3	20,420 16.0	257 9.3	20,677 15.8
Enrolled in district of residence after 10/1/11 but on/before 10/1/12	10,333 8.2	74 7.4	10,407 8.2	8,972 7.0	243 8.8	9,215 7.1
Education in Non-Traditional Settings						
Court/agency placed	64 0.1	1 0.1	65 0.1	323 0.3	12 0.4	335 0.3
Students with scores used in state summaries	125,723	1,006	126,729	127,878	2,759	130,637

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Writing

Demographic or Educational Characteristic	Grade 5			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Gender						
Female	60,458 48.9	201 46.6	60,659 48.9	62,572 48.9	946 48.2	63,518 48.9
Male	63,121 51.1	230 53.4	63,351 51.1	65,207 51.0	1,016 51.8	66,223 51.0
Race/Ethnicity						
American Indian/ Alaskan Native (not Hispanic)	184 0.1	0 0.0	184 0.1	201 0.2	1 0.1	202 0.2
Asian (not Hispanic)	4,295 3.5	2 0.5	4,297 3.5	3,975 3.1	9 0.5	3,984 3.1
Black or African American (not Hispanic)	18,389 14.9	64 14.8	18,453 14.9	18,938 14.8	122 6.2	19,060 14.7
Hispanic (any race)	10,982 8.9	34 7.9	11,016 8.9	10,704 8.4	92 4.7	10,796 8.3
Multi-Racial (not Hispanic)	2,538 2.1	20 4.6	2,558 2.1	2,015 1.6	70 3.6	2,085 1.6
White (not Hispanic)	87,083 70.4	310 71.9	87,393 70.5	91,844 71.8	1,666 84.9	93,510 72.0
Native Hawaiian or Other Pacific Islander (not Hispanic)	70 0.1	1 0.2	71 0.1	85 0.1	2 0.1	87 0.1

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Writing (continued)

Demographic or Educational Characteristic	Grade 5			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Educational Category and Other Demographic Groups						
IEP (not gifted)	18,715 15.1	89 20.6	18,804 15.2	18,873 14.8	348 17.7	19,221 14.8
Student exited IEP in last 2 years	3,517 2.8	9 2.1	3,526 2.8	2,689 2.1	42 2.1	2,731 2.1
Title I	43,171 34.9	287 66.6	43,458 35.0	26,709 20.9	143 7.3	26,852 20.7
Title III Served	2,366 1.9	2 0.5	2,368 1.9	2,373 1.9	2 0.1	2,375 1.8
Title III Not Served	139 0.1	8 1.9	147 0.1	131 0.1	28 1.4	159 0.1
Migrant Student	43 0.0	0 0.0	43 0.0	47 0.0	0 0.0	47 0.0
ELL (enrolled after 3/31/12)	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
ELL (enrolled on or before 3/31/12)	2,505 2.0	10 2.3	2,515 2.0	2,510 2.0	30 1.5	2,540 2.0
Exited ESL/bilingual program and in first year of monitoring	789 0.6	4 0.9	793 0.6	400 0.3	5 0.3	405 0.3
Exited ESL/bilingual program and in 2nd year of monitoring	1,054 0.9	2 0.5	1,056 0.9	397 0.3	0 0.0	397 0.3
Former ELL no longer monitored	1,572 1.3	1 0.2	1,573 1.3	2,565 2.0	6 0.3	2,571 2.0
Economically Disadvantaged	54,906 44.4	236 54.8	55,142 44.5	52,895 41.4	754 38.4	53,649 41.3
Historically Underperforming Subgroup	63,203 51.1	265 61.5	63,468 51.2	61,114 47.8	903 46.0	62,017 47.8

Appendix J: Demographic Characteristics of Students

Demographic Characteristics of Students Taking the 2013 PSSA: Writing (continued)

Demographic or Educational Characteristic	Grade 5			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Enrollment						
Current Enrollment in school of residence after 10/1/12	3,110 2.5	9 2.1	3,119 2.5	3,566 2.8	50 2.5	3,616 2.8
Current Enrollment in district of residence after 10/1/12	1,688 1.4	7 1.6	1,695 1.4	2,264 1.8	39 2.0	2,303 1.8
Current Enrollment as PA resident after 10/1/12	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Enrolled in school of residence after 10/1/11 but on/before 10/1/12	24,440 19.8	63 14.6	24,503 19.8	20,056 15.7	203 10.3	20,259 15.6
Enrolled in district of residence after 10/1/11 but on/before 10/1/12	10,237 8.3	63 14.6	10,300 8.3	8,669 6.8	195 9.9	8,864 6.8
Education in Non-Traditional Settings						
Court/agency placed	78 0.1	3 0.7	81 0.1	330 0.3	8 0.4	338 0.3
Students with scores used in state summaries	123,610	431	124,041	127,861	1,962	129,823

Appendix K:
Incidence of Accommodations Received

Appendix K: Incidence of Accommodations Received

Incidence of Presentation Accommodations Received on the 2013 PSSA: Mathematics

Type of Presentation Accommodation	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total															
	N/Pct	N/Pct	N/Pct															
Braille format	4 0.0	N/A N/A	4 0.0	7 0.0	N/A N/A	7 0.0	9 0.0	N/A N/A	9 0.0	7 0.0	N/A N/A	7 0.0	7 0.0	N/A N/A	7 0.0	9 0.0	N/A N/A	9 0.0
Large print format	102 0.1	N/A N/A	102 0.1	104 0.1	N/A N/A	104 0.1	98 0.1	N/A N/A	98 0.1	95 0.1	N/A N/A	95 0.1	87 0.1	N/A N/A	87 0.1	78 0.1	N/A N/A	78 0.1
Electronic Screen Reader	0 0.0	N/A N/A	0 0.0	1 0.0	N/A N/A	1 0.0	2 0.0	N/A N/A	2 0.0	0 0.0	N/A N/A	0 0.0	3 0.0	N/A N/A	3 0.0	2 0.0	N/A N/A	2 0.0
Some test items/questions read aloud	7,665 6.1	0 0.0	7,665 6.0	8,078 6.4	0 0.0	8,078 6.4	7,396 5.9	35 7.9	7,431 5.9	5,989 4.7	38 4.6	6,027 4.7	3,752 2.9	57 4.8	3,809 2.9	2,885 2.2	88 5.2	2,973 2.3
All test items/questions read aloud	6,196 4.9	22 7.9	6,218 4.9	5,752 4.6	41 18.4	5,796 4.6	4,318 3.4	80 18.1	4,398 3.5	2,997 2.3	87 10.5	3,084 2.4	1,788 1.4	82 6.9	1,870 1.4	1,324 1.0	65 3.9	1,389 1.1
Test items/questions signed	47 0.0	0 0.0	47 0.0	53 0.0	0 0.0	53 0.0	38 0.0	0 0.0	38 0.0	31 0.0	0 0.0	31 0.0	18 0.0	0 0.0	18 0.0	27 0.0	1 0.1	28 0.0
Test items/questions interpreted for ELL	67 0.1	0 0.0	67 0.1	77 0.1	0 0.0	77 0.1	68 0.1	0 0.0	68 0.1	59 0.0	0 0.0	59 0.0	81 0.1	0 0.0	81 0.1	71 0.1	0 0.0	71 0.1
Amplification device	66 0.1	0 0.0	66 0.1	52 0.0	0 0.0	52 0.0	54 0.0	0 0.0	54 0.0	21 0.0	0 0.0	21 0.0	17 0.0	0 0.0	17 0.0	17 0.0	1 0.1	18 0.0
Magnification device	20 0.0	0 0.0	20 0.0	15 0.0	0 0.0	15 0.0	12 0.0	0 0.0	12 0.0	15 0.0	0 0.0	15 0.0	9 0.0	0 0.0	9 0.0	10 0.0	0 0.0	10 0.0
Color overlay	67 0.1	N/A N/A	67 0.1	55 0.0	N/A N/A	55 0.0	58 0.0	N/A N/A	58 0.0	21 0.0	N/A N/A	21 0.0	8 0.0	N/A N/A	8 0.0	19 0.0	N/A N/A	19 0.0
Other (per Accommodations Guidelines)	454 0.4	0 0.0	454 0.4	546 0.4	0 0.0	546 0.4	537 0.4	0 0.0	537 0.4	388 0.3	3 0.4	391 0.3	57 0.0	0 0.0	57 0.0	72 0.1	5 0.3	77 0.1
Spanish version of test	107 0.1	N/A N/A	107 0.1	146 0.1	N/A N/A	146 0.1	168 0.1	N/A N/A	168 0.1	242 0.2	N/A N/A	242 0.2	214 0.2	N/A N/A	214 0.2	255 0.2	N/A N/A	255 0.2
Online Accommodations Received																		
Audio	N/A N/A	30 10.8	30 0.0	N/A N/A	64 26.8	64 0.1	N/A N/A	88 19.9	88 0.1	N/A N/A	68 8.2	68 0.1	N/A N/A	100 8.4	100 0.1	N/A N/A	96 5.7	96 0.1
Sign language	N/A N/A	0 0.0	0 0.0															
Color chooser	N/A N/A	0 0.0	0 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	1 0.1	1 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	1 0.1	1 0.0

Appendix K: Incidence of Accommodations Received

Incidence of Presentation Accommodations Received on the 2013 PSSA: Reading

Type of Presentation Accommodation	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Braille format	1 0.0	N/A N/A	1 0.0	7 0.0	N/A N/A	7 0.0	6 0.0	N/A N/A	6 0.0	8 0.0	N/A N/A	8 0.0	7 0.0	N/A N/A	7 0.0	9 0.0	N/A N/A	9 0.0
Large print format	103 0.1	N/A N/A	103 0.1	106 0.1	N/A N/A	106 0.1	99 0.1	N/A N/A	99 0.1	89 0.1	N/A N/A	89 0.1	88 0.1	N/A N/A	88 0.1	76 0.1	N/A N/A	76 0.1
Electronic Screen Reader	0 0.0	N/A N/A	0 0.0	1 0.0	N/A N/A	1 0.0	2 0.0	N/A N/A	2 0.0	1 0.0	N/A N/A	1 0.0	6 0.0	N/A N/A	6 0.0	2 0.0	N/A N/A	2 0.0
Amplification device	78 0.1	0 0.0	78 0.1	57 0.0	0 0.0	57 0.0	50 0.0	0 0.0	50 0.0	25 0.0	0 0.0	25 0.0	16 0.0	0 0.0	16 0.0	15 0.0	1 0.1	16 0.0
Magnification device	21 0.0	0 0.0	21 0.0	15 0.0	0 0.0	15 0.0	16 0.0	0 0.0	16 0.0	17 0.0	0 0.0	17 0.0	11 0.0	0 0.0	11 0.0	10 0.0	0 0.0	10 0.0
Color overlay	192 0.2	N/A N/A	192 0.2	180 0.1	N/A N/A	180 0.1	158 0.1	N/A N/A	158 0.1	77 0.1	N/A N/A	77 0.1	55 0.0	N/A N/A	55 0.0	31 0.0	N/A N/A	31 0.0
Other (per Accommodations Guidelines)	1,003 0.8	0 0.0	1,003 0.8	951 0.8	3 1.3	954 0.8	863 0.7	12 2.7	875 0.7	529 0.4	4 0.5	533 0.4	129 0.1	0 0.0	129 0.1	108 0.1	5 0.3	113 0.1
Online Accommodations Received																		
Color chooser	N/A N/A	0 0.0	0 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	1 0.1	1 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	1 0.1	1 0.0

Appendix K: Incidence of Accommodations Received

Incidence of Presentation Accommodations Received on the 2013 PSSA: Science

Type of Presentation Accommodation	Grade 4			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Braille format	5 0.0	N/A N/A	5 0.0	7 0.0	N/A N/A	7 0.0
Large print format	94 0.1	N/A N/A	94 0.1	65 0.1	N/A N/A	65 0.0
Electronic Screen Reader	1 0.0	N/A N/A	1 0.0	2 0.0	N/A N/A	2 0.0
Some test items/questions read aloud	6,369 5.1	2 0.2	6,371 5.0	2,146 1.7	71 2.6	2,217 1.7
All test items/questions read aloud	5,830 4.6	56 5.6	5,886 4.6	1,184 0.9	53 1.9	1,237 0.9
Test items/questions signed	56 0.0	0 0.0	56 0.0	35 0.0	1 0.0	36 0.0
Test items/questions interpreted for ELL	90 0.1	0 0.0	90 0.1	71 0.1	1 0.0	72 0.1
Amplification device	50 0.0	0 0.0	50 0.0	19 0.0	1 0.0	20 0.0
Magnification device	15 0.0	0 0.0	15 0.0	6 0.0	0 0.0	6 0.0
Color overlay	49 0.0	N/A N/A	49 0.0	5 0.0	N/A N/A	5 0.0
Other (per Accommodations Guidelines)	261 0.2	0 0.0	261 0.2	47 0.0	4 0.1	51 0.0
Spanish version of test	239 0.2	N/A N/A	239 0.2	353 0.3	N/A N/A	353 0.3
Online Accommodations Received						
Audio	N/A N/A	80 8.0	80 0.1	N/A N/A	109 4.0	109 0.1
Sign language	N/A N/A	0 0.0	0 0.0	N/A N/A	0 0.0	0 0.0
Color chooser	N/A N/A	0 0.0	0 0.0	N/A N/A	1 0.0	1 0.0

Appendix K: Incidence of Accommodations Received

Incidence of Presentation Accommodations Received on the 2013 PSSA: Writing

Type of Presentation Accommodation	Grade 5			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Braille format	10 0.0	N/A N/A	10 0.0	9 0.0	N/A N/A	9 0.0
Large print format	87 0.1	N/A N/A	87 0.1	78 0.1	N/A N/A	78 0.1
Electronic Screen Reader	1 0.0	N/A N/A	1 0.0	3 0.0	N/A N/A	3 0.0
Test directions read aloud	3,911 3.2	20 4.6	3,931 3.2	2,561 2.0	100 5.1	2,661 2.0
Test directions signed, interpreted for ELL, or recorded	103 0.1	0 0.0	103 0.1	96 0.1	1 0.1	97 0.1
Writing prompt(s) read aloud	6,815 5.5	54 12.5	6,869 5.5	3,606 2.8	74 3.8	3,680 2.8
Writing prompt(s) signed, interpreted for ELL, or recorded	68 0.1	0 0.0	68 0.1	63 0.0	1 0.1	64 0.0
Amplification device	50 0.0	0 0.0	50 0.0	18 0.0	1 0.1	19 0.0
Magnification device	10 0.0	0 0.0	10 0.0	8 0.0	0 0.0	8 0.0
Reading window, reading guide	170 0.1	N/A N/A	170 0.1	16 0.0	N/A N/A	16 0.0
Other (per Accommodations Guidelines)	212 0.2	0 0.0	212 0.2	97 0.1	4 0.2	101 0.1
Online Accommodations Received						
Color chooser	N/A N/A	0 0.0	0 0.0	N/A N/A	1 0.1	1 0.0

Appendix K: Incidence of Accommodations Received

Incidence of Response Accommodations Received on the 2013 PSSA: Mathematics

Type of Response Accommodation	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total															
	N/Pct																	
Test administrator marked multiple-choice responses at student's direction	165 0.1	0 0.0	165 0.1	535 0.4	0 0.0	535 0.4	525 0.4	0 0.0	525 0.4	338 0.3	1 0.1	339 0.3	226 0.2	0 0.0	226 0.2	201 0.2	0 0.0	201 0.2
Test administrator scribed open-ended responses at student's direction	869 0.7	0 0.0	869 0.7	815 0.6	0 0.0	815 0.6	627 0.5	2 0.5	629 0.5	375 0.3	12 1.4	387 0.3	264 0.2	3 0.3	267 0.2	198 0.2	1 0.1	199 0.2
Test administrator transcribed student responses	273 0.2	0 0.0	273 0.2	593 0.5	3 1.3	596 0.5	460 0.4	0 0.0	460 0.4	394 0.3	0 0.0	394 0.3	317 0.2	0 0.0	317 0.2	275 0.2	0 0.0	275 0.2
Qualified interpreter translated, transcribed, and/or scribed signed responses	4 0.0	0 0.0	4 0.0	17 0.0	0 0.0	17 0.0	12 0.0	0 0.0	12 0.0	17 0.0	0 0.0	17 0.0	6 0.0	0 0.0	6 0.0	6 0.0	0 0.0	6 0.0
Qualified interpreter translated, transcribed, and/or scribed ELL student responses	4 0.0	0 0.0	4 0.0	24 0.0	0 0.0	24 0.0	13 0.0	0 0.0	13 0.0	11 0.0	0 0.0	11 0.0	13 0.0	0 0.0	13 0.0	9 0.0	0 0.0	9 0.0
Keyboard, word processor, or computer	15 0.0	N/A N/A	15 0.0	40 0.0	N/A N/A	40 0.0	45 0.0	N/A N/A	45 0.0	72 0.1	N/A N/A	72 0.1	80 0.1	N/A N/A	80 0.1	79 0.1	N/A N/A	79 0.1
Braille/notetaker	0 0.0	N/A N/A	0 0.0	2 0.0	N/A N/A	2 0.0	7 0.0	N/A N/A	7 0.0	5 0.0	N/A N/A	5 0.0	4 0.0	N/A N/A	4 0.0	4 0.0	N/A N/A	4 0.0
Augmentative communication device	10 0.0	0 0.0	10 0.0	8 0.0	0 0.0	8 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	4 0.0	0 0.0	4 0.0	2 0.0	0 0.0	2 0.0
Audio recording of student responses	1 0.0	0 0.0	1 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	1 0.0	0 0.0	1 0.0	1 0.0	0 0.0	1 0.0	1 0.0	0 0.0	1 0.0
Electronic screen reader	3 0.0	N/A N/A	3 0.0	1 0.0	N/A N/A	1 0.0	0 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	0 0.0	2 0.0	N/A N/A	2 0.0	0 0.0	N/A N/A	0 0.0
Translation dictionary for ELL student	16 0.0	0 0.0	16 0.0	25 0.0	0 0.0	25 0.0	35 0.0	0 0.0	35 0.0	76 0.1	0 0.0	76 0.1	95 0.1	0 0.0	95 0.1	113 0.1	0 0.0	113 0.1
Other (per Accommodation Guidelines)	245 0.2	0 0.0	245 0.2	259 0.2	0 0.0	259 0.2	181 0.1	0 0.0	181 0.1	134 0.1	3 0.4	137 0.1	116 0.1	0 0.0	116 0.1	111 0.1	0 0.0	111 0.1

Appendix K: Incidence of Accommodations Received

Incidence of Response Accommodations Received on the 2013 PSSA: Reading

Type of Response Accommodation	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total															
	N/Pct																	
Test administrator marked multiple-choice responses at student's direction	157 0.1	0 0.0	157 0.1	535 0.4	0 0.0	535 0.4	519 0.4	0 0.0	519 0.4	329 0.3	1 0.1	330 0.3	217 0.2	0 0.0	217 0.2	194 0.1	0 0.0	194 0.1
Test administrator scribed open-ended responses at student's direction	924 0.7	0 0.0	924 0.7	932 0.7	0 0.0	932 0.7	766 0.6	2 0.5	768 0.6	455 0.4	12 1.4	467 0.4	319 0.2	3 0.3	322 0.2	247 0.2	1 0.1	248 0.2
Test administrator transcribed student responses	331 0.3	0 0.0	331 0.3	650 0.5	3 1.3	653 0.5	647 0.5	0 0.0	647 0.5	504 0.4	0 0.0	504 0.4	387 0.3	0 0.0	387 0.3	406 0.3	0 0.0	406 0.3
Keyboard, word processor, or computer	26 0.0	N/A N/A	26 0.0	61 0.0	N/A N/A	61 0.0	169 0.1	N/A N/A	169 0.1	158 0.1	N/A N/A	158 0.1	143 0.1	N/A N/A	143 0.1	185 0.1	N/A N/A	185 0.1
Braille/notetaker	1 0.0	N/A N/A	1 0.0	2 0.0	N/A N/A	2 0.0	5 0.0	N/A N/A	5 0.0	5 0.0	N/A N/A	5 0.0	4 0.0	N/A N/A	4 0.0	5 0.0	N/A N/A	5 0.0
Augmentative communication device	9 0.0	0 0.0	9 0.0	8 0.0	0 0.0	8 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	3 0.0	0 0.0	3 0.0	3 0.0	0 0.0	3 0.0
Audio recording of student responses	2 0.0	0 0.0	2 0.0	1 0.0	0 0.0	1 0.0	0 0.0	0 0.0	0 0.0	1 0.0	0 0.0	1 0.0	0 0.0	0 0.0	0 0.0	1 0.0	0 0.0	1 0.0
Electronic screen reader	2 0.0	N/A N/A	2 0.0	0 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	0 0.0	0 0.0	N/A N/A	0 0.0	3 0.0	N/A N/A	3 0.0	1 0.0	N/A N/A	1 0.0
Other (per Accommodation Guidelines)	180 0.1	0 0.0	180 0.1	199 0.2	0 0.0	199 0.2	139 0.1	0 0.0	139 0.1	124 0.1	0 0.0	124 0.1	118 0.1	0 0.0	118 0.1	110 0.1	0 0.0	110 0.1

Appendix K: Incidence of Accommodations Received

Incidence of Response Accommodations Received on the 2013 PSSA: Science

Type of Response Accommodation	Grade 4			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Test administrator marked multiple-choice responses at student's direction	538 0.4	7 0.7	545 0.4	168 0.1	0 0.0	168 0.1
Test administrator scribed open-ended responses at student's direction	817 0.6	11 1.1	828 0.7	178 0.1	1 0.0	179 0.1
Test administrator transcribed student responses	473 0.4	3 0.3	476 0.4	242 0.2	0 0.0	242 0.2
Qualified interpreter translated, transcribed, and/or scribed signed responses	7 0.0	0 0.0	7 0.0	10 0.0	0 0.0	10 0.0
Qualified interpreter translated, transcribed, and/or scribed ELL student responses	32 0.0	0 0.0	32 0.0	7 0.0	0 0.0	7 0.0
Keyboard, word processor, or computer	27 0.0	N/A N/A	27 0.0	78 0.1	N/A N/A	78 0.1
Braille/notetaker	2 0.0	N/A N/A	2 0.0	5 0.0	N/A N/A	5 0.0
Augmentative communication device	3 0.0	0 0.0	3 0.0	1 0.0	0 0.0	1 0.0
Audio recording of student responses	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Electronic screen reader	4 0.0	N/A N/A	4 0.0	1 0.0	N/A N/A	1 0.0
Translation dictionary for ELL student	36 0.0	0 0.0	36 0.0	83 0.1	0 0.0	83 0.1
Other (per Accommodation Guidelines)	138 0.1	0 0.0	138 0.1	79 0.1	0 0.0	79 0.1

Appendix K: Incidence of Accommodations Received

Incidence of Response Accommodations Received on the 2013 PSSA: Writing

Type of Response Accommodation	Grade 5			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Test administrator marked multiple-choice responses at student's direction	93 0.1	0 0.0	93 0.1	110 0.1	0 0.0	110 0.1
Test administrator transcribed student responses	895 0.7	0 0.0	895 0.7	629 0.5	0 0.0	629 0.5
Keyboard, word processor, or computer	390 0.3	N/A N/A	390 0.3	369 0.3	N/A N/A	369 0.3
Braille/notetaker	8 0.0	N/A N/A	8 0.0	7 0.0	N/A N/A	7 0.0
Augmentative communication device	2 0.0	0 0.0	2 0.0	1 0.0	0 0.0	1 0.0
Audio recording of student responses	1 0.0	0 0.0	1 0.0	1 0.0	0 0.0	1 0.0
Electronic screen reader	4 0.0	N/A N/A	4 0.0	2 0.0	N/A N/A	2 0.0
Other (per Accommodation Guidelines)	117 0.1	0 0.0	117 0.1	97 0.1	0 0.0	97 0.1

Appendix K: Incidence of Accommodations Received

Incidence of Setting Accommodations Received on the 2013 PSSA: Mathematics

Type of Setting Accommodation	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Hospital/home setting	65 0.1	0 0.0	65 0.1	45 0.0	0 0.0	45 0.0	54 0.0	0 0.0	54 0.0	64 0.0	0 0.0	64 0.0	88 0.1	1 0.1	89 0.1	102 0.1	0 0.0	102 0.1
One-on one setting	707 0.6	0 0.0	707 0.6	754 0.6	3 1.3	757 0.6	619 0.5	3 0.7	622 0.5	474 0.4	3 0.4	477 0.4	381 0.3	2 0.2	383 0.3	349 0.3	1 0.1	350 0.3
Small group setting	16,137 12.8	14 5.0	16,151 12.7	16,868 13.4	47 19.7	16,915 13.4	16,121 12.9	81 18.3	16,202 12.9	14,293 11.1	107 12.9	14,400 11.1	13,176 10.1	90 7.6	13,266 10.1	12,887 10.0	138 8.2	13,025 9.9

Incidence of Setting Accommodations Received on the 2013 PSSA: Reading

Type of Setting Accommodation	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Hospital/home setting	60 0.0	0 0.0	60 0.0	45 0.0	0 0.0	45 0.0	52 0.0	0 0.0	52 0.0	61 0.0	0 0.0	61 0.0	68 0.1	1 0.1	69 0.1	97 0.1	0 0.0	97 0.1
One-on one setting	847 0.7	0 0.0	847 0.7	850 0.7	3 1.3	853 0.7	663 0.5	3 0.7	666 0.5	538 0.4	3 0.4	541 0.4	386 0.3	1 0.1	387 0.3	340 0.3	1 0.1	341 0.3
Small group setting	15,878 12.6	14 5.1	15,892 12.5	16,710 13.2	17 7.1	16,727 13.2	15,908 12.7	52 11.8	15,960 12.7	14,080 11.0	104 12.5	14,184 11.0	13,140 10.1	91 7.7	13,231 10.0	12,862 9.9	136 8.1	12,998 9.9

Appendix K: Incidence of Accommodations Received

Incidence of Setting Accommodations Received on the 2013 PSSA: Science

Type of Setting Accommodation	Grade 4			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Hospital/home setting	25 0.0	0 0.0	25 0.0	67 0.1	0 0.0	67 0.1
One-on one setting	672 0.5	2 0.2	674 0.5	359 0.3	1 0.0	360 0.3
Small group setting	14,658 11.7	85 8.4	14,743 11.6	11,076 8.7	160 5.8	11,236 8.6

Incidence of Setting Accommodations Received on the 2013 PSSA: Writing

Type of Setting Accommodation	Grade 5			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Hospital/home setting	33 0.0	0 0.0	33 0.0	61 0.0	0 0.0	61 0.0
Tested in separate setting	10,133 8.2	46 10.7	10,179 8.2	6,607 5.2	101 5.1	6,708 5.2
Small group testing	13,363 10.8	55 12.8	13,418 10.8	10,839 8.5	194 9.9	11,033 8.5
Other (Per Accommodation Guidelines)	78 0.1	0 0.0	78 0.1	66 0.1	0 0.0	66 0.1

Appendix K: Incidence of Accommodations Received

Incidence of Timing Accommodations Received on the 2013 PSSA: Mathematics

Type of Timing Accommodation	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Extended time	4,862 3.8	13 4.7	4,875 3.8	6,662 5.3	12 5.0	6,674 5.3	8,119 6.5	26 5.9	8,145 6.5	6,598 5.1	112 13.5	6,710 5.2	7,249 5.5	117 9.9	7,366 5.6	4,809 3.7	112 6.7	4,921 3.8
Frequent breaks	3,537 2.8	13 4.7	3,550 2.8	3,744 3.0	19 7.9	3,763 3.0	3,508 2.8	22 5.0	3,530 2.8	2,503 1.9	90 10.8	2,593 2.0	1,899 1.5	83 7.0	1,982 1.5	1,566 1.2	87 5.2	1,653 1.3
Changed test schedule	492 0.4	0 0.0	492 0.4	625 0.5	0 0.0	625 0.5	494 0.4	1 0.2	495 0.4	380 0.3	2 0.2	382 0.3	361 0.3	0 0.0	361 0.3	400 0.3	1 0.1	401 0.3
Other (per Accommodations Guidelines)	119 0.1	0 0.0	119 0.1	168 0.1	0 0.0	168 0.1	145 0.1	0 0.0	145 0.1	127 0.1	0 0.0	127 0.1	80 0.1	0 0.0	80 0.1	70 0.1	0 0.0	70 0.1

Incidence of Timing Accommodations Received on the 2013 PSSA: Reading

Type of Timing Accommodation	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Extended time	5,582 4.4	14 5.1	5,596 4.4	9,067 7.2	11 4.6	9,078 7.2	10,888 8.7	26 5.9	10,914 8.7	7,197 5.6	110 13.3	7,307 5.7	5,961 4.6	118 10.0	6,079 4.6	6,345 4.9	110 6.6	6,455 4.9
Frequent breaks	3,621 2.9	13 4.7	3,634 2.9	3,869 3.1	18 7.6	3,887 3.1	3,590 2.9	21 4.8	3,611 2.9	2,519 2.0	90 10.9	2,609 2.0	1,899 1.5	81 6.8	1,980 1.5	1,574 1.2	86 5.1	1,660 1.3
Changed test schedule	530 0.4	0 0.0	530 0.4	655 0.5	0 0.0	655 0.5	522 0.4	1 0.2	523 0.4	382 0.3	2 0.2	384 0.3	354 0.3	0 0.0	354 0.3	398 0.3	1 0.1	399 0.3
Other (per Accommodations Guidelines)	126 0.1	0 0.0	126 0.1	170 0.1	0 0.0	170 0.1	150 0.1	0 0.0	150 0.1	117 0.1	0 0.0	117 0.1	74 0.1	0 0.0	74 0.1	71 0.1	0 0.0	71 0.1

Appendix K: Incidence of Accommodations Received

Incidence of Timing Accommodations Received on the 2013 PSSA: Science

Type of Timing Accommodation	Grade 4			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Extended time	4,917 3.9	30 3.0	4,947 3.9	4,481 3.5	107 3.9	4,588 3.5
Frequent breaks	2,744 2.2	33 3.3	2,777 2.2	1,230 1.0	83 3.0	1,313 1.0
Changed test schedule	326 0.3	0 0.0	326 0.3	179 0.1	0 0.0	179 0.1
Other (per Accommodations Guidelines)	118 0.1	0 0.0	118 0.1	43 0.0	0 0.0	43 0.0

Incidence of Timing Accommodations Received on the 2013 PSSA: Writing

Type of Timing Accommodation	Grade 5			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Extended time	8,855 7.2	23 5.3	8,878 7.2	7,839 6.1	105 5.4	7,944 6.1
Frequent breaks	2,170 1.8	17 3.9	2,187 1.8	1,232 1.0	81 4.1	1,313 1.0
Changed test schedule	291 0.2	1 0.2	292 0.2	252 0.2	0 0.0	252 0.2

Appendix L:

Accommodation Rate for Non-IEP and IEP Students

Appendix L: Accommodation Rate for Non-IEP and IEP Students

Accommodation Rate for Non-IEP and IEP Students on the 2013 PSSA: Mathematics

Student Subgroup	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Non-IEP Students	107,699	227	107,926	106,638	156	106,794	105,922	324	106,246	108,838	611	109,449	110,992	874	111,866	110,039	1,334	111,373
Non-Accommodated	98,077 91.1	223 98.2	98,300 91.1	97,094 91.1	154 98.7	97,248 91.1	96,393 91.0	276 85.2	96,669 91.0	102,393 94.1	595 97.4	102,988 94.1	104,659 94.3	854 97.7	105,513 94.3	105,706 96.1	1,312 98.4	107,018 96.1
Accommodated	9,622 8.9	4 1.8	9,626 8.9	9,544 8.9	2 1.3	9,546 8.9	9,529 9.0	48 14.8	9,577 9.0	6,445 5.9	16 2.6	6,461 5.9	6,333 5.7	20 2.3	6,353 5.7	4,333 3.9	22 1.6	4,355 3.9
IEP Students	18,757	51	18,808	19,673	83	19,756	19,425	119	19,544	19,697	220	19,917	19,666	310	19,976	19,427	343	19,770
Non-Accommodated	7,467 39.8	22 43.1	7,489 39.8	6,859 34.9	11 13.3	6,870 34.8	6,273 32.3	15 12.6	6,288 32.2	6,905 35.1	47 21.4	6,952 34.9	7,303 37.1	121 39.0	7,424 37.2	7,612 39.2	109 31.8	7,721 39.1
Accommodated	11,290 60.2	29 56.9	11,319 60.2	12,814 65.1	72 86.7	12,886 65.2	13,152 67.7	104 87.4	13,256 67.8	12,792 64.9	173 78.6	12,965 65.1	12,363 62.9	189 61.0	12,552 62.8	11,815 60.8	234 68.2	12,049 60.9

Accommodation Rate for Non-IEP and IEP Students on the 2013 PSSA: Reading

Student Subgroup	Grade 3			Grade 4			Grade 5			Grade 6			Grade 7			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Non-IEP Students	107,686	225	107,911	106,609	156	106,765	105,883	325	106,208	108,798	611	109,409	110,939	874	111,813	109,941	1,331	111,272
Non-Accommodated	99,073 92.0	223 99.1	99,296 92.0	96,229 90.3	156 100.0	96,385 90.3	94,620 89.4	291 89.5	94,911 89.4	102,264 94.0	599 98.0	102,863 94.0	105,785 95.4	858 98.2	106,643 95.4	104,433 95.0	1,310 98.4	105,743 95.0
Accommodated	8,613 8.0	2 0.9	8,615 8.0	10,380 9.7	0 0.0	10,380 9.7	11,263 10.6	34 10.5	11,297 10.6	6,534 6.0	12 2.0	6,546 6.0	5,154 4.6	16 1.8	5,170 4.6	5,508 5.0	21 1.6	5,529 5.0
IEP Students	18,723	51	18,774	19,644	82	19,726	19,402	117	19,519	19,678	218	19,896	19,644	310	19,954	19,393	341	19,734
Non-Accommodated	7,691 41.1	37 72.5	7,728 41.2	7,028 35.8	63 76.8	7,091 35.9	6,480 33.4	86 73.5	6,566 33.6	7,279 37.0	76 34.9	7,355 37.0	7,640 38.9	173 55.8	7,813 39.2	7,714 39.8	166 48.7	7,880 39.9
Accommodated	11,032 58.9	14 27.5	11,046 58.8	12,616 64.2	19 23.2	12,635 64.1	12,922 66.6	31 26.5	12,953 66.4	12,399 63.0	142 65.1	12,541 63.0	12,004 61.1	137 44.2	12,141 60.8	11,679 60.2	175 51.3	11,854 60.1

Appendix L: Accommodation Rate for Non-IEP and IEP Students

Accommodation Rate for Non-IEP and IEP Students on the 2013 PSSA: Science

Student Subgroup	Grade 4			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Non-IEP Students	106,156	839	106,995	108,771	2,283	111,054
Non-Accommodated	98,418 92.7	822 98.0	99,240 92.8	104,806 96.4	2,257 98.9	107,063 96.4
Accommodated	7,738 7.3	17 2.0	7,755 7.2	3,965 3.6	26 1.1	3,991 3.6
IEP Students	19,567	167	19,734	19,107	476	19,583
Non-Accommodated	8,089 41.3	64 38.3	8,153 41.3	8,784 46.0	219 46.0	9,003 46.0
Accommodated	11,478 58.7	103 61.7	11,581 58.7	10,323 54.0	257 54.0	10,580 54.0

Accommodation Rate for Non-IEP and IEP Students on the 2013 PSSA: Writing

Student Subgroup	Grade 5			Grade 8		
	PPT	CBT	Total	PPT	CBT	Total
	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Non-IEP Students	104,895	342	105,237	108,988	1,614	110,602
Non-Accommodated	95,679 91.2	308 90.1	95,987 91.2	101,719 93.3	1,579 97.8	103,298 93.4
Accommodated	9,216 8.8	34 9.9	9,250 8.8	7,269 6.7	35 2.2	7,304 6.6
IEP Students	18,715	89	18,804	18,873	348	19,221
Non-Accommodated	6,647 35.5	30 33.7	6,677 35.5	7,473 39.6	116 33.3	7,589 39.5
Accommodated	12,068 64.5	59 66.3	12,127 64.5	11,400 60.4	232 66.7	11,632 60.5

Appendix M:
Incidence of Accommodations Received
by IEP and ELL Students

Appendix M: Incidence of Accommodations Received by IEP and ELL Students

Incidence of IEP and ELL Students Receiving Selected Accommodation on the 2013 PSSA: Mathematics

Accommodation Received	Classification of Students Regarding IEP and ELL											
	General Education			IEP and non-ELL			ELL and non-IEP			Both IEP and ELL		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
Grade 3	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Some items/questions read aloud	2,902 2.8	0 0.0	2,902 2.8	3,823 21.1	0 0.0	3,823 21.0	741 24.1	0 0.0	741 24.1	199 32.6	0 0.0	199 32.6
All items/questions read aloud	1,238 1.2	2 0.9	1,240 1.2	4,594 25.3	20 39.2	4,614 25.4	205 6.7	0 0.0	205 6.7	159 26.0	0 0.0	159 26.0
Small group setting	4,921 4.7	2 0.9	4,923 4.7	9,747 53.7	12 23.5	9,759 53.6	1,065 34.6	0 0.0	1,065 34.6	404 66.1	0 0.0	404 66.1
Extended time	1,804 1.7	1 0.4	1,805 1.7	2,774 15.3	12 23.5	2,786 15.3	200 6.5	0 0.0	200 6.5	84 13.7	0 0.0	84 13.7
Frequent breaks	440 0.4	1 0.4	441 0.4	2,967 16.4	12 23.5	2,979 16.4	56 1.8	0 0.0	56 1.8	74 12.1	0 0.0	74 12.1
N assessed for Grade 3	104,621	225	104,846	18,146	51	18,197	3,078	2	3,080	611	0	611
Grade 4	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Some items/questions read aloud	2,409 2.3	0 0.0	2,409 2.3	4,862 25.5	0 0.0	4,862 25.4	553 23.2	0 0.0	553 23.2	254 39.6	0 0.0	254 39.6
All items/questions read aloud	919 0.9	1 0.6	920 0.9	4,488 23.6	43 51.8	4,531 23.7	169 7.1	0 0.0	169 7.1	176 27.4	0 0.0	176 27.4
Small group setting	4,489 4.3	1 0.6	4,490 4.3	11,098 58.3	46 55.4	11,144 58.3	815 34.1	0 0.0	815 34.1	466 72.6	0 0.0	466 72.6
Extended time	2,890 2.8	0 0.0	2,890 2.8	3,398 17.9	12 14.5	3,410 17.8	230 9.6	0 0.0	230 9.6	144 22.4	0 0.0	144 22.4
Frequent breaks	411 0.4	0 0.0	411 0.4	3,155 16.6	19 22.9	3,174 16.6	63 2.6	0 0.0	63 2.6	115 17.9	0 0.0	115 17.9
N assessed for Grade 4	104,251	155	104,406	19,031	83	19,114	2,387	1	2,388	642	0	642

Appendix M: Incidence of Accommodations Received by IEP and ELL Students

Incidence of IEP and ELL Students Receiving Selected Accommodation on the 2013 PSSA: Mathematics (continued)

Accommodation Received	Classification of Students Regarding IEP and ELL											
	General Education			IEP and non-ELL			ELL and non-IEP			Both IEP and ELL		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
Grade 5	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Some items/questions read aloud	1,618 1.6	26 8.2	1,644 1.6	5,134 27.4	8 6.8	5,142 27.2	399 19.9	0 0.0	399 19.8	245 36.8	1 100.0	246 36.9
All items/questions read aloud	566 0.5	3 0.9	569 0.5	3,509 18.7	77 65.3	3,586 19.0	94 4.7	0 0.0	94 4.7	149 22.4	0 0.0	149 22.3
Small group setting	3,625 3.5	26 8.2	3,651 3.5	11,407 60.8	54 45.8	11,461 60.7	611 30.5	0 0.0	611 30.3	478 71.8	1 100.0	479 71.8
Extended time	4,414 4.2	7 2.2	4,421 4.2	3,355 17.9	17 14.4	3,372 17.9	201 10.0	2 25.0	203 10.1	149 22.4	0 0.0	149 22.3
Frequent breaks	308 0.3	2 0.6	310 0.3	3,043 16.2	20 16.9	3,063 16.2	39 1.9	0 0.0	39 1.9	118 17.7	0 0.0	118 17.7
N assessed for Grade 5	103,916	316	104,232	18,759	118	18,877	2,006	8	2,014	666	1	667
Grade 6	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Some items/questions read aloud	866 0.8	0 0.0	866 0.8	4,671 24.6	31 14.5	4,702 24.5	227 11.8	1 9.1	228 11.8	225 32.6	6 100.0	231 33.2
All items/questions read aloud	322 0.3	2 0.3	324 0.3	2,567 13.5	85 39.7	2,652 13.8	48 2.5	0 0.0	48 2.5	60 8.7	0 0.0	60 8.6
Small group setting	2,328 2.2	3 0.5	2,331 2.2	11,153 58.7	97 45.3	11,250 58.5	425 22.2	1 9.1	426 22.1	387 56.1	6 100.0	393 56.5
Extended time	3,079 2.9	9 1.5	3,088 2.9	3,265 17.2	98 45.8	3,363 17.5	128 6.7	3 27.3	131 6.8	126 18.3	2 33.3	128 18.4
Frequent breaks	206 0.2	4 0.7	210 0.2	2,216 11.7	86 40.2	2,302 12.0	13 0.7	0 0.0	13 0.7	68 9.9	0 0.0	68 9.8
N assessed for Grade 6	106,921	600	107,521	19,007	214	19,221	1,917	11	1,928	690	6	696

Appendix M: Incidence of Accommodations Received by IEP and ELL Students

Incidence of IEP and ELL Students Receiving Selected Accommodation on the 2013 PSSA: Mathematics (continued)

Accommodation Received	Classification of Students Regarding IEP and ELL											
	General Education			IEP and non-ELL			ELL and non-IEP			Both IEP and ELL		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
Grade 7	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Some items/questions read aloud	324 0.3	5 0.6	329 0.3	3,114 16.4	49 16.0	3,163 16.4	155 8.0	0 0.0	155 7.9	159 23.0	3 75.0	162 23.3
All items/questions read aloud	190 0.2	2 0.2	192 0.2	1,538 8.1	80 26.1	1,618 8.4	32 1.6	0 0.0	32 1.6	28 4.1	0 0.0	28 4.0
Small group setting	1,721 1.6	9 1.0	1,730 1.6	10,803 56.9	78 25.5	10,881 56.4	313 16.1	0 0.0	313 16.0	339 49.1	3 75.0	342 49.3
Extended time	4,020 3.7	11 1.3	4,031 3.7	2,994 15.8	105 34.3	3,099 16.1	141 7.3	1 12.5	142 7.3	94 13.6	0 0.0	94 13.5
Frequent breaks	153 0.1	4 0.5	157 0.1	1,684 8.9	79 25.8	1,763 9.1	11 0.6	0 0.0	11 0.6	51 7.4	0 0.0	51 7.3
N assessed for Grade 7	109,048	866	109,914	18,976	306	19,282	1,944	8	1,952	690	4	694
Grade 8	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Some items/questions read aloud	219 0.2	3 0.2	222 0.2	2,388 12.7	80 23.8	2,468 12.9	160 8.0	0 0.0	160 7.9	118 17.9	5 71.4	123 18.5
All items/questions read aloud	122 0.1	0 0.0	122 0.1	1,148 6.1	65 19.3	1,213 6.3	31 1.5	0 0.0	31 1.5	23 3.5	0 0.0	23 3.5
Small group setting	1,632 1.5	19 1.4	1,651 1.5	10,600 56.5	114 33.9	10,714 56.1	353 17.5	0 0.0	353 17.4	302 45.8	5 71.4	307 46.1
Extended time	2,112 2.0	6 0.5	2,118 1.9	2,454 13.1	106 31.5	2,560 13.4	148 7.4	0 0.0	148 7.3	95 14.4	0 0.0	95 14.3
Frequent breaks	112 0.1	0 0.0	112 0.1	1,397 7.4	87 25.9	1,484 7.8	17 0.8	0 0.0	17 0.8	40 6.1	0 0.0	40 6.0
N assessed for Grade 8	108,027	1,317	109,344	18,768	336	19,104	2,012	17	2,029	659	7	666

Appendix M: Incidence of Accommodations Received by IEP and ELL Students

Incidence of IEP and ELL Students Receiving Selected Accommodation on the 2013 PSSA: Reading

Accommodation Received	Classification of Students Regarding IEP and ELL											
	General Education			IEP and non-ELL			ELL and non-IEP			Both IEP and ELL		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
Grade 3	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Small group setting	4,837 4.6	2 0.9	4,839 4.6	9,598 53.0	12 23.5	9,610 52.9	1,049 34.3	0 0.0	1,049 34.3	394 64.8	0 0.0	394 64.8
Extended time	2,397 2.3	1 0.4	2,398 2.3	2,879 15.9	13 25.5	2,892 15.9	221 7.2	0 0.0	221 7.2	85 14.0	0 0.0	85 14.0
Frequent breaks	449 0.4	1 0.4	450 0.4	3,029 16.7	12 23.5	3,041 16.7	65 2.1	0 0.0	65 2.1	78 12.8	0 0.0	78 12.8
N assessed for Grade 3	104,627	223	104,850	18,115	51	18,166	3,059	2	3,061	608	0	608
Grade 4	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Small group setting	4,473 4.3	0 0.0	4,473 4.3	10,974 57.7	17 20.7	10,991 57.6	801 33.8	0 0.0	801 33.8	462 72.2	0 0.0	462 72.2
Extended time	4,934 4.7	0 0.0	4,934 4.7	3,716 19.6	11 13.4	3,727 19.5	260 11.0	0 0.0	260 11.0	157 24.5	0 0.0	157 24.5
Frequent breaks	427 0.4	0 0.0	427 0.4	3,253 17.1	18 22.0	3,271 17.1	64 2.7	0 0.0	64 2.7	125 19.5	0 0.0	125 19.5
N assessed for Grade 4	104,238	155	104,393	19,004	82	19,086	2,371	1	2,372	640	0	640
Grade 5	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Small group setting	3,621 3.5	25 7.9	3,646 3.5	11,225 59.9	26 22.4	11,251 59.7	590 29.6	0 0.0	590 29.5	472 71.0	1 100.0	473 71.0
Extended time	6,876 6.6	7 2.2	6,883 6.6	3,589 19.2	17 14.7	3,606 19.1	263 13.2	2 25.0	265 13.3	160 24.1	0 0.0	160 24.0
Frequent breaks	326 0.3	2 0.6	328 0.3	3,105 16.6	19 16.4	3,124 16.6	39 2.0	0 0.0	39 2.0	120 18.0	0 0.0	120 18.0
N assessed for Grade 5	103,892	317	104,209	18,737	116	18,853	1,991	8	1,999	665	1	666

Appendix M: Incidence of Accommodations Received by IEP and ELL Students

Incidence of IEP and ELL Students Receiving Selected Accommodation on the 2013 PSSA: Reading (continued)

Accommodation Received	Classification of Students Regarding IEP and ELL											
	General Education			IEP and non-ELL			ELL and non-IEP			Both IEP and ELL		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
Grade 6	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Small group setting	2,302 2.2	3 0.5	2,305 2.1	10,994 57.9	95 44.8	11,089 57.8	405 21.3	1 9.1	406 21.2	379 55.0	5 83.3	384 55.3
Extended time	3,632 3.4	9 1.5	3,641 3.4	3,286 17.3	96 45.3	3,382 17.6	152 8.0	3 27.3	155 8.1	127 18.4	2 33.3	129 18.6
Frequent breaks	206 0.2	4 0.7	210 0.2	2,229 11.7	86 40.6	2,315 12.1	15 0.8	0 0.0	15 0.8	69 10.0	0 0.0	69 9.9
N assessed for Grade 6	106,898	600	107,498	18,989	212	19,201	1,900	11	1,911	689	6	695
Grade 7	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Small group setting	1,736 1.6	9 1.0	1,745 1.6	10,763 56.8	78 25.5	10,841 56.3	307 15.9	0 0.0	307 15.8	334 48.8	4 100.0	338 49.1
Extended time	3,039 2.8	11 1.3	3,050 2.8	2,715 14.3	106 34.6	2,821 14.6	112 5.8	1 12.5	113 5.8	95 13.9	0 0.0	95 13.8
Frequent breaks	141 0.1	4 0.5	145 0.1	1,696 8.9	77 25.2	1,773 9.2	11 0.6	0 0.0	11 0.6	51 7.5	0 0.0	51 7.4
N assessed for Grade 7	109,008	866	109,874	18,960	306	19,266	1,931	8	1,939	684	4	688
Grade 8	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Small group setting	1,649 1.5	19 1.4	1,668 1.5	10,570 56.4	112 33.5	10,682 56.0	345 17.3	0 0.0	345 17.1	298 45.2	5 71.4	303 45.5
Extended time	3,388 3.1	6 0.5	3,394 3.1	2,677 14.3	104 31.1	2,781 14.6	177 8.9	0 0.0	177 8.8	103 15.6	0 0.0	103 15.5
Frequent breaks	115 0.1	0 0.0	115 0.1	1,401 7.5	86 25.7	1,487 7.8	17 0.9	0 0.0	17 0.8	41 6.2	0 0.0	41 6.2
N assessed for Grade 8	107,945	1,314	109,259	18,734	334	19,068	1,996	17	2,013	659	7	666

Appendix M: Incidence of Accommodations Received by IEP and ELL Students

Incidence of IEP and ELL Students Receiving Selected Accommodation on the 2013 PSSA: Science

Accommodation Received	Classification of Students Regarding IEP and ELL											
	General Education			IEP and non-ELL			ELL and non-IEP			Both IEP and ELL		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
Grade 4	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Some items/questions read aloud	2,024 2.0	0 0.0	2,024 1.9	3,629 19.2	2 1.2	3,631 19.1	517 18.6	0 0.0	517 18.6	199 29.2	0 0.0	199 29.2
All items/questions read aloud	853 0.8	6 0.7	859 0.8	4,587 24.3	50 29.9	4,637 24.3	204 7.4	0 0.0	204 7.3	186 27.3	0 0.0	186 27.3
Small group setting	3,388 3.3	9 1.1	3,397 3.3	9,981 52.8	76 45.5	10,057 52.8	864 31.1	0 0.0	864 31.1	425 62.4	0 0.0	425 62.4
Extended time	2,129 2.1	7 0.8	2,136 2.0	2,425 12.8	23 13.8	2,448 12.8	242 8.7	0 0.0	242 8.7	121 17.8	0 0.0	121 17.8
Frequent breaks	273 0.3	0 0.0	273 0.3	2,317 12.3	33 19.8	2,350 12.3	52 1.9	0 0.0	52 1.9	102 15.0	0 0.0	102 15.0
N assessed for Grade 4	103,382	834	104,216	18,886	167	19,053	2,774	5	2,779	681	0	681
Grade 8	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Some items/questions read aloud	179 0.2	2 0.1	181 0.2	1,753 9.5	64 13.7	1,817 9.6	134 5.7	0 0.0	134 5.7	80 11.8	5 55.6	85 12.4
All items/questions read aloud	98 0.1	0 0.0	98 0.1	1,031 5.6	53 11.3	1,084 5.7	34 1.4	0 0.0	34 1.4	21 3.1	0 0.0	21 3.1
Small group setting	1,259 1.2	17 0.8	1,276 1.2	9,236 50.1	138 29.6	9,374 49.6	336 14.3	0 0.0	336 14.2	245 36.1	5 55.6	250 36.3
Extended time	2,149 2.0	11 0.5	2,160 2.0	2,077 11.3	96 20.6	2,173 11.5	173 7.4	0 0.0	173 7.3	82 12.1	0 0.0	82 11.9
Frequent breaks	96 0.1	0 0.0	96 0.1	1,086 5.9	83 17.8	1,169 6.2	16 0.7	0 0.0	16 0.7	32 4.7	0 0.0	32 4.7
N assessed for Grade 8	106,423	2,265	108,688	18,428	467	18,895	2,348	18	2,366	679	9	688

Appendix M: Incidence of Accommodations Received by IEP and ELL Students

Incidence of IEP and ELL Students Receiving Selected Accommodation on the 2013 PSSA: Writing

Accommodation Received	Classification of Students Regarding IEP and ELL											
	General Education			IEP and non-ELL			ELL and non-IEP			Both IEP and ELL		
	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total	PPT	CBT	Total
Grade 5	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Test directions read aloud	267 0.3	1 0.3	268 0.3	3,404 18.8	19 21.6	3,423 18.8	118 6.2	0 0.0	118 6.2	122 20.2	0 0.0	122 20.2
Writing prompts read aloud	700 0.7	6 1.8	706 0.7	5,711 31.5	47 53.4	5,758 31.6	181 9.5	0 0.0	181 9.5	223 37.0	1 100.0	224 37.1
Tested in separate setting	1,949 1.9	1 0.3	1,950 1.9	7,598 42.0	45 51.1	7,643 42.0	285 15.0	0 0.0	285 14.9	301 49.9	0 0.0	301 49.8
Small group testing	2,722 2.6	24 7.2	2,746 2.7	9,810 54.2	30 34.1	9,840 54.1	461 24.2	0 0.0	461 24.1	370 61.4	1 100.0	371 61.4
Extended time	5,540 5.4	11 3.3	5,551 5.4	3,046 16.8	12 13.6	3,058 16.8	162 8.5	0 0.0	162 8.5	107 17.7	0 0.0	107 17.7
Frequent breaks	166 0.2	1 0.3	167 0.2	1,928 10.6	16 18.2	1,944 10.7	20 1.1	0 0.0	20 1.0	56 9.3	0 0.0	56 9.3
N assessed for Grade 5	102,993	333	103,326	18,112	88	18,200	1,902	9	1,911	603	1	604
Grade 8	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct	N/Pct
Test directions read aloud	208 0.2	3 0.2	211 0.2	2,223 12.2	97 28.5	2,320 12.5	70 3.7	0 0.0	70 3.6	60 9.9	0 0.0	60 9.7
Writing prompts read aloud	341 0.3	2 0.1	343 0.3	3,035 16.6	61 17.9	3,096 16.6	127 6.7	5 22.7	132 6.9	103 16.9	6 75.0	109 17.7
Tested in separate setting	882 0.8	5 0.3	887 0.8	5,421 29.7	96 28.2	5,517 29.7	143 7.5	0 0.0	143 7.4	161 26.4	0 0.0	161 26.1
Small group testing	1,310 1.2	21 1.3	1,331 1.2	9,046 49.5	162 47.6	9,208 49.5	277 14.6	5 22.7	282 14.7	206 33.8	6 75.0	212 34.4
Extended time	5,118 4.8	12 0.8	5,130 4.7	2,518 13.8	93 27.4	2,611 14.0	132 6.9	0 0.0	132 6.9	71 11.7	0 0.0	71 11.5
Frequent breaks	92 0.1	2 0.1	94 0.1	1,111 6.1	79 23.2	1,190 6.4	7 0.4	0 0.0	7 0.4	22 3.6	0 0.0	22 3.6
N assessed for Grade 8	107,087	1,592	108,679	18,264	340	18,604	1,901	22	1,923	609	8	617

Appendix M: Incidence of Accommodations Received by IEP and ELL Students

Appendix N:
Cut Scores and Scale Transformations

Column Heading	Definition
LOSS	Lowest Obtainable Scaled Score

Appendix N: Cut Scores and Scale Transformations

	Grade	Scaling	LOSS	Scaled Score Cuts			Logit Cuts		
				Basic	Prof.	Adv.	Basic	Prof.	Adv.
Mathematics	3	$128.81X + 964.24$	750	1044	1180	1370	0.6192	1.6750	3.1501
	4	$200.00X + 1183.52$	700	1156	1246	1445	-0.1376	0.3124	1.3074
	5	$189.80X + 1134.10$	700	1158	1312	1483	0.1259	0.9373	1.8383
	6	$200.00X + 1201.54$	700	1174	1298	1476	-0.1377	0.4823	1.3723
	7	$200.00X + 1225.28$	700	1183	1298	1472	-0.2114	0.3636	1.2336
	8	$177.53X + 1182.30$	700	1171	1284	1446	-0.0637	0.5729	1.4854
	11	$206.42X + 1203.10$	700	1167	1304	1509	-0.1749	0.4888	1.4819
Reading	3	$123.80X + 1207.70$	1000	1168	1235	1442	-0.3207	0.2205	1.8926
	4	$200.00X + 1156.30$	700	1112	1255	1469	-0.2215	0.4935	1.5635
	5	$198.80X + 1094.60$	700	1137	1275	1497	0.2133	0.9074	2.0241
	6	$200.00X + 1168.96$	700	1121	1278	1456	-0.2398	0.5452	1.4352
	7	$200.00X + 1194.40$	700	1131	1279	1470	-0.3170	0.4230	1.3780
	8	$234.82X + 1113.70$	700	1146	1280	1473	0.1376	0.7082	1.5301
	11	$245.45X + 1115.20$	700	1112	1257	1492	-0.0130	0.5777	1.5351
Science	7	$176.75X + 1225.65$	1050	1150	1275	1483	-0.4280	0.2792	1.4560
	8	$191.54X + 1196.64$	925	1150	1275	1464	-0.2435	0.4091	1.3958
	11	$101.81X + 1194.69$	1050	1150	1275	1347	-0.4390	0.7888	1.4960
Writing	7	$100.00X + 1071.44$	700	745	1236	1909	-3.2644	1.6456	8.3756
	8	$100.00X + 1123.84$	700	914	1236	1748	-2.0984	1.1216	6.2416
	11	$100.00X + 1244.30$	700	952	1236	1806	-2.9230	-0.0830	5.6170

Appendix N: Cut Scores and Scale Transformations

Appendix O:

Raw-to-Scaled Score Conversion Tables

Column Heading	Definition
Raw	Raw score
Meas	Rasch measure
MeasSE	Rasch measure standard error
SS	Scaled score
SSSE	Scaled score standard error
Freq	Frequency
Freq%	Frequency percent
Cum	Cumulative frequency
Cum%	Cumulative frequency percent
Pct	Percentile

Appendix O: Raw-to-Scaled Score Conversion Tables

Mathematics Grade 3

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.2584	1.8327	750	236	0	0.0	0	0.0	0
1	-4.0366	1.0127	750	130	0	0.0	0	0.0	0
2	-3.3178	0.7251	750	93	0	0.0	0	0.0	0
3	-2.8863	0.5995	750	77	0	0.0	0	0.0	0
4	-2.5724	0.5257	750	68	0	0.0	0	0.0	0
5	-2.3227	0.4761	750	61	2	0.0	2	0.0	1
6	-2.1135	0.4401	750	57	3	0.0	5	0.0	1
7	-1.9323	0.4125	750	53	5	0.0	10	0.0	1
8	-1.7713	0.3907	750	50	4	0.0	14	0.0	1
9	-1.6257	0.3729	755	48	12	0.0	26	0.0	1
10	-1.4923	0.3582	772	46	26	0.0	52	0.0	1
11	-1.3685	0.3457	788	45	29	0.0	81	0.1	1
12	-1.2527	0.3351	803	43	67	0.1	148	0.1	1
13	-1.1435	0.326	817	42	98	0.1	246	0.2	1
14	-1.0398	0.318	830	41	113	0.1	359	0.3	1
15	-0.9409	0.3111	843	40	170	0.1	529	0.4	1
16	-0.8461	0.305	855	39	210	0.2	739	0.6	1
17	-0.7547	0.2996	867	39	237	0.2	976	0.8	1
18	-0.6664	0.2948	878	38	304	0.2	1280	1.0	1
19	-0.5807	0.2906	889	37	326	0.3	1606	1.3	1
20	-0.4974	0.2869	900	37	345	0.3	1951	1.5	1
21	-0.4161	0.2835	911	37	351	0.3	2302	1.8	2
22	-0.3365	0.2806	921	36	428	0.3	2730	2.2	2
23	-0.2585	0.278	931	36	426	0.3	3156	2.5	2
24	-0.1819	0.2757	941	36	438	0.3	3594	2.8	3
25	-0.1065	0.2737	951	35	454	0.4	4048	3.2	3
26	-0.032	0.2719	960	35	503	0.4	4551	3.6	3
27	0.0415	0.2705	970	35	517	0.4	5068	4.0	4
28	0.1143	0.2692	979	35	547	0.4	5615	4.4	4
29	0.1864	0.2681	988	35	620	0.5	6235	4.9	5
30	0.2581	0.2673	997	34	616	0.5	6851	5.4	5
31	0.3294	0.2666	1007	34	680	0.5	7531	5.9	6
32	0.4003	0.2662	1016	34	683	0.5	8214	6.5	6
33	0.4711	0.2659	1025	34	741	0.6	8955	7.1	7
34	0.5418	0.2658	1034	34	762	0.6	9717	7.7	7
35	0.6124	0.2659	1044	34	806	0.6	10523	8.3	8
36	0.6832	0.2661	1052	34	884	0.7	11407	9.0	9
37	0.7541	0.2665	1061	34	938	0.7	12345	9.7	9
38	0.8252	0.267	1071	34	952	0.8	13297	10.5	10
39	0.8967	0.2678	1080	34	1042	0.8	14339	11.3	11
40	0.9686	0.2687	1089	35	1142	0.9	15481	12.2	12
41	1.0411	0.2697	1098	35	1156	0.9	16637	13.1	13
42	1.1142	0.271	1108	35	1185	0.9	17822	14.1	14
43	1.188	0.2724	1117	35	1265	1.0	19087	15.1	15
44	1.2626	0.274	1127	35	1405	1.1	20492	16.2	16
45	1.3382	0.2758	1137	36	1531	1.2	22023	17.4	17
46	1.4148	0.2778	1146	36	1587	1.3	23610	18.6	18
47	1.4926	0.2801	1157	36	1630	1.3	25240	19.9	19
48	1.5717	0.2825	1167	36	1803	1.4	27043	21.3	21
49	1.6523	0.2853	1177	37	1870	1.5	28913	22.8	22

Appendix O: Raw-to-Scaled Score Conversion Tables

50	1.7345	0.2883	1188	37	2025	1.6	30938	24.4	24
51	1.8187	0.2917	1199	38	2240	1.8	33178	26.2	25
52	1.9048	0.2954	1210	38	2423	1.9	35601	28.1	27
53	1.9933	0.2996	1221	39	2549	2.0	38150	30.1	29
54	2.0844	0.3042	1233	39	2726	2.2	40876	32.3	31
55	2.1785	0.3093	1245	40	3005	2.4	43881	34.6	33
56	2.2759	0.3151	1257	41	3140	2.5	47021	37.1	36
57	2.3772	0.3216	1270	41	3447	2.7	50468	39.8	38
58	2.4829	0.3289	1284	42	3661	2.9	54129	42.7	41
59	2.5939	0.3373	1298	43	4028	3.2	58157	45.9	44
60	2.7108	0.3468	1313	45	4321	3.4	62478	49.3	48
61	2.8348	0.3578	1329	46	4939	3.9	67417	53.2	51
62	2.9673	0.3705	1346	48	5176	4.1	72593	57.3	55
63	3.1101	0.3855	1365	50	5574	4.4	78167	61.7	59
64	3.2655	0.4035	1385	52	5942	4.7	84109	66.4	64
65	3.4371	0.4256	1407	55	6313	5.0	90422	71.3	69
66	3.6299	0.4535	1432	58	6690	5.3	97112	76.6	74
67	3.8519	0.4904	1460	63	6743	5.3	103855	81.9	79
68	4.1167	0.5416	1495	70	6467	5.1	110322	87.1	84
69	4.4503	0.6185	1537	80	6100	4.8	116422	91.9	89
70	4.9101	0.749	1597	96	5128	4.0	121550	95.9	94
71	5.6744	1.0409	1695	134	3527	2.8	125077	98.7	97
72	6.9448	1.8549	1859	239	1657	1.3	126734	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Mathematics Grade 4

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5379	1.8317	700	366	0	0.0	0	0.0	0
1	-4.3188	1.0108	700	202	0	0.0	0	0.0	0
2	-3.6039	0.7223	700	144	1	0.0	1	0.0	1
3	-3.1766	0.5960	700	119	1	0.0	2	0.0	1
4	-2.8669	0.5216	700	104	1	0.0	3	0.0	1
5	-2.6216	0.4715	700	94	4	0.0	7	0.0	1
6	-2.4168	0.4350	700	87	6	0.0	13	0.0	1
7	-2.2400	0.4070	736	81	22	0.0	35	0.0	1
8	-2.0836	0.3847	767	77	26	0.0	61	0.0	1
9	-1.9427	0.3666	795	73	64	0.1	125	0.1	1
10	-1.8139	0.3515	821	70	113	0.1	238	0.2	1
11	-1.6949	0.3387	845	68	160	0.1	398	0.3	1
12	-1.5839	0.3278	867	66	250	0.2	648	0.5	1
13	-1.4796	0.3184	888	64	318	0.3	966	0.8	1
14	-1.3809	0.3102	907	62	394	0.3	1360	1.1	1
15	-1.2869	0.3030	926	61	513	0.4	1873	1.5	1
16	-1.1970	0.2967	944	59	560	0.4	2433	1.9	2
17	-1.1107	0.2911	961	58	663	0.5	3096	2.4	2
18	-1.0275	0.2861	978	57	780	0.6	3876	3.1	3
19	-0.9469	0.2816	994	56	854	0.7	4730	3.7	3
20	-0.8687	0.2777	1010	56	871	0.7	5601	4.4	4
21	-0.7926	0.2742	1025	55	935	0.7	6536	5.2	5
22	-0.7183	0.2711	1040	54	976	0.8	7512	5.9	6
23	-0.6456	0.2683	1054	54	964	0.8	8476	6.7	6
24	-0.5743	0.2658	1069	53	1049	0.8	9525	7.5	7
25	-0.5043	0.2636	1083	53	1135	0.9	10660	8.4	8
26	-0.4353	0.2617	1096	52	1152	0.9	11812	9.3	9
27	-0.3672	0.2601	1110	52	1169	0.9	12981	10.3	10
28	-0.2999	0.2587	1124	52	1295	1.0	14276	11.3	11
29	-0.2333	0.2575	1137	52	1291	1.0	15567	12.3	12
30	-0.1673	0.2565	1150	51	1375	1.1	16942	13.4	13
31	-0.1017	0.2558	1163	51	1436	1.1	18378	14.5	14
32	-0.0364	0.2552	1176	51	1482	1.2	19860	15.7	15
33	0.0286	0.2548	1189	51	1615	1.3	21475	17.0	16
34	0.0936	0.2547	1202	51	1649	1.3	23124	18.3	18
35	0.1584	0.2547	1215	51	1702	1.3	24826	19.6	19
36	0.2233	0.2549	1228	51	1774	1.4	26600	21.0	20
37	0.2884	0.2553	1241	51	1893	1.5	28493	22.5	22
38	0.3537	0.2559	1254	51	1929	1.5	30422	24.0	23
39	0.4194	0.2567	1267	51	1969	1.6	32391	25.6	25
40	0.4856	0.2577	1281	52	2098	1.7	34489	27.3	26
41	0.5523	0.2589	1294	52	2172	1.7	36661	29.0	28
42	0.6197	0.2603	1307	52	2242	1.8	38903	30.7	30
43	0.6879	0.2620	1321	52	2358	1.9	41261	32.6	32
44	0.7570	0.2638	1335	53	2381	1.9	43642	34.5	34
45	0.8272	0.2659	1349	53	2547	2.0	46189	36.5	35
46	0.8985	0.2683	1363	54	2573	2.0	48762	38.5	38
47	0.9712	0.2709	1378	54	2618	2.1	51380	40.6	40
48	1.0454	0.2738	1393	55	2823	2.2	54203	42.8	42
49	1.1212	0.2770	1408	55	3067	2.4	57270	45.3	44

Appendix O: Raw-to-Scaled Score Conversion Tables

50	1.1989	0.2806	1423	56	3002	2.4	60272	47.6	46
51	1.2787	0.2844	1439	57	3123	2.5	63395	50.1	49
52	1.3609	0.2887	1456	58	3200	2.5	66595	52.6	51
53	1.4455	0.2934	1473	59	3293	2.6	69888	55.2	54
54	1.5331	0.2985	1490	60	3230	2.6	73118	57.8	57
55	1.6238	0.3041	1508	61	3511	2.8	76629	60.6	59
56	1.7182	0.3103	1527	62	3458	2.7	80087	63.3	62
57	1.8166	0.3172	1547	63	3610	2.9	83697	66.1	65
58	1.9196	0.3248	1567	65	3715	2.9	87412	69.1	68
59	2.0278	0.3332	1589	67	3786	3.0	91198	72.1	71
60	2.1420	0.3428	1612	69	3864	3.1	95062	75.1	74
61	2.2632	0.3536	1636	71	3854	3.0	98916	78.2	77
62	2.3926	0.3662	1662	73	3953	3.1	102869	81.3	80
63	2.5321	0.3811	1690	76	3778	3.0	106647	84.3	83
64	2.6841	0.3992	1720	80	3745	3.0	110392	87.2	86
65	2.8522	0.4216	1754	84	3606	2.8	113998	90.1	89
66	3.0418	0.4505	1792	90	3404	2.7	117402	92.8	91
67	3.2616	0.4888	1836	98	2905	2.3	120307	95.1	94
68	3.5260	0.5421	1889	108	2374	1.9	122681	96.9	96
69	3.8612	0.6207	1956	124	1823	1.4	124504	98.4	98
70	4.3245	0.7513	2048	150	1248	1.0	125752	99.4	99
71	5.0901	1.0398	2202	208	615	0.5	126367	99.9	99
72	6.3554	1.8513	2455	370	183	0.1	126550	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Mathematics Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.2099	1.8325	700	348	0	0.0	0	0.0	0
1	-3.9888	1.0122	700	192	0	0.0	0	0.0	0
2	-3.2711	0.7243	700	137	0	0.0	0	0.0	0
3	-2.8410	0.5983	700	114	0	0.0	0	0.0	0
4	-2.5287	0.5242	700	99	0	0.0	0	0.0	0
5	-2.2807	0.4742	701	90	0	0.0	0	0.0	0
6	-2.0734	0.4379	741	83	6	0.0	6	0.0	1
7	-1.8941	0.4100	775	78	13	0.0	19	0.0	1
8	-1.7352	0.3879	805	74	26	0.0	45	0.0	1
9	-1.5918	0.3700	832	70	55	0.0	100	0.1	1
10	-1.4606	0.3550	857	67	97	0.1	197	0.2	1
11	-1.3390	0.3424	880	65	159	0.1	356	0.3	1
12	-1.2255	0.3317	902	63	217	0.2	573	0.5	1
13	-1.1185	0.3225	922	61	322	0.3	895	0.7	1
14	-1.0172	0.3145	941	60	414	0.3	1309	1.0	1
15	-0.9205	0.3075	959	58	553	0.4	1862	1.5	1
16	-0.8279	0.3013	977	57	649	0.5	2511	2.0	2
17	-0.7387	0.2960	994	56	757	0.6	3268	2.6	2
18	-0.6526	0.2912	1010	55	793	0.6	4061	3.2	3
19	-0.5690	0.2870	1026	54	863	0.7	4924	3.9	4
20	-0.4877	0.2833	1042	54	988	0.8	5912	4.7	4
21	-0.4084	0.2800	1057	53	975	0.8	6887	5.5	5
22	-0.3309	0.2771	1071	53	1088	0.9	7975	6.3	6
23	-0.2548	0.2745	1086	52	1174	0.9	9149	7.3	7
24	-0.1800	0.2723	1100	52	1200	1.0	10349	8.2	8
25	-0.1064	0.2704	1114	51	1300	1.0	11649	9.3	9
26	-0.0338	0.2687	1128	51	1340	1.1	12989	10.3	10
27	0.0380	0.2672	1141	51	1428	1.1	14417	11.5	11
28	0.1090	0.2660	1155	50	1619	1.3	16036	12.7	12
29	0.1796	0.2650	1168	50	1589	1.3	17625	14.0	13
30	0.2495	0.2642	1181	50	1747	1.4	19372	15.4	15
31	0.3192	0.2636	1195	50	1757	1.4	21129	16.8	16
32	0.3885	0.2631	1208	50	1983	1.6	23112	18.4	18
33	0.4576	0.2629	1221	50	1990	1.6	25102	20.0	19
34	0.5267	0.2628	1234	50	2062	1.6	27164	21.6	21
35	0.5958	0.2629	1247	50	2069	1.6	29233	23.2	22
36	0.6650	0.2631	1260	50	2302	1.8	31535	25.1	24
37	0.7343	0.2635	1273	50	2271	1.8	33806	26.9	26
38	0.8039	0.2641	1287	50	2429	1.9	36235	28.8	28
39	0.8738	0.2648	1300	50	2477	2.0	38712	30.8	30
40	0.9442	0.2657	1313	50	2552	2.0	41264	32.8	32
41	1.0151	0.2668	1327	51	2605	2.1	43869	34.9	34
42	1.0866	0.2681	1340	51	2730	2.2	46599	37.0	36
43	1.1588	0.2695	1354	51	2853	2.3	49452	39.3	38
44	1.2318	0.2711	1368	51	2814	2.2	52266	41.6	40
45	1.3058	0.2729	1382	52	2883	2.3	55149	43.8	43
46	1.3808	0.2749	1396	52	2992	2.4	58141	46.2	45
47	1.4570	0.2772	1411	53	2917	2.3	61058	48.5	47
48	1.5345	0.2797	1425	53	3109	2.5	64167	51.0	50
49	1.6135	0.2824	1440	54	3187	2.5	67354	53.5	52

Appendix O: Raw-to-Scaled Score Conversion Tables

50	1.6941	0.2855	1456	54	3118	2.5	70472	56.0	55
51	1.7765	0.2888	1471	55	3296	2.6	73768	58.6	57
52	1.8610	0.2926	1487	56	3250	2.6	77018	61.2	60
53	1.9478	0.2967	1504	56	3334	2.7	80352	63.9	63
54	2.0372	0.3013	1521	57	3451	2.7	83803	66.6	65
55	2.1295	0.3065	1538	58	3408	2.7	87211	69.3	68
56	2.2252	0.3123	1556	59	3403	2.7	90614	72.0	71
57	2.3248	0.3189	1575	61	3443	2.7	94057	74.8	73
58	2.4288	0.3264	1595	62	3448	2.7	97505	77.5	76
59	2.5381	0.3349	1616	64	3419	2.7	100924	80.2	79
60	2.6534	0.3447	1638	65	3460	2.8	104384	83.0	82
61	2.7761	0.3560	1661	68	3271	2.6	107655	85.6	84
62	2.9075	0.3693	1686	70	3170	2.5	110825	88.1	87
63	3.0495	0.3849	1713	73	2952	2.3	113777	90.4	89
64	3.2048	0.4036	1742	77	2785	2.2	116562	92.7	92
65	3.3768	0.4265	1775	81	2474	2.0	119036	94.6	94
66	3.5706	0.4550	1812	86	2108	1.7	121144	96.3	95
67	3.7941	0.4919	1854	93	1731	1.4	122875	97.7	97
68	4.0601	0.5420	1905	103	1322	1.1	124197	98.7	98
69	4.3926	0.6158	1968	117	874	0.7	125071	99.4	99
70	4.8450	0.7404	2054	141	497	0.4	125568	99.8	99
71	5.5875	1.0250	2195	195	187	0.1	125755	100.0	99
72	6.8275	1.8400	2430	349	35	0.0	125790	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Mathematics Grade 6

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5693	1.8325	700	367	0	0.0	0	0.0	0
1	-4.3481	1.0123	700	202	0	0.0	0	0.0	0
2	-3.6301	0.7245	700	145	0	0.0	0	0.0	0
3	-3.1998	0.5986	700	120	2	0.0	2	0.0	1
4	-2.8870	0.5245	700	105	0	0.0	2	0.0	1
5	-2.6386	0.4746	700	95	1	0.0	3	0.0	1
6	-2.4309	0.4383	715	88	3	0.0	6	0.0	1
7	-2.2513	0.4104	751	82	9	0.0	15	0.0	1
8	-2.0921	0.3883	783	78	27	0.0	42	0.0	1
9	-1.9485	0.3702	812	74	46	0.0	88	0.1	1
10	-1.8171	0.3551	838	71	89	0.1	177	0.1	1
11	-1.6956	0.3423	862	68	143	0.1	320	0.2	1
12	-1.5822	0.3314	885	66	224	0.2	544	0.4	1
13	-1.4756	0.3218	906	64	337	0.3	881	0.7	1
14	-1.3748	0.3135	927	63	394	0.3	1275	1.0	1
15	-1.2788	0.3061	946	61	534	0.4	1809	1.4	1
16	-1.1871	0.2996	964	60	656	0.5	2465	1.9	2
17	-1.0991	0.2938	982	59	741	0.6	3206	2.5	2
18	-1.0143	0.2886	999	58	778	0.6	3984	3.1	3
19	-0.9323	0.2840	1015	57	827	0.6	4811	3.7	3
20	-0.8529	0.2798	1031	56	903	0.7	5714	4.4	4
21	-0.7756	0.2761	1046	55	984	0.8	6698	5.2	5
22	-0.7003	0.2727	1061	55	1032	0.8	7730	6.0	6
23	-0.6268	0.2697	1076	54	1056	0.8	8786	6.8	6
24	-0.5548	0.2670	1091	53	1120	0.9	9906	7.7	7
25	-0.4842	0.2646	1105	53	1202	0.9	11108	8.6	8
26	-0.4147	0.2625	1119	53	1239	1.0	12347	9.5	9
27	-0.3463	0.2607	1132	52	1260	1.0	13607	10.5	10
28	-0.2788	0.2591	1146	52	1335	1.0	14942	11.6	11
29	-0.2120	0.2577	1159	52	1459	1.1	16401	12.7	12
30	-0.1459	0.2565	1172	51	1486	1.1	17887	13.8	13
31	-0.0804	0.2556	1185	51	1560	1.2	19447	15.0	14
32	-0.0152	0.2549	1199	51	1615	1.2	21062	16.3	16
33	0.0496	0.2543	1211	51	1705	1.3	22767	17.6	17
34	0.1142	0.2540	1224	51	1741	1.3	24508	18.9	18
35	0.1787	0.2539	1237	51	1854	1.4	26362	20.4	20
36	0.2432	0.2539	1250	51	1804	1.4	28166	21.8	21
37	0.3077	0.2542	1263	51	1973	1.5	30139	23.3	23
38	0.3724	0.2546	1276	51	1964	1.5	32103	24.8	24
39	0.4374	0.2553	1289	51	2093	1.6	34196	26.4	26
40	0.5027	0.2561	1302	51	2180	1.7	36376	28.1	27
41	0.5686	0.2572	1315	51	2261	1.7	38637	29.9	29
42	0.6351	0.2584	1329	52	2405	1.9	41042	31.7	31
43	0.7022	0.2599	1342	52	2427	1.9	43469	33.6	33
44	0.7702	0.2616	1356	52	2539	2.0	46008	35.6	35
45	0.8391	0.2636	1369	53	2550	2.0	48558	37.5	37
46	0.9092	0.2658	1383	53	2690	2.1	51248	39.6	39
47	0.9806	0.2684	1398	54	2781	2.1	54029	41.8	41
48	1.0533	0.2712	1412	54	2865	2.2	56894	44.0	43
49	1.1277	0.2744	1427	55	2909	2.2	59803	46.2	45

Appendix O: Raw-to-Scaled Score Conversion Tables

50	1.2039	0.2780	1442	56	3061	2.4	62864	48.6	47
51	1.2823	0.2819	1458	56	3130	2.4	65994	51.0	50
52	1.3630	0.2864	1474	57	3201	2.5	69195	53.5	52
53	1.4465	0.2914	1491	58	3233	2.5	72428	56.0	55
54	1.5330	0.2969	1508	59	3395	2.6	75823	58.6	57
55	1.6229	0.3031	1526	61	3286	2.5	79109	61.2	60
56	1.7169	0.3101	1545	62	3450	2.7	82559	63.8	62
57	1.8155	0.3180	1565	64	3611	2.8	86170	66.6	65
58	1.9195	0.3269	1585	65	3576	2.8	89746	69.4	68
59	2.0295	0.3370	1607	67	3864	3.0	93610	72.4	71
60	2.1469	0.3485	1631	70	3836	3.0	97446	75.3	74
61	2.2731	0.3619	1656	72	3873	3.0	101319	78.3	77
62	2.4096	0.3775	1683	76	3944	3.0	105263	81.4	80
63	2.5590	0.3960	1713	79	3794	2.9	109057	84.3	83
64	2.7245	0.4182	1746	84	3860	3.0	112917	87.3	86
65	2.9106	0.4455	1784	89	3653	2.8	116570	90.1	89
66	3.1242	0.4799	1826	96	3420	2.6	119990	92.8	91
67	3.3756	0.5249	1877	105	3026	2.3	123016	95.1	94
68	3.6828	0.5865	1938	117	2603	2.0	125619	97.1	96
69	4.0787	0.6772	2017	135	1893	1.5	127512	98.6	98
70	4.6344	0.8251	2128	165	1262	1.0	128774	99.5	99
71	5.5512	1.1276	2312	226	506	0.4	129280	99.9	99
72	6.9684	1.9148	2595	383	86	0.1	129366	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Mathematics Grade 7

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5118	1.8329	700	367	1	0.0	1	0.0	1
1	-4.2894	1.0131	700	203	0	0.0	1	0.0	1
2	-3.5698	0.7257	700	145	1	0.0	2	0.0	1
3	-3.1376	0.6001	700	120	0	0.0	2	0.0	1
4	-2.8232	0.5262	700	105	0	0.0	2	0.0	1
5	-2.5730	0.4765	711	95	3	0.0	5	0.0	1
6	-2.3636	0.4404	753	88	4	0.0	9	0.0	1
7	-2.1821	0.4126	789	83	15	0.0	24	0.0	1
8	-2.0210	0.3906	821	78	25	0.0	49	0.0	1
9	-1.8756	0.3727	850	75	68	0.1	117	0.1	1
10	-1.7424	0.3577	877	72	97	0.1	214	0.2	1
11	-1.6190	0.3450	901	69	158	0.1	372	0.3	1
12	-1.5038	0.3341	925	67	286	0.2	658	0.5	1
13	-1.3953	0.3247	946	65	337	0.3	995	0.8	1
14	-1.2926	0.3164	967	63	470	0.4	1465	1.1	1
15	-1.1948	0.3092	986	62	591	0.4	2056	1.6	1
16	-1.1013	0.3027	1005	61	742	0.6	2798	2.1	2
17	-1.0114	0.2969	1023	59	817	0.6	3615	2.7	2
18	-0.9248	0.2918	1040	58	936	0.7	4551	3.5	3
19	-0.8410	0.2872	1057	57	1063	0.8	5614	4.3	4
20	-0.7597	0.2830	1073	57	1157	0.9	6771	5.1	5
21	-0.6807	0.2793	1089	56	1190	0.9	7961	6.0	6
22	-0.6037	0.2760	1105	55	1237	0.9	9198	7.0	7
23	-0.5284	0.2730	1120	55	1312	1.0	10510	8.0	7
24	-0.4546	0.2703	1134	54	1320	1.0	11830	9.0	8
25	-0.3822	0.2679	1149	54	1425	1.1	13255	10.1	10
26	-0.3110	0.2658	1163	53	1478	1.1	14733	11.2	11
27	-0.2408	0.2640	1177	53	1540	1.2	16273	12.3	12
28	-0.1715	0.2625	1191	53	1609	1.2	17882	13.6	13
29	-0.1030	0.2612	1205	52	1697	1.3	19579	14.9	14
30	-0.0351	0.2601	1218	52	1759	1.3	21338	16.2	16
31	0.0324	0.2592	1232	52	1733	1.3	23071	17.5	17
32	0.0994	0.2586	1245	52	1834	1.4	24905	18.9	18
33	0.1661	0.2582	1259	52	1891	1.4	26796	20.3	20
34	0.2328	0.2581	1272	52	1850	1.4	28646	21.7	21
35	0.2994	0.2581	1285	52	1973	1.5	30619	23.2	22
36	0.3661	0.2583	1299	52	2143	1.6	32762	24.8	24
37	0.4329	0.2588	1312	52	2195	1.7	34957	26.5	26
38	0.5000	0.2594	1325	52	2217	1.7	37174	28.2	27
39	0.5675	0.2602	1339	52	2274	1.7	39448	29.9	29
40	0.6355	0.2613	1352	52	2347	1.8	41795	31.7	31
41	0.7040	0.2625	1366	53	2412	1.8	44207	33.5	33
42	0.7733	0.2639	1380	53	2535	1.9	46742	35.5	34
43	0.8434	0.2655	1394	53	2580	2.0	49322	37.4	36
44	0.9144	0.2673	1408	53	2596	2.0	51918	39.4	38
45	0.9864	0.2693	1423	54	2739	2.1	54657	41.5	40
46	1.0595	0.2716	1437	54	2964	2.2	57621	43.7	43
47	1.1339	0.2740	1452	55	2870	2.2	60491	45.9	45
48	1.2097	0.2767	1467	55	2956	2.2	63447	48.1	47
49	1.2871	0.2796	1483	56	3033	2.3	66480	50.4	49

Appendix O: Raw-to-Scaled Score Conversion Tables

50	1.3662	0.2828	1499	57	3160	2.4	69640	52.8	52
51	1.4471	0.2864	1515	57	3231	2.5	72871	55.3	54
52	1.5302	0.2903	1531	58	3233	2.5	76104	57.7	56
53	1.6157	0.2945	1548	59	3289	2.5	79393	60.2	59
54	1.7039	0.2993	1566	60	3231	2.5	82624	62.7	61
55	1.7950	0.3046	1584	61	3375	2.6	85999	65.2	64
56	1.8895	0.3105	1603	62	3476	2.6	89475	67.9	67
57	1.9879	0.3172	1623	63	3438	2.6	92913	70.5	69
58	2.0909	0.3248	1643	65	3524	2.7	96437	73.1	72
59	2.1993	0.3336	1665	67	3437	2.6	99874	75.8	74
60	2.3139	0.3438	1688	69	3449	2.6	103323	78.4	77
61	2.4361	0.3558	1713	71	3373	2.6	106696	80.9	80
62	2.5676	0.3699	1739	74	3469	2.6	110165	83.6	82
63	2.7107	0.3869	1767	77	3245	2.5	113410	86.0	85
64	2.8682	0.4075	1799	82	3295	2.5	116705	88.5	87
65	3.0445	0.4329	1834	87	3076	2.3	119781	90.9	90
66	3.2455	0.4649	1874	93	2841	2.2	122622	93.0	92
67	3.4805	0.5062	1921	101	2626	2.0	125248	95.0	94
68	3.7642	0.5617	1978	112	2317	1.8	127565	96.8	96
69	4.1234	0.6414	2050	128	1802	1.4	129367	98.1	97
70	4.6147	0.7710	2148	154	1319	1.0	130686	99.1	99
71	5.4120	1.0557	2308	211	839	0.6	131525	99.8	99
72	6.7014	1.8609	2566	372	317	0.2	131842	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Mathematics Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5449	1.8333	700	325	0	0.0	0	0.0	0
1	-4.3215	1.0138	700	180	0	0.0	0	0.0	0
2	-3.6005	0.7266	700	129	0	0.0	0	0.0	0
3	-3.1671	0.6011	700	107	0	0.0	0	0.0	0
4	-2.8514	0.5274	700	94	0	0.0	0	0.0	0
5	-2.6000	0.4778	721	85	2	0.0	2	0.0	1
6	-2.3894	0.4417	758	78	5	0.0	7	0.0	1
7	-2.2067	0.4141	791	74	17	0.0	24	0.0	1
8	-2.0445	0.3922	819	70	33	0.0	57	0.0	1
9	-1.8978	0.3743	845	66	62	0.0	119	0.1	1
10	-1.7633	0.3594	869	64	137	0.1	256	0.2	1
11	-1.6387	0.3469	891	62	190	0.1	446	0.3	1
12	-1.5222	0.3361	912	60	280	0.2	726	0.6	1
13	-1.4124	0.3267	932	58	402	0.3	1128	0.9	1
14	-1.3083	0.3186	950	57	500	0.4	1628	1.2	1
15	-1.2092	0.3114	968	55	661	0.5	2289	1.7	1
16	-1.1142	0.3050	984	54	739	0.6	3028	2.3	2
17	-1.0230	0.2993	1001	53	873	0.7	3901	3.0	3
18	-0.9350	0.2941	1016	52	900	0.7	4801	3.7	3
19	-0.8498	0.2895	1031	51	989	0.8	5790	4.4	4
20	-0.7672	0.2853	1046	51	926	0.7	6716	5.1	5
21	-0.6869	0.2816	1060	50	1043	0.8	7759	5.9	6
22	-0.6086	0.2781	1074	49	989	0.8	8748	6.7	6
23	-0.5322	0.2750	1088	49	1025	0.8	9773	7.5	7
24	-0.4574	0.2721	1101	48	1052	0.8	10825	8.3	8
25	-0.3840	0.2695	1114	48	1156	0.9	11981	9.1	9
26	-0.3120	0.2671	1127	47	1129	0.9	13110	10.0	10
27	-0.2412	0.2650	1139	47	1254	1.0	14364	11.0	10
28	-0.1715	0.2631	1152	47	1243	0.9	15607	11.9	11
29	-0.1028	0.2614	1164	46	1290	1.0	16897	12.9	12
30	-0.0349	0.2598	1176	46	1435	1.1	18332	14.0	13
31	0.0322	0.2585	1188	46	1442	1.1	19774	15.1	15
32	0.0988	0.2574	1200	46	1474	1.1	21248	16.2	16
33	0.1648	0.2564	1212	46	1549	1.2	22797	17.4	17
34	0.2303	0.2557	1223	45	1695	1.3	24492	18.7	18
35	0.2956	0.2551	1235	45	1712	1.3	26204	20.0	19
36	0.3606	0.2548	1246	45	1822	1.4	28026	21.4	21
37	0.4254	0.2546	1258	45	1928	1.5	29954	22.8	22
38	0.4903	0.2547	1269	45	1980	1.5	31934	24.4	24
39	0.5552	0.2549	1281	45	2112	1.6	34046	26.0	25
40	0.6203	0.2554	1292	45	2289	1.7	36335	27.7	27
41	0.6857	0.2561	1304	45	2301	1.8	38636	29.5	29
42	0.7515	0.2570	1316	46	2404	1.8	41040	31.3	30
43	0.8178	0.2581	1327	46	2551	1.9	43591	33.2	32
44	0.8848	0.2595	1339	46	2650	2.0	46241	35.3	34
45	0.9525	0.2611	1351	46	2764	2.1	49005	37.4	36
46	1.0212	0.2629	1364	47	2874	2.2	51879	39.6	38
47	1.0908	0.2651	1376	47	2915	2.2	54794	41.8	41
48	1.1617	0.2675	1389	47	3124	2.4	57918	44.2	43
49	1.2340	0.2702	1401	48	3277	2.5	61195	46.7	45

Appendix O: Raw-to-Scaled Score Conversion Tables

50	1.3078	0.2733	1414	49	3367	2.6	64562	49.2	48
51	1.3834	0.2767	1428	49	3276	2.5	67838	51.7	50
52	1.4610	0.2805	1442	50	3427	2.6	71265	54.3	53
53	1.5409	0.2847	1456	51	3468	2.6	74733	57.0	56
54	1.6233	0.2894	1470	51	3548	2.7	78281	59.7	58
55	1.7085	0.2947	1486	52	3618	2.8	81899	62.5	61
56	1.7971	0.3006	1501	53	3606	2.7	85505	65.2	64
57	1.8895	0.3072	1518	55	3677	2.8	89182	68.0	67
58	1.9861	0.3147	1535	56	3827	2.9	93009	70.9	69
59	2.0878	0.3232	1553	57	3768	2.9	96777	73.8	72
60	2.1954	0.3329	1572	59	3830	2.9	100607	76.7	75
61	2.3099	0.3442	1592	61	3726	2.8	104333	79.6	78
62	2.4328	0.3572	1614	63	3776	2.9	108109	82.4	81
63	2.5658	0.3726	1638	66	3649	2.8	111758	85.2	84
64	2.7114	0.3911	1664	69	3427	2.6	115185	87.8	87
65	2.8730	0.4137	1692	73	3330	2.5	118515	90.4	89
66	3.0557	0.4420	1725	78	3102	2.4	121617	92.7	92
67	3.2670	0.4788	1762	85	2757	2.1	124374	94.8	94
68	3.5198	0.5292	1807	94	2392	1.8	126766	96.7	96
69	3.8379	0.6036	1864	107	1927	1.5	128693	98.1	97
70	4.2750	0.7295	1941	130	1399	1.1	130092	99.2	99
71	5.0010	1.0167	2070	180	751	0.6	130843	99.8	99
72	6.2288	1.8352	2288	326	300	0.2	131143	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Reading Grade 3

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.4415	1.8364	1000	227	0	0.0	0	0.0	0
1	-4.2101	1.0195	1000	126	0	0.0	0	0.0	0
2	-3.4774	0.7347	1000	91	2	0.0	2	0.0	1
3	-3.0319	0.6112	1000	76	13	0.0	15	0.0	1
4	-2.7038	0.5392	1000	67	47	0.0	62	0.0	1
5	-2.4396	0.4912	1000	61	127	0.1	189	0.1	1
6	-2.2158	0.4566	1000	57	263	0.2	452	0.4	1
7	-2.0196	0.4304	1000	53	412	0.3	864	0.7	1
8	-1.8434	0.4099	1000	51	632	0.5	1496	1.2	1
9	-1.6823	0.3934	1000	49	892	0.7	2388	1.9	2
10	-1.5329	0.3800	1018	47	1111	0.9	3499	2.8	2
11	-1.3929	0.3688	1035	46	1359	1.1	4858	3.8	3
12	-1.2603	0.3596	1052	45	1495	1.2	6353	5.0	4
13	-1.1338	0.3518	1067	44	1576	1.2	7929	6.3	6
14	-1.0124	0.3453	1082	43	1669	1.3	9598	7.6	7
15	-0.8951	0.3399	1097	42	1667	1.3	11265	8.9	8
16	-0.7811	0.3354	1111	42	1777	1.4	13042	10.3	10
17	-0.6699	0.3317	1125	41	1877	1.5	14919	11.8	11
18	-0.5608	0.3288	1138	41	1933	1.5	16852	13.3	13
19	-0.4535	0.3265	1152	40	2012	1.6	18864	14.9	14
20	-0.3475	0.3249	1165	40	2156	1.7	21020	16.6	16
21	-0.2423	0.3239	1178	40	2251	1.8	23271	18.4	17
22	-0.1376	0.3234	1191	40	2309	1.8	25580	20.2	19
23	-0.0329	0.3235	1204	40	2556	2.0	28136	22.2	21
24	0.0719	0.3242	1217	40	2710	2.1	30846	24.3	23
25	0.1774	0.3254	1230	40	2886	2.3	33732	26.6	25
26	0.2838	0.3272	1243	41	3102	2.4	36834	29.1	28
27	0.3917	0.3297	1256	41	3243	2.6	40077	31.6	30
28	0.5013	0.3328	1270	41	3409	2.7	43486	34.3	33
29	0.6133	0.3366	1284	42	3698	2.9	47184	37.2	36
30	0.7280	0.3411	1298	42	4066	3.2	51250	40.5	39
31	0.8462	0.3466	1312	43	4340	3.4	55590	43.9	42
32	0.9685	0.3530	1328	44	4845	3.8	60435	47.7	46
33	1.0958	0.3606	1343	45	5003	3.9	65438	51.7	50
34	1.2290	0.3695	1360	46	5413	4.3	70851	55.9	54
35	1.3694	0.3801	1377	47	5637	4.4	76488	60.4	58
36	1.5185	0.3926	1396	49	6217	4.9	82705	65.3	63
37	1.6783	0.4075	1415	50	6446	5.1	89151	70.4	68
38	1.8516	0.4256	1437	53	6760	5.3	95911	75.7	73
39	2.0420	0.4479	1460	55	6613	5.2	102524	80.9	78
40	2.2549	0.4759	1487	59	6544	5.2	109068	86.1	84
41	2.4983	0.5123	1517	63	5815	4.6	114883	90.7	88
42	2.7855	0.5620	1553	70	4818	3.8	119701	94.5	93
43	3.1412	0.6352	1597	79	3548	2.8	123249	97.3	96
44	3.6192	0.7584	1656	94	2210	1.7	125459	99.0	98
45	4.3903	1.0397	1751	129	998	0.8	126457	99.8	99
46	5.6525	1.8489	1907	229	228	0.2	126685	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Reading Grade 4

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.3659	1.8343	700	367	1	0.0	1	0.0	1
1	-4.1400	1.0155	700	203	0	0.0	1	0.0	1
2	-3.4156	0.7288	700	146	2	0.0	3	0.0	1
3	-2.9790	0.6037	700	121	9	0.0	12	0.0	1
4	-2.6602	0.5303	700	106	24	0.0	36	0.0	1
5	-2.4058	0.4810	700	96	44	0.0	80	0.1	1
6	-2.1920	0.4452	718	89	109	0.1	189	0.1	1
7	-2.0063	0.4179	755	84	176	0.1	365	0.3	1
8	-1.8408	0.3964	788	79	316	0.2	681	0.5	1
9	-1.6906	0.3790	818	76	411	0.3	1092	0.9	1
10	-1.5525	0.3647	846	73	580	0.5	1672	1.3	1
11	-1.4240	0.3527	872	71	757	0.6	2429	1.9	2
12	-1.3032	0.3427	896	69	956	0.8	3385	2.7	2
13	-1.1887	0.3342	919	67	1089	0.9	4474	3.5	3
14	-1.0795	0.3270	940	65	1208	1.0	5682	4.5	4
15	-0.9747	0.3208	961	64	1300	1.0	6982	5.5	5
16	-0.8735	0.3156	982	63	1430	1.1	8412	6.7	6
17	-0.7753	0.3112	1001	62	1486	1.2	9898	7.8	7
18	-0.6796	0.3075	1020	62	1633	1.3	11531	9.1	8
19	-0.5860	0.3044	1039	61	1627	1.3	13158	10.4	10
20	-0.4941	0.3020	1057	60	1767	1.4	14925	11.8	11
21	-0.4036	0.3000	1076	60	1866	1.5	16791	13.3	13
22	-0.3140	0.2985	1094	60	1931	1.5	18722	14.8	14
23	-0.2253	0.2975	1112	60	2055	1.6	20777	16.4	16
24	-0.1370	0.2969	1129	59	2156	1.7	22933	18.1	17
25	-0.0489	0.2967	1147	59	2226	1.8	25159	19.9	19
26	0.0392	0.2969	1164	59	2416	1.9	27575	21.8	21
27	0.1275	0.2975	1182	60	2617	2.1	30192	23.9	23
28	0.2162	0.2984	1200	60	2835	2.2	33027	26.1	25
29	0.3057	0.2998	1217	60	2956	2.3	35983	28.4	27
30	0.3961	0.3015	1236	60	3013	2.4	38996	30.8	30
31	0.4876	0.3036	1254	61	3295	2.6	42291	33.4	32
32	0.5805	0.3062	1272	61	3524	2.8	45815	36.2	35
33	0.6752	0.3092	1291	62	3754	3.0	49569	39.2	38
34	0.7718	0.3126	1311	63	4046	3.2	53615	42.4	41
35	0.8708	0.3166	1330	63	4278	3.4	57893	45.8	44
36	0.9723	0.3211	1351	64	4575	3.6	62468	49.4	48
37	1.0771	0.3263	1372	65	4832	3.8	67300	53.2	51
38	1.1855	0.3322	1393	66	4922	3.9	72222	57.1	55
39	1.2980	0.3390	1416	68	5087	4.0	77309	61.1	59
40	1.4155	0.3468	1439	69	5230	4.1	82539	65.3	63
41	1.5389	0.3560	1464	71	5535	4.4	88074	69.6	67
42	1.6694	0.3668	1490	73	5461	4.3	93535	73.9	72
43	1.8086	0.3798	1518	76	5477	4.3	99012	78.3	76
44	1.9588	0.3958	1548	79	5221	4.1	104233	82.4	80
45	2.1231	0.4158	1581	83	4957	3.9	109190	86.3	84
46	2.3064	0.4415	1618	88	4479	3.5	113669	89.9	88
47	2.5161	0.4760	1660	95	4050	3.2	117719	93.1	91
48	2.7650	0.5242	1709	105	3287	2.6	121006	95.7	94
49	3.0766	0.5971	1772	119	2579	2.0	123585	97.7	97
50	3.5045	0.7223	1857	144	1720	1.4	125305	99.1	98
51	4.2189	1.0103	2000	202	900	0.7	126205	99.8	99
52	5.4372	1.8313	2244	366	286	0.2	126491	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Reading Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.3443	1.8352	700	365	0	0.0	0	0.0	0
1	-4.1159	1.0173	700	202	0	0.0	0	0.0	0
2	-3.3877	0.7316	700	145	3	0.0	3	0.0	1
3	-2.9468	0.6073	700	121	6	0.0	9	0.0	1
4	-2.6235	0.5347	700	106	19	0.0	28	0.0	1
5	-2.3643	0.4861	700	97	62	0.0	90	0.1	1
6	-2.1455	0.4509	700	90	110	0.1	200	0.2	1
7	-1.9545	0.4242	706	84	170	0.1	370	0.3	1
8	-1.7836	0.4032	740	80	298	0.2	668	0.5	1
9	-1.6279	0.3863	771	77	497	0.4	1165	0.9	1
10	-1.4842	0.3724	800	74	681	0.5	1846	1.5	1
11	-1.3499	0.3608	826	72	881	0.7	2727	2.2	2
12	-1.2233	0.3511	851	70	1010	0.8	3737	3.0	3
13	-1.1030	0.3429	875	68	1170	0.9	4907	3.9	3
14	-0.9879	0.3358	898	67	1324	1.1	6231	5.0	4
15	-0.8771	0.3299	920	66	1341	1.1	7572	6.0	5
16	-0.7700	0.3248	942	65	1375	1.1	8947	7.1	7
17	-0.6659	0.3205	962	64	1464	1.2	10411	8.3	8
18	-0.5644	0.3168	982	63	1543	1.2	11954	9.5	9
19	-0.4650	0.3138	1002	62	1631	1.3	13585	10.8	10
20	-0.3674	0.3114	1022	62	1683	1.3	15268	12.1	11
21	-0.2710	0.3094	1041	62	1759	1.4	17027	13.5	13
22	-0.1757	0.3080	1060	61	1878	1.5	18905	15.0	14
23	-0.0812	0.3070	1078	61	1921	1.5	20826	16.6	16
24	0.0128	0.3064	1097	61	1961	1.6	22787	18.1	17
25	0.1067	0.3063	1116	61	2238	1.8	25025	19.9	19
26	0.2006	0.3066	1134	61	2301	1.8	27326	21.7	21
27	0.2948	0.3073	1153	61	2487	2.0	29813	23.7	23
28	0.3895	0.3085	1172	61	2774	2.2	32587	25.9	25
29	0.4852	0.3101	1191	62	2888	2.3	35475	28.2	27
30	0.5819	0.3121	1210	62	2976	2.4	38451	30.6	29
31	0.6802	0.3147	1230	63	3352	2.7	41803	33.2	32
32	0.7801	0.3177	1250	63	3471	2.8	45274	36.0	35
33	0.8821	0.3213	1270	64	3817	3.0	49091	39.0	38
34	0.9868	0.3256	1291	65	4188	3.3	53279	42.4	41
35	1.0943	0.3304	1312	66	4413	3.5	57692	45.9	44
36	1.2053	0.3361	1334	67	4765	3.8	62457	49.7	48
37	1.3204	0.3425	1357	68	5052	4.0	67509	53.7	52
38	1.4403	0.3500	1381	70	5340	4.2	72849	57.9	56
39	1.5657	0.3585	1406	71	5594	4.4	78443	62.4	60
40	1.6976	0.3683	1432	73	5719	4.5	84162	66.9	65
41	1.8374	0.3797	1460	75	5797	4.6	89959	71.6	69
42	1.9865	0.3929	1490	78	6004	4.8	95963	76.3	74
43	2.1469	0.4085	1521	81	5904	4.7	101867	81.0	79
44	2.3212	0.4271	1556	85	5637	4.5	107504	85.5	83
45	2.5130	0.4497	1594	89	5070	4.0	112574	89.5	88
46	2.7277	0.4779	1637	95	4244	3.4	116818	92.9	91
47	2.9731	0.5143	1686	102	3395	2.7	120213	95.6	94
48	3.2623	0.5637	1743	112	2527	2.0	122740	97.6	97
49	3.6197	0.6364	1814	127	1668	1.3	124408	99.0	98
50	4.0990	0.7591	1909	151	866	0.7	125274	99.6	99
51	4.8709	1.0399	2063	207	362	0.3	125636	99.9	99
52	6.1331	1.8488	2314	368	91	0.1	125727	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Reading Grade 6

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5954	1.8360	700	367	0	0.0	0	0.0	0
1	-4.3654	1.0185	700	204	0	0.0	0	0.0	0
2	-3.6350	0.7329	700	147	2	0.0	2	0.0	1
3	-3.1923	0.6087	700	122	1	0.0	3	0.0	1
4	-2.8674	0.5360	700	107	8	0.0	11	0.0	1
5	-2.6069	0.4873	700	97	38	0.0	49	0.0	1
6	-2.3871	0.4520	700	90	74	0.1	123	0.1	1
7	-2.1952	0.4251	730	85	138	0.1	261	0.2	1
8	-2.0237	0.4039	764	81	225	0.2	486	0.4	1
9	-1.8675	0.3868	795	77	374	0.3	860	0.7	1
10	-1.7234	0.3727	824	75	514	0.4	1374	1.1	1
11	-1.5889	0.3610	851	72	649	0.5	2023	1.6	1
12	-1.4623	0.3511	877	70	796	0.6	2819	2.2	2
13	-1.3421	0.3427	901	69	958	0.7	3777	2.9	3
14	-1.2271	0.3355	924	67	1068	0.8	4845	3.7	3
15	-1.1167	0.3294	946	66	1119	0.9	5964	4.6	4
16	-1.0099	0.3242	967	65	1219	0.9	7183	5.6	5
17	-0.9063	0.3197	988	64	1311	1.0	8494	6.6	6
18	-0.8053	0.3160	1008	63	1442	1.1	9936	7.7	7
19	-0.7065	0.3129	1028	63	1479	1.1	11415	8.8	8
20	-0.6094	0.3103	1047	62	1640	1.3	13055	10.1	9
21	-0.5138	0.3083	1066	62	1735	1.3	14790	11.4	11
22	-0.4193	0.3067	1085	61	1836	1.4	16626	12.9	12
23	-0.3255	0.3056	1104	61	1970	1.5	18596	14.4	14
24	-0.2323	0.3050	1123	61	2146	1.7	20742	16.0	15
25	-0.1394	0.3048	1141	61	2222	1.7	22964	17.8	17
26	-0.0465	0.3050	1160	61	2415	1.9	25379	19.6	19
27	0.0468	0.3057	1178	61	2571	2.0	27950	21.6	21
28	0.1406	0.3068	1197	61	2946	2.3	30896	23.9	23
29	0.2351	0.3083	1216	62	3142	2.4	34038	26.3	25
30	0.3308	0.3104	1235	62	3337	2.6	37375	28.9	28
31	0.4279	0.3129	1255	63	3658	2.8	41033	31.7	30
32	0.5267	0.3159	1274	63	4026	3.1	45059	34.8	33
33	0.6276	0.3196	1294	64	4330	3.3	49389	38.2	37
34	0.7311	0.3238	1315	65	4597	3.6	53986	41.8	40
35	0.8375	0.3288	1336	66	4931	3.8	58917	45.6	44
36	0.9475	0.3345	1358	67	5112	4.0	64029	49.5	48
37	1.0616	0.3412	1381	68	5666	4.4	69695	53.9	52
38	1.1805	0.3488	1405	70	5779	4.5	75474	58.4	56
39	1.3052	0.3576	1430	72	6161	4.8	81635	63.1	61
40	1.4366	0.3677	1456	74	6448	5.0	88083	68.1	66
41	1.5761	0.3795	1484	76	6349	4.9	94432	73.0	71
42	1.7253	0.3933	1514	79	6383	4.9	100815	78.0	75
43	1.8863	0.4096	1546	82	6104	4.7	106919	82.7	80
44	2.0619	0.4289	1581	86	5673	4.4	112592	87.1	85
45	2.2557	0.4523	1620	90	4933	3.8	117525	90.9	89
46	2.4732	0.4813	1664	96	4254	3.3	121779	94.2	93
47	2.7223	0.5184	1713	104	3140	2.4	124919	96.6	95
48	3.0162	0.5682	1772	114	2224	1.7	127143	98.3	97
49	3.3789	0.6408	1845	128	1314	1.0	128457	99.3	99
50	3.8639	0.7627	1942	153	588	0.5	129045	99.8	99
51	4.6410	1.0422	2097	208	221	0.2	129266	100.0	99
52	5.9062	1.8499	2350	370	39	0.0	129305	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Reading Grade 7

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5179	1.8469	700	369	1	0.0	1	0.0	1
1	-4.2625	1.0342	700	207	2	0.0	3	0.0	1
2	-3.5046	0.7487	700	150	1	0.0	4	0.0	1
3	-3.0421	0.6224	700	124	3	0.0	7	0.0	1
4	-2.7027	0.5473	700	109	25	0.0	32	0.0	1
5	-2.4317	0.4964	708	99	63	0.0	95	0.1	1
6	-2.2042	0.4592	754	92	124	0.1	219	0.2	1
7	-2.0066	0.4307	793	86	223	0.2	442	0.3	1
8	-1.8310	0.4082	828	82	344	0.3	786	0.6	1
9	-1.6719	0.3900	860	78	554	0.4	1340	1.0	1
10	-1.5258	0.3749	889	75	725	0.6	2065	1.6	1
11	-1.3900	0.3624	916	72	880	0.7	2945	2.2	2
12	-1.2626	0.3518	942	70	1123	0.9	4068	3.1	3
13	-1.1420	0.3428	966	69	1316	1.0	5384	4.1	4
14	-1.0272	0.3352	989	67	1479	1.1	6863	5.2	5
15	-0.9170	0.3287	1011	66	1532	1.2	8395	6.4	6
16	-0.8109	0.3231	1032	65	1530	1.2	9925	7.5	7
17	-0.7080	0.3184	1053	64	1657	1.3	11582	8.8	8
18	-0.6080	0.3143	1073	63	1652	1.3	13234	10.0	9
19	-0.5103	0.3110	1092	62	1796	1.4	15030	11.4	11
20	-0.4144	0.3082	1112	62	1773	1.3	16803	12.8	12
21	-0.3202	0.3059	1131	61	1931	1.5	18734	14.2	13
22	-0.2272	0.3042	1149	61	2154	1.6	20888	15.9	15
23	-0.1350	0.3029	1167	61	2086	1.6	22974	17.4	17
24	-0.0436	0.3020	1186	60	2236	1.7	25210	19.1	18
25	0.0474	0.3015	1204	60	2340	1.8	27550	20.9	20
26	0.1383	0.3015	1222	60	2524	1.9	30074	22.8	22
27	0.2292	0.3018	1240	60	2754	2.1	32828	24.9	24
28	0.3206	0.3025	1259	61	2952	2.2	35780	27.2	26
29	0.4124	0.3037	1277	61	3242	2.5	39022	29.6	28
30	0.5051	0.3052	1295	61	3518	2.7	42540	32.3	31
31	0.5988	0.3072	1314	61	3706	2.8	46246	35.1	34
32	0.6939	0.3096	1333	62	3993	3.0	50239	38.1	37
33	0.7907	0.3126	1353	63	4326	3.3	54565	41.4	40
34	0.8894	0.3160	1372	63	4372	3.3	58937	44.7	43
35	0.9905	0.3200	1393	64	4813	3.7	63750	48.4	47
36	1.0944	0.3247	1413	65	5059	3.8	68809	52.2	50
37	1.2016	0.3301	1435	66	5313	4.0	74122	56.3	54
38	1.3126	0.3364	1457	67	5385	4.1	79507	60.3	58
39	1.4282	0.3438	1480	69	5783	4.4	85290	64.7	63
40	1.5493	0.3523	1504	70	5860	4.4	91150	69.2	67
41	1.6768	0.3623	1530	72	5835	4.4	96985	73.6	71
42	1.8124	0.3742	1557	75	5743	4.4	102728	78.0	76
43	1.9576	0.3884	1586	78	5513	4.2	108241	82.1	80
44	2.1150	0.4057	1617	81	5297	4.0	113538	86.2	84
45	2.2882	0.4271	1652	85	4740	3.6	118278	89.8	88
46	2.4819	0.4543	1691	91	4143	3.1	122421	92.9	91
47	2.7041	0.4900	1735	98	3406	2.6	125827	95.5	94
48	2.9677	0.5392	1788	108	2627	2.0	128454	97.5	96
49	3.2966	0.6125	1854	123	1749	1.3	130203	98.8	98
50	3.7445	0.7370	1943	147	1024	0.8	131227	99.6	99
51	4.4818	1.0223	2091	204	421	0.3	131648	99.9	99
52	5.7179	1.8385	2338	368	119	0.1	131767	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Reading Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.7689	1.8352	700	431	1	0.0	1	0.0	1
1	-3.5408	1.0172	700	239	1	0.0	2	0.0	1
2	-2.8129	0.7313	700	172	3	0.0	5	0.0	1
3	-2.3724	0.6070	700	143	11	0.0	16	0.0	1
4	-2.0494	0.5343	700	125	23	0.0	39	0.0	1
5	-1.7907	0.4856	700	114	51	0.0	90	0.1	1
6	-1.5723	0.4505	744	106	104	0.1	194	0.1	1
7	-1.3817	0.4237	789	99	201	0.2	395	0.3	1
8	-1.2113	0.4027	829	95	359	0.3	754	0.6	1
9	-1.0561	0.3857	866	91	479	0.4	1233	0.9	1
10	-0.9127	0.3718	899	87	705	0.5	1938	1.5	1
11	-0.7788	0.3602	931	85	926	0.7	2864	2.2	2
12	-0.6527	0.3505	960	82	1122	0.9	3986	3.0	3
13	-0.5328	0.3422	989	80	1280	1.0	5266	4.0	4
14	-0.4182	0.3352	1015	79	1425	1.1	6691	5.1	5
15	-0.3078	0.3292	1041	77	1553	1.2	8244	6.3	6
16	-0.2012	0.3241	1066	76	1694	1.3	9938	7.6	7
17	-0.0975	0.3198	1091	75	1650	1.3	11588	8.8	8
18	0.0035	0.3161	1115	74	1802	1.4	13390	10.2	10
19	0.1025	0.3131	1138	74	1942	1.5	15332	11.7	11
20	0.1997	0.3105	1161	73	2041	1.6	17373	13.3	12
21	0.2955	0.3085	1183	72	2138	1.6	19511	14.9	14
22	0.3901	0.3070	1205	72	2340	1.8	21851	16.7	16
23	0.4840	0.3058	1227	72	2408	1.8	24259	18.5	18
24	0.5773	0.3051	1249	72	2618	2.0	26877	20.5	20
25	0.6702	0.3048	1271	72	2605	2.0	29482	22.5	22
26	0.7631	0.3048	1293	72	2883	2.2	32365	24.7	24
27	0.8561	0.3052	1315	72	2951	2.3	35316	27.0	26
28	0.9495	0.3060	1337	72	3240	2.5	38556	29.4	28
29	1.0435	0.3072	1359	72	3432	2.6	41988	32.1	31
30	1.1383	0.3088	1381	73	3608	2.8	45596	34.8	33
31	1.2343	0.3108	1404	73	3878	3.0	49474	37.8	36
32	1.3316	0.3132	1426	74	4216	3.2	53690	41.0	39
33	1.4305	0.3161	1450	74	4509	3.4	58199	44.4	43
34	1.5315	0.3195	1473	75	4680	3.6	62879	48.0	46
35	1.6348	0.3235	1498	76	4876	3.7	67755	51.7	50
36	1.7410	0.3282	1523	77	5349	4.1	73104	55.8	54
37	1.8504	0.3335	1548	78	5491	4.2	78595	60.0	58
38	1.9637	0.3398	1575	80	5602	4.3	84197	64.3	62
39	2.0816	0.3471	1603	82	5649	4.3	89846	68.6	66
40	2.2049	0.3556	1631	84	5660	4.3	95506	72.9	71
41	2.3348	0.3655	1662	86	5473	4.2	100979	77.1	75
42	2.4726	0.3773	1694	89	5276	4.0	106255	81.1	79
43	2.6202	0.3914	1729	92	5016	3.8	111271	84.9	83
44	2.7801	0.4086	1767	96	4669	3.6	115940	88.5	87
45	2.9555	0.4298	1808	101	4155	3.2	120095	91.7	90
46	3.1516	0.4568	1854	107	3539	2.7	123634	94.4	93
47	3.3760	0.4922	1906	116	2887	2.2	126521	96.6	95
48	3.6415	0.5410	1969	127	2008	1.5	128529	98.1	97
49	3.9722	0.6137	2046	144	1319	1.0	129848	99.1	99
50	4.4214	0.7377	2152	173	786	0.6	130634	99.7	99
51	5.1594	1.0225	2325	240	300	0.2	130934	99.9	99
52	6.3957	1.8384	2616	432	72	0.1	131006	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Science Grade 4

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5138	1.8332	1050	324	0	0.0	0	0.0	0
1	-4.2907	1.0135	1050	179	3	0.0	3	0.0	1
2	-3.5703	0.7261	1050	128	1	0.0	4	0.0	1
3	-3.1376	0.6005	1050	106	0	0.0	4	0.0	1
4	-2.8226	0.5267	1050	93	0	0.0	4	0.0	1
5	-2.5720	0.4769	1050	84	5	0.0	9	0.0	1
6	-2.3622	0.4407	1050	78	5	0.0	14	0.0	1
7	-2.1804	0.4130	1050	73	12	0.0	26	0.0	1
8	-2.0191	0.3909	1050	69	34	0.0	60	0.0	1
9	-1.8735	0.3729	1050	66	70	0.1	130	0.1	1
10	-1.7401	0.3579	1050	63	120	0.1	250	0.2	1
11	-1.6166	0.3453	1050	61	208	0.2	458	0.4	1
12	-1.5012	0.3344	1050	59	274	0.2	732	0.6	1
13	-1.3926	0.3250	1050	57	400	0.3	1132	0.9	1
14	-1.2897	0.3167	1050	56	503	0.4	1635	1.3	1
15	-1.1917	0.3095	1050	55	684	0.5	2319	1.8	2
16	-1.0979	0.3031	1050	54	764	0.6	3083	2.4	2
17	-1.0078	0.2974	1050	53	885	0.7	3968	3.1	3
18	-0.9209	0.2923	1063	52	924	0.7	4892	3.9	3
19	-0.8367	0.2878	1078	51	991	0.8	5883	4.6	4
20	-0.7551	0.2837	1092	50	1135	0.9	7018	5.5	5
21	-0.6757	0.2801	1106	50	1083	0.9	8101	6.4	6
22	-0.5981	0.2768	1120	49	1188	0.9	9289	7.3	7
23	-0.5223	0.2739	1133	48	1156	0.9	10445	8.2	8
24	-0.4480	0.2713	1146	48	1211	1.0	11656	9.2	9
25	-0.3750	0.2690	1159	48	1233	1.0	12889	10.2	10
26	-0.3032	0.2670	1172	47	1360	1.1	14249	11.2	11
27	-0.2324	0.2652	1185	47	1320	1.0	15569	12.3	12
28	-0.1625	0.2636	1197	47	1417	1.1	16986	13.4	13
29	-0.0934	0.2623	1209	46	1524	1.2	18510	14.6	14
30	-0.0249	0.2611	1221	46	1551	1.2	20061	15.8	15
31	0.0430	0.2602	1233	46	1703	1.3	21764	17.2	17
32	0.1105	0.2595	1245	46	1754	1.4	23518	18.6	18
33	0.1777	0.2590	1257	46	1804	1.4	25322	20.0	19
34	0.2447	0.2586	1269	46	1826	1.4	27148	21.4	21
35	0.3115	0.2585	1281	46	1975	1.6	29123	23.0	22
36	0.3784	0.2586	1293	46	2125	1.7	31248	24.7	24
37	0.4453	0.2589	1304	46	2183	1.7	33431	26.4	26
38	0.5125	0.2594	1316	46	2302	1.8	35733	28.2	27
39	0.5799	0.2601	1328	46	2405	1.9	38138	30.1	29
40	0.6477	0.2610	1340	46	2546	2.0	40684	32.1	31
41	0.7162	0.2622	1352	46	2601	2.1	43285	34.2	33
42	0.7853	0.2636	1364	47	2715	2.1	46000	36.3	35
43	0.8552	0.2653	1377	47	2822	2.2	48822	38.5	37
44	0.9261	0.2672	1389	47	2989	2.4	51811	40.9	40
45	0.9981	0.2695	1402	48	3158	2.5	54969	43.4	42
46	1.0714	0.2721	1415	48	3297	2.6	58266	46.0	45
47	1.1462	0.2751	1428	49	3519	2.8	61785	48.8	47
48	1.2228	0.2785	1442	49	3557	2.8	65342	51.6	50
49	1.3014	0.2823	1456	50	3624	2.9	68966	54.4	53

Appendix O: Raw-to-Scaled Score Conversion Tables

50	1.3823	0.2866	1470	51	3845	3.0	72811	57.5	56
51	1.4658	0.2915	1485	52	3852	3.0	76663	60.5	59
52	1.5524	0.2971	1500	53	3884	3.1	80547	63.6	62
53	1.6426	0.3034	1516	54	4020	3.2	84567	66.7	65
54	1.7368	0.3106	1533	55	4095	3.2	88662	70.0	68
55	1.8357	0.3188	1550	56	4200	3.3	92862	73.3	72
56	1.9404	0.3283	1569	58	4142	3.3	97004	76.5	75
57	2.0517	0.3392	1588	60	4188	3.3	101192	79.8	78
58	2.1710	0.3520	1609	62	3960	3.1	105152	83.0	81
59	2.3002	0.3672	1632	65	3757	3.0	108909	85.9	84
60	2.4416	0.3854	1657	68	3735	2.9	112644	88.9	87
61	2.5986	0.4077	1685	72	3470	2.7	116114	91.6	90
62	2.7761	0.4358	1716	77	3103	2.4	119217	94.1	93
63	2.9815	0.4724	1753	83	2651	2.1	121868	96.2	95
64	3.2279	0.5226	1796	92	2039	1.6	123907	97.8	97
65	3.5386	0.5970	1851	106	1499	1.2	125406	99.0	98
66	3.9671	0.7232	1927	128	848	0.7	126254	99.6	99
67	4.6833	1.0114	2053	179	385	0.3	126639	99.9	99
68	5.9033	1.8320	2269	324	90	0.1	126729	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Science Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.7519	1.8312	925	351	0	0.0	0	0.0	0
1	-4.5338	1.0101	925	193	0	0.0	0	0.0	0
2	-3.8203	0.7214	925	138	0	0.0	0	0.0	0
3	-3.3942	0.5950	925	114	0	0.0	0	0.0	0
4	-3.0858	0.5204	925	100	1	0.0	1	0.0	1
5	-2.8418	0.4702	925	90	1	0.0	2	0.0	1
6	-2.6382	0.4335	925	83	10	0.0	12	0.0	1
7	-2.4627	0.4054	925	78	9	0.0	21	0.0	1
8	-2.3076	0.3830	925	73	25	0.0	46	0.0	1
9	-2.1680	0.3648	925	70	69	0.1	115	0.1	1
10	-2.0405	0.3496	925	67	129	0.1	244	0.2	1
11	-1.9229	0.3368	925	65	220	0.2	464	0.4	1
12	-1.8132	0.3257	925	62	312	0.2	776	0.6	1
13	-1.7102	0.3162	925	61	473	0.4	1249	1.0	1
14	-1.6129	0.3079	925	59	650	0.5	1899	1.5	1
15	-1.5203	0.3007	925	58	824	0.6	2723	2.1	2
16	-1.4319	0.2943	925	56	1013	0.8	3736	2.9	2
17	-1.3470	0.2886	939	55	1171	0.9	4907	3.8	3
18	-1.2652	0.2836	954	54	1256	1.0	6163	4.7	4
19	-1.1861	0.2791	969	53	1295	1.0	7458	5.7	5
20	-1.1093	0.2751	984	53	1393	1.1	8851	6.8	6
21	-1.0346	0.2716	998	52	1480	1.1	10331	7.9	7
22	-0.9617	0.2685	1012	51	1472	1.1	11803	9.0	8
23	-0.8903	0.2658	1026	51	1590	1.2	13393	10.3	10
24	-0.8204	0.2634	1040	50	1622	1.2	15015	11.5	11
25	-0.7515	0.2613	1053	50	1683	1.3	16698	12.8	12
26	-0.6838	0.2595	1066	50	1676	1.3	18374	14.1	13
27	-0.6168	0.2579	1078	49	1668	1.3	20042	15.3	15
28	-0.5506	0.2566	1091	49	1754	1.3	21796	16.7	16
29	-0.4851	0.2556	1104	49	1740	1.3	23536	18.0	17
30	-0.4200	0.2548	1116	49	1783	1.4	25319	19.4	19
31	-0.3552	0.2542	1129	49	1861	1.4	27180	20.8	20
32	-0.2906	0.2539	1141	49	1915	1.5	29095	22.3	22
33	-0.2263	0.2537	1153	49	1946	1.5	31041	23.8	23
34	-0.1619	0.2538	1166	49	2049	1.6	33090	25.3	25
35	-0.0974	0.2541	1178	49	2140	1.6	35230	27.0	26
36	-0.0327	0.2546	1190	49	2207	1.7	37437	28.7	28
37	0.0323	0.2553	1203	49	2189	1.7	39626	30.3	29
38	0.0977	0.2562	1215	49	2316	1.8	41942	32.1	31
39	0.1636	0.2574	1228	49	2406	1.8	44348	33.9	33
40	0.2302	0.2587	1241	50	2478	1.9	46826	35.8	35
41	0.2975	0.2604	1254	50	2639	2.0	49465	37.9	37
42	0.3658	0.2622	1267	50	2705	2.1	52170	39.9	39
43	0.4352	0.2644	1280	51	2960	2.3	55130	42.2	41
44	0.5057	0.2668	1294	51	3027	2.3	58157	44.5	43
45	0.5776	0.2695	1307	52	3206	2.5	61363	47.0	46
46	0.6510	0.2726	1321	52	3316	2.5	64679	49.5	48
47	0.7263	0.2761	1336	53	3472	2.7	68151	52.2	51
48	0.8036	0.2799	1351	54	3631	2.8	71782	54.9	54
49	0.8831	0.2842	1366	54	3753	2.9	75535	57.8	56

Appendix O: Raw-to-Scaled Score Conversion Tables

50	0.9652	0.2890	1382	55	3868	3.0	79403	60.8	59
51	1.0502	0.2944	1398	56	3958	3.0	83361	63.8	62
52	1.1387	0.3004	1415	58	4177	3.2	87538	67.0	65
53	1.2310	0.3072	1432	59	4055	3.1	91593	70.1	69
54	1.3277	0.3149	1451	60	4204	3.2	95797	73.3	72
55	1.4295	0.3236	1470	62	4240	3.2	100037	76.6	75
56	1.5374	0.3335	1491	64	4147	3.2	104184	79.8	78
57	1.6524	0.3449	1513	66	3998	3.1	108182	82.8	81
58	1.7759	0.3582	1537	69	3912	3.0	112094	85.8	84
59	1.9097	0.3739	1562	72	3813	2.9	115907	88.7	87
60	2.0565	0.3926	1591	75	3491	2.7	119398	91.4	90
61	2.2194	0.4154	1622	80	3116	2.4	122514	93.8	93
62	2.4037	0.4440	1657	85	2749	2.1	125263	95.9	95
63	2.6169	0.4810	1698	92	2091	1.6	127354	97.5	97
64	2.8719	0.5314	1747	102	1503	1.2	128857	98.6	98
65	3.1926	0.6058	1808	116	1041	0.8	129898	99.4	99
66	3.6325	0.7316	1892	140	495	0.4	130393	99.8	99
67	4.3618	1.0184	2032	195	207	0.2	130600	100.0	99
68	5.5921	1.8362	2268	352	37	0.0	130637	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Writing Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
22	-7.3892	1.8391	700	184	21	0.0	21	0.0	1
23	-6.1505	1.0248	700	102	126	0.1	147	0.1	1
24	-5.4062	0.7431	700	74	259	0.2	406	0.3	1
25	-4.9475	0.6226	700	62	343	0.3	749	0.6	1
26	-4.6045	0.5537	700	55	336	0.3	1085	0.9	1
27	-4.3236	0.5089	700	51	221	0.2	1306	1.1	1
28	-4.0809	0.4779	700	48	166	0.1	1472	1.2	1
29	-3.8636	0.4555	700	46	105	0.1	1577	1.3	1
30	-3.6639	0.4391	705	44	50	0.0	1627	1.3	1
31	-3.4767	0.4271	724	43	42	0.0	1669	1.3	1
32	-3.2981	0.4184	742	42	30	0.0	1699	1.4	1
33	-3.1257	0.4125	759	41	80	0.1	1779	1.4	1
34	-2.9572	0.4088	776	41	223	0.2	2002	1.6	2
35	-2.7909	0.4071	792	41	420	0.3	2422	2.0	2
36	-2.6253	0.4070	809	41	601	0.5	3023	2.4	2
37	-2.4591	0.4084	826	41	670	0.5	3693	3.0	3
38	-2.2914	0.4109	842	41	682	0.5	4375	3.5	3
39	-2.1212	0.4143	859	41	597	0.5	4972	4.0	4
40	-1.9479	0.4183	877	42	506	0.4	5478	4.4	4
41	-1.7713	0.4223	894	42	461	0.4	5939	4.8	5
42	-1.5913	0.4260	912	43	314	0.3	6253	5.0	5
43	-1.4087	0.4286	931	43	216	0.2	6469	5.2	5
44	-1.2243	0.4298	949	43	224	0.2	6693	5.4	5
45	-1.0398	0.4292	967	43	376	0.3	7069	5.7	6
46	-0.8565	0.4266	986	43	843	0.7	7912	6.4	6
47	-0.6762	0.4224	1004	42	1479	1.2	9391	7.6	7
48	-0.5000	0.4169	1021	42	2191	1.8	11582	9.3	8
49	-0.3288	0.4105	1039	41	2677	2.2	14259	11.5	10
50	-0.1630	0.4037	1055	40	3372	2.7	17631	14.2	13
51	-0.0028	0.3970	1071	40	3862	3.1	21493	17.3	16
52	0.1522	0.3905	1087	39	4263	3.4	25756	20.8	19
53	0.3023	0.3845	1102	38	4182	3.4	29938	24.1	22
54	0.4480	0.3791	1116	38	3322	2.7	33260	26.8	25
55	0.5899	0.3744	1130	37	2045	1.6	35305	28.5	28
56	0.7285	0.3704	1144	37	804	0.6	36109	29.1	29
57	0.8644	0.3672	1158	37	302	0.2	36411	29.4	29
58	0.9983	0.3647	1171	36	483	0.4	36894	29.7	30
59	1.1307	0.3631	1185	36	957	0.8	37851	30.5	30
60	1.2622	0.3623	1198	36	1505	1.2	39356	31.7	31
61	1.3934	0.3622	1211	36	2559	2.1	41915	33.8	33
62	1.5249	0.3631	1224	36	3583	2.9	45498	36.7	35
63	1.6573	0.3649	1237	36	5101	4.1	50599	40.8	39
64	1.7913	0.3676	1251	37	6297	5.1	56896	45.9	43
65	1.9279	0.3714	1264	37	6224	5.0	63120	50.9	48
66	2.0676	0.3765	1278	38	4797	3.9	67917	54.8	53
67	2.2117	0.3829	1293	38	2224	1.8	70141	56.5	56
68	2.3613	0.3910	1308	39	215	0.2	70356	56.7	57
69	2.5180	0.4010	1323	40	128	0.1	70484	56.8	57
70	2.6836	0.4132	1340	41	303	0.2	70787	57.1	57
71	2.8604	0.4283	1357	43	685	0.6	71472	57.6	57

Appendix O: Raw-to-Scaled Score Conversion Tables

72	3.0517	0.4470	1377	45	1365	1.1	72837	58.7	58
73	3.2615	0.4699	1398	47	2812	2.3	75649	61.0	60
74	3.4953	0.4979	1421	50	4752	3.8	80401	64.8	63
75	3.7598	0.5314	1447	53	7557	6.1	87958	70.9	68
76	4.0622	0.5684	1478	57	9846	7.9	97804	78.8	75
77	4.4057	0.6019	1512	60	9435	7.6	107239	86.5	83
78	4.7803	0.6181	1549	62	5196	4.2	112435	90.6	89
79	5.1588	0.6082	1587	61	126	0.1	112561	90.7	91
80	5.5128	0.5799	1623	58	5	0.0	112566	90.7	91
81	5.8303	0.5471	1654	55	14	0.0	112580	90.8	91
82	6.1133	0.5174	1683	52	35	0.0	112615	90.8	91
83	6.3682	0.4933	1708	49	100	0.1	112715	90.9	91
84	6.6020	0.4745	1732	47	252	0.2	112967	91.1	91
85	6.8202	0.4604	1753	46	593	0.5	113560	91.6	91
86	7.0273	0.4503	1774	45	1227	1.0	114787	92.5	92
87	7.2268	0.4437	1794	44	2170	1.7	116957	94.3	93
88	7.4219	0.4402	1814	44	2733	2.2	119690	96.5	95
89	7.6152	0.4397	1833	44	2265	1.8	121955	98.3	97
90	7.8094	0.4422	1852	44	35	0.0	121990	98.3	98
91	8.0072	0.4480	1872	45	0	0.0	121990	98.3	98
92	8.2119	0.4575	1893	46	1	0.0	121991	98.3	98
93	8.4274	0.4717	1914	47	4	0.0	121995	98.4	98
94	8.6591	0.4921	1937	49	9	0.0	122004	98.4	98
95	8.9149	0.5212	1963	52	18	0.0	122022	98.4	98
96	9.2080	0.5641	1992	56	47	0.0	122069	98.4	98
97	9.5623	0.6312	2028	63	154	0.1	122223	98.5	98
98	10.0313	0.7498	2075	75	385	0.3	122608	98.8	99
99	10.7852	1.0293	2150	103	690	0.6	123298	99.4	99
100	12.0301	1.8415	2274	184	743	0.6	124041	100.0	99

Appendix O: Raw-to-Scaled Score Conversion Tables

Writing Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
22	-6.9747	1.8382	700	184	27	0.0	27	0.0	1
23	-5.7386	1.0231	700	102	143	0.1	170	0.1	1
24	-4.9979	0.7406	700	74	309	0.2	479	0.4	1
25	-4.5429	0.6195	700	62	414	0.3	893	0.7	1
26	-4.2038	0.5500	703	55	486	0.4	1379	1.1	1
27	-3.9270	0.5048	731	50	350	0.3	1729	1.3	1
28	-3.6887	0.4732	755	47	274	0.2	2003	1.5	1
29	-3.4759	0.4503	776	45	160	0.1	2163	1.7	2
30	-3.2810	0.4334	796	43	126	0.1	2289	1.8	2
31	-3.0988	0.4209	814	42	55	0.0	2344	1.8	2
32	-2.9257	0.4117	831	41	28	0.0	2372	1.8	2
33	-2.7591	0.4052	848	41	62	0.0	2434	1.9	2
34	-2.5968	0.4009	864	40	153	0.1	2587	2.0	2
35	-2.4372	0.3984	880	40	361	0.3	2948	2.3	2
36	-2.2788	0.3976	896	40	610	0.5	3558	2.7	3
37	-2.1206	0.3982	912	40	679	0.5	4237	3.3	3
38	-1.9614	0.3999	928	40	767	0.6	5004	3.9	4
39	-1.8005	0.4026	944	40	768	0.6	5772	4.4	4
40	-1.6370	0.4060	960	41	649	0.5	6421	4.9	5
41	-1.4707	0.4097	977	41	500	0.4	6921	5.3	5
42	-1.3013	0.4134	994	41	329	0.3	7250	5.6	5
43	-1.1290	0.4166	1011	42	197	0.2	7447	5.7	6
44	-0.9545	0.4188	1028	42	148	0.1	7595	5.9	6
45	-0.7787	0.4196	1046	42	279	0.2	7874	6.1	6
46	-0.6028	0.4188	1064	42	568	0.4	8442	6.5	6
47	-0.4283	0.4163	1081	42	1218	0.9	9660	7.4	7
48	-0.2566	0.4123	1098	41	2124	1.6	11784	9.1	8
49	-0.0887	0.4070	1115	41	2939	2.3	14723	11.3	10
50	0.0746	0.4010	1131	40	3784	2.9	18507	14.3	13
51	0.2328	0.3945	1147	39	4265	3.3	22772	17.5	16
52	0.3859	0.3880	1162	39	4280	3.3	27052	20.8	19
53	0.5340	0.3817	1177	38	3658	2.8	30710	23.7	22
54	0.6775	0.3759	1192	38	2507	1.9	33217	25.6	25
55	0.8167	0.3707	1206	37	1414	1.1	34631	26.7	26
56	0.9524	0.3661	1219	37	562	0.4	35193	27.1	27
57	1.0850	0.3623	1232	36	317	0.2	35510	27.4	27
58	1.2152	0.3594	1245	36	491	0.4	36001	27.7	28
59	1.3435	0.3573	1258	36	1033	0.8	37034	28.5	28
60	1.4707	0.3561	1271	36	1838	1.4	38872	29.9	29
61	1.5974	0.3558	1284	36	2815	2.2	41687	32.1	31
62	1.7241	0.3565	1296	36	3990	3.1	45677	35.2	34
63	1.8518	0.3582	1309	36	4841	3.7	50518	38.9	37
64	1.9810	0.3610	1322	36	4927	3.8	55445	42.7	41
65	2.1127	0.3651	1335	37	4051	3.1	59496	45.8	44
66	2.2480	0.3705	1349	37	2675	2.1	62171	47.9	47
67	2.3878	0.3775	1363	38	1062	0.8	63233	48.7	48
68	2.5334	0.3862	1377	39	265	0.2	63498	48.9	49
69	2.6867	0.3970	1393	40	272	0.2	63770	49.1	49
70	2.8494	0.4103	1409	41	650	0.5	64420	49.6	49
71	3.0242	0.4264	1426	43	1414	1.1	65834	50.7	50

Appendix O: Raw-to-Scaled Score Conversion Tables

72	3.2143	0.4461	1445	45	2852	2.2	68686	52.9	52
73	3.4238	0.4699	1466	47	5019	3.9	73705	56.8	55
74	3.6578	0.4982	1490	50	7627	5.9	81332	62.6	60
75	3.9222	0.5305	1516	53	10135	7.8	91467	70.5	67
76	4.2218	0.5639	1546	56	11158	8.6	102625	79.0	75
77	4.5563	0.5906	1579	59	8641	6.7	111266	85.7	82
78	4.9128	0.5998	1615	60	3795	2.9	115061	88.6	87
79	5.2668	0.5868	1651	59	170	0.1	115231	88.8	89
80	5.5960	0.5592	1683	56	15	0.0	115246	88.8	89
81	5.8916	0.5281	1713	53	39	0.0	115285	88.8	89
82	6.1555	0.4998	1739	50	112	0.1	115397	88.9	89
83	6.3932	0.4763	1763	48	217	0.2	115614	89.1	89
84	6.6110	0.4577	1785	46	542	0.4	116156	89.5	89
85	6.8138	0.4436	1805	44	1119	0.9	117275	90.3	90
86	7.0059	0.4335	1824	43	1935	1.5	119210	91.8	91
87	7.1907	0.4268	1843	43	2801	2.2	122011	94.0	93
88	7.3711	0.4233	1861	42	2765	2.1	124776	96.1	95
89	7.5500	0.4230	1879	42	1595	1.2	126371	97.3	97
90	7.7298	0.4257	1897	43	80	0.1	126451	97.4	97
91	7.9134	0.4320	1915	43	1	0.0	126452	97.4	97
92	8.1041	0.4421	1934	44	1	0.0	126453	97.4	97
93	8.3058	0.4570	1954	46	10	0.0	126463	97.4	97
94	8.5241	0.4783	1976	48	36	0.0	126499	97.4	97
95	8.7667	0.5086	2001	51	87	0.1	126586	97.5	97
96	9.0470	0.5528	2029	55	219	0.2	126805	97.7	98
97	9.3888	0.6214	2063	62	398	0.3	127203	98.0	98
98	9.8457	0.7418	2108	74	824	0.6	128027	98.6	98
99	10.5879	1.0237	2183	102	1029	0.8	129056	99.4	99
100	11.8250	1.8384	2306	184	767	0.6	129823	100.0	99

Appendix P:

Linking Item Statistics

Column Heading	Definition
Type	Item type
Form	Form
Seq	Sequence
Prev Form	Previous form
Prev Seq	Previous sequence
Prev P-Val	Previous P-Value
P-Val	P-Value
Prev Meas	Previous Rasch item measure
Meas	Rasch item measure

Appendix P: Linking Item Statistics

Mathematics Grade 3

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
677403	MC	0	5	0	5	0.85	0.84	0.5532	0.5595
301157	MC	0	11	0	11	0.60	0.63	2.2904	2.0410
995660	MC	0	12	0	12	0.83	0.80	0.6685	0.8992
189908	MC	0	13	0	13	0.86	0.83	0.4551	0.5759
533007	MC	0	14	0	14	0.85	0.87	0.5030	0.2280
490727	MC	0	19	0	19	0.95	0.94	-0.9139	-0.9646
848920	MC	0	20	0	20	0.64	0.69	2.0766	1.5742
119254	MC	0	59	0	60	0.73	0.71	1.4963	1.3951
165929	MC	0	60	0	61	0.64	0.64	2.0703	1.8969
628439	MC	0	96	0	97	0.89	0.87	0.0176	0.2081
120420	MC	0	97	0	98	0.85	0.84	0.5512	0.5347
351133	MC	0	103	0	104	0.76	0.78	1.2416	1.0711
797010	MC	0	104	0	105	0.78	0.75	1.1172	1.2152
995654	MC	0	110	0	111	0.76	0.77	1.2469	1.1730
549331	MC	0	112	0	113	0.93	0.94	-0.4464	-0.9033
470154	MC	0	117	0	118	0.88	0.88	0.1409	0.0531
421694	MC	1	67	4	68	0.90	0.88	-0.1126	-0.0255
178999	MC	1	72	3	73	0.93	0.90	-0.5334	-0.2903
453466	MC	2	65	5	66	0.77	0.76	1.1951	1.1529
950572	MC	2	69	2	70	0.83	0.81	0.6893	0.7002
194241	MC	3	65	2	66	0.91	0.92	-0.2094	-0.4381
118310	MC	3	71	5	72	0.95	0.89	-1.0137	-0.0710
477222	MC	4	64	1	65	0.81	0.85	0.8254	0.4059
810070	MC	5	66	4	67	0.81	0.82	0.8939	0.7088
809659	MC	5	74	3	75	0.68	0.65	1.8050	1.8715
733036	MC	6	70	1	71	0.90	0.88	-0.0164	0.0669
660173	MC	8	67	1	68	0.93	0.92	-0.5917	-0.3608
298664	MC	8	70	3	71	0.77	0.78	1.2016	1.0633
195514	MC	9	64	5	65	0.94	0.93	-0.6005	-0.6414
612936	MC	9	69	1	70	0.90	0.90	-0.0538	-0.1014
877363	MC	10	64	4	65	0.92	0.89	-0.3993	-0.0604
475865	MC	10	71	3	72	0.94	0.92	-0.7263	-0.3910
836818	MC	11	66	1	67	0.71	0.71	1.5860	1.5463
202678	MC	17	68	2	69	0.82	0.77	0.7774	1.0920
880373	OE	0	26	0	26	0.58	0.59	2.1501	2.0273
926386	OE	0	119	0	120	0.78	0.75	0.9094	1.0118
				Mean		0.82	0.81	0.58	0.58

Appendix P: Linking Item Statistics

Mathematics Grade 4

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
748263	MC	0	4	0	4	0.6706	0.6345	0.5401	0.5871
365429	MC	0	10	0	10	0.6724	0.6818	0.5268	0.3348
204844	MC	0	12	0	12	0.5924	0.5624	0.9639	0.9776
431721	MC	0	19	0	19	0.6256	0.6127	0.7862	0.6851
942067	MC	0	55	0	55	0.6669	0.6095	0.5612	0.7256
449831	MC	0	62	0	62	0.6877	0.6683	0.4434	0.4688
858067	MC	0	63	0	63	0.4362	0.4901	1.775	1.4295
802821	MC	0	65	0	65	0.547	0.5203	1.2017	1.2301
120946	MC	0	99	0	98	0.7589	0.7144	0.0061	0.1211
393169	MC	0	100	0	99	0.6491	0.596	0.6585	0.7584
761338	MC	0	102	0	101	0.6099	0.6065	0.8713	0.7902
413141	MC	0	109	0	108	0.5758	0.553	1.0505	1.0606
473271	MC	0	113	0	112	0.712	0.6985	0.2996	0.2434
807624	MC	0	120	0	119	0.6702	0.544	0.5397	1.0792
222967	MC	0	121	0	120	0.662	0.6099	0.5878	0.7574
315545	MC	1	70	5	70	0.8133	0.7533	-0.369	-0.178
628670	MC	1	76	5	76	0.6074	0.6574	0.8843	0.3981
514260	MC	2	70	4	70	0.793	0.7538	-0.228	-0.148
637676	MC	2	75	1	75	0.81	0.7729	-0.375	-0.282
960494	MC	3	66	1	66	0.8069	0.778	-0.351	-0.324
428718	MC	3	71	3	71	0.7811	0.7661	-0.133	-0.238
583449	MC	4	68	3	68	0.8171	0.7854	-0.399	-0.356
666065	MC	5	69	1	69	0.8723	0.8424	-0.921	-0.828
545059	MC	5	72	5	72	0.7715	0.7414	-0.068	-0.07
621134	MC	6	71	1	71	0.7691	0.7547	-0.081	-0.129
527723	MC	7	68	2	68	0.6441	0.5865	0.6893	0.8575
169690	MC	7	71	5	71	0.7131	0.7151	0.3005	0.1397
646996	MC	8	67	1	67	0.8035	0.7873	-0.326	-0.353
538975	MC	9	69	4	69	0.8434	0.8094	-0.626	-0.509
761734	MC	9	76	4	76	0.6746	0.6604	0.5178	0.4906
269221	MC	10	74	3	74	0.6991	0.7028	0.3863	0.2127
425910	MC	12	66	2	66	0.8022	0.7944	-0.293	-0.413
619132	MC	12	71	2	71	0.8099	0.7795	-0.351	-0.306
685707	OE	0	25	0	25	0.6209	0.5807	0.8945	1.006
705911	OE	0	122	0	121	0.6651	0.6385	0.4942	0.4499
Mean						0.70	0.68	0.30	0.30

Appendix P: Linking Item Statistics

Mathematics Grade 5

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
394647	MC	0	1	0	1	0.73	0.70	0.4544	0.3903
444378	MC	0	13	0	13	0.89	0.86	-0.8476	-0.6264
742978	MC	0	14	0	14	0.53	0.49	1.5355	1.5795
440248	MC	0	15	0	15	0.71	0.70	0.5733	0.4751
552627	MC	0	16	0	16	0.45	0.39	1.9727	2.1055
232435	MC	0	18	0	18	0.63	0.62	1.0307	0.9517
511468	MC	0	19	0	19	0.90	0.89	-1.0072	-0.9596
156320	MC	0	20	0	20	0.51	0.50	1.6651	1.5261
708664	MC	0	63	0	63	0.67	0.64	0.8055	0.7035
827957	MC	0	65	0	65	0.69	0.66	0.6800	0.6949
681431	MC	0	98	0	97	0.72	0.70	0.4829	0.4759
477782	MC	0	103	0	102	0.74	0.70	0.3619	0.4708
914398	MC	0	106	0	105	0.86	0.84	-0.5433	-0.4487
482722	MC	0	114	0	113	0.57	0.52	1.3726	1.4745
175897	MC	0	115	0	114	0.82	0.78	-0.2074	-0.0017
572321	MC	0	120	0	119	0.52	0.55	1.6156	1.3332
808418	MC	1	68	4	68	0.58	0.52	1.2658	1.4012
767695	MC	1	76	5	76	0.78	0.72	0.1118	0.2856
829302	MC	2	69	1	69	0.87	0.86	-0.6692	-0.7328
993492	MC	2	75	2	75	0.33	0.33	2.6440	2.4779
880560	MC	3	66	2	66	0.73	0.76	0.4390	0.0861
229081	MC	3	68	3	68	0.74	0.73	0.4111	0.2781
982034	MC	4	67	1	67	0.81	0.80	-0.1617	-0.1750
280349	MC	4	70	4	70	0.64	0.64	0.9559	0.8012
333758	MC	5	70	3	70	0.81	0.80	-0.1078	-0.1735
450840	MC	5	76	4	76	0.87	0.83	-0.6124	-0.4386
546551	MC	7	66	1	66	0.56	0.57	1.3805	1.2135
836464	MC	9	69	4	69	0.75	0.70	0.3228	0.4452
670651	MC	9	73	1	73	0.39	0.42	2.2677	1.9760
325495	MC	10	71	2	71	0.77	0.71	0.1567	0.3828
479783	MC	11	67	3	67	0.59	0.55	1.2554	1.3037
441375	MC	12	68	1	68	0.75	0.68	0.2598	0.5907
718159	MC	12	71	5	71	0.85	0.79	-0.4303	-0.1434
631362	MC	13	69	2	69	0.70	0.66	0.6006	0.7075
610026	OE	0	25	0	25	0.54	0.53	1.5101	1.4116
374124	OE	0	26	0	26	0.50	0.46	1.7218	1.7525
Mean						0.68	0.66	0.65	0.66

Appendix P: Linking Item Statistics

Mathematics Grade 6

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
604859	MC	0	4	0	4	0.64	0.61	0.6955	0.6556
626379	MC	0	7	0	7	0.61	0.58	0.8527	0.8526
331202	MC	0	8	0	8	0.84	0.81	-0.6159	-0.5679
622963	MC	0	10	0	10	0.73	0.72	0.1545	0.1500
401528	MC	0	12	0	12	0.77	0.74	-0.1341	-0.0452
207996	MC	0	13	0	13	0.83	0.81	-0.5620	-0.6455
244461	MC	0	14	0	14	0.68	0.68	0.4640	0.3241
710121	MC	0	18	0	18	0.65	0.64	0.6409	0.5241
600168	MC	0	21	0	21	0.77	0.77	-0.1354	-0.2451
223719	MC	0	60	0	60	0.88	0.87	-0.9967	-1.0341
286671	MC	0	97	0	97	0.77	0.72	-0.1056	0.1158
673089	MC	0	98	0	98	0.62	0.61	0.7545	0.7118
830344	MC	0	104	0	104	0.55	0.56	1.1306	0.9804
938904	MC	0	106	0	106	0.65	0.63	0.5972	0.6268
383620	MC	0	107	0	107	0.67	0.64	0.4888	0.4831
734443	MC	0	113	0	113	0.59	0.55	0.9293	0.9965
982442	MC	1	65	4	65	0.83	0.82	-0.5553	-0.6633
880564	MC	1	70	4	70	0.62	0.60	0.7861	0.7453
587756	MC	2	65	3	65	0.68	0.63	0.4518	0.6197
945675	MC	2	73	1	73	0.81	0.77	-0.4377	-0.2521
977856	MC	3	66	5	66	0.86	0.87	-0.8292	-1.1220
426666	MC	3	71	1	71	0.67	0.66	0.5171	0.4607
553715	MC	4	66	1	66	0.56	0.57	1.0569	0.9267
781053	MC	4	70	5	70	0.90	0.89	-1.2016	-1.3350
257435	MC	5	64	4	64	0.58	0.59	0.9717	0.8128
491875	MC	5	71	4	71	0.84	0.81	-0.6098	-0.5110
140481	MC	6	63	2	63	0.69	0.66	0.3592	0.4012
339400	MC	6	69	1	69	0.75	0.71	0.0145	0.1380
258486	MC	7	68	2	68	0.79	0.76	-0.2722	-0.1870
357624	MC	7	72	4	72	0.77	0.74	-0.0841	-0.0228
202339	MC	8	69	5	69	0.81	0.80	-0.4359	-0.4415
638487	MC	8	73	1	72	0.48	0.46	1.4927	1.5603
889787	MC	9	64	1	64	0.82	0.81	-0.4726	-0.5536
773778	MC	9	69	2	69	0.64	0.57	0.6520	0.9399
591902	OE	0	25	0	25	0.66	0.64	0.6322	0.6529
261960	OE	0	26	0	26	0.43	0.41	2.0372	2.1284
Mean						0.71	0.69	0.23	0.23

Appendix P: Linking Item Statistics

Mathematics Grade 7

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
295811	MC	0	4	0	4	0.85	0.83	-0.7942	-0.5942
283945	MC	0	6	0	6	0.65	0.65	0.5494	0.5302
464845	MC	0	13	0	13	0.88	0.86	-1.0999	-0.9428
597220	MC	0	14	0	14	0.77	0.77	-0.1486	-0.2812
694992	MC	0	16	0	16	0.89	0.88	-1.1893	-1.1580
652832	MC	0	17	0	17	0.85	0.83	-0.7833	-0.7372
729525	MC	0	18	0	18	0.84	0.82	-0.6520	-0.6253
921830	MC	0	51	0	51	0.67	0.68	0.4492	0.2741
126589	MC	0	54	0	54	0.75	0.69	0.0032	0.2446
204405	MC	0	61	0	61	0.74	0.70	0.0349	0.2821
420089	MC	0	99	0	99	0.66	0.62	0.5392	0.7335
223637	MC	0	101	0	101	0.81	0.74	-0.4773	0.0462
123702	MC	0	109	0	109	0.59	0.63	0.8809	0.6522
894083	MC	0	111	0	111	0.56	0.53	1.0750	1.1949
598136	MC	0	112	0	112	0.51	0.49	1.3132	1.3607
120142	MC	0	116	0	116	0.82	0.82	-0.4958	-0.5756
624691	MC	1	62	1	62	0.87	0.86	-1.0164	-0.9928
293374	MC	1	71	1	71	0.37	0.42	2.0232	1.7037
770525	MC	2	64	4	64	0.63	0.63	0.6851	0.6305
166213	MC	2	70	4	70	0.87	0.88	-0.9509	-1.1530
600663	MC	3	64	2	64	0.70	0.73	0.2887	0.0442
368087	MC	3	69	2	69	0.86	0.85	-0.8893	-0.8613
732209	MC	4	62	3	62	0.73	0.69	0.1320	0.2952
919191	MC	4	69	5	69	0.45	0.51	1.5983	1.2846
689725	MC	5	63	3	63	0.71	0.70	0.2203	0.2089
904775	MC	5	72	2	72	0.60	0.63	0.8300	0.6452
957646	MC	6	64	3	64	0.77	0.78	-0.1815	-0.3058
870502	MC	6	67	3	67	0.63	0.61	0.7046	0.7454
268352	MC	7	62	2	62	0.64	0.67	0.6238	0.4398
882239	MC	7	70	2	65	0.70	0.68	0.3249	0.3698
534297	MC	8	65	3	65	0.55	0.53	1.1206	1.1548
374162	MC	8	72	3	72	0.72	0.68	0.1759	0.3536
478167	MC	9	67	1	67	0.56	0.59	1.0335	0.8603
465450	MC	9	71	5	71	0.71	0.67	0.1974	0.4071
389329	OE	0	25	0	25	0.40	0.40	2.0124	2.1086
321694	OE	0	117	0	117	0.54	0.56	1.3661	1.2264
Mean						0.69	0.68	0.26	0.27

Appendix P: Linking Item Statistics

Mathematics Grade 8

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
109474	MC	0	4	0	4	0.62	0.62	0.8513	0.6586
209177	MC	0	8	0	8	0.67	0.64	0.5732	0.6453
384306	MC	0	9	0	9	0.69	0.67	0.4231	0.4389
596319	MC	0	11	0	11	0.60	0.61	0.9631	0.7063
570649	MC	0	15	0	15	0.81	0.78	-0.3354	-0.2866
867671	MC	0	17	0	17	0.87	0.86	-0.9211	-0.9208
734995	MC	0	19	0	19	0.87	0.86	-0.9029	-0.9956
392171	MC	0	50	0	50	0.80	0.78	-0.2482	-0.2381
860931	MC	0	53	0	53	0.78	0.77	-0.1808	-0.2235
819288	MC	0	96	0	96	0.81	0.81	-0.3572	-0.5292
336885	MC	0	105	0	105	0.54	0.50	1.2488	1.3248
630766	MC	0	106	0	106	0.81	0.82	-0.3702	-0.5364
209285	MC	0	109	0	109	0.83	0.83	-0.5015	-0.6081
394222	MC	0	113	0	113	0.79	0.80	-0.2353	-0.4467
410768	MC	0	115	0	115	0.68	0.66	0.4956	0.6224
773570	MC	0	116	0	116	0.84	0.83	-0.6351	-0.6497
773144	MC	1	66	2	66	0.72	0.72	0.2349	0.0999
542175	MC	1	71	1	71	0.71	0.70	0.3048	0.2206
797012	MC	2	64	2	64	0.84	0.81	-0.6133	-0.4852
497859	MC	2	72	1	72	0.65	0.68	0.6348	0.4171
592257	MC	3	64	3	64	0.79	0.74	-0.2216	-0.0306
482169	MC	3	70	1	70	0.46	0.42	1.6894	1.7698
598782	MC	4	65	4	65	0.75	0.71	0.0481	0.2216
601123	MC	4	73	1	73	0.77	0.74	-0.1208	0.0561
452612	MC	5	63	1	63	0.74	0.72	0.1104	0.1339
616725	MC	5	69	4	69	0.65	0.65	0.6998	0.5812
893634	MC	6	66	1	66	0.86	0.86	-0.7872	-0.9726
564091	MC	6	71	5	71	0.31	0.26	2.5147	2.7360
715523	MC	7	65	3	65	0.76	0.78	-0.0376	-0.2830
656496	MC	7	67	1	67	0.66	0.64	0.5963	0.6012
462758	MC	8	64	4	64	0.61	0.60	0.8863	0.8803
556425	MC	8	68	4	68	0.83	0.77	-0.4961	-0.1671
213065	MC	9	67	4	67	0.76	0.69	-0.0101	0.3350
414235	MC	9	72	3	72	0.61	0.60	0.9039	0.8758
999681	OE	0	25	0	25	0.58	0.56	1.0525	1.1165
157731	OE	0	118	0	118	0.50	0.48	1.3659	1.4355
Mean						0.71	0.69	0.24	0.24

Appendix P: Linking Item Statistics

Reading Grade 3

PubID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
634032	MC	0	44	0	43	0.80	0.78	-0.7561	-0.6359
756962	MC	0	45	0	44	0.77	0.76	-0.5383	-0.5073
682837	MC	0	46	0	45	0.86	0.85	-1.3133	-1.1611
557563	MC	0	47	0	46	0.81	0.80	-0.8202	-0.7563
321297	MC	0	49	0	50	0.76	0.77	-0.4323	-0.4696
997224	MC	0	130	0	131	0.52	0.52	0.8964	0.9020
413909	MC	0	131	0	132	0.61	0.60	0.4580	0.4540
432442	MC	0	132	0	133	0.71	0.75	-0.1257	-0.3473
262291	MC	0	133	0	134	0.82	0.82	-0.9289	-0.9438
791246	MC	0	134	0	135	0.65	0.66	0.2124	0.1530
896266	MC	0	135	0	136	0.72	0.74	-0.2223	-0.2652
570439	MC	0	136	0	137	0.49	0.51	1.0904	0.9264
616793	MC	1	76	4	77	0.75	0.77	-0.4169	-0.5590
110222	MC	1	77	4	78	0.81	0.82	-0.8422	-0.9620
731578	MC	1	78	4	79	0.79	0.77	-0.7074	-0.5858
634052	MC	1	79	4	80	0.58	0.56	0.6032	0.7141
322025	MC	1	80	4	81	0.73	0.72	-0.2517	-0.2126
553923	MC	1	81	4	82	0.67	0.68	0.1080	0.0240
635862	MC	1	82	4	86	0.67	0.68	0.0913	0.0326
564018	MC	1	83	4	85	0.49	0.49	1.0547	1.0772
176097	MC	11	76	3	77	0.72	0.75	-0.2150	-0.3884
729263	MC	11	77	3	80	0.55	0.54	0.7343	0.8306
531308	MC	11	78	3	81	0.68	0.66	0.0769	0.1570
921044	MC	11	79	3	82	0.75	0.77	-0.3936	-0.5069
274899	MC	11	80	3	83	0.70	0.71	-0.0662	-0.1091
244633	MC	11	81	3	84	0.84	0.85	-1.0789	-1.1693
205293	MC	11	82	3	85	0.53	0.55	0.8531	0.7864
629231	MC	11	83	3	86	0.60	0.59	0.4697	0.5922
134519	OE	0	50	0	51	0.50	0.50	0.7777	0.9565
Mean						0.69	0.69	-0.06	-0.07

Appendix P: Linking Item Statistics

Reading Grade 4

PubID	Type	Form	Seq	Prev	Prev	Prev	P-Val	P-Val	Prev	Meas
				Form	Seq	P-Val			Meas	
405322	MC	0	27	0	27	0.50	0.45	1.0594	1.1026	
880961	MC	0	28	0	28	0.77	0.74	-0.4227	-0.3393	
306348	MC	0	29	0	29	0.68	0.69	0.1220	0.0475	
621765	MC	0	30	0	30	0.78	0.76	-0.4729	-0.4425	
754929	MC	0	31	0	31	0.71	0.67	-0.0637	0.1110	
767504	MC	0	32	0	32	0.36	0.37	1.7649	1.5858	
554550	MC	0	33	0	33	0.77	0.77	-0.4001	-0.4173	
604428	MC	0	34	0	34	0.65	0.66	0.2895	0.1790	
228772	MC	0	35	0	35	0.59	0.62	0.5862	0.5327	
961412	MC	0	123	0	122	0.62	0.58	0.4658	0.4820	
200141	MC	0	124	0	123	0.90	0.89	-1.5867	-1.6045	
539204	MC	0	125	0	124	0.80	0.78	-0.6079	-0.6452	
778345	MC	0	126	0	125	0.73	0.71	-0.2001	-0.1124	
433250	MC	0	127	0	126	0.83	0.79	-0.8910	-0.7906	
873058	MC	0	128	0	127	0.65	0.62	0.2731	0.3721	
249409	MC	0	129	0	128	0.75	0.74	-0.3075	-0.2191	
387664	MC	0	130	0	129	0.79	0.78	-0.5400	-0.5634	
653146	MC	1	78	4	78	0.49	0.45	1.0972	1.2769	
650367	MC	1	79	4	79	0.82	0.81	-0.8241	-0.7991	
271851	MC	1	80	4	80	0.80	0.78	-0.6256	-0.5812	
814134	MC	1	81	4	81	0.62	0.60	0.4553	0.4808	
517815	MC	1	82	4	82	0.84	0.82	-0.9629	-0.9184	
159092	MC	1	83	4	83	0.81	0.80	-0.7293	-0.7586	
635182	MC	1	84	4	86	0.67	0.66	0.1612	0.1353	
510956	MC	1	85	4	87	0.88	0.85	-1.3370	-1.1351	
666860	MC	11	78	1	78	0.83	0.82	-0.8645	-0.8749	
636874	MC	11	79	1	79	0.84	0.84	-0.9899	-1.0628	
878620	MC	11	80	1	80	0.61	0.64	0.4818	0.2611	
181299	MC	11	81	1	82	0.88	0.87	-1.3633	-1.3602	
184637	MC	11	82	1	83	0.62	0.64	0.4349	0.2744	
354728	MC	11	83	1	85	0.55	0.55	0.7942	0.7403	
538462	MC	11	84	1	86	0.51	0.54	0.9849	0.7829	
889448	MC	11	85	1	87	0.85	0.83	-1.0098	-0.9856	
320650	OE	0	36	0	36	0.71	0.68	-0.06	0.09	
960880	OE	0	131	0	130	0.51	0.51	0.6168	0.6113	
				Mean		0.71	0.69	-0.13	-0.13	

Appendix P: Linking Item Statistics

Reading Grade 5

PubID	Type	Form	Seq	Prev	Prev	Prev	Prev		
				Form	Seq	P-Val	P-Val	Meas	Meas
896897	MC	0	34	0	35	0.86	0.81	-0.8901	-0.7038
317589	MC	0	35	0	36	0.77	0.75	-0.2025	-0.2751
625565	MC	0	37	0	37	0.81	0.79	-0.4859	-0.4891
795874	MC	0	38	0	38	0.64	0.66	0.5715	0.3674
643928	MC	0	39	0	39	0.51	0.48	1.2595	1.3372
281111	MC	0	40	0	40	0.84	0.81	-0.6873	-0.5950
124985	MC	0	41	0	41	0.87	0.84	-1.0185	-0.8874
832981	MC	0	42	0	42	0.59	0.58	0.8667	0.8450
615093	MC	0	123	0	122	0.57	0.53	0.9692	0.9849
518488	MC	0	124	0	123	0.69	0.68	0.2897	0.2103
832131	MC	0	125	0	124	0.75	0.71	-0.0719	-0.0153
357399	MC	0	126	0	125	0.82	0.80	-0.5539	-0.5620
165045	MC	0	127	0	126	0.82	0.80	-0.5888	-0.5055
346828	MC	0	128	0	127	0.73	0.70	0.0503	0.1752
461548	MC	0	129	0	128	0.67	0.63	0.4218	0.4910
689341	MC	0	130	0	129	0.77	0.74	-0.1832	-0.1076
643018	MC	1	78	2	78	0.58	0.58	0.8759	0.7725
141009	MC	1	79	2	79	0.44	0.47	1.5720	1.3179
295719	MC	1	80	2	80	0.75	0.75	-0.0798	-0.1810
354587	MC	1	81	2	81	0.74	0.73	-0.0004	-0.0998
931567	MC	1	82	2	83	0.88	0.87	-1.0917	-1.1517
538567	MC	1	83	2	84	0.70	0.70	0.2710	0.0743
807610	MC	1	84	2	86	0.58	0.54	0.8868	0.9598
644489	MC	1	85	2	87	0.68	0.68	0.3471	0.1935
238111	MC	11	78	4	78	0.77	0.74	-0.1707	-0.1069
906530	MC	11	79	4	80	0.82	0.82	-0.5241	-0.6545
599152	MC	11	80	4	81	0.47	0.49	1.4404	1.2978
975807	MC	11	81	4	82	0.90	0.90	-1.3746	-1.4207
395108	MC	11	82	4	83	0.76	0.74	-0.1325	-0.1032
355090	MC	11	83	4	85	0.69	0.65	0.3013	0.4358
120119	MC	11	84	4	86	0.67	0.65	0.4425	0.4575
448613	MC	11	85	4	87	0.76	0.75	-0.1000	-0.2042
459665	OE	0	43	0	43	0.63	0.59	0.4268	0.6399
468777	OE	0	131	0	130	0.66	0.58	0.21	0.66
Mean						0.71	0.69	0.09	0.09

Appendix P: Linking Item Statistics

Reading Grade 6

PubID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
227473	MC	0	35	0	33	0.87	0.81	-1.3310	-0.9394
348368	MC	0	36	0	34	0.69	0.69	0.0530	-0.0519
791314	MC	0	37	0	35	0.58	0.60	0.6437	0.5112
634961	MC	0	38	0	36	0.78	0.74	-0.5268	-0.3643
424466	MC	0	39	0	37	0.65	0.63	0.2652	0.2646
349178	MC	0	40	0	38	0.61	0.60	0.4582	0.4626
841102	MC	0	41	0	39	0.60	0.60	0.5155	0.5044
693185	MC	0	133	0	133	0.78	0.77	-0.5583	-0.5556
141293	MC	0	134	0	134	0.50	0.48	1.0189	1.0350
665376	MC	0	135	0	135	0.74	0.76	-0.3007	-0.5052
691880	MC	0	136	0	136	0.88	0.87	-1.4632	-1.2184
800013	MC	0	137	0	137	0.73	0.71	-0.1904	-0.1565
630176	MC	0	138	0	138	0.74	0.72	-0.2789	-0.1733
512599	MC	1	75	1	75	0.74	0.74	-0.2869	-0.3603
672306	MC	1	76	1	76	0.61	0.62	0.4224	0.3546
149000	MC	1	77	1	77	0.64	0.60	0.3019	0.4223
151276	MC	1	78	1	79	0.69	0.69	-0.0013	-0.0658
645461	MC	1	79	1	80	0.77	0.75	-0.5049	-0.4109
170102	MC	1	80	1	81	0.62	0.65	0.4029	0.1881
486898	MC	1	81	1	82	0.66	0.66	0.1759	0.0967
837636	MC	1	82	1	84	0.77	0.77	-0.5228	-0.5479
504641	MC	6	75	4	75	0.92	0.92	-1.9298	-1.9295
326029	MC	6	76	4	77	0.66	0.67	0.1739	0.0971
951249	MC	6	77	4	78	0.92	0.92	-1.9106	-1.9402
702603	MC	6	78	4	79	0.66	0.66	0.1890	0.1783
886011	MC	6	79	4	81	0.59	0.56	0.5821	0.6628
281166	MC	6	80	4	82	0.93	0.93	-2.0958	-2.1462
563943	MC	6	81	4	83	0.61	0.63	0.4804	0.3145
329113	MC	6	82	4	84	0.77	0.79	-0.4543	-0.6713
875738	OE	0	42	0	40	0.53	0.51	0.6437	0.7484
868146	OE	0	139	0	139	0.61	0.58	0.4218	0.4376
Mean						0.70	0.70	-0.18	-0.19

Appendix P: Linking Item Statistics

Reading Grade 7

PubID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
989224	MC	0	42	0	40	0.60	0.62	0.5943	0.4326
292242	MC	0	43	0	41	0.63	0.62	0.4311	0.3754
935200	MC	0	44	0	42	0.77	0.73	-0.3909	-0.2664
102614	MC	0	45	0	43	0.82	0.80	-0.7814	-0.6655
534891	MC	0	46	0	45	0.79	0.78	-0.5086	-0.4161
624516	MC	0	47	0	47	0.79	0.77	-0.5529	-0.3941
385857	MC	0	118	0	118	0.83	0.81	-0.8229	-0.8203
120997	MC	0	119	0	119	0.67	0.67	0.2045	0.1015
713814	MC	0	120	0	121	0.73	0.71	-0.1312	-0.0946
841826	MC	0	121	0	122	0.82	0.81	-0.7598	-0.7787
277751	MC	0	122	0	123	0.65	0.61	0.3381	0.4728
762432	MC	0	123	0	124	0.72	0.72	-0.0801	-0.1252
328344	MC	1	74	4	75	0.76	0.71	-0.2830	-0.1203
120544	MC	1	75	4	76	0.72	0.70	-0.0655	-0.0579
192182	MC	1	76	4	77	0.78	0.74	-0.4143	-0.2732
575398	MC	1	77	4	79	0.70	0.71	0.0741	-0.1030
282121	MC	1	78	4	80	0.61	0.61	0.5785	0.4511
797899	MC	1	79	4	81	0.65	0.69	0.3653	-0.0005
186701	MC	1	80	4	82	0.69	0.67	0.1412	0.1442
896940	MC	1	81	4	83	0.83	0.83	-0.8347	-0.9171
942990	MC	6	74	2	74	0.41	0.39	1.5361	1.5814
969936	MC	6	75	2	76	0.64	0.65	0.3587	0.2743
463641	MC	6	76	2	77	0.84	0.83	-0.8765	-0.9333
228197	MC	6	77	2	78	0.55	0.55	0.8422	0.7621
857598	MC	6	78	2	79	0.87	0.87	-1.2259	-1.2806
719014	MC	6	79	2	80	0.57	0.58	0.7397	0.6306
729270	MC	6	80	2	81	0.82	0.82	-0.7186	-0.8523
811829	MC	6	81	2	83	0.59	0.58	0.6319	0.6387
516438	OE	0	48	0	48	0.61	0.61	0.4904	0.4255
612072	OE	0	124	0	125	0.58	0.57	0.5778	0.5940
				Mean		0.70	0.69	-0.02	-0.04

Appendix P: Linking Item Statistics

Reading Grade 8

PubID	Type	Form	Seq	Prev	Prev	Prev	P-Val	P-Val	Prev	Meas
				Form	Seq	P-Val			Meas	
182415	MC	0	41	0	41	0.50	0.46	1.6547	1.6215	
930938	MC	0	42	0	42	0.67	0.66	0.7648	0.6720	
354421	MC	0	43	0	43	0.47	0.46	1.8255	1.7362	
826834	MC	0	44	0	44	0.55	0.54	1.4270	1.3532	
949977	MC	0	45	0	45	0.72	0.73	0.5222	0.4063	
530542	MC	0	46	0	46	0.49	0.47	1.7105	1.6971	
422217	MC	0	47	0	47	0.49	0.52	1.7051	1.5454	
586345	MC	0	48	0	48	0.54	0.55	1.4587	1.3499	
687667	MC	0	119	0	119	0.79	0.77	0.0182	0.0418	
285023	MC	0	120	0	120	0.79	0.80	0.0638	-0.1053	
908916	MC	0	121	0	121	0.91	0.90	-1.0399	-1.0561	
127733	MC	0	122	0	123	0.81	0.81	-0.1250	-0.1480	
248187	MC	0	123	0	124	0.75	0.72	0.2832	0.4428	
233568	MC	0	124	0	125	0.51	0.52	1.5883	1.5433	
675488	MC	1	75	5	75	0.86	0.85	-0.5126	-0.5432	
755371	MC	1	76	5	77	0.52	0.51	1.5592	1.5265	
414404	MC	1	77	5	78	0.92	0.92	-1.2847	-1.3625	
275020	MC	1	78	5	79	0.83	0.84	-0.2806	-0.4753	
698889	MC	1	79	5	81	0.70	0.69	0.6252	0.5542	
269093	MC	1	80	5	82	0.68	0.66	0.7568	0.7610	
601995	MC	1	81	5	83	0.53	0.51	1.5149	1.5313	
235156	MC	1	82	5	84	0.80	0.78	0.0181	0.0268	
765630	MC	6	75	3	75	0.81	0.80	-0.1001	-0.0520	
589708	MC	6	76	3	76	0.67	0.65	0.7969	0.8434	
618040	MC	6	77	3	77	0.50	0.49	1.6460	1.6168	
104483	MC	6	78	3	78	0.59	0.60	1.2120	1.0753	
142131	MC	6	79	3	79	0.69	0.67	0.6974	0.7162	
464382	MC	6	80	3	81	0.74	0.73	0.4018	0.3792	
125109	MC	6	81	3	82	0.74	0.75	0.3543	0.2719	
644778	MC	6	82	3	84	0.54	0.52	1.4668	1.5001	
797230	OE	0	49	0	49	0.76	0.71	0.1644	0.4048	
960786	OE	0	125	0	126	0.68	0.61	0.5304	0.9028	
Mean						0.67	0.66	0.67	0.65	

Appendix P: Linking Item Statistics

Science Grade 4

PubID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
419598	MC	0	2	0	2	0.82	0.79	-0.5946	-0.4844
537831	MC	0	9	0	9	0.78	0.76	-0.2855	-0.3531
911602	MC	0	12	0	12	0.75	0.75	-0.1018	-0.3733
773351	MC	0	13	0	13	0.80	0.78	-0.4421	-0.1861
403295	MC	0	21	0	21	0.89	0.87	-1.1645	-1.0756
156402	MC	0	27	0	27	0.60	0.57	0.7745	0.8212
491938	MC	0	28	0	28	0.48	0.42	1.3341	1.5586
529781	MC	0	42	0	42	0.57	0.55	0.8994	0.9826
509737	MC	0	46	0	46	0.52	0.53	1.1391	1.0453
378436	MC	0	47	0	47	0.59	0.60	0.8163	0.7583
468916	MC	0	50	0	50	0.61	0.57	0.7219	0.8307
542509	MC	0	54	0	54	0.78	0.74	-0.2730	-0.0668
698019	MC	0	56	0	56	0.90	0.87	-1.3041	-1.1735
427454	MC	0	60	0	60	0.65	0.64	0.4947	0.4975
150982	MC	0	62	0	62	0.53	0.55	1.1063	0.8302
121495	MC	0	64	0	64	0.72	0.73	0.1175	-0.0773
793801	MC	1	34	7	34	0.65	0.62	0.4738	0.5186
374230	MC	1	70	10	33	0.54	0.54	1.0609	0.9336
780842	MC	2	33	9	70	0.79	0.76	-0.3110	-0.2754
130383	MC	2	71	3	71	0.76	0.75	-0.1547	-0.2248
783412	MC	3	30	12	67	0.90	0.85	-1.2913	-1.0139
556915	MC	3	68	2	31	0.88	0.86	-1.1223	-1.0965
934500	MC	4	34	12	71	0.57	0.50	0.9205	1.2057
453102	MC	4	70	11	33	0.76	0.76	-0.1667	-0.2285
978453	MC	5	34	5	34	0.52	0.50	1.1550	1.2044
193861	MC	5	67	1	30	0.55	0.54	0.9753	0.9937
266974	MC	6	32	2	69	0.71	0.78	0.1580	-0.3452
884038	MC	6	70	6	33	0.77	0.77	-0.2244	-0.3293
415055	MC	7	30	5	67	0.66	0.60	0.4804	0.6592
655990	MC	7	68	5	68	0.80	0.78	-0.3533	-0.3807
974812	MC	8	33	8	33	0.53	0.54	1.0948	0.9948
251601	MC	8	69	10	32	0.67	0.63	0.4013	0.5180
351468	MC	9	32	11	32	0.62	0.61	0.6410	0.6384
784929	MC	9	70	4	33	0.64	0.61	0.5327	0.6731
540820	MC	10	34	1	34	0.62	0.64	0.5676	0.4762
949285	MC	10	70	1	33	0.56	0.55	0.8922	0.9213
126979	MC	11	30	4	67	0.67	0.69	0.3574	0.2256
177179	MC	11	68	10	31	0.53	0.51	1.1024	1.1424
615699	MC	12	32	2	32	0.59	0.59	0.8248	0.7461
902303	MC	12	71	4	34	0.56	0.57	0.9677	0.8723
759380	SCR	0	36	0	36	0.47	0.44	1.4121	1.4789
390993	SCR	0	37	0	37	0.61	0.59	0.7699	0.7894
Mean						0.67	0.65	0.34	0.35

Appendix P: Linking Item Statistics

Science Grade 8

PubID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
944605	MC	0	9	0	9	0.78	0.80	-0.9106	-1.1468
886481	MC	0	10	0	10	0.71	0.72	-0.4267	-0.3878
202536	MC	0	13	0	13	0.74	0.74	-0.5924	-0.5445
720123	MC	0	18	0	18	0.67	0.66	-0.2342	-0.1686
219249	MC	0	22	0	22	0.82	0.81	-1.1600	-1.0800
638630	MC	0	27	0	27	0.60	0.58	0.1582	0.2095
996635	MC	0	43	0	43	0.68	0.71	-0.2898	-0.4349
971134	MC	0	47	0	47	0.61	0.63	0.1162	0.0054
256203	MC	0	50	0	50	0.69	0.70	-0.3274	-0.3798
780508	MC	0	52	0	52	0.52	0.48	0.5215	0.7836
587572	MC	0	54	0	54	0.46	0.49	0.8446	0.6209
775606	MC	0	55	0	55	0.79	0.78	-0.9193	-0.8443
215792	MC	0	57	0	57	0.75	0.71	-0.6842	-0.5890
347000	MC	0	60	0	60	0.58	0.55	0.2390	0.3450
725216	MC	0	61	0	61	0.79	0.79	-0.9704	-1.1146
323252	MC	0	65	0	65	0.62	0.62	0.0218	0.0196
374997	MC	1	33	11	71	0.68	0.65	-0.2754	-0.1902
529504	MC	1	70	10	70	0.74	0.70	-0.6012	-0.4322
585550	MC	2	34	3	34	0.52	0.52	0.5369	0.5698
350244	MC	2	73	9	73	0.63	0.67	0.0299	-0.2565
329296	MC	3	32	6	32	0.58	0.68	0.2143	-0.3205
797649	MC	3	73	10	35	0.58	0.59	0.2454	0.1694
107676	MC	4	32	2	32	0.61	0.61	0.0927	0.0746
235080	MC	4	73	4	35	0.63	0.60	0.0185	0.1361
123131	MC	5	35	6	73	0.64	0.65	-0.0988	-0.1035
833129	MC	5	73	9	35	0.62	0.61	0.0772	0.0881
517795	MC	6	34	2	34	0.53	0.54	0.5123	0.4387
599352	MC	6	73	10	73	0.57	0.54	0.2935	0.4608
654040	MC	7	33	5	33	0.53	0.56	0.5068	0.3470
401435	MC	7	72	5	72	0.56	0.48	0.3609	0.7865
614073	MC	8	35	2	35	0.62	0.64	0.0379	-0.0542
246709	MC	8	71	8	33	0.50	0.51	0.6591	0.5999
718854	MC	9	33	11	33	0.50	0.50	0.6293	0.6728
687422	MC	9	70	1	70	0.49	0.46	0.6530	0.8577
701514	MC	10	73	12	73	0.80	0.80	-1.0199	-1.0767
632024	MC	11	34	4	34	0.52	0.49	0.5345	0.7416
881635	MC	11	72	3	72	0.47	0.46	0.7837	0.8859
478259	MC	12	34	9	34	0.66	0.67	-0.1359	-0.2228
335799	MC	12	71	10	71	0.59	0.53	0.2125	0.4977
721625	SCR	0	37	0	37	0.49	0.52	0.7068	0.4638
255445	SCR	0	74	0	74	0.78	0.76	-0.6124	-0.5412
Mean						0.63	0.62	-0.01	0.00

Appendix P: Linking Item Statistics

Writing Grade 5

PubID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	Prev P-Val	Prev Meas	Prev Meas
378579	MC	0	1	1	13	0.70	0.73	0.8397	0.5182
271681	MC	0	2	1	14	0.84	0.88	-0.4715	-1.0590
692814	MC	0	3	1	15	0.74	0.76	0.5067	0.2192
636721	MC	0	4	1	16	0.60	0.63	1.6416	1.3485
259577	MC	0	9	3	13	0.71	0.75	0.8284	0.3418
788538	MC	0	10	3	14	0.83	0.84	-0.2806	-0.5469
481427	MC	0	11	3	15	0.43	0.43	2.9214	2.8111
365716	MC	0	12	3	16	0.72	0.73	0.7910	0.5265
416129	MC	0	17	4	13	0.76	0.75	0.4330	0.3642
545891	MC	0	18	4	14	0.68	0.68	1.0318	0.9490
401654	MC	0	19	4	15	0.76	0.74	0.4156	0.4237
983159	MC	0	20	4	16	0.73	0.73	0.6344	0.5293
140921	WP	0	21	5	21	0.69	0.67	1.4026	1.6432
140921	WP	0	21	5	21	0.68	0.66	1.5018	1.9722
504276	WP	0	22	6	21	0.65	0.63	1.9846	2.5599
504276	WP	0	22	6	21	0.65	0.63	2.1245	2.5974
Mean						0.70	0.70	1.02	0.95

Appendix P: Linking Item Statistics

Writing Grade 8

PubID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
897968	MC	0	1	6	14	0.80	0.84	0.3185	-0.2889
946344	MC	0	2	6	15	0.73	0.80	0.9147	0.2302
100912	MC	0	3	6	13	0.58	0.59	2.1256	2.0709
101932	MC	0	4	6	16	0.72	0.76	0.9858	0.6241
898150	MC	0	9	3	16	0.72	0.75	0.9814	0.6779
535325	MC	0	10	3	14	0.82	0.86	0.0405	-0.4658
641620	MC	0	11	3	13	0.56	0.58	2.2527	2.1759
697743	MC	0	12	3	15	0.53	0.60	2.4253	1.9993
779630	MC	0	17	5	8	0.92	0.92	-1.3242	-1.5032
619158	MC	0	18	5	5	0.76	0.68	0.6878	1.3415
595700	MC	0	19	5	7	0.73	0.66	0.9362	1.5190
490703	MC	0	20	5	6	0.34	0.33	3.8213	4.0397
757690	WP	0	21	1	21	0.67	0.67	2.0601	2.1165
757690	WP	0	21	1	21	0.67	0.66	2.1720	2.3261
133857	WP	0	22	6	21	0.70	0.66	1.6138	2.3116
133857	WP	0	22	6	21	0.70	0.65	1.6339	2.4847
Mean						0.69	0.69	1.35	1.35

Appendix Q:

Reliabilities

Column Heading	Definition
Strand	Strand (Tot.=total)
Group	Subgroup
Pts.	Points possible
Len.	Length
N	N
Mean	Mean
<i>SD</i>	Standard deviation
r	Reliability coefficient
<i>SEM</i>	Standard error of measurement
Items	Item types present

Appendix Q: Reliabilities

Mathematics Grade 3

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126734	56.8	12.55	0.94	3.2	MC*OE
	A	All	33	30	126734	26.3	6.20	0.89	2.1	MC*OE
	B	All	10	7	126734	7.2	2.19	0.60	1.4	MC*OE
	C	All	10	10	126734	8.2	1.89	0.69	1.0	MC
	D	All	10	10	126734	8.2	1.92	0.71	1.0	MC
	E	All	9	6	126734	6.9	1.97	0.59	1.3	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	64753	56.7	12.80	0.94	3.2	MC*OE
		Female		72	63	61935	56.9	12.29	0.93	3.2	MC*OE
	A	Male		33	30	64753	26.2	6.29	0.89	2.0	MC*OE
		Female		33	30	61935	26.3	6.10	0.89	2.1	MC*OE
	B	Male		10	7	64753	7.3	2.20	0.61	1.4	MC*OE
		Female		10	7	61935	7.1	2.17	0.59	1.4	MC*OE
	C	Male		10	10	64753	8.2	1.91	0.70	1.0	MC
		Female		10	10	61935	8.2	1.86	0.69	1.0	MC
	D	Male		10	10	64753	8.1	1.96	0.72	1.0	MC
		Female		10	10	61935	8.2	1.87	0.70	1.0	MC
	E	Male		9	6	64753	6.9	2.00	0.60	1.3	MC*OE
		Female		9	6	61935	7.0	1.93	0.59	1.2	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	87626	59.4	10.58	0.92	3.0	MC*OE
		Af. Amer.		72	63	18571	48.0	14.49	0.94	3.5	MC*OE
		Hispanic		72	63	11902	50.4	14.00	0.94	3.5	MC*OE
		Asian		72	63	4632	62.1	10.35	0.93	2.8	MC*OE
		Am. Indian		72	63	184	55.0	14.23	0.95	3.2	MC*OE
		Multi		72	63	3726	54.0	13.58	0.94	3.3	MC*OE
		A	White		33	30	87626	27.5	5.28	0.87	1.9
	Af. Amer.			33	30	18571	22.2	7.22	0.90	2.3	MC*OE
	Hispanic			33	30	11902	23.3	6.97	0.89	2.3	MC*OE
	Asian			33	30	4632	28.8	5.01	0.88	1.8	MC*OE
	Am. Indian			33	30	184	25.4	7.04	0.91	2.1	MC*OE
	Multi			33	30	3726	25.0	6.72	0.90	2.2	MC*OE
	B		White		10	7	87626	7.6	1.95	0.53	1.3
		Af. Amer.		10	7	18571	5.8	2.37	0.64	1.4	MC*OE
		Hispanic		10	7	11902	6.2	2.33	0.63	1.4	MC*OE
		Asian		10	7	4632	7.9	2.02	0.56	1.3	MC*OE
		Am. Indian		10	7	184	6.9	2.40	0.67	1.4	MC*OE
		Multi		10	7	3726	6.7	2.29	0.62	1.4	MC*OE
		C	White		10	10	87626	8.5	1.66	0.65	1.0
	Af. Amer.			10	10	18571	7.1	2.22	0.70	1.2	MC
	Hispanic			10	10	11902	7.6	2.12	0.70	1.2	MC
	Asian			10	10	4632	8.9	1.59	0.70	0.9	MC
	Am. Indian			10	10	184	8.0	2.06	0.73	1.1	MC
	Multi			10	10	3726	7.9	2.04	0.70	1.1	MC

Appendix Q: Reliabilities

D	White	10	10	87626	8.5	1.68	0.66	1.0	MC
	Af. Amer.	10	10	18571	7.1	2.28	0.71	1.2	MC
	Hispanic	10	10	11902	7.4	2.18	0.71	1.2	MC
	Asian	10	10	4632	8.9	1.52	0.68	0.9	MC
	Am. Indian	10	10	184	8.0	2.09	0.75	1.1	MC
	Multi	10	10	3726	7.9	2.06	0.72	1.1	MC
E	White	9	6	87626	7.3	1.70	0.52	1.2	MC*OE
	Af. Amer.	9	6	18571	5.6	2.25	0.62	1.4	MC*OE
	Hispanic	9	6	11902	6.0	2.19	0.61	1.4	MC*OE
	Asian	9	6	4632	7.6	1.66	0.57	1.1	MC*OE
	Am. Indian	9	6	184	6.7	2.18	0.66	1.3	MC*OE
	Multi	9	6	3726	6.5	2.10	0.60	1.3	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	3691	44.6	14.70	0.94	3.7	MC*OE
	A	All	33	30	3691	20.6	7.36	0.89	2.4	MC*OE
	B	All	10	7	3691	5.3	2.32	0.61	1.5	MC*OE
	C	All	10	10	3691	6.8	2.29	0.69	1.3	MC
	D	All	10	10	3691	6.7	2.36	0.71	1.3	MC
	E	All	9	6	3691	5.3	2.32	0.63	1.4	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	18808	46.7	15.66	0.95	3.6	MC*OE
	A	All	33	30	18808	21.4	7.83	0.91	2.4	MC*OE
	B	All	10	7	18808	5.8	2.48	0.66	1.4	MC*OE
	C	All	10	10	18808	7.1	2.27	0.71	1.2	MC
	D	All	10	10	18808	6.8	2.44	0.74	1.2	MC
	E	All	9	6	18808	5.7	2.33	0.64	1.4	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	58464	51.7	13.70	0.94	3.4	MC*OE
	A	All	33	30	58464	23.9	6.84	0.89	2.2	MC*OE
	B	All	10	7	58464	6.4	2.28	0.62	1.4	MC*OE
	C	All	10	10	58464	7.6	2.08	0.69	1.2	MC
	D	All	10	10	58464	7.6	2.14	0.71	1.2	MC
	E	All	9	6	58464	6.2	2.14	0.60	1.4	MC*OE

Appendix Q: Reliabilities

Mathematics Grade 4

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126550	48.8	14.29	0.94	3.5	MC*OE
	A	All	33	30	126550	21.0	7.30	0.89	2.4	MC*OE
	B	All	10	10	126550	7.2	2.32	0.72	1.2	MC
	C	All	10	7	126550	6.6	2.30	0.63	1.4	MC*OE
	D	All	10	10	126550	7.2	2.28	0.69	1.3	MC
	E	All	9	6	126550	6.8	1.91	0.60	1.2	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	64372	49.0	14.45	0.94	3.5	MC*OE
		Female		72	63	62122	48.6	14.11	0.94	3.5	MC*OE
	A	Male		33	30	64372	21.2	7.34	0.90	2.4	MC*OE
		Female		33	30	62122	20.8	7.24	0.89	2.4	MC*OE
	B	Male		10	10	64372	7.4	2.29	0.72	1.2	MC
		Female		10	10	62122	7.0	2.34	0.71	1.3	MC
	C	Male		10	7	64372	6.5	2.35	0.64	1.4	MC*OE
		Female		10	7	62122	6.7	2.25	0.62	1.4	MC*OE
	D	Male		10	10	64372	7.2	2.31	0.70	1.3	MC
		Female		10	10	62122	7.2	2.26	0.68	1.3	MC
	E	Male		9	6	64372	6.7	1.94	0.61	1.2	MC*OE
		Female		9	6	62122	6.9	1.88	0.59	1.2	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	88373	51.7	12.79	0.93	3.4	MC*OE
		Af. Amer.		72	63	18789	38.4	14.42	0.93	3.7	MC*OE
		Hispanic		72	63	11413	41.1	14.33	0.93	3.7	MC*OE
		Asian		72	63	4554	55.9	12.79	0.94	3.2	MC*OE
		Am. Indian		72	63	183	47.7	13.56	0.93	3.6	MC*OE
		Multi		72	63	3116	46.2	14.11	0.93	3.6	MC*OE
		A	White		33	30	88373	22.4	6.71	0.88	2.4
	Af. Amer.			33	30	18789	16.0	6.97	0.88	2.5	MC*OE
	Hispanic			33	30	11413	17.1	7.06	0.88	2.5	MC*OE
	Asian			33	30	4554	24.7	6.56	0.88	2.3	MC*OE
	Am. Indian			33	30	183	20.5	6.93	0.88	2.5	MC*OE
	Multi			33	30	3116	19.6	7.18	0.89	2.4	MC*OE
	B		White		10	10	88373	7.6	2.11	0.68	1.2
		Af. Amer.		10	10	18789	5.7	2.43	0.67	1.4	MC
		Hispanic		10	10	11413	6.2	2.41	0.69	1.3	MC
		Asian		10	10	4554	8.0	2.09	0.72	1.1	MC
		Am. Indian		10	10	183	7.0	2.22	0.68	1.3	MC
		Multi		10	10	3116	6.8	2.33	0.69	1.3	MC
		C	White		10	7	88373	7.0	2.09	0.59	1.3
	Af. Amer.			10	7	18789	5.1	2.43	0.61	1.5	MC*OE
	Hispanic			10	7	11413	5.6	2.39	0.61	1.5	MC*OE
	Asian			10	7	4554	7.5	2.10	0.63	1.3	MC*OE
	Am. Indian			10	7	183	6.4	2.31	0.59	1.5	MC*OE
	Multi			10	7	3116	6.2	2.34	0.61	1.5	MC*OE

Appendix Q: Reliabilities

D	White	10	10	88373	7.5	2.13	0.67	1.2	MC
	Af. Amer.	10	10	18789	6.1	2.44	0.67	1.4	MC
	Hispanic	10	10	11413	6.3	2.40	0.67	1.4	MC
	Asian	10	10	4554	8.2	1.88	0.67	1.1	MC
	Am. Indian	10	10	183	7.1	2.30	0.69	1.3	MC
	Multi	10	10	3116	6.9	2.28	0.67	1.3	MC
E	White	9	6	88373	7.2	1.65	0.51	1.2	MC*OE
	Af. Amer.	9	6	18789	5.6	2.23	0.68	1.3	MC*OE
	Hispanic	9	6	11413	5.9	2.14	0.66	1.3	MC*OE
	Asian	9	6	4554	7.5	1.76	0.56	1.2	MC*OE
	Am. Indian	9	6	183	6.7	1.92	0.60	1.2	MC*OE
	Multi	9	6	3116	6.6	1.93	0.60	1.2	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	3030	32.5	12.92	0.91	3.8	MC*OE
	A	All	33	30	3030	13.4	6.16	0.84	2.5	MC*OE
	B	All	10	10	3030	5.0	2.27	0.61	1.4	MC
	C	All	10	7	3030	4.3	2.25	0.54	1.5	MC*OE
	D	All	10	10	3030	5.2	2.34	0.63	1.4	MC
	E	All	9	6	3030	4.6	2.25	0.67	1.3	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	19756	37.4	15.39	0.94	3.7	MC*OE
	A	All	33	30	19756	15.6	7.51	0.89	2.5	MC*OE
	B	All	10	10	19756	5.7	2.54	0.71	1.4	MC
	C	All	10	7	19756	5.1	2.47	0.62	1.5	MC*OE
	D	All	10	10	19756	5.6	2.54	0.70	1.4	MC
	E	All	9	6	19756	5.4	2.33	0.70	1.3	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	57361	42.6	14.38	0.93	3.7	MC*OE
	A	All	33	30	57361	17.9	7.16	0.88	2.4	MC*OE
	B	All	10	10	57361	6.4	2.41	0.69	1.3	MC
	C	All	10	7	57361	5.8	2.39	0.61	1.5	MC*OE
	D	All	10	10	57361	6.4	2.38	0.67	1.4	MC
	E	All	9	6	57361	6.1	2.09	0.65	1.2	MC*OE

Appendix Q: Reliabilities

Mathematics Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	125790	46.3	13.82	0.93	3.6	MC*OE
	A	All	31	28	125790	20.2	6.56	0.88	2.3	MC*OE
	B	All	12	12	125790	7.5	2.79	0.72	1.5	MC
	C	All	10	10	125790	6.8	2.12	0.64	1.3	MC
	D	All	10	7	125790	6.2	1.99	0.61	1.2	MC*OE
	E	All	9	6	125790	5.6	2.19	0.59	1.4	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	64547	46.3	14.05	0.94	3.5	MC*OE
		Female		72	63	61184	46.4	13.57	0.93	3.6	MC*OE
	A	Male		31	28	64547	20.2	6.63	0.88	2.3	MC*OE
		Female		31	28	61184	20.3	6.49	0.87	2.3	MC*OE
	B	Male		12	12	64547	7.6	2.81	0.73	1.5	MC
		Female		12	12	61184	7.4	2.77	0.71	1.5	MC
	C	Male		10	10	64547	6.8	2.16	0.66	1.3	MC
		Female		10	10	61184	6.8	2.07	0.63	1.3	MC
	D	Male		10	7	64547	6.2	2.02	0.62	1.2	MC*OE
		Female		10	7	61184	6.2	1.95	0.60	1.2	MC*OE
	E	Male		9	6	64547	5.5	2.22	0.60	1.4	MC*OE
		Female		9	6	61184	5.7	2.15	0.57	1.4	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	88289	49.0	12.64	0.92	3.5	MC*OE
		Af. Amer.		72	63	18917	36.4	13.19	0.92	3.7	MC*OE
		Hispanic		72	63	11254	39.5	13.35	0.92	3.7	MC*OE
		Asian		72	63	4426	53.9	12.79	0.93	3.3	MC*OE
		Am. Indian		72	63	187	45.7	13.50	0.93	3.7	MC*OE
		Multi		72	63	2615	43.5	13.95	0.93	3.6	MC*OE
		A	White		31	28	88289	21.4	6.06	0.86	2.3
	Af. Amer.			31	28	18917	15.9	6.35	0.86	2.4	MC*OE
	Hispanic			31	28	11254	17.2	6.45	0.86	2.4	MC*OE
	Asian			31	28	4426	23.9	5.94	0.87	2.1	MC*OE
	Am. Indian			31	28	187	20.0	6.27	0.86	2.4	MC*OE
	Multi			31	28	2615	19.0	6.68	0.88	2.4	MC*OE
	B		White		12	12	88289	8.0	2.61	0.69	1.4
		Af. Amer.		12	12	18917	5.5	2.52	0.61	1.6	MC
		Hispanic		12	12	11254	6.2	2.61	0.64	1.6	MC
		Asian		12	12	4426	8.7	2.64	0.74	1.3	MC
		Am. Indian		12	12	187	7.3	2.89	0.74	1.5	MC
		Multi		12	12	2615	7.0	2.76	0.70	1.5	MC
		C	White		10	10	88289	7.1	1.95	0.60	1.2
	Af. Amer.			10	10	18917	5.4	2.17	0.59	1.4	MC
	Hispanic			10	10	11254	6.0	2.13	0.60	1.3	MC
	Asian			10	10	4426	7.6	1.99	0.66	1.2	MC
	Am. Indian			10	10	187	6.9	1.95	0.56	1.3	MC
Multi			10	10	2615	6.4	2.13	0.63	1.3	MC	

Appendix Q: Reliabilities

D	White	10	7	88289	6.5	1.87	0.58	1.2	MC*OE
	Af. Amer.	10	7	18917	5.1	1.98	0.59	1.3	MC*OE
	Hispanic	10	7	11254	5.5	1.98	0.59	1.3	MC*OE
	Asian	10	7	4426	7.2	1.93	0.61	1.2	MC*OE
	Am. Indian	10	7	187	6.1	2.05	0.63	1.2	MC*OE
	Multi	10	7	2615	5.9	2.03	0.61	1.3	MC*OE
E	White	9	6	88289	6.0	2.04	0.54	1.4	MC*OE
	Af. Amer.	9	6	18917	4.4	2.26	0.59	1.4	MC*OE
	Hispanic	9	6	11254	4.7	2.25	0.60	1.4	MC*OE
	Asian	9	6	4426	6.5	1.99	0.54	1.3	MC*OE
	Am. Indian	9	6	187	5.4	2.35	0.63	1.4	MC*OE
	Multi	9	6	2615	5.2	2.22	0.60	1.4	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2681	30.1	11.62	0.89	3.8	MC*OE
	A	All	31	28	2681	13.0	5.74	0.83	2.4	MC*OE
	B	All	12	12	2681	4.7	2.22	0.50	1.6	MC
	C	All	10	10	2681	4.6	2.02	0.50	1.4	MC
	D	All	10	7	2681	4.3	2.05	0.58	1.3	MC*OE
	E	All	9	6	2681	3.5	2.11	0.56	1.4	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	19544	34.1	14.04	0.93	3.7	MC*OE
	A	All	31	28	19544	14.7	6.68	0.87	2.4	MC*OE
	B	All	12	12	19544	5.5	2.67	0.66	1.6	MC
	C	All	10	10	19544	5.3	2.23	0.61	1.4	MC
	D	All	10	7	19544	4.7	2.20	0.63	1.3	MC*OE
	E	All	9	6	19544	4.0	2.25	0.63	1.4	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	56316	40.4	13.51	0.93	3.7	MC*OE
	A	All	31	28	56316	17.6	6.48	0.87	2.4	MC*OE
	B	All	12	12	56316	6.4	2.68	0.67	1.6	MC
	C	All	10	10	56316	6.0	2.15	0.61	1.3	MC
	D	All	10	7	56316	5.5	1.97	0.59	1.3	MC*OE
	E	All	9	6	56316	4.9	2.25	0.60	1.4	MC*OE

Appendix Q: Reliabilities

Mathematics Grade 6

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	129366	48.5	14.35	0.94	3.6	MC*OE
	A	All	22	19	129366	15.1	5.01	0.83	2.0	MC*OE
	B	All	10	7	129366	6.3	2.28	0.61	1.4	MC*OE
	C	All	12	12	129366	8.2	2.72	0.75	1.4	MC
	D	All	17	14	129366	11.3	3.41	0.76	1.7	MC*OE
	E	All	11	11	129366	7.7	2.63	0.75	1.3	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	66094	48.1	14.72	0.94	3.6	MC*OE
		Female		72	63	63194	49.0	13.93	0.94	3.5	MC*OE
	A	Male		22	19	66094	14.9	5.13	0.84	2.0	MC*OE
		Female		22	19	63194	15.2	4.86	0.82	2.0	MC*OE
	B	Male		10	7	66094	6.3	2.33	0.62	1.4	MC*OE
		Female		10	7	63194	6.2	2.23	0.60	1.4	MC*OE
	C	Male		12	12	66094	8.2	2.78	0.76	1.4	MC
		Female		12	12	63194	8.3	2.65	0.74	1.4	MC
	D	Male		17	14	66094	11.1	3.47	0.77	1.7	MC*OE
		Female		17	14	63194	11.5	3.33	0.75	1.7	MC*OE
	E	Male		11	11	66094	7.6	2.67	0.76	1.3	MC
		Female		11	11	63194	7.8	2.58	0.74	1.3	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	91686	51.2	13.08	0.93	3.4	MC*OE
		Af. Amer.		72	63	19183	39.0	14.32	0.93	3.8	MC*OE
		Hispanic		72	63	11469	41.2	14.47	0.93	3.8	MC*OE
		Asian		72	63	4417	56.7	12.46	0.94	3.1	MC*OE
		Am. Indian		72	63	189	43.9	14.96	0.94	3.7	MC*OE
		Multi		72	63	2324	45.2	14.67	0.94	3.7	MC*OE
		A	White		22	19	91686	15.9	4.62	0.82	2.0
	Af. Amer.			22	19	19183	12.0	5.11	0.83	2.1	MC*OE
	Hispanic			22	19	11469	12.7	5.09	0.82	2.1	MC*OE
	Asian			22	19	4417	17.8	4.17	0.82	1.8	MC*OE
	Am. Indian			22	19	189	13.6	5.39	0.85	2.1	MC*OE
	Multi			22	19	2324	13.9	5.20	0.84	2.1	MC*OE
	B		White		10	7	91686	6.6	2.10	0.58	1.4
		Af. Amer.		10	7	19183	4.9	2.35	0.55	1.6	MC*OE
		Hispanic		10	7	11469	5.3	2.36	0.57	1.6	MC*OE
		Asian		10	7	4417	7.4	2.05	0.62	1.3	MC*OE
		Am. Indian		10	7	189	5.6	2.36	0.60	1.5	MC*OE
		Multi		10	7	2324	5.8	2.35	0.59	1.5	MC*OE
		C	White		12	12	91686	8.7	2.53	0.72	1.3
	Af. Amer.			12	12	19183	6.6	2.73	0.70	1.5	MC
	Hispanic			12	12	11469	7.0	2.73	0.71	1.5	MC
	Asian			12	12	4417	9.5	2.40	0.75	1.2	MC
	Am. Indian			12	12	189	7.5	2.75	0.72	1.5	MC
Multi			12	12	2324	7.7	2.77	0.74	1.4	MC	

Appendix Q: Reliabilities

D	White	17	14	91686	11.9	3.14	0.73	1.6	MC*OE
	Af. Amer.	17	14	19183	9.4	3.54	0.75	1.8	MC*OE
	Hispanic	17	14	11469	9.7	3.57	0.76	1.7	MC*OE
	Asian	17	14	4417	13.1	2.98	0.74	1.5	MC*OE
	Am. Indian	17	14	189	10.4	3.52	0.76	1.7	MC*OE
	Multi	17	14	2324	10.6	3.50	0.76	1.7	MC*OE
E	White	11	11	91686	8.1	2.45	0.73	1.3	MC
	Af. Amer.	11	11	19183	6.1	2.57	0.68	1.5	MC
	Hispanic	11	11	11469	6.4	2.63	0.71	1.4	MC
	Asian	11	11	4417	8.9	2.32	0.76	1.1	MC
	Am. Indian	11	11	189	6.8	2.73	0.74	1.4	MC
	Multi	11	11	2324	7.1	2.65	0.73	1.4	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2624	31.0	12.50	0.90	3.9	MC*OE
	A	All	22	19	2624	9.7	4.60	0.79	2.1	MC*OE
	B	All	10	7	2624	3.9	2.27	0.48	1.6	MC*OE
	C	All	12	12	2624	5.3	2.37	0.58	1.5	MC
	D	All	17	14	2624	7.3	3.40	0.72	1.8	MC*OE
	E	All	11	11	2624	4.7	2.16	0.54	1.5	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	19917	34.3	14.28	0.93	3.9	MC*OE
	A	All	22	19	19917	10.4	5.02	0.82	2.1	MC*OE
	B	All	10	7	19917	4.4	2.39	0.54	1.6	MC*OE
	C	All	12	12	19917	6.0	2.69	0.68	1.5	MC
	D	All	17	14	19917	8.1	3.63	0.76	1.8	MC*OE
	E	All	11	11	19917	5.4	2.59	0.68	1.5	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	56578	42.4	14.38	0.93	3.8	MC*OE
	A	All	22	19	56578	13.1	5.09	0.83	2.1	MC*OE
	B	All	10	7	56578	5.5	2.34	0.57	1.5	MC*OE
	C	All	12	12	56578	7.2	2.73	0.72	1.5	MC
	D	All	17	14	56578	10.0	3.51	0.76	1.7	MC*OE
	E	All	11	11	56578	6.6	2.63	0.71	1.4	MC

Appendix Q: Reliabilities

Mathematics Grade 7

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	131842	47.2	14.64	0.94	3.6	MC*OE
	A	All	17	14	131842	11.2	3.78	0.78	1.8	MC*OE
	B	All	10	7	131842	4.9	2.66	0.74	1.3	MC*OE
	C	All	14	14	131842	11.2	2.75	0.77	1.3	MC
	D	All	19	16	131842	11.7	4.48	0.80	2.0	MC*OE
	E	All	12	12	131842	8.2	2.75	0.74	1.4	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	67485	46.8	15.10	0.94	3.6	MC*OE
		Female		72	63	64239	47.7	14.12	0.94	3.6	MC*OE
	A	Male		17	14	67485	11.1	3.87	0.79	1.8	MC*OE
		Female		17	14	64239	11.3	3.67	0.77	1.8	MC*OE
	B	Male		10	7	67485	4.9	2.68	0.75	1.3	MC*OE
		Female		10	7	64239	4.9	2.63	0.74	1.4	MC*OE
	C	Male		14	14	67485	11.1	2.88	0.79	1.3	MC
		Female		14	14	64239	11.3	2.61	0.75	1.3	MC
	D	Male		19	16	67485	11.7	4.59	0.81	2.0	MC*OE
		Female		19	16	64239	11.8	4.36	0.78	2.0	MC*OE
	E	Male		12	12	67485	8.1	2.82	0.75	1.4	MC
		Female		12	12	64239	8.3	2.67	0.73	1.4	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	94229	49.8	13.52	0.93	3.5	MC*OE
		Af. Amer.		72	63	19451	37.7	14.22	0.93	3.7	MC*OE
		Hispanic		72	63	11053	39.4	14.35	0.93	3.8	MC*OE
		Asian		72	63	4394	56.1	13.22	0.94	3.2	MC*OE
		Am. Indian		72	63	194	42.6	14.89	0.94	3.7	MC*OE
		Multi		72	63	2371	44.2	14.60	0.94	3.7	MC*OE
		A	White		17	14	94229	11.8	3.51	0.76	1.7
	Af. Amer.			17	14	19451	9.0	3.81	0.75	1.9	MC*OE
	Hispanic			17	14	11053	9.3	3.81	0.75	1.9	MC*OE
	Asian			17	14	4394	13.4	3.31	0.78	1.6	MC*OE
	Am. Indian			17	14	194	10.4	3.86	0.77	1.8	MC*OE
	Multi			17	14	2371	10.4	3.84	0.77	1.8	MC*OE
	B		White		10	7	94229	5.3	2.57	0.73	1.3
		Af. Amer.		10	7	19451	3.3	2.28	0.67	1.3	MC*OE
		Hispanic		10	7	11053	3.6	2.39	0.69	1.3	MC*OE
		Asian		10	7	4394	6.5	2.59	0.74	1.3	MC*OE
		Am. Indian		10	7	194	4.2	2.57	0.71	1.4	MC*OE
		Multi		10	7	2371	4.4	2.60	0.73	1.3	MC*OE
		C	White		14	14	94229	11.6	2.47	0.75	1.2
	Af. Amer.			14	14	19451	9.5	3.10	0.75	1.6	MC
	Hispanic			14	14	11053	10.0	3.02	0.75	1.5	MC
	Asian			14	14	4394	12.4	2.22	0.78	1.1	MC
	Am. Indian			14	14	194	10.4	2.99	0.77	1.4	MC
	Multi			14	14	2371	10.7	2.88	0.76	1.4	MC

Appendix Q: Reliabilities

D	White	19	16	94229	12.4	4.24	0.77	2.0	MC*OE
	Af. Amer.	19	16	19451	9.2	4.28	0.79	2.0	MC*OE
	Hispanic	19	16	11053	9.6	4.34	0.79	2.0	MC*OE
	Asian	19	16	4394	14.5	4.10	0.79	1.9	MC*OE
	Am. Indian	19	16	194	10.3	4.57	0.80	2.1	MC*OE
	Multi	19	16	2371	11.0	4.47	0.79	2.0	MC*OE
E	White	12	12	94229	8.6	2.57	0.72	1.4	MC
	Af. Amer.	12	12	19451	6.6	2.78	0.71	1.5	MC
	Hispanic	12	12	11053	6.9	2.81	0.72	1.5	MC
	Asian	12	12	4394	9.4	2.52	0.76	1.2	MC
	Am. Indian	12	12	194	7.3	2.89	0.74	1.5	MC
	Multi	12	12	2371	7.7	2.73	0.72	1.4	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2646	30.6	12.30	0.91	3.8	MC*OE
	A	All	17	14	2646	7.4	3.59	0.72	1.9	MC*OE
	B	All	10	7	2646	2.4	1.91	0.58	1.2	MC*OE
	C	All	14	14	2646	8.4	2.99	0.69	1.7	MC
	D	All	19	16	2646	7.1	3.74	0.73	1.9	MC*OE
	E	All	12	12	2646	5.2	2.48	0.62	1.5	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	19976	32.5	13.62	0.92	3.8	MC*OE
	A	All	17	14	19976	7.7	3.75	0.74	1.9	MC*OE
	B	All	10	7	19976	2.7	2.14	0.64	1.3	MC*OE
	C	All	14	14	19976	8.7	3.19	0.74	1.6	MC
	D	All	19	16	19976	7.6	4.04	0.76	2.0	MC*OE
	E	All	12	12	19976	5.8	2.67	0.67	1.5	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	56070	40.8	14.38	0.93	3.7	MC*OE
	A	All	17	14	56070	9.7	3.81	0.76	1.9	MC*OE
	B	All	10	7	56070	3.8	2.44	0.70	1.3	MC*OE
	C	All	14	14	56070	10.2	3.00	0.76	1.5	MC
	D	All	19	16	56070	9.9	4.34	0.78	2.0	MC*OE
	E	All	12	12	56070	7.2	2.79	0.72	1.5	MC

Appendix Q: Reliabilities

Mathematics Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	131143	48.4	14.40	0.93	3.7	MC*OE
	A	All	15	15	131143	10.8	3.11	0.76	1.5	MC
	B	All	11	8	131143	7.2	2.61	0.63	1.6	MC*OE
	C	All	13	13	131143	9.1	2.82	0.75	1.4	MC
	D	All	20	17	131143	13.8	4.70	0.83	2.0	MC*OE
	E	All	13	10	131143	7.5	2.99	0.69	1.7	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	67122	47.9	14.99	0.94	3.7	MC*OE
		Female		72	63	63920	48.9	13.71	0.93	3.7	MC*OE
	A	Male		15	15	67122	10.7	3.23	0.77	1.5	MC
		Female		15	15	63920	10.8	2.98	0.74	1.5	MC
	B	Male		11	8	67122	7.1	2.68	0.64	1.6	MC*OE
		Female		11	8	63920	7.3	2.54	0.62	1.6	MC*OE
	C	Male		13	13	67122	9.0	2.86	0.76	1.4	MC
		Female		13	13	63920	9.3	2.77	0.74	1.4	MC
	D	Male		20	17	67122	13.6	4.95	0.84	2.0	MC*OE
		Female		20	17	63920	13.9	4.43	0.81	1.9	MC*OE
	E	Male		13	10	67122	7.5	3.07	0.71	1.6	MC*OE
		Female		13	10	63920	7.5	2.91	0.67	1.7	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	94196	50.8	13.21	0.93	3.6	MC*OE
		Af. Amer.		72	63	19339	39.3	14.36	0.93	3.9	MC*OE
		Hispanic		72	63	11055	40.7	14.76	0.93	3.9	MC*OE
		Asian		72	63	4109	56.9	12.63	0.93	3.2	MC*OE
		Am. Indian		72	63	201	44.0	14.26	0.93	3.9	MC*OE
		Multi		72	63	2119	45.4	14.50	0.93	3.8	MC*OE
		A	White		15	15	94196	11.2	2.92	0.74	1.5
	Af. Amer.			15	15	19339	9.1	3.13	0.71	1.7	MC
	Hispanic			15	15	11055	9.2	3.20	0.73	1.7	MC
	Asian			15	15	4109	12.4	2.60	0.75	1.3	MC
	Am. Indian			15	15	201	10.0	3.15	0.73	1.6	MC
	Multi			15	15	2119	10.2	3.16	0.74	1.6	MC
	B		White		11	8	94196	7.6	2.42	0.60	1.5
		Af. Amer.		11	8	19339	5.7	2.64	0.61	1.6	MC*OE
		Hispanic		11	8	11055	6.0	2.74	0.63	1.7	MC*OE
		Asian		11	8	4109	8.5	2.31	0.64	1.4	MC*OE
		Am. Indian		11	8	201	6.7	2.60	0.59	1.7	MC*OE
		Multi		11	8	2119	6.7	2.62	0.62	1.6	MC*OE
		C	White		13	13	94196	9.5	2.62	0.73	1.4
	Af. Amer.			13	13	19339	7.6	2.93	0.73	1.5	MC
	Hispanic			13	13	11055	7.9	2.92	0.74	1.5	MC
	Asian			13	13	4109	10.6	2.49	0.77	1.2	MC
	Am. Indian			13	13	201	8.4	2.78	0.71	1.5	MC
Multi			13	13	2119	8.7	2.89	0.75	1.4	MC	

Appendix Q: Reliabilities

D	White	20	17	94196	14.4	4.38	0.81	1.9	MC*OE
	Af. Amer.	20	17	19339	11.2	4.87	0.82	2.1	MC*OE
	Hispanic	20	17	11055	11.6	4.92	0.83	2.1	MC*OE
	Asian	20	17	4109	16.4	3.94	0.82	1.7	MC*OE
	Am. Indian	20	17	201	12.2	4.75	0.81	2.1	MC*OE
	Multi	20	17	2119	13.0	4.78	0.82	2.0	MC*OE
E	White	13	10	94196	8.0	2.80	0.66	1.6	MC*OE
	Af. Amer.	13	10	19339	5.7	2.85	0.67	1.6	MC*OE
	Hispanic	13	10	11055	5.9	2.98	0.69	1.7	MC*OE
	Asian	13	10	4109	8.9	2.88	0.69	1.6	MC*OE
	Am. Indian	13	10	201	6.7	2.86	0.65	1.7	MC*OE
	Multi	13	10	2119	6.9	2.99	0.69	1.7	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2695	31.5	13.24	0.92	3.9	MC*OE
	A	All	15	15	2695	7.6	2.94	0.64	1.8	MC
	B	All	11	8	2695	4.5	2.56	0.58	1.7	MC*OE
	C	All	13	13	2695	6.6	2.88	0.71	1.6	MC
	D	All	20	17	2695	8.9	4.69	0.81	2.1	MC*OE
	E	All	13	10	2695	4.0	2.43	0.62	1.5	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	19770	33.2	14.01	0.92	3.9	MC*OE
	A	All	15	15	19770	7.8	3.16	0.69	1.8	MC
	B	All	11	8	19770	4.9	2.60	0.59	1.7	MC*OE
	C	All	13	13	19770	6.8	2.92	0.72	1.6	MC
	D	All	20	17	19770	9.0	4.74	0.80	2.1	MC*OE
	E	All	13	10	19770	4.7	2.75	0.68	1.6	MC*OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	54562	42.1	14.52	0.93	3.8	MC*OE
	A	All	15	15	54562	9.6	3.19	0.73	1.7	MC
	B	All	11	8	54562	6.2	2.67	0.62	1.7	MC*OE
	C	All	13	13	54562	8.1	2.90	0.73	1.5	MC
	D	All	20	17	54562	11.9	4.85	0.82	2.1	MC*OE
	E	All	13	10	54562	6.3	2.93	0.68	1.7	MC*OE

Appendix Q: Reliabilities

Reading Grade 3

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	126685	30.9	9.34	0.92	2.7
A	All		28	26	126685	19.3	5.91	0.87	2.1	MC*OE
B	All		18	16	126685	11.6	3.81	0.80	1.7	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	46	42	64706	29.9	9.62	0.92	2.7
Female			46	42	61934	31.9	8.94	0.91	2.7	MC*OE
A		Male	28	26	64706	18.8	6.09	0.88	2.1	MC*OE
		Female	28	26	61934	19.9	5.66	0.87	2.1	MC*OE
B		Male	18	16	64706	11.2	3.90	0.80	1.7	MC*OE
		Female	18	16	61934	12.0	3.66	0.79	1.7	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	46	42	87596	32.8	8.43	0.90	2.6
Af. Amer.			46	42	18567	25.0	9.54	0.91	2.9	MC*OE
Hispanic			46	42	11895	25.8	9.65	0.91	2.9	MC*OE
Asian			46	42	4625	34.0	8.48	0.91	2.6	MC*OE
Am. Indian			46	42	183	29.4	9.87	0.92	2.8	MC*OE
Multi			46	42	3728	29.1	9.65	0.92	2.8	MC*OE
A		White	28	26	87596	20.5	5.34	0.86	2.0	MC*OE
		Af. Amer.	28	26	18567	15.7	6.10	0.86	2.3	MC*OE
		Hispanic	28	26	11895	16.1	6.17	0.87	2.3	MC*OE
		Asian	28	26	4625	21.2	5.35	0.86	2.0	MC*OE
		Am. Indian	28	26	183	18.6	6.14	0.88	2.1	MC*OE
		Multi	28	26	3728	18.2	6.12	0.88	2.2	MC*OE
B		White	18	16	87596	12.3	3.49	0.77	1.7	MC*OE
		Af. Amer.	18	16	18567	9.3	3.87	0.78	1.8	MC*OE
		Hispanic	18	16	11895	9.7	3.88	0.78	1.8	MC*OE
		Asian	18	16	4625	12.9	3.49	0.78	1.6	MC*OE
		Am. Indian	18	16	183	10.9	4.09	0.82	1.8	MC*OE
		Multi	18	16	3728	10.9	3.90	0.80	1.8	MC*OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	3669	20.6	8.52	0.88	3.0
A	All		28	26	3669	12.8	5.49	0.82	2.4	MC*OE
B	All		18	16	3669	7.8	3.52	0.72	1.9	MC*OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	18774	22.8	10.25	0.92	2.9
A	All		28	26	18774	14.2	6.57	0.88	2.3	MC*OE
B	All		18	16	18774	8.6	4.09	0.80	1.8	MC*OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	58437	27.0	9.52	0.91	2.9
A	All		28	26	58437	16.9	6.08	0.87	2.2	MC*OE
B	All		18	16	58437	10.1	3.85	0.78	1.8	MC*OE

Appendix Q: Reliabilities

Reading Grade 4

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	126491	34.7	10.19	0.91	3.1
A	All		36	32	126491	24.1	7.36	0.88	2.5	MC*OE
B	All		16	12	126491	10.6	3.30	0.72	1.7	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	64338	33.4	10.44	0.91	3.1
Female			52	44	62098	36.1	9.73	0.90	3.0	MC*OE
A		Male	36	32	64338	23.3	7.55	0.89	2.5	MC*OE
		Female	36	32	62098	24.9	7.07	0.88	2.5	MC*OE
B		Male	16	12	64338	10.1	3.36	0.73	1.7	MC*OE
		Female	16	12	62098	11.1	3.14	0.70	1.7	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	88363	36.6	9.26	0.90	3.0
Af. Amer.			52	44	18755	28.1	10.38	0.90	3.3	MC*OE
Hispanic			52	44	11396	29.5	10.38	0.90	3.2	MC*OE
Asian			52	44	4552	39.1	9.33	0.91	2.9	MC*OE
Am. Indian			52	44	183	34.4	9.46	0.90	3.1	MC*OE
Multi			52	44	3121	33.2	10.25	0.91	3.1	MC*OE
A		White	36	32	88363	25.5	6.70	0.87	2.4	MC*OE
		Af. Amer.	36	32	18755	19.3	7.46	0.87	2.7	MC*OE
		Hispanic	36	32	11396	20.4	7.49	0.87	2.7	MC*OE
		Asian	36	32	4552	27.1	6.73	0.88	2.4	MC*OE
		Am. Indian	36	32	183	23.9	6.81	0.86	2.5	MC*OE
		Multi	36	32	3121	23.0	7.44	0.88	2.6	MC*OE
B		White	16	12	88363	11.1	3.06	0.69	1.7	MC*OE
		Af. Amer.	16	12	18755	8.8	3.43	0.71	1.8	MC*OE
		Hispanic	16	12	11396	9.1	3.39	0.72	1.8	MC*OE
		Asian	16	12	4552	12.0	3.05	0.71	1.6	MC*OE
		Am. Indian	16	12	183	10.6	3.21	0.71	1.7	MC*OE
		Multi	16	12	3121	10.2	3.28	0.71	1.8	MC*OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	3012	22.1	8.68	0.85	3.4
A	All		36	32	3012	15.0	6.24	0.80	2.8	MC*OE
B	All		16	12	3012	7.1	3.08	0.63	1.9	MC*OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	19726	25.8	10.86	0.91	3.3
A	All		36	32	19726	17.8	7.87	0.88	2.7	MC*OE
B	All		16	12	19726	8.0	3.49	0.73	1.8	MC*OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	57297	30.4	10.29	0.90	3.2
A	All		36	32	57297	21.0	7.45	0.87	2.7	MC*OE
B	All		16	12	57297	9.4	3.35	0.71	1.8	MC*OE

Appendix Q: Reliabilities

Reading Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	125727	34.4	10.00	0.91	2.9
A	All		33	31	125727	22.8	6.54	0.88	2.3	MC*OE
B	All		19	13	125727	11.6	3.88	0.78	1.8	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	64509	33.2	10.28	0.92	2.9
Female			52	44	61160	35.6	9.53	0.91	2.9	MC*OE
A		Male	33	31	64509	22.1	6.78	0.89	2.3	MC*OE
		Female	33	31	61160	23.5	6.20	0.87	2.2	MC*OE
B		Male	19	13	64509	11.1	3.93	0.79	1.8	MC*OE
		Female	19	13	61160	12.1	3.76	0.77	1.8	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	88262	36.3	9.06	0.90	2.8
Af. Amer.			52	44	18907	27.8	10.17	0.90	3.2	MC*OE
Hispanic			52	44	11238	29.3	10.23	0.91	3.1	MC*OE
Asian			52	44	4417	38.0	9.24	0.91	2.8	MC*OE
Am. Indian			52	44	188	34.9	10.02	0.92	2.9	MC*OE
Multi			52	44	2615	32.7	10.15	0.91	3.0	MC*OE
A		White	33	31	88262	24.0	5.92	0.86	2.2	MC*OE
		Af. Amer.	33	31	18907	18.5	6.73	0.86	2.5	MC*OE
		Hispanic	33	31	11238	19.5	6.79	0.87	2.4	MC*OE
		Asian	33	31	4417	24.9	6.02	0.88	2.1	MC*OE
		Am. Indian	33	31	188	23.2	6.59	0.88	2.2	MC*OE
		Multi	33	31	2615	21.7	6.67	0.88	2.3	MC*OE
B		White	19	13	88262	12.3	3.59	0.75	1.8	MC*OE
		Af. Amer.	19	13	18907	9.3	3.91	0.76	1.9	MC*OE
		Hispanic	19	13	11238	9.8	3.89	0.77	1.9	MC*OE
		Asian	19	13	4417	13.1	3.63	0.77	1.8	MC*OE
		Am. Indian	19	13	188	11.7	3.79	0.76	1.9	MC*OE
		Multi	19	13	2615	11.0	3.91	0.77	1.9	MC*OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2665	20.8	8.20	0.85	3.2
A	All		33	31	2665	13.9	5.56	0.78	2.6	MC*OE
B	All		19	13	2665	7.0	3.22	0.65	1.9	MC*OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	19519	24.6	10.47	0.91	3.2
A	All		33	31	19519	16.5	7.02	0.87	2.5	MC*OE
B	All		19	13	19519	8.1	3.92	0.77	1.9	MC*OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	56279	30.2	10.19	0.91	3.1
A	All		33	31	56279	20.1	6.76	0.87	2.4	MC*OE
B	All		19	13	56279	10.1	3.89	0.77	1.9	MC*OE

Appendix Q: Reliabilities

Reading Grade 6

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	129305	34.7	9.39	0.90	2.9
A	All		28	26	129305	18.9	5.37	0.84	2.2	MC*OE
B	All		24	18	129305	15.8	4.45	0.80	2.0	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	66053	33.2	9.66	0.91	3.0
Female			52	44	63174	36.2	8.84	0.89	2.9	MC*OE
A		Male	28	26	66053	18.2	5.55	0.84	2.2	MC*OE
		Female	28	26	63174	19.6	5.07	0.83	2.1	MC*OE
B		Male	24	18	66053	15.0	4.54	0.81	2.0	MC*OE
		Female	24	18	63174	16.6	4.20	0.79	1.9	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	91652	36.3	8.53	0.89	2.9
Af. Amer.			52	44	19170	29.2	9.79	0.90	3.1	MC*OE
Hispanic			52	44	11457	29.6	9.99	0.90	3.1	MC*OE
Asian			52	44	4414	38.4	8.78	0.90	2.8	MC*OE
Am. Indian			52	44	189	32.6	10.24	0.92	3.0	MC*OE
Multi			52	44	2325	33.0	9.54	0.90	3.0	MC*OE
A		White	28	26	91652	19.8	4.93	0.82	2.1	MC*OE
		Af. Amer.	28	26	19170	15.9	5.58	0.83	2.3	MC*OE
		Hispanic	28	26	11457	16.1	5.67	0.84	2.3	MC*OE
		Asian	28	26	4414	20.9	5.02	0.84	2.0	MC*OE
		Am. Indian	28	26	189	17.8	5.84	0.86	2.2	MC*OE
		Multi	28	26	2325	18.0	5.47	0.84	2.2	MC*OE
B		White	24	18	91652	16.5	4.06	0.78	1.9	MC*OE
		Af. Amer.	24	18	19170	13.3	4.67	0.80	2.1	MC*OE
		Hispanic	24	18	11457	13.5	4.77	0.81	2.1	MC*OE
		Asian	24	18	4414	17.5	4.18	0.79	1.9	MC*OE
		Am. Indian	24	18	189	14.8	4.79	0.83	2.0	MC*OE
		Multi	24	18	2325	15.0	4.50	0.80	2.0	MC*OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2606	20.3	7.62	0.82	3.2
A	All		28	26	2606	11.0	4.32	0.69	2.4	MC*OE
B	All		24	18	2606	9.3	3.93	0.71	2.1	MC*OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	19896	24.7	9.65	0.89	3.2
A	All		28	26	19896	13.5	5.48	0.81	2.4	MC*OE
B	All		24	18	19896	11.2	4.66	0.80	2.1	MC*OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	56534	30.8	9.69	0.90	3.1
A	All		28	26	56534	16.8	5.54	0.83	2.3	MC*OE
B	All		24	18	56534	14.0	4.61	0.80	2.0	MC*OE

Appendix Q: Reliabilities

Reading Grade 7

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	131767	34.0	10.06	0.91	3.0
A	All		26	24	131767	17.7	5.30	0.85	2.1	MC*OE
B	All		26	20	131767	16.3	5.20	0.82	2.2	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	67447	32.5	10.33	0.91	3.0
Female			52	44	64203	35.5	9.53	0.90	3.0	MC*OE
A		Male	26	24	67447	17.0	5.47	0.85	2.1	MC*OE
		Female	26	24	64203	18.4	5.02	0.83	2.0	MC*OE
B		Male	26	20	67447	15.5	5.29	0.83	2.2	MC*OE
		Female	26	20	64203	17.2	4.96	0.81	2.2	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	94207	35.8	9.24	0.90	3.0
Af. Amer.			52	44	19429	27.7	10.09	0.90	3.2	MC*OE
Hispanic			52	44	11026	28.5	10.31	0.91	3.2	MC*OE
Asian			52	44	4393	37.9	9.42	0.91	2.9	MC*OE
Am. Indian			52	44	193	31.9	10.13	0.91	3.1	MC*OE
Multi			52	44	2371	32.3	10.16	0.91	3.1	MC*OE
A		White	26	24	94207	18.7	4.83	0.82	2.0	MC*OE
		Af. Amer.	26	24	19429	14.3	5.36	0.82	2.3	MC*OE
		Hispanic	26	24	11026	14.8	5.51	0.84	2.2	MC*OE
		Asian	26	24	4393	19.3	4.96	0.84	2.0	MC*OE
		Am. Indian	26	24	193	16.8	5.26	0.83	2.2	MC*OE
		Multi	26	24	2371	16.8	5.41	0.84	2.1	MC*OE
B		White	26	20	94207	17.1	4.87	0.80	2.2	MC*OE
		Af. Amer.	26	20	19429	13.4	5.21	0.81	2.3	MC*OE
		Hispanic	26	20	11026	13.7	5.25	0.82	2.3	MC*OE
		Asian	26	20	4393	18.6	4.89	0.82	2.1	MC*OE
		Am. Indian	26	20	193	15.1	5.35	0.83	2.2	MC*OE
		Multi	26	20	2371	15.5	5.23	0.82	2.2	MC*OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2627	19.8	7.64	0.82	3.3
A	All		26	24	2627	10.1	4.35	0.71	2.3	MC*OE
B	All		26	20	2627	9.7	3.94	0.67	2.3	MC*OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	19954	23.3	9.81	0.89	3.2
A	All		26	24	19954	12.3	5.39	0.82	2.3	MC*OE
B	All		26	20	19954	11.0	4.91	0.79	2.2	MC*OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	56022	29.5	10.15	0.90	3.2
A	All		26	24	56022	15.4	5.45	0.84	2.2	MC*OE
B	All		26	20	56022	14.1	5.18	0.81	2.3	MC*OE

Appendix Q: Reliabilities

Reading Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	131006	33.3	9.90	0.91	3.0
A	All		21	19	131006	13.1	4.40	0.81	1.9	MC*OE
B	All		31	25	131006	20.2	5.94	0.84	2.4	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	67065	31.7	10.16	0.91	3.1
Female			52	44	63840	35.0	9.32	0.90	3.0	MC*OE
A		Male	21	19	67065	12.5	4.48	0.82	1.9	MC*OE
		Female	21	19	63840	13.7	4.23	0.80	1.9	MC*OE
B		Male	31	25	67065	19.1	6.12	0.85	2.4	MC*OE
		Female	31	25	63840	21.3	5.54	0.83	2.3	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	94143	34.9	9.18	0.90	3.0
Af. Amer.			52	44	19296	27.6	9.82	0.89	3.2	MC*OE
Hispanic			52	44	11019	28.0	10.25	0.90	3.2	MC*OE
Asian			52	44	4108	37.8	9.41	0.91	2.8	MC*OE
Am. Indian			52	44	201	30.7	9.44	0.89	3.2	MC*OE
Multi			52	44	2115	31.7	9.97	0.90	3.1	MC*OE
A		White	21	19	94143	13.8	4.13	0.79	1.9	MC*OE
		Af. Amer.	21	19	19296	10.6	4.24	0.77	2.0	MC*OE
		Hispanic	21	19	11019	10.8	4.44	0.80	2.0	MC*OE
		Asian	21	19	4108	15.0	4.27	0.83	1.8	MC*OE
		Am. Indian	21	19	201	11.9	4.29	0.79	2.0	MC*OE
		Multi	21	19	2115	12.4	4.38	0.80	1.9	MC*OE
B		White	31	25	94143	21.1	5.50	0.82	2.3	MC*OE
		Af. Amer.	31	25	19296	17.0	6.09	0.83	2.5	MC*OE
		Hispanic	31	25	11019	17.2	6.28	0.84	2.5	MC*OE
		Asian	31	25	4108	22.9	5.54	0.84	2.2	MC*OE
		Am. Indian	31	25	201	18.8	5.69	0.81	2.5	MC*OE
		Multi	31	25	2115	19.3	6.05	0.84	2.4	MC*OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2679	19.6	7.32	0.80	3.3
A	All		21	19	2679	7.3	3.06	0.55	2.0	MC*OE
B	All		31	25	2679	12.2	4.96	0.73	2.6	MC*OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	19734	22.6	9.25	0.88	3.2
A	All		21	19	19734	8.7	3.97	0.74	2.0	MC*OE
B	All		31	25	19734	13.8	5.82	0.81	2.5	MC*OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	54456	28.9	9.93	0.90	3.2
A	All		21	19	54456	11.2	4.34	0.79	2.0	MC*OE
B	All		31	25	54456	17.7	6.08	0.83	2.5	MC*OE

Appendix Q: Reliabilities

Science Grade 4

		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Overall	Tot.	All		68	63	126729	45.5	13.20	0.93	3.5	MC*OE
	A	All		32	30	126729	21.5	6.75	0.88	2.4	MC*OE
	B	All		12	10	126729	8.2	2.65	0.72	1.4	MC*OE
	C	All		12	11	126729	8.0	2.54	0.66	1.5	MC*OE
	D	All		12	12	126729	7.8	2.55	0.67	1.5	MC
		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Gender	Tot.	Male		68	63	64484	45.4	13.61	0.94	3.5	MC*OE
		Female		68	63	62189	45.6	12.76	0.93	3.5	MC*OE
	A	Male		32	30	64484	21.4	6.93	0.88	2.4	MC*OE
		Female		32	30	62189	21.6	6.55	0.87	2.4	MC*OE
	B	Male		12	10	64484	8.2	2.69	0.73	1.4	MC*OE
		Female		12	10	62189	8.3	2.60	0.70	1.4	MC*OE
	C	Male		12	11	64484	8.0	2.60	0.68	1.5	MC*OE
		Female		12	11	62189	8.0	2.48	0.64	1.5	MC*OE
	D	Male		12	12	64484	7.8	2.63	0.69	1.5	MC
		Female		12	12	62189	7.8	2.47	0.65	1.5	MC
		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Ethnicity	Tot.	White		68	63	88248	48.8	11.44	0.91	3.4	MC*OE
		Af. Amer.		68	63	18784	34.7	12.87	0.92	3.7	MC*OE
		Hispanic		68	63	11609	37.0	13.07	0.92	3.7	MC*OE
		Asian		68	63	4665	49.2	12.67	0.93	3.3	MC*OE
		Am. Indian		68	63	182	45.8	11.93	0.91	3.5	MC*OE
		Multi		68	63	3127	42.7	13.08	0.93	3.6	MC*OE
	A	White		32	30	88248	23.1	5.94	0.85	2.3	MC*OE
		Af. Amer.		32	30	18784	16.2	6.57	0.85	2.6	MC*OE
		Hispanic		32	30	11609	17.3	6.70	0.86	2.6	MC*OE
		Asian		32	30	4665	23.4	6.48	0.88	2.3	MC*OE
		Am. Indian		32	30	182	21.4	6.41	0.86	2.4	MC*OE
		Multi		32	30	3127	20.1	6.69	0.86	2.5	MC*OE
	B	White		12	10	88248	8.8	2.30	0.65	1.4	MC*OE
		Af. Amer.		12	10	18784	6.3	2.80	0.71	1.5	MC*OE
		Hispanic		12	10	11609	6.7	2.80	0.71	1.5	MC*OE
		Asian		12	10	4665	8.8	2.55	0.72	1.3	MC*OE
		Am. Indian		12	10	182	8.4	2.33	0.62	1.4	MC*OE
		Multi		12	10	3127	7.8	2.66	0.70	1.5	MC*OE
	C	White		12	11	88248	8.5	2.28	0.60	1.4	MC*OE
		Af. Amer.		12	11	18784	6.1	2.52	0.61	1.6	MC*OE
		Hispanic		12	11	11609	6.5	2.54	0.62	1.6	MC*OE
		Asian		12	11	4665	8.6	2.45	0.66	1.4	MC*OE
		Am. Indian		12	11	182	8.3	2.35	0.60	1.5	MC*OE
		Multi		12	11	3127	7.5	2.52	0.64	1.5	MC*OE
D	White		12	12	88248	8.3	2.32	0.63	1.4	MC	
	Af. Amer.		12	12	18784	6.0	2.48	0.60	1.6	MC	
	Hispanic		12	12	11609	6.4	2.50	0.62	1.5	MC	
	Asian		12	12	4665	8.4	2.39	0.66	1.4	MC	
	Am. Indian		12	12	182	7.7	2.41	0.63	1.5	MC	
	Multi		12	12	3127	7.3	2.54	0.65	1.5	MC	

Appendix Q: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	68	63	3460	28.2	10.98	0.88	3.8	MC*OE
	A	All	32	30	3460	13.1	5.64	0.79	2.6	MC*OE
	B	All	12	10	3460	5.0	2.55	0.63	1.5	MC*OE
	C	All	12	11	3460	5.1	2.34	0.53	1.6	MC*OE
	D	All	12	12	3460	5.1	2.22	0.49	1.6	MC
IEP	Tot.	All	68	63	19734	36.2	14.14	0.93	3.7	MC*OE
	A	All	32	30	19734	16.8	7.20	0.87	2.6	MC*OE
	B	All	12	10	19734	6.6	2.94	0.74	1.5	MC*OE
	C	All	12	11	19734	6.5	2.72	0.67	1.6	MC*OE
	D	All	12	12	19734	6.3	2.65	0.66	1.5	MC
Eco. Disadv.	Tot.	All	68	63	57544	39.3	13.25	0.92	3.7	MC*OE
	A	All	32	30	57544	18.4	6.78	0.86	2.5	MC*OE
	B	All	12	10	57544	7.2	2.78	0.71	1.5	MC*OE
	C	All	12	11	57544	6.9	2.57	0.63	1.6	MC*OE
	D	All	12	12	57544	6.8	2.54	0.64	1.5	MC

Appendix Q: Reliabilities

Science Grade 8

		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Overall	Tot.	All		68	63	130637	44.0	13.52	0.93	3.5	MC*OE
	A	All		33	31	130637	21.6	6.54	0.86	2.4	MC*OE
	B	All		12	10	130637	7.9	2.71	0.71	1.5	MC*OE
	C	All		11	11	130637	6.7	2.69	0.72	1.4	MC
	D	All		12	11	130637	7.9	2.90	0.75	1.5	MC*OE
		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Gender	Tot.	Male		68	63	66913	44.4	14.19	0.94	3.5	MC*OE
		Female		68	63	63624	43.7	12.76	0.92	3.5	MC*OE
	A	Male		33	31	66913	21.6	6.89	0.88	2.4	MC*OE
		Female		33	31	63624	21.5	6.13	0.84	2.4	MC*OE
	B	Male		12	10	66913	7.9	2.79	0.73	1.5	MC*OE
		Female		12	10	63624	7.9	2.61	0.70	1.4	MC*OE
	C	Male		11	11	66913	7.0	2.75	0.74	1.4	MC
		Female		11	11	63624	6.5	2.61	0.69	1.5	MC
	D	Male		12	11	66913	8.0	2.98	0.77	1.4	MC*OE
		Female		12	11	63624	7.8	2.81	0.72	1.5	MC*OE
		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Ethnicity	Tot.	White		68	63	93659	47.1	12.05	0.92	3.4	MC*OE
		Af. Amer.		68	63	19202	33.6	12.71	0.91	3.8	MC*OE
		Hispanic		68	63	11151	35.2	13.48	0.92	3.7	MC*OE
		Asian		68	63	4214	48.4	13.09	0.94	3.3	MC*OE
		Am. Indian		68	63	203	40.6	13.11	0.92	3.7	MC*OE
		Multi		68	63	2091	41.5	13.59	0.93	3.6	MC*OE
	A	White		33	31	93659	22.9	5.91	0.84	2.4	MC*OE
		Af. Amer.		33	31	19202	16.9	6.31	0.83	2.6	MC*OE
		Hispanic		33	31	11151	17.6	6.62	0.85	2.6	MC*OE
		Asian		33	31	4214	23.9	6.20	0.87	2.3	MC*OE
		Am. Indian		33	31	203	19.8	6.42	0.84	2.5	MC*OE
		Multi		33	31	2091	20.4	6.62	0.86	2.5	MC*OE
	B	White		12	10	93659	8.4	2.42	0.67	1.4	MC*OE
		Af. Amer.		12	10	19202	6.1	2.73	0.66	1.6	MC*OE
		Hispanic		12	10	11151	6.3	2.85	0.69	1.6	MC*OE
		Asian		12	10	4214	8.4	2.69	0.74	1.4	MC*OE
		Am. Indian		12	10	203	7.3	2.61	0.65	1.5	MC*OE
		Multi		12	10	2091	7.5	2.73	0.70	1.5	MC*OE
	C	White		11	11	93659	7.3	2.48	0.68	1.4	MC
		Af. Amer.		11	11	19202	4.8	2.41	0.61	1.5	MC
		Hispanic		11	11	11151	5.1	2.54	0.65	1.5	MC
		Asian		11	11	4214	7.4	2.69	0.75	1.4	MC
		Am. Indian		11	11	203	6.2	2.62	0.68	1.5	MC
		Multi		11	11	2091	6.2	2.70	0.71	1.5	MC
D	White		12	11	93659	8.5	2.62	0.71	1.4	MC*OE	
	Af. Amer.		12	11	19202	5.8	2.87	0.70	1.6	MC*OE	
	Hispanic		12	11	11151	6.2	2.98	0.73	1.6	MC*OE	
	Asian		12	11	4214	8.6	2.75	0.75	1.4	MC*OE	
	Am. Indian		12	11	203	7.3	2.90	0.72	1.5	MC*OE	
	Multi		12	11	2091	7.4	2.92	0.74	1.5	MC*OE	

Appendix Q: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	68	63	3054	25.4	9.51	0.84	3.8	MC*OE
	A	All	33	31	3054	13.1	5.15	0.73	2.7	MC*OE
	B	All	12	10	3054	4.3	2.22	0.48	1.6	MC*OE
	C	All	11	11	3054	3.8	1.95	0.40	1.5	MC
	D	All	12	11	3054	4.3	2.28	0.55	1.5	MC*OE
	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	68	63	19583	31.4	13.00	0.92	3.8	MC*OE
	A	All	33	31	19583	15.4	6.37	0.83	2.6	MC*OE
	B	All	12	10	19583	5.7	2.79	0.67	1.6	MC*OE
	C	All	11	11	19583	4.9	2.49	0.64	1.5	MC
	D	All	12	11	19583	5.5	2.89	0.72	1.5	MC*OE
	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	68	63	54325	37.5	13.51	0.93	3.7	MC*OE
	A	All	33	31	54325	18.6	6.59	0.85	2.6	MC*OE
	B	All	12	10	54325	6.8	2.80	0.69	1.6	MC*OE
	C	All	11	11	54325	5.6	2.61	0.68	1.5	MC
	D	All	12	11	54325	6.6	2.97	0.73	1.5	MC*OE

Appendix Q: Reliabilities

Writing Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	124041	65.6	13.93	0.77	6.7
A	All		80	2	124041	51.8	11.31	0.67	6.5	OE
B	All		20	14	124041	13.8	3.27	0.78	1.5	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	100	16	63351	62.5	13.85	0.77	6.6
Female			100	16	60659	68.9	13.24	0.74	6.7	MC*OE
A		Male	80	2	63351	49.3	11.20	0.67	6.4	OE
		Female	80	2	60659	54.5	10.80	0.64	6.5	OE
B		Male	20	14	63351	13.2	3.34	0.78	1.6	MC*OE
		Female	20	14	60659	14.4	3.08	0.76	1.5	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	100	16	87393	67.6	13.39	0.75	6.7
Af. Amer.			100	16	18453	58.5	13.18	0.75	6.6	MC*OE
Hispanic			100	16	11016	59.9	13.53	0.77	6.5	MC*OE
Asian			100	16	4368	71.4	13.74	0.77	6.6	MC*OE
Am. Indian			100	16	184	65.1	13.81	0.78	6.5	MC*OE
Multi			100	16	2558	63.9	14.01	0.77	6.7	MC*OE
A		White	80	2	87393	53.3	11.03	0.65	6.5	OE
		Af. Amer.	80	2	18453	46.7	10.57	0.64	6.3	OE
		Hispanic	80	2	11016	47.7	10.91	0.66	6.3	OE
		Asian	80	2	4368	56.4	11.24	0.67	6.5	OE
		Am. Indian	80	2	184	51.3	10.94	0.67	6.3	OE
		Multi	80	2	2558	50.5	11.36	0.67	6.6	OE
B		White	20	14	87393	14.3	3.00	0.75	1.5	MC*OE
		Af. Amer.	20	14	18453	11.8	3.37	0.76	1.7	MC*OE
		Hispanic	20	14	11016	12.2	3.35	0.76	1.6	MC*OE
		Asian	20	14	4368	15.0	3.05	0.78	1.4	MC*OE
		Am. Indian	20	14	184	13.8	3.45	0.81	1.5	MC*OE
		Multi	20	14	2558	13.4	3.32	0.78	1.6	MC*OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	2515	51.2	12.81	0.75	6.4
A	All		80	2	2515	41.5	10.45	0.65	6.2	OE
B	All		20	14	2515	9.7	3.12	0.69	1.7	MC*OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	18804	53.7	14.26	0.79	6.6
A	All		80	2	18804	43.0	11.45	0.69	6.3	OE
B	All		20	14	18804	10.7	3.57	0.78	1.7	MC*OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	55142	60.3	13.45	0.76	6.6
A	All		80	2	55142	47.9	10.86	0.65	6.4	OE
B	All		20	14	55142	12.4	3.33	0.76	1.6	MC*OE

Appendix Q: Reliabilities

Writing Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	129823	66.6	14.49	0.81	6.3
A	All		80	2	129823	53.0	11.94	0.74	6.1	OE
B	All		20	14	129823	13.6	3.19	0.77	1.5	MC*OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	100	16	66223	63.5	14.67	0.81	6.3
Female			100	16	63518	69.9	13.53	0.79	6.3	MC*OE
A		Male	80	2	66223	50.4	12.06	0.74	6.1	OE
		Female	80	2	63518	55.8	11.17	0.70	6.1	OE
B		Male	20	14	66223	13.1	3.27	0.77	1.6	MC*OE
		Female	20	14	63518	14.2	3.00	0.75	1.5	MC*OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	100	16	93510	68.8	13.67	0.79	6.3
Af. Amer.			100	16	19060	59.2	14.16	0.80	6.3	MC*OE
Hispanic			100	16	10796	59.2	14.70	0.82	6.3	MC*OE
Asian			100	16	4071	73.0	14.38	0.80	6.4	MC*OE
Am. Indian			100	16	202	62.7	14.03	0.83	5.8	MC*OE
Multi			100	16	2085	63.9	14.50	0.79	6.6	MC*OE
A		White	80	2	93510	54.7	11.36	0.71	6.1	OE
		Af. Amer.	80	2	19060	47.4	11.72	0.73	6.1	OE
		Hispanic	80	2	10796	47.3	12.10	0.75	6.1	OE
		Asian	80	2	4071	58.1	11.84	0.72	6.2	OE
		Am. Indian	80	2	202	49.7	11.56	0.77	5.6	OE
		Multi	80	2	2085	50.9	11.95	0.71	6.5	OE
B		White	20	14	93510	14.1	2.96	0.74	1.5	MC*OE
		Af. Amer.	20	14	19060	11.8	3.16	0.73	1.6	MC*OE
		Hispanic	20	14	10796	11.8	3.28	0.75	1.6	MC*OE
		Asian	20	14	4071	15.0	3.10	0.78	1.4	MC*OE
		Am. Indian	20	14	202	13.0	3.18	0.76	1.5	MC*OE
		Multi	20	14	2085	13.0	3.23	0.76	1.6	MC*OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	2540	49.3	13.07	0.76	6.4
A	All		80	2	2540	40.1	11.11	0.69	6.2	OE
B	All		20	14	2540	9.2	2.72	0.61	1.7	MC*OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	19221	52.8	14.40	0.80	6.5
A	All		80	2	19221	42.5	11.96	0.73	6.2	OE
B	All		20	14	19221	10.3	3.21	0.73	1.7	MC*OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	53649	60.7	14.29	0.80	6.4
A	All		80	2	53649	48.4	11.80	0.73	6.2	OE
B	All		20	14	53649	12.2	3.21	0.75	1.6	MC*OE

Appendix R:
Historical Statistics

Appendix R: Historical Statistics

		2005	2006	2007	2008	2009	2010	2011	2012	2013												
Mathematics Grade 3	Raw Score	Mean	-	-	54.98	55.00	60.02	60.32	59.45	57.33	56.80	Raw Score	Mean	-	45.08	43.61	44.28	47.22	49.11	48.92	48.78	48.81
		SD	-	-	9.66	9.91	10.63	9.97	10.81	12.11	12.55		SD	-	12.66	12.41	13.25	14.51	12.95	13.25	13.67	14.29
		Max	-	-	66	66	72	72	72	72	72		Max	-	66	66	66	66	72	72	72	72
	Scaled Score	Mean	-	-	1314.5	1332.9	1333.0	1341.0	1345.7	1330.2	1317.2	Scaled Score	Mean	-	1403.0	1416.7	1445.3	1456.6	1469.6	1476.9	1475.7	1448.0
		SD	-	-	176.6	184.7	176.0	164.7	176.6	185.0	187.6		SD	-	220.6	221.0	243.0	234.0	222.4	221.6	237.7	254.6
		Max	-	-	1765	1827	1814	1816	1832	1843	1859		Max	-	2282	2348	2370	2405	2446	2467	2482	2455
	Raw Cuts	Bel. Basic/Basic	-	-	37	36	38	38	37	35	35	Raw Cuts	Bel. Basic/Basic	-	29	28	27	26	28	27	28	31
		Basic/Prof.	-	-	50	49	53	52	51	49	50		Basic/Prof.	-	36	34	33	33	35	34	35	38
		Prof./Adv.	-	-	61	60	65	65	64	63	64		Prof./Adv.	-	50	47	47	49	50	50	50	52
	Theta Cuts	Bel. Basic/Basic	-	-	0.6369	0.6397	0.6171	0.6277	0.6410	0.6440	0.6124	Theta Cuts	Bel. Basic/Basic	-	-0.1359	-0.1029	-0.0871	-0.1178	-0.1150	-0.0872	-0.0802	-0.1017
		Basic/Prof.	-	-	1.7479	1.7081	1.7404	1.7186	1.7186	1.6906	1.7345		Basic/Prof.	-	0.3124	0.3496	0.3348	0.3321	0.3378	0.3446	0.3611	0.3537
		Prof./Adv.	-	-	3.3362	3.2408	3.1592	3.2516	3.2193	3.1710	3.2655		Prof./Adv.	-	1.3089	1.3315	1.3437	1.3204	1.3175	1.3544	1.3427	1.3609
Impact %	Bel. Basic	-	-	6.1	6.0	5.2	4.2	5.1	6.6	7.7	Impact %	Bel. Basic	-	12.6	12.7	12.3	9.4	7.0	7.1	8.7	13.4	
	Basic	-	-	15.4	13.5	13.1	11.3	11.4	13.3	15.1		Basic	-	10.1	9.3	8.2	8.8	8.1	7.6	8.6	9.1	
	Proficient	-	-	44.2	38.0	38.1	41.1	37.3	36.4	38.9		Proficient	-	33.7	31.1	29.6	30.6	30.9	31.0	29.2	27.6	
	Advanced	-	-	34.3	42.5	43.6	43.4	46.2	43.6	38.3		Advanced	-	43.5	46.9	50.0	51.2	54.0	54.2	53.4	49.9	
	Prof. + Adv.	-	-	78.5	80.5	81.7	84.5	83.5	80.0	77.2		Prof. + Adv.	-	77.3	78.0	79.5	81.8	84.8	85.2	82.7	77.5	
Demographic	N Count	-	-	125533	126552	127268	126676	124749	126139	126734	Demographic	N Count	-	127959	126154	126414	127601	126333	125604	122526	126550	
	% City	-	-	11.4	11.2	10.9	10.8	10.6	10.5	10.2		% City	-	11.6	11.3	11.0	10.9	10.6	10.2	10.2	10.0	
	% White	-	-	73.1	72.8	72.5	71.5	70.8	70.0	69.1		% White	-	74.5	73.6	73.0	72.5	72.2	71.5	70.6	69.8	
	% Black	-	-	15.8	15.8	15.5	15.5	15.4	15.1	14.7		% Black	-	15.4	15.7	15.7	15.6	15.3	15.1	15.0	14.8	
	% Hispanic	-	-	7.2	7.5	7.6	8.1	8.5	8.8	9.4		% Hispanic	-	6.4	6.9	7.5	7.6	7.7	8.3	8.7	9.0	

		2005	2006	2007	2008	2009	2010	2011	2012	2013												
Mathematics Grade 5	Raw Score	Mean	47.21	44.71	43.81	43.39	46.20	48.59	47.54	47.28	46.32	Raw Score	Mean	-	42.44	44.66	42.96	47.90	49.42	49.33	48.65	48.55
		SD	12.31	12.99	12.45	14.08	14.57	13.60	13.17	13.52	13.82		SD	-	13.07	11.81	13.85	14.36	13.68	13.92	13.11	14.35
		Max	66	66	66	66	72	72	72	72	72		Max	-	66	66	66	66	72	72	72	72
	Scaled Score	Mean	1419.3	1424.0	1427.6	1453.1	1451.9	1477.1	1474.1	1462.5	1428.2	Scaled Score	Mean	-	1400.2	1421.1	1457.4	1469.9	1493.4	1499.2	1485.9	1467.2
		SD	223.8	238.1	226.7	234.2	226.2	236.3	222.2	235.2	227.3		SD	-	227.7	233.6	253.5	240.2	245.0	248.0	240.2	259.9
		Max	2272	2292	2476	2329	2409	2432	2470	2455	2430		Max	-	2345	2369	2453	2415	2447	2476	2580	2595
	Raw Cuts	Bel. Basic/Basic	31	29	28	23	25	28	27	28	29	Raw Cuts	Bel. Basic/Basic	-	28	31	26	28	29	29	29	31
		Basic/Prof.	43	40	38	35	37	40	38	39	40		Basic/Prof.	-	37	39	35	38	39	38	39	40
		Prof./Adv.	54	51	49	48	51	52	51	51	52		Prof./Adv.	-	49	50	47	51	51	51	51	53
	Theta Cuts	Bel. Basic/Basic	-	0.1924	0.1886	0.1398	0.1286	0.1494	0.1911	0.1526	0.1796	Theta Cuts	Bel. Basic/Basic	-	-0.1366	-0.1292	-0.0912	-0.1288	-0.1237	-0.0971	-0.1424	-0.0804
		Basic/Prof.	-	0.9868	0.9326	0.9407	0.9367	0.9992	0.9477	0.9473	0.9442		Basic/Prof.	-	0.4823	0.5116	0.5200	0.5206	0.5324	0.4855	0.5263	0.5027
		Prof./Adv.	-	1.8626	1.8384	1.8360	1.8797	1.9071	1.9015	1.8719	1.8610		Prof./Adv.	-	1.3721	1.4429	1.4008	1.4040	1.3791	1.4047	1.4132	1.4465
Impact %	Bel. Basic	11.9	13.4	12.1	10.4	9.6	8.8	7.7	9.5	12.7	Impact %	Bel. Basic	-	15.8	14.4	14.1	11.1	9.4	10.1	9.0	13.8	
	Basic	19.1	19.8	17.0	16.4	16.9	16.8	16.0	17.3	18.0		Basic	-	16.2	15.9	13.6	13.2	12.6	11.0	13.8	12.6	
	Proficient	30.9	28.0	29.5	27.5	29.2	26.8	30.1	27.5	27.9		Proficient	-	30.2	30.0	25.5	26.2	24.7	25.0	26.7	27.1	
	Advanced	38.1	38.9	41.5	45.7	44.3	47.6	46.2	45.8	41.4		Advanced	-	37.8	39.6	46.8	49.5	53.3	53.8	50.5	46.5	
	Prof. + Adv.	69.0	66.9	71.0	73.2	73.5	74.4	76.3	73.2	69.2		Prof. + Adv.	-	68.0	69.6	72.3	75.7	78.0	78.9	77.2	73.6	
Demographic	N Count	134322	131702	129781	127324	127544	126419	126578	124973	125790	Demographic	N Count	-	136186	133610	130851	128421	126288	126630	126661	129366	
	% City	12.3	11.6	11.0	10.8	10.6	10.6	9.7	9.5	9.3		% City	-	11.4	10.8	10.3	10.2	10.2	9.7	9.0	8.6	
	% White	74.4	74.7	74.2	73.4	72.9	72.3	72.2	71.3	70.2		% White	-	74.5	74.5	74.2	73.3	72.8	72.2	72.1	70.9	
	% Black	16.3	15.6	15.4	15.6	15.5	15.5	15.0	14.8	15.0		% Black	-	16.1	15.6	15.3	15.4	15.2	15.2	15.2	14.7	14.8
	% Hispanic	6.0	6.3	6.7	7.2	7.5	7.8	7.9	8.6	8.9		% Hispanic	-	6.2	6.5	6.9	7.3	7.6	8.0	8.1	8.9	

Appendix R: Historical Statistics

Mathematics Grade 7											Mathematics Grade 8											
	2005	2006	2007	2008	2009	2010	2011	2012	2013		2005	2006	2007	2008	2009	2010	2011	2012	2013			
Mathematics Grade 7	Raw Score	Mean	-	39.77	40.54	41.58	45.62	47.88	47.81	48.19	47.20	Raw Score	Mean	43.97	42.33	42.62	44.17	47.17	49.33	49.21	49.32	48.35
		SD	-	13.38	13.23	13.41	14.57	14.61	14.13	13.84	14.64		SD	13.69	13.71	13.70	13.54	14.84	14.53	14.17	13.99	14.40
		Max	-	66	66	66	72	72	72	72	72		Max	66	66	66	66	72	72	72	72	72
	Scaled Score	Mean	-	1393.3	1419.2	1442.7	1464.2	1500.0	1503.8	1499.9	1497.1	Scaled Score	Mean	1369.2	1368.7	1393.5	1406.3	1419.8	1450.7	1448.7	1446.1	1425.8
		SD	-	221.7	248.5	236.7	233.4	254.7	249.7	239.8	267.3		SD	222.2	222.5	222.3	221.0	220.3	236.9	225.4	223.0	221.7
		Max	-	2343	2487	2407	2450	2475	2545	2548	2566		Max	2240	2225	2259	2270	2286	2314	2310	2301	2288
	Raw Cuts	Bel. Basic/Basic	-	26	27	26	26	28	28	27	28	Raw Cuts	Bel. Basic/Basic	31	29	28	29	28	30	30	30	30
		Basic/Prof.	-	34	35	34	35	36	36	36	36		Basic/Prof.	41	39	37	38	39	40	39	40	40
		Prof./Adv.	-	46	46	46	49	49	49	49	49		Prof./Adv.	52	50	49	50	52	52	52	52	53
	Theta Cuts	Bel. Basic/Basic	-	-0.2123	-0.2114	-0.1486	-0.2145	-0.1565	-0.1500	-0.2106	-0.1715	Theta Cuts	Bel. Basic/Basic	-	-0.0514	-0.0174	-0.0046	-0.0649	-0.0609	-0.0168	-0.0559	-0.0349
		Basic/Prof.	-	0.3636	0.4076	0.4271	0.3755	0.3673	0.3885	0.3655	0.3661		Basic/Prof.	-	0.6355	0.6341	0.6221	0.6285	0.6122	0.5777	0.6189	0.6203
		Prof./Adv.	-	1.2351	1.3170	1.2916	1.2920	1.2552	1.2924	1.2310	1.2871		Prof./Adv.	-	1.4907	1.5493	1.5535	1.4991	1.5042	1.5154	1.5031	1.5409
	Impact %	Bel. Basic	-	17.3	17.8	14.9	11.6	11.7	10.8	9.2	12.3	Impact %	Bel. Basic	19.3	18.9	16.9	16.0	12.8	12.0	11.4	11.4	12.9
		Basic	-	16.3	15.0	14.5	13.1	10.3	10.6	10.8	10.9		Basic	17.8	18.9	15.2	13.7	16.0	12.8	11.7	12.2	13.1
		Proficient	-	29.3	26.2	26.8	27.8	23.6	24.9	24.7	24.9		Proficient	26.5	26.1	27.6	27.7	26.6	24.1	26.7	25.0	28.4
		Advanced	-	37.2	41.0	43.8	47.5	54.3	53.7	55.4	51.9		Advanced	36.4	36.1	40.3	42.6	44.7	51.1	50.2	51.4	45.7
		Prof. + Adv.	-	66.4	67.2	70.6	75.3	78.0	78.6	80.0	76.8		Prof. + Adv.	62.9	62.2	67.9	70.3	71.2	75.1	76.9	76.5	74.0
	Demographic	N Count	-	141300	138838	135807	132803	127685	126993	127152	131842	Demographic	N Count	145999	143749	141451	138582	135909	129983	126786	126204	131143
% City		-	10.9	10.7	10.0	9.7	9.6	9.2	8.6	8.0	% City		11.1	11.0	10.6	10.3	9.8	9.5	9.1	8.7	8.0	
% White		-	75.1	74.3	74.4	74.1	73.3	72.7	72.1	71.5	% White		76.8	75.9	75.0	74.5	74.4	74.1	73.3	72.6	71.8	
% Black		-	15.8	15.9	15.4	15.1	15.1	14.8	14.9	14.8	% Black		15.0	15.4	15.7	15.6	15.0	14.7	14.8	14.5	14.7	
% Hispanic		-	6.0	6.4	6.7	7.0	7.4	7.9	8.2	8.4	% Hispanic		5.3	5.6	6.2	6.5	6.9	7.0	7.6	8.1	8.4	

Mathematics Grade 11										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Raw Score	Mean	39.89	43.39	40.95	42.00	45.97	47.62	47.99	45.57	-
	SD	15.17	14.24	14.25	14.33	15.50	15.23	14.56	14.73	-
	Max	66	66	66	66	72	72	72	72	-
Scaled Score	Mean	1338.1	1342.5	1332.8	1343.8	1345.4	1372.2	1379.0	1375.8	-
	SD	288.3	292.5	253.3	267.3	259.9	276.0	264.0	267.0	-
	Max	2440	2398	2349	2342	2347	2377	2425	2587	-
Raw Cuts	Bel. Basic/Basic	31	36	31	33	35	37	36	34	-
	Basic/Prof.	41	45	41	42	46	46	46	43	-
	Prof./Adv.	53	55	54	54	59	58	59	56	-
Theta Cuts	Bel. Basic/Basic	-	-0.1182	-0.1546	-0.1113	-0.1731	-0.1149	-0.1601	-0.1157	-
	Basic/Prof.	-	0.5620	0.5150	0.5254	0.5272	0.4987	0.4983	0.4933	-
	Prof./Adv.	-	1.5382	1.5344	1.5474	1.5417	1.4788	1.5722	1.4957	-
Impact %	Bel. Basic	30.5	30.4	26.6	26.6	24.9	24.8	21.6	23.2	-
	Basic	18.7	17.7	19.8	17.6	19.5	15.6	18.0	16.8	-
	Proficient	24.6	23.9	29.5	30.0	29.9	27.6	31.5	29.6	-
	Advanced	26.3	28.1	24.2	25.9	25.7	32.0	28.8	30.4	-
	Prof. + Adv.	50.8	51.9	53.7	55.9	55.7	59.6	60.4	60.0	-
Demographic	N Count	129962	132666	135632	135137	133952	129910	127797	125113	-
	% City	9.3	8.5	8.2	7.8	8.4	8.2	8.2	7.5	-
	% White	80.5	80.5	79.5	79.1	77.8	76.6	75.9	75.5	-
	% Black	12.1	12.2	12.6	12.7	13.5	13.7	13.9	13.4	-
	% Hispanic	3.8	4.0	4.5	5.0	5.3	5.8	6.2	6.6	-

Appendix R: Historical Statistics

		2005	2006	2007	2008	2009	2010	2011	2012	2013			2005	2006	2007	2008	2009	2010	2011	2012	2013	
Reading Grade 3	Raw Score	Mean	-	-	30.18	30.64	30.82	30.64	31.11	30.81	30.91	Raw Score	Mean	-	33.10	31.74	33.93	34.07	34.97	35.41	35.30	34.70
		SD	-	-	9.43	8.87	8.80	9.09	8.87	8.98	9.34		SD	-	9.92	9.63	9.82	10.15	9.98	9.26	9.59	10.19
		Max	-	-	46	46	46	46	46	46	46		46	Max	-	52	52	52	52	52	52	52
	Scaled Score	Mean	-	-	1330.8	1334.8	1342.1	1350.2	1346.5	1332.8	1335.8	Scaled Score	Mean	-	1339.3	1349.2	1366.6	1375.5	1379.6	1379.5	1367.6	1355.8
		SD	-	-	149.7	139.4	145.8	158.6	155.9	150.7	157.7		SD	-	217.9	218.7	225.1	223.0	222.9	205.8	221.4	232.2
		Max	-	-	1891	1896	1928	1966	1942	1929	1907		Max	-	2303	2411	2318	2299	2294	2286	2249	2244
	Raw Cuts	Bel. Basic/Basic	-	-	19	19	20	19	20	21	21	Raw Cuts	Bel. Basic/Basic	-	22	21	22	21	22	23	24	23
		Basic/Prof.	-	-	25	25	25	25	25	26	26		Basic/Prof.	-	30	28	30	29	30	31	31	32
		Prof./Adv.	-	-	39	39	38	38	38	38	39		Prof./Adv.	-	40	38	40	40	41	41	42	42
	Theta Cuts	Bel. Basic/Basic	-	-	-0.3137	-0.3235	-0.2423	-0.3251	-0.3173	-0.2522	-0.2423	Theta Cuts	Bel. Basic/Basic	-	-0.2218	-0.1667	-0.2014	-0.2069	-0.2073	-0.1389	-0.1402	-0.2253
		Basic/Prof.	-	-	0.2857	0.2836	0.2779	0.3125	0.2220	0.2858	0.2838		Basic/Prof.	-	0.4935	0.5021	0.5469	0.5023	0.5057	0.5607	0.4941	0.5805
		Prof./Adv.	-	-	2.0417	2.0544	1.9360	2.0230	1.9466	1.8854	2.0420		Prof./Adv.	-	1.5629	1.5675	1.6028	1.5925	1.6441	1.6033	1.6862	1.6694
	Impact %	Bel. Basic	-	-	14.8	12.4	13.5	12.9	13.1	15.9	16.6	Impact %	Bel. Basic	-	15.3	14.9	13.6	12.8	12.8	11.3	13.5	14.8
		Basic	-	-	12.4	10.7	9.5	11.9	9.6	10.0	10.0		Basic	-	16.6	15.0	16.3	14.6	14.3	15.3	14.4	18.6
		Proficient	-	-	50.8	57.1	50.8	47.9	48.9	46.9	49.1		Proficient	-	37.1	38.1	35.8	36.2	36.3	37.9	41.3	36.2
Advanced		-	-	22.0	19.7	26.2	27.3	28.3	27.2	24.3	Advanced		-	31.0	32.0	34.3	36.4	36.6	35.4	30.8	30.4	
Prof. + Adv.		-	-	72.8	76.9	77.0	75.2	77.2	74.1	73.4	Prof. + Adv.		-	68.1	70.1	70.1	72.6	72.9	73.4	72.0	66.6	
Demographic	N Count	-	-	125344	126395	127154	126588	124678	126062	126685	Demographic	N Count	-	127680	125981	126280	127519	128452	124535	121479	126491	
	% City	-	-	11.4	11.2	10.9	10.8	10.6	10.5	10.2		% City	-	11.5	11.3	11.0	10.9	10.5	10.2	10.2	9.9	
	% White	-	-	73.2	72.8	72.5	71.6	70.8	70.0	69.1		% White	-	74.5	73.7	73.0	72.5	72.2	71.4	70.6	69.9	
	% Black	-	-	15.8	15.8	15.5	15.5	15.4	15.1	14.7		% Black	-	15.4	15.7	15.7	15.6	15.3	15.2	15.0	14.8	
	% Hispanic	-	-	7.2	7.5	7.6	8.1	8.5	8.8	9.4		% Hispanic	-	6.4	6.9	7.4	7.6	7.7	8.4	8.7	9.0	
Reading Grade 4	Raw Score	Mean	35.87	35.13	33.83	34.57	35.11	35.65	35.72	36.29	34.39	Raw Score	Mean	-	32.96	33.11	34.54	35.44	35.71	36.22	35.79	34.66
		SD	9.52	9.81	9.68	9.80	9.19	8.79	8.53	9.07	10.00		SD	-	9.26	9.87	9.60	9.67	9.72	9.27	9.47	9.39
		Max	52	52	52	52	52	52	52	52	52		Max	-	52	52	52	52	52	52	52	52
	Scaled Score	Mean	1334.8	1311.5	1318.0	1329.7	1332.1	1328.9	1354.3	1353.5	1331.7	Scaled Score	Mean	-	1335.6	1342.7	1357.6	1373.1	1378.4	1396.4	1377.0	1358.9
		SD	235.1	232.9	221.9	222.0	219.8	217.6	214.5	226.4	238.7		SD	-	210.4	223.9	221.5	222.4	233.7	234.0	238.4	222.5
		Max	2300	2234	2261	2262	2322	2357	2344	2293	2314		Max	-	2339	2306	2290	2285	2293	2332	2319	2350
	Raw Cuts	Bel. Basic/Basic	28	28	26	26	27	28	27	28	27	Raw Cuts	Bel. Basic/Basic	-	23	23	24	24	25	25	25	24
		Basic/Prof.	35	35	33	34	34	35	34	35	34		Basic/Prof.	-	31	31	32	33	33	33	33	33
		Prof./Adv.	44	44	43	43	43	43	43	43	43		Prof./Adv.	-	39	40	41	41	41	41	41	41
	Theta Cuts	Bel. Basic/Basic	-	0.2263	0.2564	0.2378	0.2289	0.2219	0.2425	0.2815	0.2948	Theta Cuts	Bel. Basic/Basic	-	-0.2409	-0.1960	-0.1898	-0.1980	-0.1583	-0.1615	-0.2155	-0.2323
		Basic/Prof.	-	0.9268	0.9094	0.9934	0.9321	0.9505	0.9668	0.9794	0.9868		Basic/Prof.	-	0.5452	0.5488	0.5587	0.6215	0.5928	0.6003	0.5576	0.6276
		Prof./Adv.	-	2.0985	2.0854	2.0706	2.1020	2.0584	2.1815	2.0234	2.1469		Prof./Adv.	-	1.4345	1.5094	1.5553	1.5044	1.5051	1.5402	1.5031	1.4366
	Impact %	Bel. Basic	19.1	21.1	20.4	18.9	17.9	17.2	14.6	17.0	21.7	Impact %	Bel. Basic	-	15.6	17.0	15.3	14.0	14.8	13.1	14.2	14.4
		Basic	16.7	18.3	19.7	19.6	17.5	18.7	18.2	18.0	17.3		Basic	-	18.5	19.6	17.7	18.4	16.4	17.0	17.3	20.5
		Proficient	41.3	39.8	39.2	38.1	41.8	41.2	44.9	36.7	37.3		Proficient	-	33.5	32.7	34.9	30.5	30.7	30.5	31.1	28.3
Advanced		22.9	20.8	20.8	23.5	22.7	22.9	22.4	28.3	23.7	Advanced		-	32.4	30.8	32.0	37.1	38.1	39.4	37.4	36.9	
Prof. + Adv.		64.2	60.6	59.9	61.5	64.5	64.1	67.2	65.0	61.0	Prof. + Adv.		-	65.9	63.5	66.9	67.6	68.7	69.9	68.5	65.2	
Demographic	N Count	134142	131488	129593	127211	127430	128933	125963	124007	125727	Demographic	N Count	-	135914	133399	130706	128284	128921	126170	126146	129305	
	% City	12.2	11.6	11.0	10.8	10.6	10.5	9.7	9.5	9.3		% City	-	11.4	10.8	10.3	10.2	10.1	9.7	9.0	8.6	
	% White	74.4	74.7	74.3	73.5	72.9	72.2	72.2	71.3	70.2		% White	-	74.5	74.6	74.3	73.3	72.7	72.2	72.0	70.9	
	% Black	16.3	15.6	15.5	15.6	15.5	15.6	15.0	14.8	15.0		% Black	-	16.0	15.6	15.3	15.4	15.3	15.2	14.7	14.8	
	% Hispanic	5.9	6.3	6.7	7.2	7.5	7.8	7.9	8.6	8.9		% Hispanic	-	6.2	6.5	6.9	7.3	7.6	8.0	8.2	8.9	
Reading Grade 5	Raw Score	Mean	35.87	35.13	33.83	34.57	35.11	35.65	35.72	36.29	34.39	Raw Score	Mean	-	32.96	33.11	34.54	35.44	35.71	36.22	35.79	34.66
		SD	9.52	9.81	9.68	9.80	9.19	8.79	8.53	9.07	10.00		SD	-	9.26	9.87	9.60	9.67	9.72	9.27	9.47	9.39
		Max	52	52	52	52	52	52	52	52	52		Max	-	52	52	52	52	52	52	52	52
	Scaled Score	Mean	1334.8	1311.5	1318.0	1329.7	1332.1	1328.9	1354.3	1353.5	1331.7	Scaled Score	Mean	-	1335.6	1342.7	1357.6	1373.1	1378.4	1396.4	1377.0	1358.9
		SD	235.1	232.9	221.9	222.0	219.8	217.6	214.5	226.4	238.7		SD	-	210.4	223.9	221.5	222.4	233.7	234.0	238.4	222.5
		Max	2300	2234	2261	2262	2322	2357	2344	2293	2314		Max	-	2339	2306	2290	2285	2293	2332	2319	2350
	Raw Cuts	Bel. Basic/Basic	28	28	26	26	27	28	27	28	27	Raw Cuts	Bel. Basic/Basic	-	23	23	24	24	25	25	25	24
		Basic/Prof.	35	35	33	34	34	35	34	35	34		Basic/Prof.	-	31	31	32	33	33	33	33	33
		Prof./Adv.	44	44	43	43	43	43	43	43	43		Prof./Adv.	-	39	40	41	41	41	41	41	41
	Theta Cuts	Bel. Basic/Basic	-	0.2263	0.2564	0.2378	0.2289	0.2219	0.2425	0.2815	0.2948	Theta Cuts	Bel. Basic/Basic	-	-0.2409	-0.1960	-0.1898	-0.1980	-0.1583	-0.1615	-0.2155	-0.2323
		Basic/Prof.	-	0.9268	0.9094	0.9934	0.9321	0.9505	0.9668	0.9794	0.9868		Basic/Prof.	-	0.5452	0.5488	0.5587	0.6215	0.5928	0.6003	0.5576	0.6276
		Prof./Adv.	-	2.0985	2.0854	2.0706	2.1020	2.0584	2.1815	2.0234	2.1469		Prof./Adv.	-	1.4345	1.5094	1.5553	1.5044	1.5051	1.5402	1.5031	1.4366
	Impact %	Bel. Basic	19.1	21.1	20.4	18.9	17.9	17.2	14.6	17.0	21.7	Impact %	Bel. Basic	-	15.6	17.0	15.3	14.0	14.8	13.1	14.2	14.4
		Basic	16.7	18.3	19.7	19.6	17.5	18.7	18.2	18.0	17.3		Basic	-	18.5	19.6	17.7	18.4	16.4	17.0	17.3	20.5
		Proficient	41.3	39.8	39.2	38.1	41.8	41.2	44.9	36.7	37.3		Proficient	-	33.5	32.7	34.9	30.5	30.7	30.5	31.1	28.3
Advanced		22.9	20.8	20.8	23.5	22.7	22.9	22.4	28.3	23.7	Advanced		-	32.4	30.8	32.0	37.1	38.1	39.4	37.4	36.9	
Prof. + Adv.		64.2	60.6	59.9	61.5	64.5	64.1	67.2	65.0	61.0	Prof. + Adv.		-	65.9	63.5	66.9	67.6	68.7	69.9	68.5	65.2	
Demographic	N Count	134142	131488	129593	127211	127430	128933	125963	124007	125727	Demographic	N Count	-	135914	133399	130706	128284	128921	126170	126146	129305	
	% City	12.2	11.6	11.0	10.8	10.6	10.5	9.7	9.5	9.3		% City	-	11.4	10.8	10.3	10.2	10.1	9.7	9.0	8.6	
	% White	74.4	74.7	74.3	73.5	72.9	72.2	72.2	71.3	70.2		% White	-	74.5	74.6	74.3	73.3	72.7	72.2	72.0	70.9	
	% Black	16.3	15.																			

Appendix R: Historical Statistics

		2005	2006	2007	2008	2009	2010	2011	2012	2013													
Reading Grade 7	Raw Score	Mean	-	33.13	33.19	34.12	34.52	34.83	34.42	35.06	33.96	Reading Grade 8	Raw Score	Mean	39.12	34.98	33.08	33.57	34.77	34.61	35.60	35.18	33.28
		SD	-	9.75	10.18	10.05	9.91	9.48	9.02	8.96	10.06			SD	9.07	9.78	8.98	10.13	9.55	8.89	8.93	9.30	9.90
		Max	-	52	52	52	52	52	52	52	52			52	Max	52	52	52	52	52	52	52	52
	Scaled Score	Mean	-	1363.5	1372.4	1394.2	1413.1	1413.9	1418.3	1412.8	1397.5		Scaled Score	Mean	1359.5	1424.8	1441.3	1479.9	1499.5	1491.3	1513.0	1505.5	1483.1
		SD	-	220.1	229.7	234.8	231.0	219.2	210.7	221.2	228.1		SD	274.3	284.7	249.2	272.8	263.7	245.3	260.4	265.7	263.4	
		Max	-	2351	2361	2366	2388	2373	2387	2394	2338		Max	2349	2559	2646	2628	2621	2635	2639	2626	2616	
	Raw Cuts	Bel. Basic/Basic	-	22	22	22	21	22	21	23	21		Raw Cuts	Bel. Basic/Basic	33	25	22	20	21	21	22	21	20
		Basic/Prof.	-	30	30	30	30	30	29	30	30		Basic/Prof.	39	31	28	26	27	27	28	28	26	
		Prof./Adv.	-	39	39	40	39	39	38	39	39		Prof./Adv.	45	39	36	35	36	36	36	36	36	
	Theta Cuts	Bel. Basic/Basic	-	-0.3167	-0.2713	-0.2808	-0.3012	-0.2353	-0.2950	-0.2634	-0.3202		Theta Cuts	Bel. Basic/Basic	-	0.1584	0.1727	0.1507	0.1775	0.1659	0.1977	0.1407	0.1997
		Basic/Prof.	-	0.4230	0.4511	0.4361	0.4955	0.4820	0.4572	0.4224	0.5051		Basic/Prof.	-	0.7466	0.7668	0.7042	0.7360	0.7294	0.7688	0.7964	0.7631	
		Prof./Adv.	-	1.3773	1.3771	1.4939	1.4066	1.4015	1.3935	1.4251	1.4282		Prof./Adv.	-	1.6424	1.6248	1.5700	1.6317	1.6340	1.5882	1.6002	1.5315	
	Impact %	Bel. Basic	-	14.6	16.0	13.8	11.2	11.2	9.2	10.7	12.8		Impact %	Bel. Basic	19.7	16.2	12.3	12.1	10.6	8.7	8.9	9.0	11.7
		Basic	-	17.3	17.3	16.2	17.4	15.3	14.8	13.2	16.9		Basic	16.3	13.2	12.7	9.6	8.9	9.4	9.3	11.3	10.8	
		Proficient	-	33.2	30.3	34.0	30.0	31.6	32.7	34.7	30.7		Proficient	30.6	27.1	29.3	24.2	25.2	28.6	24.1	24.1	21.9	
Advanced		-	34.9	36.5	36.0	41.4	41.9	43.3	41.3	39.7	Advanced	33.5	43.5	45.7	54.1	55.3	53.3	57.7	55.7	55.6			
Prof. + Adv.		-	68.0	66.8	70.0	71.4	73.5	76.0	76.1	70.4	Prof. + Adv.	64.0	70.6	75.0	78.2	80.5	81.9	81.7	79.8	77.5			
Demographic	N Count	-	141012	138610	135669	132641	130376	126902	126765	131767	Demographic	N Count	145752	143401	141193	138377	135739	132906	127125	126250	131006		
	% City	-	10.9	10.6	10.0	9.7	9.6	9.2	8.6	8.0	% City	11.1	11.0	10.6	10.2	9.8	9.4	9.0	8.6	7.9			
	% White	-	75.2	74.4	74.5	74.2	73.3	72.7	72.1	71.5	% White	76.8	76.0	75.0	74.5	74.5	74.1	73.3	72.6	71.9			
	% Black	-	15.7	15.9	15.4	15.1	15.2	14.9	14.9	14.7	% Black	15.0	15.4	15.7	15.6	15.0	14.8	14.8	14.5	14.7			
	% Hispanic	-	6.0	6.4	6.7	7.0	7.4	7.9	8.2	8.4	% Hispanic	5.3	5.6	6.2	6.5	6.9	7.1	7.6	8.1	8.4			

		2005	2006	2007	2008	2009	2010	2011	2012	2013	
Reading Grade 11	Raw Score	Mean	38.75	34.76	34.02	34.81	35.04	35.25	35.88	35.99	-
		SD	9.51	9.13	9.55	9.28	9.39	9.38	9.10	8.49	-
		Max	52	52	52	52	52	52	52	52	-
	Scaled Score	Mean	1362.9	1366.4	1346.2	1360.2	1368.5	1363.2	1381.6	1370.0	-
		SD	316.5	278.5	266.9	276.2	280.8	280.4	273.4	258.6	-
		Max	2446	2631	2529	2546	2524	2520	2511	2520	-
	Raw Cuts	Bel. Basic/Basic	33	27	26	27	27	27	27	28	-
		Basic/Prof.	38	33	32	33	33	33	33	34	-
		Prof./Adv.	45	41	41	41	41	41	41	41	-
	Theta Cuts	Bel. Basic/Basic	-	0.0646	0.0416	0.0582	0.0675	0.0156	0.0437	0.0633	-
		Basic/Prof.	-	0.6639	0.6034	0.6497	0.6540	0.6097	0.6194	0.6795	-
		Prof./Adv.	-	1.6804	1.6229	1.6056	1.5958	1.5606	1.5392	1.5355	-
	Impact %	Bel. Basic	22.0	18.5	19.3	19.0	18.8	18.0	15.9	15.7	-
		Basic	12.9	16.3	15.3	16.2	15.9	14.8	14.9	16.5	-
		Proficient	31.4	33.9	36.5	32.9	32.1	33.2	33.0	33.6	-
Advanced		33.6	31.2	28.9	31.8	33.1	34.0	36.1	34.2	-	
Prof. + Adv.		65.0	65.2	65.4	64.7	65.3	67.2	69.2	67.8	-	
Demographic	N Count	129693	132434	135364	135015	133753	133291	127997	125380	-	
	% City	9.3	8.5	8.2	7.8	8.4	8.2	8.2	7.4	-	
	% White	80.6	80.5	79.6	79.2	77.8	76.4	75.9	75.5	-	
	% Black	12.1	12.2	12.5	12.7	13.4	13.9	13.9	13.3	-	
	% Hispanic	3.8	4.0	4.5	4.9	5.2	5.9	6.2	6.6	-	

Appendix R: Historical Statistics

		2005	2006	2007	2008	2009	2010	2011	2012	2013												
Science Grade 4	Raw Score	Mean	-	-	-	45.80	47.25	48.64	48.47	45.73	45.47	Raw Score	Mean	-	-	-	38.25	41.00	42.61	42.10	43.09	44.04
		SD	-	-	-	11.04	11.53	12.22	11.88	12.28	13.20		SD	-	-	-	11.71	13.02	13.74	13.62	12.75	13.52
		Max	-	-	-	66	66	68	68	68	68		Max	-	-	-	66	66	68	68	68	68
	Scaled Score	Mean	-	-	-	1429.4	1449.2	1456.8	1452.4	1447.8	1435.5	Scaled Score	Mean	-	-	-	1284.4	1302.9	1309.0	1312.5	1319.6	1323.2
		SD	-	-	-	174.1	176.0	200.4	181.9	183.8	196.0		SD	-	-	-	174.1	197.6	210.1	203.2	191.9	209.9
		Max	-	-	-	2256	2271	2254	2234	2285	2269		Max	-	-	-	2297	2303	2258	2283	2276	2268
	Raw Cuts	Bel. Basic/Basic	-	-	-	26	25	28	26	24	25	Raw Cuts	Bel. Basic/Basic	-	-	-	29	31	33	31	32	33
		Basic/Prof.	-	-	-	36	36	38	37	34	35		Basic/Prof.	-	-	-	39	41	42	41	42	43
		Prof./Adv.	-	-	-	51	52	53	53	50	51		Prof./Adv.	-	-	-	51	53	55	54	54	55
	Theta Cuts	Bel. Basic/Basic	-	-	-	-0.4243	-0.4261	-0.3909	-0.3994	-0.3851	-0.3750	Theta Cuts	Bel. Basic/Basic	-	-	-	-0.2333	-0.2118	-0.1829	-0.2267	-0.2018	-0.2263
		Basic/Prof.	-	-	-	0.2798	0.3223	0.3093	0.3180	0.3065	0.3115		Basic/Prof.	-	-	-	0.4587	0.4620	0.4202	0.4102	0.4526	0.4352
		Prof./Adv.	-	-	-	1.4659	1.5133	1.4914	1.4788	1.4523	1.4658		Prof./Adv.	-	-	-	1.4173	1.4098	1.4771	1.4148	1.4096	1.4295
	Impact %	Bel. Basic	-	-	-	5.9	4.9	7.7	5.6	6.1	9.2	Impact %	Bel. Basic	-	-	-	23.1	24.0	25.5	22.9	20.9	22.3
		Basic	-	-	-	12.7	11.7	10.8	11.5	11.6	12.2		Basic	-	-	-	24.3	21.1	17.3	18.9	19.5	17.7
		Proficient	-	-	-	41.2	41.0	35.5	38.0	37.8	36.0		Proficient	-	-	-	36.4	32.5	33.7	34.0	35.4	33.4
Advanced		-	-	-	40.3	42.4	45.9	44.9	44.5	42.5	Advanced		-	-	-	16.3	22.3	23.5	24.3	24.3	26.7	
Prof. + Adv.		-	-	-	81.5	83.4	81.5	83.0	82.3	78.6	Prof. + Adv.		-	-	-	52.7	54.8	57.2	58.3	59.6	60.1	
Demographic	N Count	-	-	-	126426	127537	128565	128103	125170	126729	Demographic	N Count	-	-	-	137790	134969	132452	127075	126112	130637	
	% City	-	-	-	10.9	10.7	10.5	10.2	10.3	10.0		% City	-	-	-	10.1	9.7	9.3	9.0	8.6	7.9	
	% White	-	-	-	72.9	72.5	72.0	71.2	70.4	69.6		% White	-	-	-	74.6	74.5	74.1	73.2	72.6	71.7	
	% Black	-	-	-	15.5	15.5	15.3	15.2	15.1	14.8		% Black	-	-	-	15.3	14.9	14.6	14.7	14.4	14.7	
	% Hispanic	-	-	-	7.6	7.7	7.9	8.5	8.9	9.2		% Hispanic	-	-	-	6.6	7.0	7.1	7.6	8.1	8.5	

		2005	2006	2007	2008	2009	2010	2011	2012	2013												
Science Grade 11	Raw Score	Mean	-	-	-	36.11	39.02	39.48	39.72	39.47	-	Raw Score	Mean	-	-	-	36.11	39.02	39.48	39.72	39.47	-
		SD	-	-	-	12.46	13.16	13.02	13.94	13.38	-		SD	-	-	-	12.46	13.16	13.02	13.94	13.38	-
		Max	-	-	-	72	72	74	74	74	-		Max	-	-	-	72	72	74	74	74	-
	Scaled Score	Mean	-	-	-	1236.3	1244.0	1242.6	1244.8	1245.9	-	Scaled Score	Mean	-	-	-	1236.3	1244.0	1242.6	1244.8	1245.9	-
		SD	-	-	-	89.0	101.5	96.7	96.5	93.5	-		SD	-	-	-	89.0	101.5	96.7	96.5	93.5	-
		Max	-	-	-	1825	1859	1862	1822	1814	-		Max	-	-	-	1825	1859	1862	1822	1814	-
	Raw Cuts	Bel. Basic/Basic	-	-	-	24	27	27	26	25	-	Raw Cuts	Bel. Basic/Basic	-	-	-	24	27	27	26	25	-
		Basic/Prof.	-	-	-	42	44	45	45	44	-		Basic/Prof.	-	-	-	42	44	45	45	44	-
		Prof./Adv.	-	-	-	53	53	54	56	55	-		Prof./Adv.	-	-	-	53	53	54	56	55	-
	Theta Cuts	Bel. Basic/Basic	-	-	-	-0.3955	-0.3898	-0.4062	-0.3853	-0.4439	-	Theta Cuts	Bel. Basic/Basic	-	-	-	-0.3955	-0.3898	-0.4062	-0.3853	-0.4439	-
		Basic/Prof.	-	-	-	0.7921	0.8144	0.8288	0.7891	0.7792	-		Basic/Prof.	-	-	-	0.7921	0.8144	0.8288	0.7891	0.7792	-
		Prof./Adv.	-	-	-	1.5577	1.4967	1.5053	1.5633	1.5334	-		Prof./Adv.	-	-	-	1.5577	1.4967	1.5053	1.5633	1.5334	-
	Impact %	Bel. Basic	-	-	-	18.1	19.8	19.0	18.8	16.3	-	Impact %	Bel. Basic	-	-	-	18.1	19.8	19.0	18.8	16.3	-
		Basic	-	-	-	46.2	40.5	41.2	40.4	41.8	-		Basic	-	-	-	46.2	40.5	41.2	40.4	41.8	-
		Proficient	-	-	-	25.2	22.5	25.0	26.7	27.6	-		Proficient	-	-	-	25.2	22.5	25.0	26.7	27.6	-
Advanced		-	-	-	10.5	17.2	14.8	14.1	14.2	-	Advanced		-	-	-	10.5	17.2	14.8	14.1	14.2	-	
Prof. + Adv.		-	-	-	35.6	39.7	39.8	40.8	41.9	-	Prof. + Adv.		-	-	-	35.6	39.7	39.8	40.8	41.9	-	
Demographic	N Count	-	-	-	131157	130262	129926	125307	121693	-	Demographic	N Count	-	-	-	131157	130262	129926	125307	121693	-	
	% City	-	-	-	6.8	7.3	7.0	7.4	6.4	-		% City	-	-	-	6.8	7.3	7.0	7.4	6.4	-	
	% White	-	-	-	80.2	78.8	77.5	76.8	76.7	-		% White	-	-	-	80.2	78.8	77.5	76.8	76.7	-	
	% Black	-	-	-	11.6	12.4	13.0	13.1	12.4	-		% Black	-	-	-	11.6	12.4	13.0	13.1	12.4	-	
	% Hispanic	-	-	-	4.8	5.1	5.7	6.0	6.2	-		% Hispanic	-	-	-	4.8	5.1	5.7	6.0	6.2	-	

Appendix R: Historical Statistics

		2005	2006	2007	2008	2009	2010	2011	2012	2013												
Writing Grade 5	Raw Score	Mean	-	68.63	65.07	66.56	66.03	65.44	65.83	64.82	65.63	Raw Score	Mean	-	71.71	67.24	68.05	67.82	68.36	67.11	67.06	66.63
		SD	-	12.97	13.03	13.93	14.35	14.55	14.57	14.91	13.93		SD	-	14.09	13.91	13.32	13.83	14.90	14.22	14.41	14.49
		Max	-	100	100	100	100	100	100	100	100		100	Max	-	100	100	100	100	100	100	100
	Scaled Score	Mean	-	1300.2	1274.5	1319.6	1303.2	1322.1	1351.3	1331.0	1315.6	Scaled Score	Mean	-	1340.5	1375.1	1322.5	1363.1	1400.9	1415.5	1406.6	1402.9
		SD	-	248.9	215.4	304.4	246.0	265.5	277.7	275.7	262.6		SD	-	266.0	258.4	210.5	265.5	271.9	272.1	276.8	268.4
		Max	-	2188	2145	2615	2162	2249	2294	2314	2274		Max	-	2119	2265	2098	2288	2245	2329	2341	2306
	Raw Cuts	Bel. Basic/Basic	-	35	35	34	31	30	31	28	33	Raw Cuts	Bel. Basic/Basic	-	45	40	43	43	38	38	38	38
		Basic/Prof.	-	68	64	65	64	63	61	62	63		Basic/Prof.	-	69	60	63	62	60	58	59	58
		Prof./Adv.	-	96	98	89	97	94	92	91	93		Prof./Adv.	-	92	85	94	85	86	82	82	83
	Theta Cuts	Bel. Basic/Basic	-			-3.2096	-3.2167	-3.2280	-3.1071	-3.1662	-3.1257	Theta Cuts	Bel. Basic/Basic	-			-1.9218	-2.0619	-2.0663	-2.0134	-1.9652	-1.9614
		Basic/Prof.	-			1.6555	1.7538	1.7554	1.7133	1.7283	1.6573		Basic/Prof.	-			1.1614	1.1847	1.1789	1.2283	1.2174	1.2152
		Prof./Adv.	-			8.6187	8.4299	8.4710	8.4777	8.3972	8.4274		Prof./Adv.	-			6.4254	6.3760	6.4115	6.3574	6.4652	6.3932
	Impact %	Bel. Basic	-	0.8	1.1	1.2	1.0	1.8	1.9	1.8	1.4	Impact %	Bel. Basic	-	3.4	2.8	2.9	4.2	3.2	2.8	3.2	3.3
		Basic	-	45.0	41.6	41.6	40.9	36.5	31.0	34.0	35.3		Basic	-	30.6	25.5	28.0	24.6	21.6	24.1	24.1	24.1
		Proficient	-	52.0	56.0	52.7	55.5	59.8	64.9	62.5	61.7		Proficient	-	60.5	60.9	66.8	60.7	61.7	62.1	62.2	61.5
Advanced		-	2.1	1.3	4.6	2.6	2.0	2.2	1.7	1.7	Advanced		-	5.6	10.9	2.3	10.5	13.5	11.0	10.5	11.1	
Prof. + Adv.		-	54.1	57.3	57.3	58.1	61.7	67.1	64.2	63.3	Prof. + Adv.		-	66.0	71.7	69.1	71.2	75.1	73.1	72.7	72.6	
Demographic	N Count	-	129802	128637	125547	126625	128201	128833	127549	124041	Demographic	N Count	-	141365	139263	136417	134976	131780	129619	129035	129823	
	% City	-	11.2	10.7	10.5	10.4	10.4	9.6	9.5	9.2		% City	-	10.4	10.1	9.8	9.6	9.3	8.9	8.5	7.8	
	% White	-	75.2	74.6	73.9	73.1	72.4	72.2	71.3	70.5		% White	-	76.7	75.6	75.0	74.7	74.3	73.4	72.7	72.0	
	% Black	-	15.2	15.2	15.5	15.3	15.4	15.1	14.9	14.9		% Black	-	14.9	15.3	15.2	14.9	14.6	14.8	14.5	14.7	
	% Hispanic	-	6.2	6.6	7.0	7.5	7.7	7.9	8.6	8.9		% Hispanic	-	5.5	6.0	6.4	6.8	7.0	7.5	8.0	8.3	

		2005	2006	2007	2008	2009	2010	2011	2012	2013												
Writing Grade 11	Raw Score	Mean	-	71.90	70.23	69.71	72.30	69.60	71.44	68.63	-	Raw Score	Mean	-	71.90	70.23	69.71	72.30	69.60	71.44	68.63	-
		SD	-	13.22	11.48	13.27	14.48	14.35	14.76	15.27	-		SD	-	13.22	11.48	13.27	14.48	14.35	14.76	15.27	-
		Max	-	100	100	100	100	100	100	100	100		-	Max	-	100	100	100	100	100	100	100
	Scaled Score	Mean	-	1515.7	1442.9	1470.6	1480.4	1483.7	1536.8	1523.3	-	Scaled Score	Mean	-	1515.7	1442.9	1470.6	1480.4	1483.7	1536.8	1523.3	-
		SD	-	274.8	216.7	262.8	283.7	282.3	298.6	293.9	-		SD	-	274.8	216.7	262.8	283.7	282.3	298.6	293.9	-
		Max	-	2356	2283	2377	2257	2382	2364	2418	-		Max	-	2356	2283	2377	2257	2382	2364	2418	-
	Raw Cuts	Bel. Basic/Basic	-	36	38	36	39	35	34	31	-	Raw Cuts	Bel. Basic/Basic	-	36	38	36	39	35	34	31	-
		Basic/Prof.	-	57	59	56	60	57	55	53	-		Basic/Prof.	-	57	59	56	60	57	55	53	-
		Prof./Adv.	-	83	87	84	88	82	83	81	-		Prof./Adv.	-	83	87	84	88	82	83	81	-
	Theta Cuts	Bel. Basic/Basic	-			-2.8217	-2.8091	-2.7956	-2.7861	-2.9190	-	Theta Cuts	Bel. Basic/Basic	-			-2.8217	-2.8091	-2.7956	-2.7861	-2.9190	-
		Basic/Prof.	-			-0.0891	-0.0515	-0.0159	-0.0562	0.0251	-		Basic/Prof.	-			-0.0891	-0.0515	-0.0159	-0.0562	0.0251	-
		Prof./Adv.	-			5.6192	5.6480	5.6311	5.7382	5.7556	-		Prof./Adv.	-			5.6192	5.6480	5.6311	5.7382	5.7556	-
	Impact %	Bel. Basic	-	1.2	0.8	1.2	2.3	2.2	1.7	2.5	-	Impact %	Bel. Basic	-	1.2	0.8	1.2	2.3	2.2	1.7	2.5	-
		Basic	-	13.1	11.3	13.0	14.9	17.1	13.6	14.6	-		Basic	-	13.1	11.3	13.0	14.9	17.1	13.6	14.6	-
		Proficient	-	69.8	80.2	72.2	67.9	67.7	66.0	69.3	-		Proficient	-	69.8	80.2	72.2	67.9	67.7	66.0	69.3	-
Advanced		-	15.8	7.7	13.6	14.8	13.0	18.7	13.6	-	Advanced		-	15.8	7.7	13.6	14.8	13.0	18.7	13.6	-	
Prof. + Adv.		-	85.7	87.8	85.8	82.8	80.7	84.7	82.9	-	Prof. + Adv.		-	85.7	87.8	85.8	82.8	80.7	84.7	82.9	-	
Demographic	N Count	-	130572	133368	132349	132866	130352	128775	125095	-	Demographic	N Count	-	130572	133368	132349	132866	130352	128775	125095	-	
	% City	-	7.9	7.4	7.0	7.9	7.3	7.5	6.7	-		% City	-	7.9	7.4	7.0	7.9	7.3	7.5	6.7	-	
	% White	-	81.4	80.3	80.1	78.2	77.3	76.5	76.5	-		% White	-	81.4	80.3	80.1	78.2	77.3	76.5	76.5	-	
	% Black	-	11.6	12.0	11.9	13.1	13.2	13.4	12.8	-		% Black	-	11.6	12.0	11.9	13.1	13.2	13.4	12.8	-	
	% Hispanic	-	3.8	4.3	4.8	5.1	5.7	6.1	6.2	-		% Hispanic	-	3.8	4.3	4.8	5.1	5.7	6.1	6.2	-	

Appendix S:
Online Testing and Mode Comparability

In spring 2013, all grades and content areas of the Pennsylvania System of School Assessment (PSSA) operational tests were available in dual mode. Students tested using either paper or online via the DRC INSIGHT test engine. This represents a significant change for PSSA. Up to this point, all tests have been administered in paper based format only.

Unlike Keystone Exams, none of the PSSA operational items were field tested online prior to their use on spring 2013 operational forms. This is a key difference between Keystone and PSSA. In building operational Keystone forms it was possible to avoid using items that showed differential item functioning for mode in the field test. This was not possible in test construction of operational PSSA forms for spring 2013.

Given that PSSA items were not field tested online and the wide range of grades (3 - 8) and content areas (Reading, Math, Science, and Writing) tested, it is possible that some combination of grade and content area could demonstrate a mode effect. For example:

- Reading performance online in grade 4 could be lower if students are negatively impacted by scrolling requirements for passage-based items.
- Writing performance online in grade 8 could be higher if composing an essay online more closely mirrors students' day to day writing experiences.

Unfortunately, we had relatively few students participate in the online administration of PSSA in 2013 and for this reason, the 2013 mode comparability analyses should be considered exploratory. This appendix presents the results from the 2013 mode comparability analyses.

2013 MODE COMPARABILITY ANALYSES

Ideally, experimental designs wherein large groups of students are randomly assigned to different testing conditions would be implemented to address mode comparability. However, with classroom testing time at a premium and the impact on administration and reporting schedules, experimental design work is often impossible to implement in K-12 testing programs.

In lieu of experimental designs using randomly equivalent groups, mode comparability can be assessed using matched samples that are constructed to form equivalent groups. While there are a variety of approaches that can be used to construct matched samples (Karkee, Kim, & Fatica, 2010; Moses, Deng, & Zhang, 2012; Way, Lin & Kong, 2008), key demographic variables such as gender, ethnicity, and prior achievement are typically used as matching criteria. Once the matched samples have been developed, they are treated as equivalent groups that can be used to evaluate mode comparability. That is, the matched sample reduces the bias between the two groups when randomization is difficult or impossible.

Propensity score matching (D'Agostino, 1998; Rosenbaum, 1995; Rosenbaum and Rubin, 1983; Rubin 2006) was implemented to construct equivalent groups of students who took the computer based PSSA and the PSSA using paper and pencil. Propensity score matching uses covariates to predict group membership (e.g., modality administered) using logistic regression. Each student who took the computer based test s matched with a student who the test on paper based on their propensity scores.

Gender, ethnicity, income level status, ELL status, IEP and prior performance were used in developing the propensity scores for the PSSA mode comparability analyses. Logistic regression was conducted to predict each student’s group membership (i.e., online or paper/pencil administration) using this set of predictors. Propensity scores, expressing the likelihood that each student was a member of each group, are then used to select the equivalent groups. In particular, each student who took the PSSA online was matched to a student who took the PSSA on paper with the nearest propensity score.

IRT calibrations were then performed using PSSA data for the computer based and paper/pencil groups to evaluate the difference in administration mode. Table S-1 presents summary statistics from the two sets of calibrations. Differences between the average difficulty parameter estimates suggest relatively small differences between the PSSA tests administered in different modalities.

Table S-1. Mode Comparability Summary Statistics

Subject	Grade	N	Mean Difficulty Estimates		Difference	SD Ratio	Correlation
			Computer	Paper			
Math	3	268	0.08	0.06	0.02	1.10	0.93
Math	4	225	0.08	0.06	0.02	1.14	0.93
Math	5	434	0.08	0.06	0.02	1.01	0.95
Math	6	796	0.06	0.06	0.00	1.00	0.97
Math	7	1153	0.08	0.07	0.01	1.06	0.98
Math	8	1608	0.05	0.05	0.01	1.01	0.98
Reading	3	266	0.04	0.05	-0.01	0.86	0.93
Reading	4	225	0.06	0.03	0.03	1.02	0.92
Reading	5	433	0.09	0.07	0.02	1.00	0.96
Reading	6	797	0.09	0.06	0.02	1.00	0.96
Reading	7	1153	0.06	0.04	0.02	1.06	0.97
Reading	8	1604	0.04	0.02	0.02	0.96	0.97
Science	4	993	0.08	0.07	0.01	1.16	0.98
Science	8	2686	0.06	0.05	0.01	1.02	0.97
Writing	5	419	0.00	0.00	0.00	1.00	0.94
Writing	8	1940	0.00	0.00	0.00	0.96	0.99

Although the computer based and paper/pencil versions of the PSSA appear to be functioning very similarly, there were relatively few students who took the computer based PSSA in 2013 and three scrambled forms were administered. While the operational analyses suggest that the equating was invariant with respect to scrambling, our mode comparability analyses essentially ignored the scrambling. Ideally, we will have increased computer based PSSA administrations such that mode comparability can be more thoroughly evaluated in 2014. Future research will address the effect of scrambling and the impact of sampling bias within the evaluation of mode comparability.