PSSA

Pennsylvania System of School Assessment

Math
Grade 4

Item Sampler
Scoring Guide

2025–2026

Pennsylvania
Department of Education

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INFORMATION ABOUT MATHEMATICS

Introduction

General Introduction

The Pennsylvania Department of Education (PDE) provides districts and schools with tools to assist in delivering focused instructional programs aligned with the Pennsylvania Core Standards (PCS). These tools include Academic Standards, Assessment Anchors and Eligible Content (AAEC) documents, assessment handbooks, content-based online Item Samplers, and Sampler Guides. The online Item Sampler provides examples of actual PSSA questions. The Sampler Guide provides examples of scored student responses. Pennsylvania educators can use the online Item Samplers in conjunction with the Sampler Guides as a tool in preparing local instruction. Questions from the Item Samplers are not designed to serve as a pretest or benchmark assessment.

The online Item Samplers are available in Braille format. For more information regarding a Braille version, call (717) 901-2238.

Pennsylvania Core Standards (PCS)

The online Item Sampler and this Sampler Guide contain examples of test questions designed to assess the Pennsylvania Assessment Anchors and Eligible Content aligned to the PCS.

What Is Included

The online Item Samplers contain test questions aligned to the Assessment Anchors and Eligible Content of the PCS. Teams of Pennsylvania educators thoroughly reviewed each question for alignment to the Assessment Anchors, context, word selection, and difficulty level prior to field testing and operational use on the PSSA. Answer choices and distractor rationales are included for multiple-choice questions. The Sampler Guides contain Scoring Guidelines for open-ended questions, Formula Sheets, and summary data, as well as the Mathematics Test Directions for online assessments. Actual responses for each point value (4, 3, 2, 1, and 0) are provided as well. To access the Online Item Sampler, go to https://portal.te.drcedirect.com/PA. Select Item Samplers. Then, select the subject and grade levels as needed.

Purpose and Uses

Pennsylvania educators may use[1] the questions within the Item Samplers as examples when creating classroom-level assessments. Students can answer the multiple-choice and open-ended questions in the testing platform. Classroom teachers can use the Scoring Guidelines as well as sample student responses to the open-ended questions as a guide if they wish to score students' work, either independently or alongside school or district colleagues. Students have access to the *General Description of Scoring Guidelines for Mathematics Open-Ended Questions* during the PSSA. Educators may distribute copies to students for use during classroom assessments.

Item Format and Scoring Guidelines

The multiple-choice (MC) items have four answer choices. Each correct response to an MC item is worth one point.

Each OE question in mathematics is scored using a question-specific rubric based upon a 0–4-point scale. The Sampler Guides include the rubric and examples of students' responses for each score point.

Item Alignment

All PSSA items are aligned to statements and specifications included in the *Assessment Anchors and Eligible Content Aligned to the Pennsylvania Core Standards*. The mathematics content, process skills, directives, and action statements included in the PSSA mathematics questions align with the Assessment Anchor Content Standards. The eligible content statements reflect the content limits of mathematics questions.

Testing Time and Mode of Test Delivery for the PSSA

The PSSA is delivered in an online format. The estimated response time for each item type is listed below.

- **Multiple-Choice:** 2 minutes
- **Open-Ended:** 10 to 15 minutes

During an official test administration, students are given as much additional time as is necessary to complete the test questions.

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[1] The permission to copy and/or use these materials does not extend to commercial purposes.

Mathematics Reporting Categories

The Assessment Anchors are organized into four classifications as listed below.

- A = Numbers and Operations
- B = Algebraic Concepts
- C = Geometry
- D = Data Analysis and Probability

These four classifications are used throughout the grade levels. In addition to these classifications, there are five Reporting Categories for each grade level. The first letter of each Reporting Category represents the classification; the second letter represents the Domain as stated in the Common Core State Standards for Mathematics. Listed below are the Reporting Categories for Grade 4.

- A-T = Numbers and Operations in Base Ten
- A-F = Numbers and Operations—Fractions
- B-O = Operations and Algebraic Thinking
- C-G = Geometry
- D-M = Measurement and Data

Examples of MC and OE items assessing these categories are included in the online Item Samplers and the Sampler Guides.

Item and Scoring Sampler Format

The online Item Samplers and the Sampler Guides include the test directions and scoring guidelines that appear in the PSSA Mathematics assessments. Each MC item contains a table that includes the item alignment, the answer key, the depth of knowledge (DOK) level, points possible, the percentage[2] of students who chose each answer option, and a brief answer-option analysis or rationale. The OE item contains a table that includes the item alignment, the DOK level, points possible, and the mean student score. Additionally, every item-specific scoring guideline included in this Sampler Guide is combined with sample student responses representing each score point to form a practical item-specific scoring guide. The *General Description of Scoring Guidelines for Mathematics Open-Ended Questions* used to develop the item-specific scoring guidelines should be used if any additional item-specific scoring guidelines are created for use within local instructional programs. The student responses in this Sampler Guide are actual student responses.

Example Multiple-Choice Item Information Table

Item-Specific Information	Item Statistics
Alignment:	*p*-value A:
Answer Key:	*p*-value B:
Depth of Knowledge:	*p*-value C:
Points Possible:	*p*-value D:

Option Annotations
Brief answer-option analysis or rationale.

Example Open-Ended Item Information Table

Category	Item-Specific Information
Alignment	Assigned AAEC
Depth of Knowledge	Assigned DOK
Points Possible	Number of Points
Mean Score	Average Score

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2 All *p*-value percentages listed in the item information tables have been rounded.

General Description of Scoring Guidelines for Mathematics Open-Ended Questions

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. The response may contain a minor "blemish" 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 a *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.

The response is marginally correct with a *minimal* understanding of the required mathematical concepts and/or procedures demonstrated and/or explained. The response may contain work that is undeveloped and rudimentary in nature.

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.

The 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
OT	Off task
LOE	Response in a language other than English
IL	Illegible

Grade 4 Formula Sheet

> Formulas and conversions that you may need on this test are found below. You may refer back to this page at any time during the mathematics test.
>
> 2025
> Grade 4

Standard Conversions

1 yard (yd) = 3 feet (ft)
1 foot = 12 inches (in.)

1 pound (lb) = 16 ounces (oz.)

1 gallon (gal) = 4 quarts (qt)
1 quart = 2 pints (pt)
1 pint = 2 cups (c)

Metric Conversions

1 kilometer (km) = 1,000 meters (m)
1 meter = 100 centimeters (cm)

1 kilogram (kg) = 1,000 grams (g)

1 liter (L) = 1,000 milliliters (mL)

Time Conversions

1 year (yr) = 12 months (mo)
1 year = 52 weeks (wk)
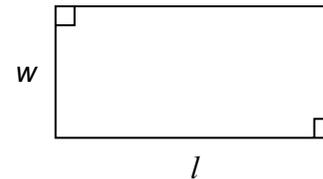1 year = 365 days
1 week = 7 days
1 day = 24 hours (hr)
1 hour = 60 minutes (min)
1 minute = 60 seconds (sec)

Rectangle

Area = length × width
$A = l \times w$

Perimeter = length + length + width + width
$P = l + l + w + w$

PSSA MATHEMATICS GRADE 4

Mathematics—Summary Data

Multiple-Choice

An asterisk (*) indicates the key.

Sample Number	Alignment	Answer Key	Depth of Knowledge	Points	*p*-value A	*p*-value B	*p*-value C	*p*-value D
1	A-F.2.1.6	C	1	1	23%	8%	64%*	4%
2	A-T.1.1	A	1	1	67%*	9%	6%	17%
3	A-T.1.1.1	A	2	1	64%*	14%	13%	8%
4	A-T.1.1.3	C	1	1	7%	6%	80%*	6%
5	A-T.2.1.4	B	2	1	20%	47%*	18%	13%
6	A-F.1.1.1	D	2	1	28%	14%	17%	39%*
7	A-F.2.1.4	D	2	1	22%	10%	11%	56%*
8	A-F.3.1	A	2	1	62%*	16%	14%	7%
9	B-O.1.1.3	B	2	1	11%	51%*	17%	20%
10	B-O.3.1.3	B	2	1	8%	75%*	9%	8%
11	C-G.1.1	D	2	1	14%	17%	24%	44%*
12	C-G.1.1.1	C	1	1	21%	9%	59%*	10%
13	C-G.1.1.3	C	1	1	18%	16%	39%*	26%
14	D-M.1.1.2	B	2	1	12%	42%*	24%	20%
15	D-M.2.1.1	A	1	1	69%*	13%	8%	10%
16	D-M.3.1.1	B	1	1	27%	52%*	13%	8%

Open-Ended

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	B-O.2	4	3	1.71

Mathematics Test Directions

Read these directions <u>carefully</u> before beginning the assessment. To look at these directions again, select the **? [Help]** button and choose the **Test Directions** tab.

You may <u>not</u> use a calculator for question 1. You may use a calculator for all other questions on this test. This section of the test has multiple-choice questions and open-ended questions. Each multiple-choice question has four answer choices. The open-ended question has one or more areas in which to enter your response(s). The open-ended question, which is question number 17, may have multiple pages. These page numbers will be shown below the question number, for example, "Page 1 of 3."

Answering Questions

Read each question carefully and choose your answer or enter your response.

1. For the multiple-choice questions, numbers 1–16, first, solve the problem on scratch paper. Then, find the answer to the question and select the correct answer using the **Pointer** tool.

    - Only one of the answer choices provided is correct. If none of the choices matches your answer, go back and check your work for possible errors.

    - To change an answer, use the **Pointer** tool to choose a different answer.

    - Select the **Flag** button if you are not sure of the answer to a question. It will mark the question so you know to go back and answer the question later.

2. For the open-ended question, number 17, use the keyboard, the equation builder, and other online tools to enter your response in the areas provided.

    - These questions have more than one part. Be sure to read the directions carefully.

    - You cannot receive the highest score for an open-ended question without completing all tasks in the question. For example,

        ○ if the question asks you to show your work or explain your reasoning, be sure to show your work or explain your reasoning in the space provided.

        ○ if the question asks you to explain, be sure to use words to explain your reasoning in the space provided.

    - If the question does not ask you to show your work or explain your reasoning, you may use the space provided, but only those parts of your response that the question specifically asks for will be scored.

    - For questions that require using the equation builder, select the question mark button **[?]** in the upper-right corner of that feature. This will open **Help**, which offers descriptions about how to use that feature.

    - An example of the scoring guidelines that professional scorers will use to evaluate your responses to open-ended questions can be found by selecting the **? [Help]** button and choosing the **Scoring Guidelines** tab. You may refer to the **Scoring Guidelines** at any time while responding to open-ended questions.

3. Use tools such as the **Cross-Off**, **Highlighter**, **Notepad**, **Magnifier**, **Line Guide**, **Protractor**, and **Formula Sheet** to assist you during the test.

Navigation

1. Only one question at a time will appear on the screen. Use the **Next** and **Back** buttons to move from question to question or page to page.

2. When you have answered all the questions, select the **Review/End Test** button at the top-right of the screen.

   - Select questions from the list that appears on the screen to check your work.

   - When you have finished and have checked your answers, follow the directions on the screen to exit.

Helpful Hints

- There is no time limit to finish the test.

- If you need to take a break from the assessment, select the **Pause Test** button. Select the **Resume** button to continue. If you are away from the assessment for more than 20 minutes, you will need to log back in.

- To see your progress on the test, select the **Review/End Test** button. You may go to any question by selecting it from the list that appears on the screen.

- Select the **? [Help]** button to find more information.

Open-Ended Item-Specific Scoring Guideline

#17 Item Information

Category	Item-Specific Information
Alignment	B-O.2
Depth of Knowledge	3
Points Possible	4
Mean Score	1.71

Assessment Anchor this item will be reported under:

M04.B-O.2 Gain familiarity with factors and multiples.

Specific Anchor Descriptor addressed by this item:

M04.B-O.2.1 Develop and apply number theory concepts to represent numbers in various ways.

Item-Specific Scoring Guideline

Score	In this item, the student . . .
4	Demonstrates a thorough understanding of factors and multiples by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of factors and multiples by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of factors and multiples by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of factors and multiples.
0	The response has no correct answer and insufficient evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.

Top-Scoring Student Response and Training Notes

Score	Description
4	Student earns 4 points.
3	Student earns 3.0–3.5 points.
2	Student earns 2.0–2.5 points.
1	Student earns 0.5–1.5 points. OR Student demonstrates minimal understanding of factors and multiples.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Top-Scoring Response

Part A (1 point):

1 point for correct answer

What?
Answers may vary. Accept any pair of numbers that are a factor pair of 12: 1 & 12, 2 & 6, 3 & 4 (order does not matter).

Sample Response:

number of groups: 4

number of model boats in each group: 3

Part B (1 point):

1 point for correct and complete explanation

OR 1/2 point for incomplete explanation (must be at least partially correct)

Why?
Sample Explanation:

Since 17 is a prime number, it has only two factors: 1 and itself (17). So, Gabby can either arrange the model airplanes either into 1 group of 17 airplanes or into 17 groups with 1 airplane in each group.

OR equivalent

Part C (1 point):

1 point for correct and complete explanation

   OR 1/2 point for incomplete explanation (must be at least partially correct)

Why?
Sample Explanation: Even though 28 has an 8 in the ones place, 8 is not a factor of 28. To arrange the model cars into equal-sized groups, the number of model cars in each group must be a factor of 28. If she arranged them into groups of 8 model cars, she would have 4 model cars remaining since 28 ÷ 8 = 3 R4.   **OR equivalent**

Part D (1 point):

1 point for correct answer

Why?
4 (model cars remaining)

Sample Student Responses

Item 17 – 4 points

Part A – Student Response	Part A – Annotations
there could be 2 groups of 6 because 6 × 2 = 12 number of groups: 2 number of model boats in each group: 6	The student provided a correct number of groups (*2*) and number of model boats in each group (*6*). Though support is not required, the student's explanation correctly explains why two groups of six boats is a correct factor pair for twelve model boats (*there could be 2 groups of 6 because 6 × 2 = 12*). [1 point]

Part B – Student Response	Part B – Annotations
17 is prime so the only two are: 17 groups of 1 or 1 group of 17	The student provided a correct and complete explanation as to why there are only two ways for Gabby to arrange the 17 model airplanes into equal-sized groups (*17 is prime so the only two are: 17 groups of 1 or 1 group of 17*). [1 point]

Part C – Student Response	Part C – Annotations
even if there is a 8 in the ones place doesn't mean it can be ÷ 8. 28 ÷ 8 will end up with a decimal becaeuse if you do 28 ÷ 8 it equals 3, R4, and it has a remander (28 ÷ 8 = 3.5)	The student provided a correct and complete explanation as to why Gabby's claim is incorrect (*even if there is a 8 in the ones place doesn't mean it can be ÷ 8. 28 ÷ 8 will end up with a decimal becaeuse if you do 28 ÷ 8 it equals 3, R4, and it has a remander (28 ÷ 8 = 3.5)*). [1 point]

Part D – Student Response	Part D – Annotations
4 modal cars	The student provided a correct answer (*4 modal cars*). While support is not required for Part D, the response in Part C shows that the student divided 28 by 8, which resulted in an answer of 3 with a remainder of 4. [1 point]

Item 17 – 3 points

Part A – Student Response	Part A – Annotations
number of groups: 4 number of model boats in each group: 3	The student provided a correct number of groups (*4*) and number of model boats in each group (*3*). Four groups of three boats is a correct factor pair for twelve model boats. [1 point]

Part B – Student Response	Part B – Annotations
the 17 is composite there is only two because its a odd number	The student provided an incorrect explanation as to why there are only two ways for Gabby to arrange the 17 model airplanes into equal-sized groups (*the 17 is composite there is only two because its a odd number*). The student's explanation incorrectly states that *17 is composite*, whereas 17 is prime. A composite number would have more than two factors, whereas a prime number like 17 has exactly two factors, itself and 1. [0 points]

Part C – Student Response	Part C – Annotations
$8 \times 1 = 8$ $8 \times 2 = 16$ $8 \times 3 = 24$ $8 \times 4 = 32$ its wrong because 3 × nothing equals 28 since nothing × 8 can get to 28	The student provided a correct and complete explanation as to why Gabby's claim is incorrect (*8 × 1 = 8, 8 × 2 = 16, 8 × 3 = 24, 8 × 4 = 32, its wrong because 3 × nothing equals 28 since nothing × 8 can get to 28*). [1 point]

Part D – Student Response	Part D – Annotations
4 cars would be remaining because 8 × 3 is the highest the number can go and 8 × 3 = 24 so 28 − 24 = 4	The student provided a correct answer (*4 cars would be remaining*). The explanation and work shown is correct, though not required (*because 8 × 3 is the highest the number can go and 8 × 3 = 24 so 28 − 24 = 4*). [1 point]

Item 17 – 2 points

Part A – Student Response	Part A – Annotations
number of groups: 12 number of model boats in each group: 1	The student provided a correct number of groups (*12*) and number of model boats in each group (*1*). Twelve groups of one boat is a correct factor pair for twelve model boats. [1 point]

Part B – Student Response	Part B – Annotations
Because 17 can lony be split in to by 2 so that will be 2 in all groups and 10 groups.	The student provided an incorrect explanation as to why there are only two ways for Gabby to arrange the 17 model airplanes into equal-sized groups (*Because 17 can lony* [only] *be split in to by 2 so that will be 2 in all groups and 10 groups*). The explanation lacks including either the term "prime" or the term "composite." The explanation is also unclear. [0 points]

Part C – Student Response	Part C – Annotations
Becues you can not split 20 by 8 you can oly split 8 by 8.	The student provided a correct and complete explanation as to why Gabby's claim is incorrect (*Becues you can not split 20 by 8 you can oly split 8 by 8*). [1 point]

Part D – Student Response	Part D – Annotations
3	The student provided an incorrect answer (*3*). No support (work or explanation) is required, so it is unclear where an error was made. [0 points]

Item 17 – 1 point

Part A – Student Response	Part A – Annotations
number of groups: it would be 144 boats number of model boats in each group: 144	The student provided an incorrect number of groups (*it would be 144 boats*) and an incorrect number of model boats in each group (*144*). No support (work or explanation) is required, so it is unclear where an error was made. The student may have multiplied 12 × 12 to get an answer of 144. [0 points]

Part B – Student Response	Part B – Annotations
i think 144 would be prime because the root of the number 144 can be prime.	The student provided an incorrect explanation as to why there are only two ways for Gabby to arrange the 17 model airplanes into equal-sized groups (*i think 144 would be prime because the root of the number 144 can be prime*). The explanation lacks an understanding of primes since 144 is not a prime number and shows a misunderstanding of what number to split into equal-sized groups (the explanation references 144 from the student's answer in Part A instead of the 17 model airplanes from Part B). [0 points]

Part C – Student Response	Part C – Annotations
i think its because 8+ more eights wont make 28.	The student provided a correct and complete explanation as to why Gabby's claim is incorrect (*its because 8+ more eights wont make 28*). The student correctly recognizes that no multiple of 8 results in a product of 28. [1 point]

Part D – Student Response	Part D – Annotations
64.	The student provided an incorrect answer (*64*). No support (work or explanation) is required, so it is unclear where an error was made. [0 points]

Item 17 – 0 points

Part A – Student Response	Part A – Annotations
number of groups: 5 number of model boats in each group: 7	The student provided an incorrect number of groups (*5*) and an incorrect number of model boats in each group (*7*). No support (work or explanation) is required, so it is unclear where an error was made. The student may have chosen *5* and *7* because they equal 12 when added together; however, 5 groups of 7 boats would equal 35 total boats instead of 12 total boats. [0 points]

Part B – Student Response	Part B – Annotations
you could make it 5 groups and 7 composites, i made it that way because if you think about it theres 12 model boats so that means there would be enough for 5 in 7 groups.	The student provided an incorrect explanation as to why there are only two ways for Gabby to arrange the 17 model airplanes into equal-sized groups (*you could make it 5 groups and 7 composites . . . because if you think about it theres 12 model boats so that means there would be enough for 5 in 7 groups*). The explanation uses the term "composite" incorrectly. Additionally, the explanation appears to reference the student's answer from Part A (5 groups of 7 boats) to answer Part B. [0 points]

Part C – Student Response	Part C – Annotations
I think shes incorrect that because yes 28 does have a 8 in its ones place, but whats the first number? 2. 2 is the first number in 28 so I think it would be 2 and not 8 so thats why she is inncorect.	The student provided an incorrect explanation as to why Gabby's claim is incorrect (*because yes 28 does have a 8 in its ones place, but whats the first number? 2. 2 is the first number in 28 so I think it would be 2 and not 8 so thats why she is inncorect*). [0 points]

Part D – Student Response	Part D – Annotations
3?	The student provided an incorrect answer (*3?*). No support (work or explanation) is required, so it is unclear where an error was made. [0 points]

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