



pennsylvania
DEPARTMENT OF EDUCATION

**The Pennsylvania System of School
Assessment
Mathematics
Item and Scoring Sampler
2016–2017
Grade 3**

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INTRODUCTION

General Introduction

The Pennsylvania Department of Education 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 Anchor documents, assessment handbooks, and content-based item and scoring samplers. This Item and Scoring Sampler is a useful tool for Pennsylvania educators in preparing local instructional programs. It can also be useful in preparing students for the statewide assessment.

Pennsylvania Core Standards (PCS)

This sampler contains examples of test questions that are aligned to the new Pennsylvania Core Standards-based 2013 PSSA Assessment Anchors and Eligible Content. The Mathematics, Reading, and Writing PSSA transitioned to PCS-based operational Mathematics and English Language Arts assessments starting with the spring 2015 PSSA administration.

The 2013 PCS-aligned Assessment Anchor and Eligible Content documents are posted on this portal:

- www.education.pa.gov [Hover over “K–12,” select “Assessment and Accountability,” and select “Pennsylvania System of School Assessment (PSSA).” Then select “Assessment Anchors” from the “Other Materials” list on the right side of the screen.]

What Is Included

This sampler contains test questions (items) that have been written to align to the Assessment Anchors that are based on the Pennsylvania Core Standards (PCS). The test questions provide an idea of the types of items that will appear on an operational, PCS-based PSSA. Each sample test question has been through a rigorous review process to ensure alignment with the Assessment Anchors.

Purpose and Uses

The items in this sampler may be used as examples for creating assessment items at the classroom level, and they may also be copied and used as part of a local instructional program.¹ Classroom teachers may find it beneficial to have students respond to the open-ended item in this sampler. Educators can then use the sampler as a guide to score the responses either independently or together with colleagues within a school or district.

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 open-ended (OE) item is designed to take approximately ten to fifteen minutes to complete.

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During the administration of the PSSA, students are given additional time as necessary to complete the test items. Each OE item in mathematics is scored using an item-specific scoring guideline based on a 0–4-point scale. In this sampler, every item-specific scoring guideline is combined with examples of student responses that represent each score point to form a practical, item-specific scoring guide.

This sampler also includes the *General Description of Scoring Guidelines for Mathematics Open-Ended Questions* that students will have access to during a PSSA mathematics administration. The general description of scoring guidelines can be distributed to students for use during local assessments and can also be used by educators when scoring local assessments.²

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 represent the limits of the content of the mathematics questions.

Testing Time and Mode of Testing Delivery for the PSSA

The PSSA is delivered in traditional paper-and-pencil format as well as in an online format. The estimated time to respond to a test question is the same for both methods of test delivery. During an official testing administration, students are given additional time as necessary to complete the test questions. The following table shows the estimated response time for each item type.

Mathematics Item Type	MC	OE
Estimated Response Time (minutes)	2	10 to 15

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

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INFORMATION ABOUT MATHEMATICS

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 3.

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 multiple-choice and open-ended items assessing these categories are included in this booklet.

General Description of Scoring Guidelines for Mathematics Open-Ended Questions

4: The response demonstrates a **thorough** understanding of 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” 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

OT Off Task

LOE Response in a language other than English

IL Illegible

Item and Scoring Sampler Format

This sampler includes the test directions and scoring guidelines that appear in the PSSA Mathematics assessments. Each multiple-choice item is followed by a table that includes the alignment, the answer key, the depth of knowledge (DOK) level, the percentage³ of students who chose each answer option, and a brief answer option analysis or rationale. The open-ended item is followed by a table that includes the item alignment, DOK level, and mean student score. Additionally, each of the included item-specific scoring guidelines 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.

Example Multiple-Choice Item Information Table

Item Information	
Alignment	Assigned AAEC
Answer Key	Correct answer
Depth of Knowledge	Assigned DOK
p-value A	Percentage of students who selected each option
p-value B	Percentage of students who selected each option
p-value C	Percentage of students who selected each option
p-value D	Percentage of students who selected each option
Option Annotations	Brief answer option analysis or rationale

Example Open-Ended Item Information Table

Alignment: Assigned AAEC

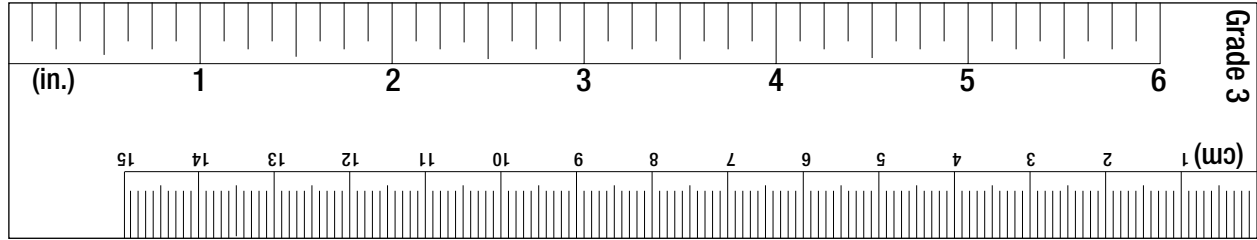
Depth of Knowledge: Assigned DOK

Mean Score

³All *p*-value percentages listed in the item information tables have been rounded.

Grade 3 Ruler

The ruler shown below is not intended to be used to measure. It has been included as a representation of the rulers that will be provided for students when they take the test. Due to differences in printers, the ruler and measurement questions may not accurately reproduce to scale.



MATHEMATICS TEST DIRECTIONS

You may not use a calculator on this test.

You may need a ruler for question(s) on this test.

Directions for Multiple-Choice Questions

Some questions will ask you to select an answer from amount four choices.

Directions: On the following pages are the Mathematics questions.

For the multiple-choice questions:

First solve the problem on scratch paper.

Choose the correct answer and record your choice in the booklet.

If none of the choices matches your answer, go back and check your work for possible errors.

Only one of the answers provided is the correct response.

Directions for Open-Ended Questions:

Some questions will require you to write your response.

For the open-ended questions:

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 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.

Write your response in the appropriate location within the response box in the booklet. Some answers may require graphing, plotting, labeling, drawing, or shading. If you use scratch paper, be sure to transfer your final response and any needed work or reasoning to the booklet.

MULTIPLE-CHOICE ITEMS

1. Joel is putting gray and white cubes together into a group.

In his group, $\frac{2}{6}$ of the cubes are white.

Which could be the group Joel put together?

- A. Graphic of 6 cubes. 4 cubes are white and 2 cubes are gray.
- B. Graphic of 6 cubes. 4 cubes are gray and 2 cubes are white.
- C. Graphic of 8 cubes. 6 cubes are white and 2 cubes are gray.
- D. Graphic of 8 cubes. 6 cubes are gray and 2 cubes are white.

Item Information	
Alignment	A-F.1.1.1
Answer Key	B
Depth of Knowledge	1
p-value A	38%
p-value B	49% (correct answer)
p-value C	7%
p-value D	6%
Option Annotations	A. $\frac{4}{6}$ ($\frac{2}{6}$ are gray) B. correct C. $\frac{6}{8}$ (ratio of 6 to 2) D. $\frac{2}{8}$ (ratio of 2 to 6)

2. Roger has a box that is $3\frac{3}{4}$ inches wide.

The length of the box is $4\frac{1}{4}$ inches.

The height of the box is $2\frac{2}{4}$ inches.

Which number line shows each measurement of Roger’s box?

- A. A number line is shown. The numbers below the number line are 2, 3, 4, and 5. There are three points on the number line.
- B. A number line is shown. The numbers below the number line are 2, 3, 4, and 5. There are three points on the number line.
- C. A number line is shown. The numbers below the number line are 2, 3, 4, and 5. There are three points on the number line.
- D. A number line is shown. The numbers below the number line are 2, 3, 4, and 5. There are three points on the number line.

Item Information	
Alignment	A-F.1.1.2 A-F.1.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	49% (correct answer)
p-value B	15%
p-value C	16%
p-value D	20%
Option Annotations	A. correct B. switches fractional parts for width and length C. switches fractional parts for length and height D. switches fractional parts for width and height

3. Which comparison is true?
- A. $2/8$ greater than $5/8$
 - B. $2/8$ greater than $7/8$
 - C. $5/8$ less than $2/8$
 - D. $5/8$ less than $7/8$

Item Information	
Alignment	A-F.1.1.5
Answer Key	D
Depth of Knowledge	1
p-value A	10%
p-value B	7%
p-value C	9%
p-value D	74% (correct answer)
Option Annotations	A. incorrectly reads symbol B. incorrectly reads symbol C. incorrectly reads symbol D. correct

4. Katie earns \$5 for each lawn she mows.

Last week she earned \$25 mowing lawns.

This week she earned \$15 mowing lawns.

Which statement correctly explains how many more lawns Katie mowed last week than this week?

- A. Katie mowed 2 more lawns because $25 \div 5$ is 2 more than $15 \div 5$.
- B. Katie mowed 10 more lawns because $25 - 5$ is 10 more than $15 - 5$.
- C. Katie mowed 10 more lawns because $25 + 5$ is 10 more than $15 + 5$.
- D. Katie mowed 50 more lawns because 25×5 is 50 more than 15×5 .

Item Information	
Alignment	B-O.1 B-O.3.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	44% (correct answer)
p-value B	23%
p-value C	21%
p-value D	12%
Option Annotations	A. correct B. uses wrong operation C. uses wrong operation D. uses wrong operation

5. Amar puts all of his crayons into boxes.

There are exactly 8 crayons in each box.

Which expression shows how Amar could have found the number of crayons to put into each box?

- A. $28 \div 4$
- B. $32 \div 4$
- C. $36 \div 4$
- D. $40 \div 4$

Item Information	
Alignment	B-O.1.1.2
Answer Key	B
Depth of Knowledge	2
p-value A	28%
p-value B	51% (correct answer)
p-value C	10%
p-value D	11%
Option Annotations	A. 7 crayons per box B. correct C. 9 crayons per box D. 10 crayons per box

6. A company orders 40 cases of paper for 8 stores.

A worker wrote the equation shown below.

$$40 \div 8 = \text{blank}$$

Which statement could explain what the missing number in the equation represents?

- A. The company ordered 5 extra cases of paper.
- B. The company ordered 32 extra cases of paper.
- C. The company will send 5 cases of paper to each of its 8 stores.
- D. The company will send 6 cases of paper to each of its 8 stores.

Item Information	
Alignment	B-O.1.2.2 B-O.1.1.2
Answer Key	C
Depth of Knowledge	2
p-value A	28%
p-value B	11%
p-value C	51% (correct answer)
p-value D	10%
Option Annotations	A. gets the correct number but the wrong interpretation, thinking of remainders B. $40 - 8$ and gets the incorrect interpretation, thinking of remainders C. correct D. thinks $40 \div 8 = 6$

7. There are 8 rows of computers in a classroom.

There are 3 computers in each row.

At each computer, 2 students are working together.

The expression $8 \times 3 \times 2$ represents how many students are in the classroom.

Which expression also represents how many students there are in the classroom?

- A. 3×10
- B. 3×16
- C. 11×2
- D. 21×2

Item Information	
Alignment	B-O.2.1.2
Answer Key	B
Depth of Knowledge	2
p-value A	20%
p-value B	50% (correct answer)
p-value C	16%
p-value D	14%
Option Annotations	A. adds 8 and 2 instead of multiplying B. correct C. adds 8 and 3 instead of multiplying D. makes an error in multiplication

8. Mr. Randall is starting a tree farm.

He has planted 72 trees in 9 equal rows.

Mr. Randall used an equation to find the number of trees he planted in each row.

The equation he used was $9 \times \text{blank} = 72$.

Which equation shows another way to find the number of trees blank Mr. Randall planted in each row?

- A. $72 + 9 = \text{blank}$
- B. $72 \div 9 = \text{blank}$
- C. $72 \times 9 = \text{blank}$
- D. $72 - 9 = \text{blank}$

Item Information	
Alignment	B-O.2.2.1
Answer Key	B
Depth of Knowledge	1
p-value A	4%
p-value B	73% (correct answer)
p-value C	20%
p-value D	3%
Option Annotations	A. uses wrong operation B. correct C. uses wrong operation D. uses wrong operation

9. Nate bought two 50-pound bags of birdseed.

He used 30 pounds in one week.

Which equation shows how many pounds of birdseed Nate still has?

- A. $2 + 50 - 30 = \text{blank}$
- B. $50 + 50 - 30 = \text{blank}$
- C. $2 \times 50 + 30 = \text{blank}$
- D. $50 + 50 + 30 = \text{blank}$

Item Information	
Alignment	B-O.3.1.2
Answer Key	B
Depth of Knowledge	2
p-value A	25%
p-value B	54% (correct answer)
p-value C	13%
p-value D	8%
Option Annotations	A. adds 2 instead of multiplying B. correct C. correctly multiplies by 2 but adds 30 D. correctly adds second 50 but adds 30

10. Marshawn wants to buy a bike that costs \$180.

He has saved \$60 from babysitting.

He has saved \$130 from doing yard work.

Which number sentence correctly shows whether Marshawn has saved enough money to buy the bike?

- A. $130 < 180 + 60$
- B. $180 > 130 - 60$
- C. $60 + 130 > 180$
- D. $80 - 130 < 60$

Item Information	
Alignment	B-O.3.1.7 B-O.3.1.6
Answer Key	C
Depth of Knowledge	2
p-value A	22%
p-value B	10%
p-value C	63% (correct answer)
p-value D	5%
Option Annotations	A. correct inequality but does not represent the story B. correct inequality but does not represent the story C. correct D. correct inequality but does not represent the story

11. The shapes below are all in a group because their sides have equal lengths.

Three shapes are shown. One shape has three sides, one shape has five sides, and one shape has six sides.

A quadrilateral is added to the group.

Which term **best** describes the quadrilateral that is added to the group?

- A. octagon
- B. pentagon
- C. rhombus
- D. triangle

Item Information	
Alignment	C-G.1.1.1 C-G.1.1.2
Answer Key	C
Depth of Knowledge	1
p-value A	17%
p-value B	22%
p-value C	43% (correct answer)
p-value D	18%
Option Annotations	A. not a quadrilateral, but octagon would belong in the group B. not a quadrilateral, and pentagon already in the group C. correct D. not a quadrilateral, and equilateral triangle already in the group

12. Hernando used different shapes to create the diagram of his rocket as shown below.

Hernando's Rocket

A five-sided shape is labeled body. A round shape is labeled window. A four-sided shape is labeled wing. A three-sided shape is labeled nozzle.

Which part of Hernando's diagram is a quadrilateral?

- A. body
- B. window
- C. wing
- D. nozzle

Item Information	
Alignment	C-G.1.1.2
Answer Key	C
Depth of Knowledge	1
p-value A	21%
p-value B	3%
p-value C	66% (correct answer)
p-value D	10%
Option Annotations	A. incorrect definition of quadrilateral; body is a pentagon B. incorrect definition of quadrilateral; window is not a polygon C. correct D. incorrect definition of quadrilateral; nozzle is an equilateral triangle

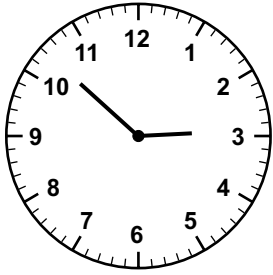
13. When Mr. Phan finished dividing a candy bar, all parts were squares with equal areas.

Which could be Mr. Phan’s candy bar after he finished dividing it?

- A. A rectangle is shown. It is divided into one large square and four small squares.
- B. A rectangle is shown. It is divided into two large squares.
- C. A rectangle is shown. It is divided into two small rectangles and one large square.
- D. A rectangle is shown. It is divided into four small rectangles.

Item Information	
Alignment	C-G.1.1.3 C-G.1.1.2
Answer Key	B
Depth of Knowledge	1
p-value A	7%
p-value B	49% (correct answer)
p-value C	2%
p-value D	42%
Option Annotations	A. identifies all the shapes as squares but does not identify them as having unequal areas B. correct C. identifies one of the shapes as a square but does not pay attention to the areas of each partition D. identifies the partitions as having equal area but misidentifies the rectangles as squares

14. Kira started riding her bike at the time shown on the clock.



She stopped riding her bike at 3:27.

How long did Kira ride her bike?

- A. 17 minutes
- B. 25 minutes
- C. 35 minutes
- D. 37 minutes

Item Information	
Alignment	D-M.1.1.1 D-M.1.1.2
Answer Key	C
Depth of Knowledge	2
p-value A	12%
p-value B	21%
p-value C	45% (correct answer)
p-value D	22%
Option Annotations	A. subtracts 10 (where minute hand is pointing) from 27 B. $52 - 27$ C. correct D. $27 + 10$

15. Gwen bought a milkshake for \$3.52.

She paid for the milkshake with \$5.00.

Which amount of money shows the correct change Gwen should receive?

- A. Picture of a 1 dollar bill, 1 quarter, 2 dimes, and 3 pennies
- B. Picture of a 1 dollar bill, 1 quarter, 2 nickels, and 3 pennies
- C. Picture of a 1 dollar bill, 2 quarters, 1 nickel, and 3 pennies
- D. Picture of a 1 dollar bill, 6 quarters, and 2 pennies

Item Information	
Alignment	D-M.1.3.2
Answer Key	A
Depth of Knowledge	2
p-value A	50% (correct answer)
p-value B	8%
p-value C	11%
p-value D	31%
Option Annotations	A. correct B. confuses dimes and nickels (\$1.38) C. does not regroup while subtracting (\$1.58) D. subtracts smaller digit from larger digit in each place value (\$2.52)

16. A picture of a garden is shown below.

Garden

A rectangle is shown. The length is 10 feet. The width is labeled with a question mark.

The perimeter of the garden is 32 feet.

What is the missing length of the side of the garden?

- A. 6 feet
- B. 10 feet
- C. 12 feet
- D. 22 feet

Item Information	
Alignment	D-M.4.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	57% (correct answer)
p-value B	7%
p-value C	10%
p-value D	26%
Option Annotations	A. correct B. confuses with other side C. $32 - 20$, forgot to divide by 2 D. $32 - 10$

OPEN-ENDED QUESTION

17. The bar graph below shows the number of students at Abigail’s school who were born outside of Pennsylvania.

The information for Ohio is not included in the bar graph.

The title of the bar graph is Students Born Outside of Pennsylvania. The label to the left of the bar graph is Number of Students. The numbers to the left of the bar graph are 0 through 18 counting by 2s. The label below the bar graph is State. The first bar is labeled Delaware and has a height between 2 and 4. The next bar is labeled Maryland and has a height of 6. The next bar is labeled New Jersey and has a height of 18. The next bar is labeled New York and has a height of 12. The last label is Ohio.

The number of students who were born in New Jersey is the same as the number of students who were born in two other states combined.

- A. What are the two other states?

PUT your answers in the **BLANKS BELOW**.

State 1:

State 2:

There are more students at Abigail’s school who were born in Maryland than were born in Ohio.

Also, there are more students who were born in Ohio than were born in Delaware.

- B. List all the possible numbers of students at Abigail’s school who could have been born in Ohio.

PUT your answer in the **BLANK BELOW**.

EXPLAIN how you found your answer.

Answer:

Abigail says that the number of students in her school who were actually born in Ohio must be an even number since only even numbers appear on the left side of the graph.

- C. **EXPLAIN** why Abigail’s reasoning is **not** correct.

Item-Specific Scoring Guideline

#17 Item Information

Alignment D-M.2

Depth of Knowledge 3

Mean Score 1.27

Assessment Anchor this item will be reported under:

M03.D-M.2—Represent and interpret data.

Specific Anchor Descriptor addressed by this item:

M03.D-M.2.1—Organize, display, and answer questions based on data.

Scoring Guide

Score	In this item, the student . . .
4	Demonstrates a thorough understanding of representing and interpreting data by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of representing and interpreting data by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of representing and interpreting data by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of representing and interpreting data.
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 representing and interpreting data.
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?	Why?
State 1: Maryland State 2: New York [Note: Order does not matter]	

Part B (2 points):

1 point for correct answer

1 point for complete explanation

OR $\frac{1}{2}$ point for correct but incomplete explanation

What?	Why?
4 or 5 [Note: student must include both numbers]	Sample Explanation: Since there were 3 students who were born in Delaware and 6 students born in Maryland, the number of students who were born in Ohio must be a whole number between 3 and 6. So the only possible numbers are 4 and 5.

Part C (1 point):

1 point for complete explanation

OR $\frac{1}{2}$ point for correct but incomplete explanation

What?	Why?
	Sample Explanation: Although only even numbers appear on the left side of the graph, an odd number can be represented by placing a bar halfway between the even-numbered lines.

STUDENT RESPONSE

Response Score: 4 points

17. The bar graph below shows the number of students at Abigail's school who were born outside of Pennsylvania.

The information for Ohio is not included in the bar graph.

The title of the bar graph is Students Born Outside of Pennsylvania. The label to the left of the bar graph is Number of Students. The numbers to the left of the bar graph are 0 through 18 counting by 2s. The label below the bar graph is State. The first bar is labeled Delaware and has a height between 2 and 4. The next bar is labeled Maryland and has a height of 6. The next bar is labeled New Jersey and has a height of 18. The next bar is labeled New York and has a height of 12. The last label is Ohio.

The number of students who were born in New Jersey is the same as the number of students who were born in two other states combined.

- A. What are the two other states?

PUT your answers in the **BLANKS BELOW**.

Student Response: State 1: New York

State 2: Maryland

Annotation: The student has given a correct answer (order does not matter).

There are more students at Abigail’s school who were born in Maryland than were born in Ohio.

Also, there are more students who were born in Ohio than were born in Delaware.

- B. List all the possible numbers of students at Abigail’s school who could have been born in Ohio.

PUT your answer in the **BLANK BELOW**.

EXPLAIN how you found your answer.

Student Response: 4 and 5 are less than 6. 4 and 5 are more than 3.

Answer: 4–5

Annotation: The student has given a correct answer and complete explanation.

Abigail says that the number of students in her school who were actually born in Ohio must be an even number since only even numbers appear on the left side of the graph.

- C. **EXPLAIN** why Abigail’s reasoning is **not** correct.

Student Response: Her reasoning is not correct because you can put your bar in between two even numbers and get a odd number like in Delaware.

Annotation: The student has given a complete explanation.

STUDENT RESPONSE

Response Score: 3 points

17. The bar graph below shows the number of students at Abigail's school who were born outside of Pennsylvania.

The information for Ohio is not included in the bar graph.

The title of the bar graph is Students Born Outside of Pennsylvania. The label to the left of the bar graph is Number of Students. The numbers to the left of the bar graph are 0 through 18 counting by 2s. The label below the bar graph is State. The first bar is labeled Delaware and has a height between 2 and 4. The next bar is labeled Maryland and has a height of 6. The next bar is labeled New Jersey and has a height of 18. The next bar is labeled New York and has a height of 12. The last label is Ohio.

The number of students who were born in New Jersey is the same as the number of students who were born in two other states combined.

- A. What are the two other states?

PUT your answers in the **BLANKS BELOW**.

Student Response: State 1: New York

State 2: Maryland

Annotation: The student has given a correct answer.

There are more students at Abigail’s school who were born in Maryland than were born in Ohio.

Also, there are more students who were born in Ohio than were born in Delaware.

- B. List all the possible numbers of students at Abigail’s school who could have been born in Ohio.

PUT your answer in the **BLANK BELOW**.

EXPLAIN how you found your answer.

Student Response: Four children because less than Maryland but more than Delaware

Answer: 4 children

Annotation: The student has given an incorrect answer (both numbers must be listed) and a complete explanation.

Abigail says that the number of students in her school who were actually born in Ohio must be an even number since only even numbers appear on the left side of the graph.

- C. **EXPLAIN** why Abigail’s reasoning is **not** correct.

Student Response: She is not correct because Delaware is odd it has 3!

Annotation: The student has given a complete explanation.

STUDENT RESPONSE

Response Score: 2 points

17. The bar graph below shows the number of students at Abigail's school who were born outside of Pennsylvania.

The information for Ohio is not included in the bar graph.

The title of the bar graph is Students Born Outside of Pennsylvania. The label to the left of the bar graph is Number of Students. The numbers to the left of the bar graph are 0 through 18 counting by 2s. The label below the bar graph is State. The first bar is labeled Delaware and has a height between 2 and 4. The next bar is labeled Maryland and has a height of 6. The next bar is labeled New Jersey and has a height of 18. The next bar is labeled New York and has a height of 12. The last label is Ohio..

The number of students who were born in New Jersey is the same as the number of students who were born in two other states combined.

- A. What are the two other states?

PUT your answers in the **BLANKS BELOW**.

Student Response: State 1: Maryland

State 2: New York

Annotation: The student has given a correct answer.

There are more students at Abigail's school who were born in Maryland than were born in Ohio.

Also, there are more students who were born in Ohio than were born in Delaware.

- B. List all the possible numbers of students at Abigail's school who could have been born in Ohio.

PUT your answer in the **BLANK BELOW**.

EXPLAIN how you found your answer.

Student Response: I found my answer because I looked at the bar graph.

Answer: 4, 5

Annotation: The student has given a correct answer, but the explanation is insufficient for any credit.

Abigail says that the number of students in her school who were actually born in Ohio must be an even number since only even numbers appear on the left side of the graph.

- C. **EXPLAIN** why Abigail's reasoning is **not** correct.

Student Response: She is not right because in between the even numbers there are odd ones.

Annotation: The student has given a correct but incomplete explanation (no reference to the bars or the states).

STUDENT RESPONSE

Response Score: 1 point

17. The bar graph below shows the number of students at Abigail's school who were born outside of Pennsylvania.

The information for Ohio is not included in the bar graph.

The title of the bar graph is Students Born Outside of Pennsylvania. The label to the left of the bar graph is Number of Students. The numbers to the left of the bar graph are 0 through 18 counting by 2s. The label below the bar graph is State. The first bar is labeled Delaware and has a height between 2 and 4. The next bar is labeled Maryland and has a height of 6. The next bar is labeled New Jersey and has a height of 18. The next bar is labeled New York and has a height of 12. The last label is Ohio.

The number of students who were born in New Jersey is the same as the number of students who were born in two other states combined.

- A. What are the two other states?

PUT your answers in the **BLANKS BELOW**.

Student Response: State 1: New York

State 2: Maryland

Annotation: The student has given a correct answer.

There are more students at Abigail's school who were born in Maryland than were born in Ohio.

Also, there are more students who were born in Ohio than were born in Delaware.

- B. List all the possible numbers of students at Abigail's school who could have been born in Ohio.

PUT your answer in the **BLANK BELOW**.

EXPLAIN how you found your answer.

Student Response: I found this answer because Delaware can be 20 and Maryland can be 40

Answer: 30

Annotation: The student has given an incorrect answer and incorrect explanation.

Abigail says that the number of students in her school who were actually born in Ohio must be an even number since only even numbers appear on the left side of the graph.

- C. **EXPLAIN** why Abigail's reasoning is **not** correct.

Student Response: It is not correct because Ohio can be one off.

Annotation: The student has given an incorrect explanation.

STUDENT RESPONSE

Response Score: 0 points

17. The bar graph below shows the number of students at Abigail's school who were born outside of Pennsylvania.

The information for Ohio is not included in the bar graph.

The title of the bar graph is Students Born Outside of Pennsylvania. The label to the left of the bar graph is Number of Students. The numbers to the left of the bar graph are 0 through 18 counting by 2s. The label below the bar graph is State. The first bar is labeled Delaware and has a height between 2 and 4. The next bar is labeled Maryland and has a height of 6. The next bar is labeled New Jersey and has a height of 18. The next bar is labeled New York and has a height of 12. The last label is Ohio.

The number of students who were born in New Jersey is the same as the number of students who were born in two other states combined.

- A. What are the two other states?

PUT your answers in the **BLANKS BELOW**.

Student Response: State 1: New Jersey

State 2: New York

Annotation: The student has given an incorrect answer (both states must be correct for any credit).

There are more students at Abigail’s school who were born in Maryland than were born in Ohio.

Also, there are more students who were born in Ohio than were born in Delaware.

- B. List all the possible numbers of students at Abigail’s school who could have been born in Ohio.

PUT your answer in the **BLANK BELOW**.

EXPLAIN how you found your answer.

Student Response: Well you see that nobody live there so it could be 2 people was born in Ohio

Answer: 2

Annotation: The student has given an incorrect answer and incorrect explanation.

Abigail says that the number of students in her school who were actually born in Ohio must be an even number since only even numbers appear on the left side of the graph.

- C. **EXPLAIN** why Abigail’s reasoning is **not** correct.

Student Response: because it doesn’t have to be even

Annotation: The student has given an incorrect explanation.

MATHEMATICS—SUMMARY DATA

MULTIPLE-CHOICE

Sample Number	Alignment	Answer Key	Depth of Knowledge	p-value A	p-value B	p-value C	p-value D
1	A-F.1.1.1	B	1	38%	49% (correct answer)	7%	6%
2	A-F.1.1.2 A-F.1.1.1	A	2	49% (correct answer)	15%	16%	20%
3	A-F.1.1.5	D	1	10%	7%	9%	74% (correct answer)
4	B-O.1 B-O.3.1.1	A	2	44% (correct answer)	23%	21%	12%
5	B-O.1.1.2	B	2	28%	51% (correct answer)	10%	11%
6	B-O.1.2.2 B-O.1.1.2	C	2	28%	11%	51% (correct answer)	10%
7	B-O.2.1.2	B	2	20%	50% (correct answer)	16%	14%
8	B-O.2.2.1	B	1	4%	73% (correct answer)	20%	3%
9	B-O.3.1.2	B	2	25%	54% (correct answer)	13%	8%
10	B-O.3.1.7 B-O.3.1.6	C	2	22%	10%	63% (correct answer)	5%
11	C-G.1.1.1 C-G.1.1.2	C	1	17%	22%	43% (correct answer)	18%
12	C-G.1.1.2	C	1	21%	3%	66% (correct answer)	10%
13	C-G.1.1.3 C-G.1.1.2	B	1	7%	49% (correct answer)	2%	42%
14	D-M.1.1.1 D-M.1.1.2	C	2	12%	21%	45% (correct answer)	22%

PSSA MATHEMATICS GRADE 3

Sample Number	Alignment	Answer Key	Depth of Knowledge	p-value A	p-value B	p-value C	p-value D
15	D-M.1.3.2	A	2	50% (correct answer)	8%	11%	31%
16	D-M.4.1.1	A	2	57% (correct answer)	7%	10%	26%

TEXT-DEPENDENT ANALYSIS AND WRITING PROMPT

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	D-M.2	4	3	1.27

PSSA Grade 3 Mathematics Item and Scoring Sampler