

# PSSA

Pennsylvania System of School Assessment

# Math

# Grade 6

## 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<sup>1</sup> 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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<sup>1</sup> 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 6.

- A-N = The Number System
- A-R = Ratios and Proportional Relationships
- B-E = Expressions and Equations
- C-G = Geometry
- D-S = Statistics and Probability

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<sup>2</sup> 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:	<i>p</i> -value A:
Answer Key:	<i>p</i> -value B:
Depth of Knowledge:	<i>p</i> -value C:
Points Possible:	<i>p</i> -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

<sup>2</sup> 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.

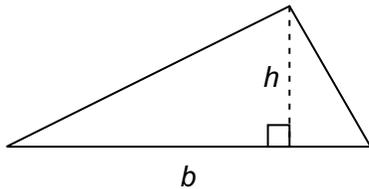
Special Categories within zero reported separately:

BLK (blank)	Blank, entirely erased, or written refusal to respond
OT	Off task
LOE	Response in a language other than English
IL	Illegible

Grade 6 Formula Sheet

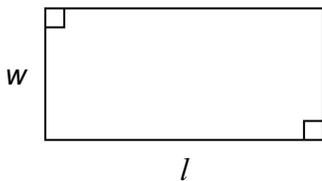
Formulas that you may need on this test are found below. 2025  
 You may refer back to this page at any time during the mathematics test. Grade 6

**Triangle**



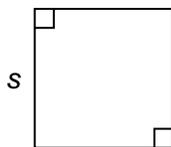
$$A = \frac{1}{2}bh$$

**Rectangle**



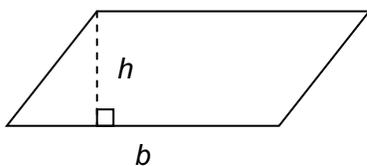
$$A = lw$$

**Square**



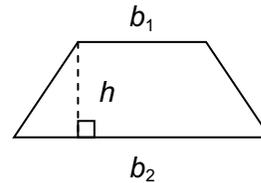
$$A = s^2$$

**Parallelogram**



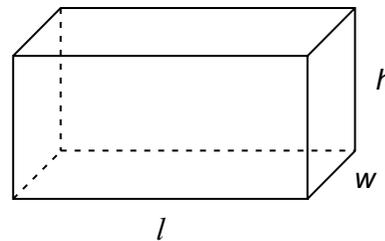
$$A = bh$$

**Trapezoid**



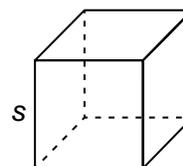
$$A = \frac{1}{2}h(b_1 + b_2)$$

**Rectangular Prism**



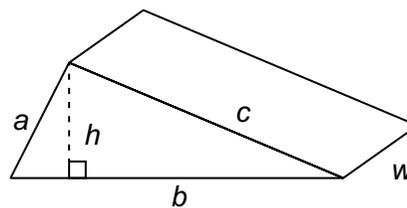
$$V = lwh \quad SA = 2lw + 2lh + 2wh$$

**Cube**



$$V = s \cdot s \cdot s \quad SA = 6s^2$$

**Triangular Prism**



$$SA = bh + aw + bw + cw$$

## PSSA MATHEMATICS GRADE 6

## 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-N.2.1.1	B	1	1	9%	43%*	25%	22%
2	A-N.1	D	1	1	22%	16%	18%	43%*
3	A-N.1.1.1	A	2	1	39%*	24%	23%	13%
4	A-N.3.2	A	1	1	54%*	24%	13%	8%
5	A-R.1.1.3	A	2	1	63%*	15%	17%	6%
6	A-R.1.1.4	C	2	1	5%	10%	53%*	31%
7	A-R.1.1.5	B	1	1	7%	77%*	10%	6%
8	B-E.1.1.2	D	1	1	8%	17%	23%	51%*
9	B-E.1.1.4	D	2	1	15%	18%	19%	47%*
10	B-E.2.1	A	2	1	74%*	14%	8%	5%
11	B-E.2.1.1	C	1	1	19%	20%	45%*	16%
12	B-E.2.1.4	C	1	1	6%	31%	55%*	7%
13	B-E.3.1	D	2	1	23%	24%	24%	28%*
14	C-G.1.1.2	B	2	1	18%	51%*	13%	17%
15	C-G.1.1.3	C	1	1	8%	13%	69%*	10%
16	C-G.1.1.5	B	2	1	29%	61%*	5%	5%

## Open-Ended

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	D-S.1.1 A-N.3.1.1	4	3	1.15

## Mathematics Test Directions

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

You may not 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**, 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	D-S.1.1 A-N.3.1.1
Depth of Knowledge	3
Points Possible	4
Mean Score	1.15

#### Assessment Anchor this item will be reported under:

**M06.D-S.1** Demonstrate understanding of statistical variability by summarizing and describing distributions.

#### Specific Anchor Descriptor addressed by this item:

**M06.D-S.1.1** Display, analyze, and summarize numerical data sets in relation to their context.

**M06.A-N.3.1** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values and locations on the number line and coordinate plane.

#### Item-Specific Scoring Guideline

Score	In this item, the student . . .
4	Demonstrates a thorough understanding of how to demonstrate statistical variability by summarizing and describing distributions by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of how to demonstrate statistical variability by summarizing and describing distributions by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of how to demonstrate statistical variability by summarizing and describing distributions by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of how to demonstrate statistical variability by summarizing and describing distributions.
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 how to demonstrate statistical variability by summarizing and describing distributions.
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 and complete response

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

**What?**

**Sample Response:**

At the end of some month last year, there was 1 less zoo member than at the end of the previous month.

**OR equivalent**

**Part B (1 point):**

1 point for correct answer

**What?**

8 (months)

**Part C (1 point):**

1 point for correct answer

**What?**

2.5 (members)

**OR**

a gain of 2.5 members

**Part D (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:**

The mean is skewed by the outlier at  $-6$ .

**OR equivalent**

**Sample Student Responses**

Item 17 – 4 points

<b>Part A – Student Response</b>	<b>Part A – Annotations</b>
The x above $-1$ on the line plot represents that for 1 of the twelve months the zoo lost 1 membership.	The student provided a correct response for what the x above $-1$ on the line plot represents ( <i>for 1 of the twelve months the zoo lost 1 membership</i> ). [1 point]

<b>Part B – Student Response</b>	<b>Part B – Annotations</b>
8 months gained members	The student provided the correct answer ( <i>8 months gained members</i> ). While support is not required for Part B, the student likely counted the number of positive changes in zoo memberships on the line plot. [1 point]

<b>Part C – Student Response</b>	<b>Part C – Annotations</b>
2.5	The student provided the correct answer (2.5). While support is not required for Part C, the student likely arranged the data points from least to greatest, saw that the set had two middle numbers (2 and 3), and calculated the mean of those two middle numbers. [1 point]

<b>Part D – Student Response</b>	<b>Part D – Annotations</b>
The median is a better predictor of the monthly change in zoo members than the mean because there is an outlier in the data set: $-6$ . Whenever there is an outlier, you always want to use the median rather than the mean, because the outlier will pull the mean higher or lower, but doesn't do much to the median.	The student provided a correct and complete explanation as to why the median is a better predictor of the monthly change in zoo members than the mean ( <i>because there is an outlier in the data set: <math>-6</math></i> ). [1 point]

Item 17 – 3 points

Part A – Student Response	Part A – Annotations
<p>The x above <math>-1</math> on the line plot represents one person that left the zoo membership. This represents this because one person that quit could be a negative in return of employment or volenteere.</p>	<p>The student provided a correct response for what the x above <math>-1</math> on the line plot represents (<i>one person that left the zoo membership</i>). [1 point]</p>

Part B – Student Response	Part B – Annotations
<p>5 months gained zoo memberships since Kelly has started because there are 5 positive months with an uprice of memberships such as 1, 2, 3, 4, 5 months</p>	<p>The student provided an incorrect answer (<i>5 months</i>). Though not required, the explanation provided (<i>because there are 5 positive months with an uprice [uprise] of memberships such as 1, 2, 3, 4, 5 months</i>) shows a misinterpretation of the line plot. The 1, 2, 3, 4, 5 labels the student refers to represent the changes in zoo memberships, not months. [0 points]</p>

Part C – Student Response	Part C – Annotations
<p>The median of monthly change during Kelly’s 12 month recartion of the data is <math>2\frac{1}{2}</math> zoo memberships.</p> <p><del>6</del>, <del>-1</del>, <del>0</del>, <del>0</del>, <del>1</del>, <del>2</del>, <del>3</del>, <del>3</del>, <del>4</del>, <del>4</del>, <del>5</del></p>	<p>The student provided the correct answer (<math>2\frac{1}{2}</math>). The work shown is correct, though not required. The student wrote out the data points from least to greatest and crossed off values until the middle two values were found. The student then likely found the average of the two middle values. [1 point]</p>

Part D – Student Response	Part D – Annotations
<p>The median is a better predictor of monthly change of the zoo memberships because the data consits of an outlier <math>-6</math> because the data is scuwed to the right of the graph.</p>	<p>The student provided a correct and complete explanation as to why the median is a better predictor of the monthly change in zoo members than the mean (<i>because the data consits of an outlier <math>-6</math></i>). [1 point]</p>

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Item 17 – 2 points

<b>Part A – Student Response</b>	<b>Part A – Annotations</b>
The x means zoo membership	The student provided an incorrect response for what the x above $-1$ on the line plot represents ( <i>The x means zoo membership</i> ). [0 points]
<b>Part B – Student Response</b>	<b>Part B – Annotations</b>
8 months	The student provided the correct answer ( <i>8 months</i> ). While support is not required for Part B, the student likely counted the number of positive changes in zoo memberships on the line plot. [1 point]
<b>Part C – Student Response</b>	<b>Part C – Annotations</b>
$-6, -1, 0, 0, 1, 2, 3, 3, 3, 4, 4, 5$  The median is $2\frac{1}{2}$	The student provided the correct answer ( $2\frac{1}{2}$ ). The work shown is correct, though not required. The student wrote out the data points from least to greatest. The student then likely found the average of the two middle values. [1 point]
<b>Part D – Student Response</b>	<b>Part D – Annotations</b>
The median is in between two numbers an the mean is the bigger number	The student provided an incorrect explanation as to why the median is a better predictor of the monthly change in zoo members than the mean ( <i>The median is in between two numbers an the mean is the bigger number</i> ). [0 points]

Item 17 – 1 point

Part A – Student Response	Part A – Annotations
The x above the $-1$ represents how many people were at the zoo that day/month.	The student provided an incorrect response for what the x above $-1$ on the line plot represents ( <i>how many people were at the zoo that day/month</i> ). [0 points]
Part B – Student Response	Part B – Annotations
8 monts gained members	The student provided the correct answer ( <i>8 monts gained members</i> ). While support is not required for Part B, the student likely counted the number of positive changes in zoo memberships on the line plot. [1 point]
Part C – Student Response	Part C – Annotations
The median monthly change was 0 members.	The student provided an incorrect answer ( <i>0 members</i> ). No support (work or explanation) is required, so it is unclear where an error was made. [0 points]
Part D – Student Response	Part D – Annotations
It's better because it has more members than any other from the 12 monts of the membership zoo	The student provided an incorrect explanation as to why the median is a better predictor of the monthly change in zoo members than the mean ( <i>because it has more members than any other from the 12 monts of the membership zoo</i> ). [0 points]

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Item 17 – 0 points

<b>Part A – Student Response</b>	<b>Part A – Annotations</b>
zoo memberships	The student provided an incorrect response for what the x above $-1$ on the line plot represents ( <i>zoo memberships</i> ). [0 points]

<b>Part B – Student Response</b>	<b>Part B – Annotations</b>
7	The student provided an incorrect answer (7). No support (work or explanation) is required, so it is unclear where an error was made. [0 points]

<b>Part C – Student Response</b>	<b>Part C – Annotations</b>
3, 2	The student provided an incorrect answer (3, 2). No support (work or explanation) is required, so it is unclear where an error was made. The student may have arranged the data from least to greatest to find the two middle values, which may have been provided as the answer, but did not calculate the mean of those two values. [0 points]

<b>Part D – Student Response</b>	<b>Part D – Annotations</b>
It is greater.	The student provided an incorrect explanation as to why the median is a better predictor of the monthly change in zoo members than the mean ( <i>It is greater</i> ). [0 points]

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# **PSSA Grade 6 Math Item Sampler Scoring Guide**

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