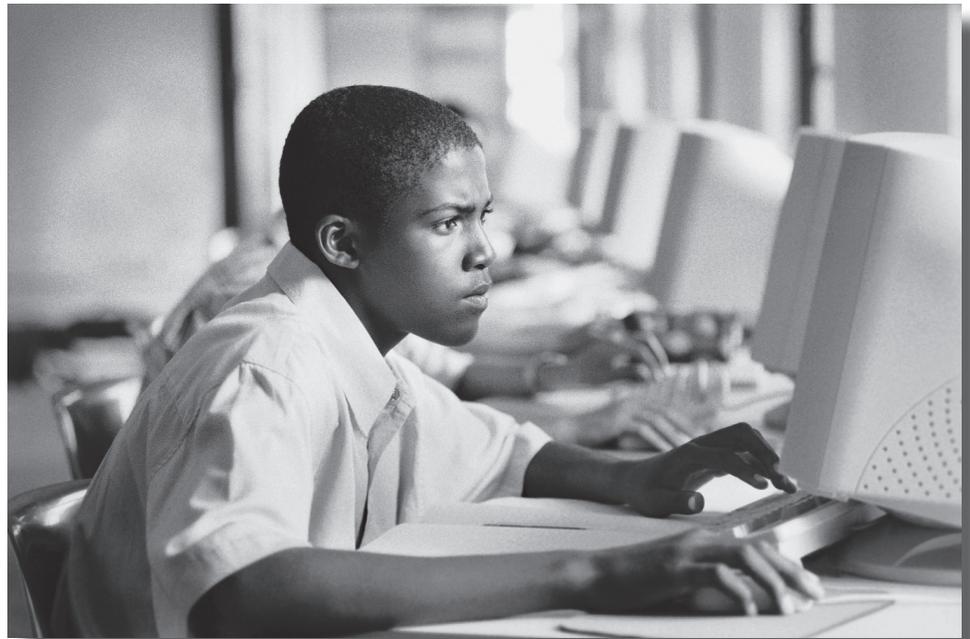




pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Mathematics Item and Scoring Sampler



2016–2017
Grade 7

INFORMATION ABOUT MATHEMATICS

Introduction	1
General Introduction	1
Pennsylvania Core Standards (PCS)	1
What Is Included	1
Purpose and Uses	1
Item Format and Scoring Guidelines	1
Item Alignment	2
Testing Time and Mode of Testing Delivery for the PSSA	2
Mathematics Reporting Categories	2
General Description of Scoring Guidelines for Mathematics Open-Ended Questions	3
Item and Scoring Sampler Format	4
Grade 7 Formula Sheet	5
Mathematics Test Directions.....	6
Multiple-Choice Items.....	7
Open-Ended Question	24
Item-Specific Scoring Guideline.....	26
Mathematics—Summary Data.....	38

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. 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.¹

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

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	• C = Geometry
• B = Algebraic Concepts	• 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 7.

- 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 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 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” 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

LOEResponse in a language other than English

ILIllegible

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 percentage² 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		Option Annotations					
Alignment	Assigned AAEC	Brief answer option analysis or rationale					
Answer Key	Correct Answer						
Depth of Knowledge	Assigned DOK						
<i>p</i>-values							
A	B					C	D
Percentage of students who selected each option							

Example Open-Ended Item Information Table

Alignment	Assigned AAEC	Depth of Knowledge	Assigned DOK	Mean Score	
------------------	---------------	---------------------------	--------------	-------------------	--

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

Grade 7 Formula Sheet

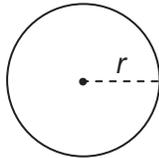
Formulas that you may need to work questions on this test are found below.
 You may refer back to this page at any time during the mathematics test.
 You may use calculator π or the number 3.14.

2016
 Grade 7

Simple Interest

$$I = Prt$$

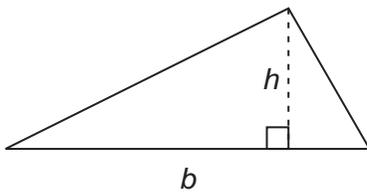
Circle



$$C = 2\pi r$$

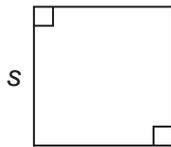
$$A = \pi r^2$$

Triangle



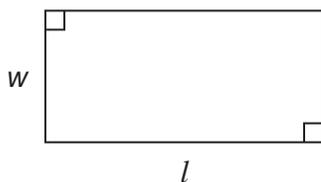
$$A = \frac{1}{2}bh$$

Square



$$A = s^2$$

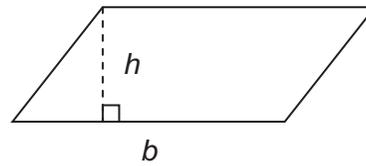
Rectangle



$$A = lw$$

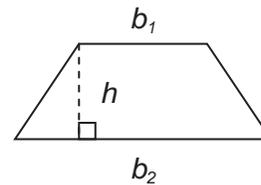
$$P = 2l + 2w$$

Parallelogram



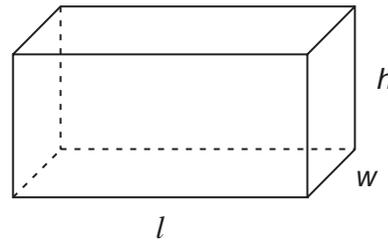
$$A = bh$$

Trapezoid



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

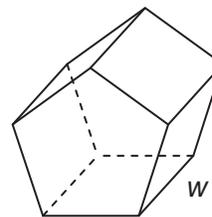
Rectangular Prism



$$V = lwh$$

$$SA = 2lw + 2lh + 2wh$$

Polygonal Prism



$$V = Bw, \text{ where } B = \text{area of the base}$$

$$SA = Pw + 2B, \text{ where } P = \text{perimeter of base}$$

MATHEMATICS TEST DIRECTIONS

On the following pages are the mathematics questions.

- You may not use a calculator for question 1. You may use a calculator for all other questions on this test.

Directions for Multiple-Choice Questions:

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

For the multiple-choice questions:

- First solve the problem on scratch paper.
- Choose the correct answer and record your choice in the answer 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 answer 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 answer booklet.

Question 1 in this sampler is to be solved without the use of a calculator.

MULTIPLE-CHOICE ITEMS

1. Subtract: $-10 - 21$

- A. -31
- B. -11
- C. 11
- D. 31

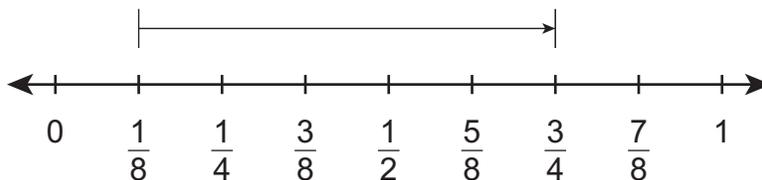
Item Information				Option Annotations
Alignment		A-N.1.1.1		A. correct B. $10 + -21$ C. $-10 + 21$ D. $10 + 21$
Answer Key		A		
Depth of Knowledge		1		
<i>p</i> -values				
A	B	C	D	
57%	11%	23%	9%	

A calculator is permitted for use in solving questions 2–17 in this sampler.

2. Laura has a board that measures $6\frac{11}{12}$ feet in length. She will cut the board into pieces that are each $\frac{11}{12}$ foot long. How many full pieces can Laura cut from her board, and how much of her board will be remaining?
- A. Laura can cut the board into 6 pieces with nothing remaining.
 - B. Laura can cut the board into 6 pieces with $\frac{11}{12}$ foot remaining.
 - C. Laura can cut the board into 7 pieces with $\frac{1}{12}$ foot remaining.
 - D. Laura can cut the board into 7 pieces with $\frac{1}{2}$ foot remaining.

Item Information				Option Annotations
Alignment		A-N.1.1		A. thinks $6\frac{11}{12} = 66/12$ B. removes the whole number part from the length of the board C. converts $6\frac{11}{12}$ to an improper fraction by doing $6 \times 11 + 12$ D. correct
Answer Key		D		
Depth of Knowledge		2		
p-values				
A	B	C	D	
16%	19%	22%	43%	

3. The gas tank in Phil’s car was $\frac{1}{8}$ full. He put more gasoline in the car’s gas tank. The number line below shows how full the car’s gas tank was before and after Phil put in more gasoline.



Which equation represents the change in the amount of gasoline in the car’s tank?

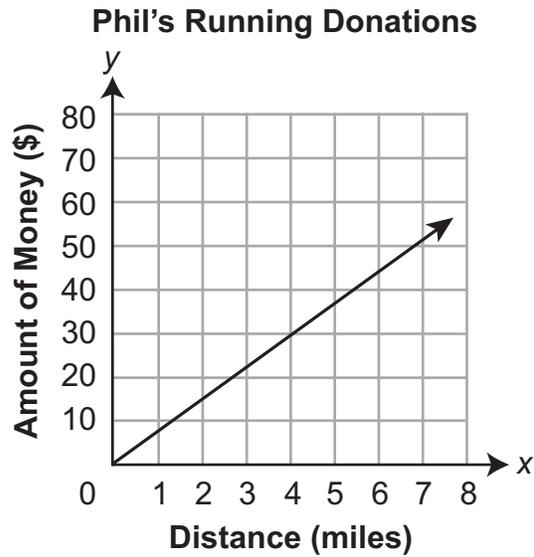
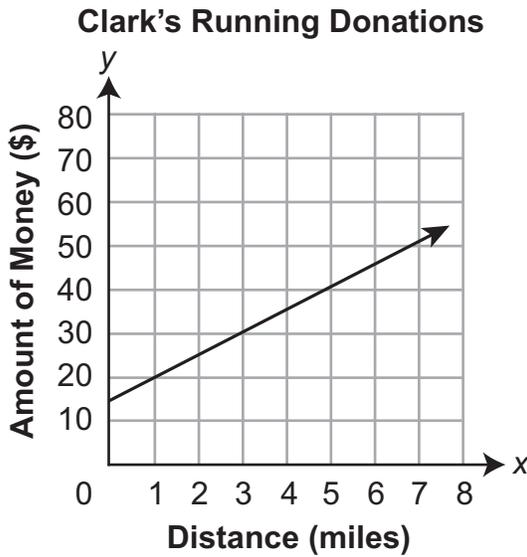
- A. $\frac{1}{8} + \frac{2}{4} = \frac{3}{4}$
- B. $\frac{1}{8} + \frac{5}{8} = \frac{3}{4}$
- C. $\frac{1}{8} + \frac{3}{4} = \frac{7}{8}$
- D. $\frac{1}{8} + \frac{3}{4} = \frac{4}{12}$

Item Information				Option Annotations
Alignment		A-N.1.1.2 A-N.1.1.1		A. adds the numerators and keeps the smaller denominator B. correct C. adds the starting and ending fractions D. adds the starting and ending fractions by adding their numerators and denominators
Answer Key		B		
Depth of Knowledge		2		
p-values				
A	B	C	D	
12%	66%	16%	6%	

4. For a science experiment, Annie removes a cold liquid from a refrigerator and measures its temperature every $\frac{1}{2}$ minute. Annie finds that the temperature increases by $1\frac{3}{4}$ degrees Fahrenheit ($^{\circ}\text{F}$) between each measurement for three minutes. What is the rate per minute of the temperature increase?
- A. $\frac{7}{8}^{\circ}\text{F}$ per minute
 - B. $1\frac{1}{4}^{\circ}\text{F}$ per minute
 - C. $2\frac{1}{4}^{\circ}\text{F}$ per minute
 - D. $3\frac{1}{2}^{\circ}\text{F}$ per minute

Item Information				Option Annotations
Alignment		A-R.1.1.1		A. divides the given rate by 2 B. subtracts $\frac{1}{2}$ from the given rate C. adds $\frac{1}{2}$ to the given rate D. correct
Answer Key		D		
Depth of Knowledge		2		
<i>p</i> -values				
A	B	C	D	
29%	15%	16%	40%	

5. Clark and Phil are each running to raise money. The amount of money (y), in dollars, they each raise is based on the distance (x), in miles, they each run. Clark has an initial donation that he has received regardless of how many miles he runs. The graphs shown below model the amount of money each will raise based on the distance they each run.



What is the unit rate for the person for whom the amount of money and the number of miles are proportionally related?

- A. \$5.00 per mile
- B. \$7.50 per mile
- C. \$15.00 per mile
- D. \$30.00 per mile

Item Information				Option Annotations
Alignment		A-R.1.1.2 A-R.1.1.3		A. chooses Clark's unit rate but does not realize Clark's quantities are not proportionally related B. correct C. picks Clark's y -intercept D. picks the first value with integer coordinates for Phil
Answer Key		B		
Depth of Knowledge		2		
<i>p</i>-values				
A	B	C	D	
23%	54%	16%	7%	

6. Joe has a picture that measures 8 centimeters by 12 centimeters. He creates four enlargements of the picture. The table below shows the width and the length of each enlargement.

Joe’s Picture Enlargements

Width (cm)	Length (cm)
10	15
12	18
20	30
25	37.5

What is the constant of proportionality between the width and the length of the pictures?

- A. 0.5
- B. 1.2
- C. 1.5
- D. 2.5

Item Information				Option Annotations
Alignment		A-R.1.1.3		A. solves $(15 - 10)/10$ B. uses ratio of first two values in either column (12/10 or 18/15) C. correct D. uses ratio of first and last values in either column (25/10 or 37.5/15)
Answer Key		C		
Depth of Knowledge		1		
p-values				
A	B	C	D	
15%	12%	54%	19%	

7. Jaya is painting her room. She mixes 2 pints of blue paint with 5 pints of red paint to get her desired color. Which equation can be used to find the number of pints of blue paint (x) Jaya should mix with 18 pints of red paint?

A. $\frac{2}{x} = \frac{18}{5}$

B. $\frac{2}{5} = \frac{x}{18}$

C. $\frac{2}{18} = \frac{5}{x}$

D. $\frac{x}{18} = \frac{5}{2}$

Item Information				Option Annotations
Alignment		A-R.1.1.4		A. sets up the equation 2:x equals to 18:5 instead of 5:18 B. correct C. reverses placement of 18 and x D. sets up the equation x:18 equals to 5:2 instead of 2:5
Answer Key		B		
Depth of Knowledge		2		
<i>p-values</i>				
A	B	C	D	
16%	63%	12%	9%	

8. Ernesto made a graph of the distance (y), in miles, he can ride a bicycle in x hours. Ernesto can ride 5.5 miles in 0.5 hour. Which point on the graph represents Ernesto's rate of travel, in miles per hour?
- A. (0, 5.5)
 - B. (0, 11)
 - C. (1, 5.5)
 - D. (1, 11)

Item Information				Option Annotations
Alignment		A-R.1.1.5 A-R.1.1.1		A. thinks starting at 5.5 mph B. uses wrong x -value C. thinks 5.5 mph D. correct
Answer Key		D		
Depth of Knowledge		1		
<i>p</i>-values				
A	B	C	D	
26%	8%	23%	43%	

9. The ratio of the number of students in the chess club to the number of students on the math team is 1 : 3. The ratio of the number of students on the math team to the number of students on the quiz bowl team is 1 : 2. There are 4 students in the chess club. How many students are on the quiz bowl team?
- A. 7
 - B. 9
 - C. 12
 - D. 24

Item Information				Option Annotations
Alignment		A-R.1.1.6		A. adds the ratio difference to the chess club total (4 + 2 + 1) B. adds the larger number to the chess club total (4 + 3 + 2) C. finds the math team total D. correct
Answer Key		D		
Depth of Knowledge		2		
p-values				
A	B	C	D	
17%	19%	23%	41%	

10. Arnie buys $2\frac{2}{5}$ pounds of red grapes for \$1.95 per pound. He buys $2\frac{2}{5}$ pounds of green grapes for \$2.20 per pound. Which expression can be used to determine the total cost, in dollars, of the grapes Arnie buys?

- A. $2.4(1.95 + 2.20)$
- B. $2.4 \cdot 1.95 \cdot 2.20$
- C. $(2.4 + 2.4)(1.95 + 2.20)$
- D. $(2.4 \cdot 2.4) + (1.95 \cdot 2.20)$

Item Information				Option Annotations
Alignment		B-E.2.1.1		A. correct B. multiplies all C. multiplies total weight by sum of rates D. adds product of weights and product of rates
Answer Key		A		
Depth of Knowledge		2		
<i>p</i> -values				
A	B	C	D	
52%	11%	22%	15%	

11. An author receives \$0.75 for each hardcover book or paperback book that is sold. There were x hardcover books and 42,000 paperback books sold of her most recent book. The author received a total of \$60,000 for the book sales. The equation below can be used to determine the number of hardcover books that were sold.

$$0.75(x + 42,000) = 60,000$$

How many hardcover books were sold?

- A. 18,000
- B. 24,000
- C. 28,500
- D. 38,000

Item Information				Option Annotations
Alignment		B-E.2.2.1		A. “distributes” to 60,000 B. does not distribute to 42,000 C. does not distribute to x D. correct
Answer Key		D		
Depth of Knowledge		1		
<i>p</i> -values				
A	B	C	D	
24%	16%	15%	45%	

12. Tasha sells gift boxes and cookies at her bakery.

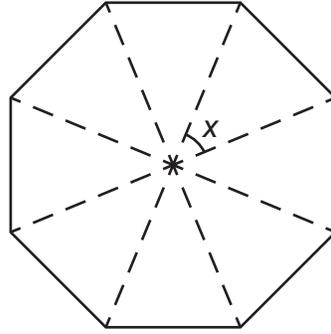
- Gift boxes sell for \$26.00 each.
- Cookies sell for \$1.50 each.
- Tasha would like her total sales to be at least \$50.00 from the sale of one gift box and some cookies.

Which inequality describes all the numbers of cookies (x) that Tasha needs to sell?

- A. $x \geq 2$
- B. $x \geq 8$
- C. $x \geq 16$
- D. $x \geq 24$

Item Information				Option Annotations
Alignment		B-E.2.2.2		A. solves $(26.00 + 1.50)x \geq 50.00$; rounds up B. solves $x \geq (50.00/1.50) - 26.00$; rounds up C. correct D. solves $50.00 - 26.00$
Answer Key		C		
Depth of Knowledge		2		
<i>p-values</i>				
A	B	C	D	
9%	8%	57%	26%	

13. A stained glass window is in the shape of a regular octagon as shown below.

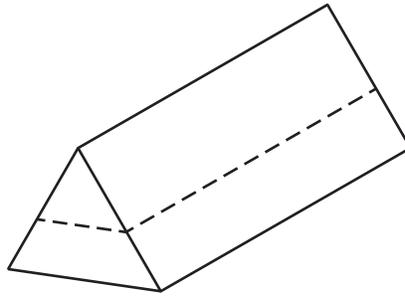


The window is separated into sections by drawing straight, dashed lines that intersect in the center of the octagon. What is the value of x ?

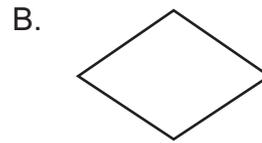
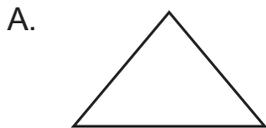
- A. 22.5°
- B. 37.5°
- C. 45°
- D. 50°

Item Information				Option Annotations
Alignment		C-G.1		A. divides 180 by 8 B. thinks a full circle is 300° C. correct D. thinks a full circle is 400°
Answer Key		C		
Depth of Knowledge		2		
p-values				
A	B	C	D	
25%	11%	55%	9%	

14. Melinda's candy bar is in the shape of a triangular prism. She cuts her candy bar parallel to its bottom. The dotted line in the picture below represents Melinda's cut.

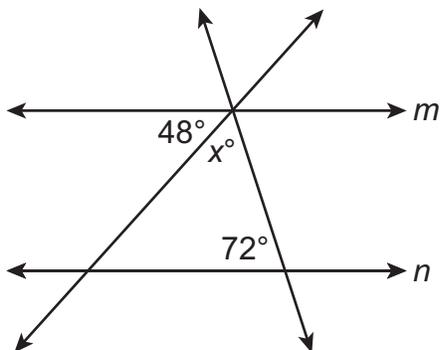


What is the shape of the cross section of Melinda's cut?



Item Information				Option Annotations
Alignment		C-G.1.1.4		A. chooses shape of the base (triangle), not the lateral face B. chooses rhombus (prisms have rectangular faces) C. correct D. chooses side face after cut
Answer Key		C		
Depth of Knowledge		1		
p-values				
A	B	C	D	
21%	3%	47%	29%	

15. Two lines intersect parallel lines m and n as shown below.



What is the value of x ?

- A. 24
- B. 48
- C. 60
- D. 66

Item Information				Option Annotations
Alignment		C-G.2.1.2		A. solves $72 - 48$ B. thinks value is equal to the adjacent angle C. correct D. solves $90 - 72 = 18$ and then adds 18 to 48
Answer Key		C		
Depth of Knowledge		2		
p-values				
A	B	C	D	
19%	26%	46%	9%	

16. The diameter of Jacob’s circular tabletop is 6 feet. What is the area, in square feet, of Jacob’s tabletop?
- A. 6π
 - B. 9π
 - C. 12π
 - D. 36π

Item Information				Option Annotations
Alignment		C-G.2.2.1		A. finds circumference B. correct C. finds circumference using $r = 6$ D. uses the diameter
Answer Key		B		
Depth of Knowledge		1		
<i>p</i> -values				
A	B	C	D	
21%	37%	19%	23%	

**THIS PAGE IS
INTENTIONALLY BLANK.**

OPEN-ENDED QUESTION

17. The table below shows the number of pencils of each color for all 25 pencils in a box.

Pencils in the Box

Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

A single pencil is drawn from the box.

- A.** Describe the likelihood that the pencil is a yellow pencil. Explain your reasoning.

The pencils have all been placed back in the box.

- B.** Compare the likelihood of drawing a red pencil to the likelihood of drawing a blue pencil from the box. Explain your reasoning.

Go to the next page to finish question 17.

17. **Continued.** Please refer to the previous page for task explanation.

The original 25 colored pencils have all been placed back in the box and another 11 colored pencils have been added to the box. The new pencils are either red, blue, or green. The likelihood of drawing a green pencil is now **greater** than the likelihood of drawing a red pencil, but **less** than the likelihood of drawing a blue pencil.

- C. How many pencils of each color were added to the box? Explain how you know that your answer is the only possible outcome that meets all of the conditions.

Item-Specific Scoring Guideline

#17 Item Information

Alignment	D-S.3	Depth of Knowledge	3	Mean Score	2.16
------------------	-------	---------------------------	---	-------------------	------

Assessment Anchor this item will be reported under:

M07.D-S.3—Investigate chance processes and develop, use, and evaluate probability models.

Specific Anchor Descriptor addressed by this item:

M07.D-S.3.1—Predict or determine the likelihood of outcomes.

Scoring Guide

Score	In this item, the student . . .
4	Demonstrates a thorough understanding of predicting or determining whether some outcomes are certain, more likely, less likely, equally likely, or impossible by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of predicting or determining whether some outcomes are certain, more likely, less likely, equally likely, or impossible by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of predicting or determining whether some outcomes are certain, more likely, less likely, equally likely, or impossible by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of predicting or determining whether some outcomes are certain, more likely, less likely, equally likely, or impossible.
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 predicting or determining whether some outcomes are certain, more likely, less likely, equally likely, or impossible.
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):

$\frac{1}{2}$ point for correct answer

$\frac{1}{2}$ point for complete explanation

What?	Why?
impossible	<p>Sample Explanation: There are no yellow pencils in the box, so it is not possible to draw out a yellow pencil.</p>

Part B (1 point):

$\frac{1}{2}$ point for correct answer

$\frac{1}{2}$ point for complete explanation

What?	Why?
equally likely	<p>Sample Explanation: Since there is the same number of each color of pencil, both outcomes are equally likely.</p>

Part C (2 points):

1 point for correct answer

1 point for complete explanation

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

What?	Why?
<p>9 green pencils AND 2 blue pencils</p>	<p>Sample Explanation: Since the likelihood of drawing a green pencil is now greater than the likelihood of drawing a red pencil, there were at least 9 green pencils added ($3 + 9 = 12$; $12 > 11$). Since the likelihood of drawing a green pencil is now less likely than drawing a blue pencil, there were at least 2 blue pencils added ($11 + 2 = 13$; $13 > 12$). Since there were 11 pencils added to the box, this is the only possible answer ($9 + 2 = 11$).</p>

STUDENT RESPONSE

Response Score: 4 points



PARTS A AND B

Question 17
Page 1 of 2

Item ID

?

Line Guide

EQ

EQ

123 / 1000

The table below shows the number of pencils of each color for all 25 pencils in a box.

Pencils in the Box	
Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

A single pencil is drawn from the box.

A. Describe the likelihood that the pencil is a yellow pencil. Explain your reasoning.

The likelihood is impossible. It is impossible because there are no yellow pencils to begin with.

97 / 1000

The pencils have all been placed back in the box.

B. Compare the likelihood of drawing a red pencil to the likelihood of drawing a blue pencil from the box. Explain your reasoning.

The likelihood of drawing a red and a blue pencil equally likely because they both have the same number of colored pencils.

123 / 1000

Next

Options

Flag

Pause

Review/End Test

PART C

Question 17
Page 2 of 2


Item ID

The original 25 colored pencils have all been placed back in the box and another 11 colored pencils have been added to the box. The new pencils are either red, blue, or green. The likelihood of drawing a green pencil is now **greater** than the likelihood of drawing a red pencil, but **less** than the likelihood of drawing a blue pencil.

C. How many pencils of each color were added to the box? Explain how you know that your answer is the only possible outcome that meets all of the conditions.



Pencils in the Box

Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

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

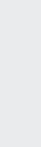
264 / 1000

 Review/End Test

 Pause

 Flag

 Options

 Back

STUDENT RESPONSE

Response Score: 3 points

17. The table below shows the number of pencils of each color for all 25 pencils in a box.

Pencils in the Box

Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

A single pencil is drawn from the box.

A. Describe the likelihood that the pencil is a yellow pencil. Explain your reasoning.

It would not be yellow because there isn't any in the box. Only red, blue, and green.

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

The pencils have all been placed back in the box.

B. Compare the likelihood of drawing a red pencil to the likelihood of drawing a blue pencil from the box. Explain your reasoning.

Its even, they both have 11.

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

Go to the next page to finish question 17.

17. **Continued.** Please refer to the previous page for task explanation.

The original 25 colored pencils have all been placed back in the box and another 11 colored pencils have been added to the box. The new pencils are either red, blue, or green. The likelihood of drawing a green pencil is now **greater** than the likelihood of drawing a red pencil, but **less** than the likelihood of drawing a blue pencil.

C. How many pencils of each color were added to the box? Explain how you know that your answer is the only possible outcome that meets all of the conditions.

0 = red 9 = green

2 = blue

It is correct because red =
 11 green is bigger with
 12 and blue is the most
 with 13.

The student has given a correct answer and a correct but incomplete explanation (insufficient explanation of only possible outcome).

STUDENT RESPONSE

Response Score: 2 points



PARTS A AND B

Question 17
Page 1 of 2

Item ID

?

EQ

85 / 1000

The table below shows the number of pencils of each color for all 25 pencils in a box.

Pencils in the Box	
Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

EQ

69 / 1000

A single pencil is drawn from the box.

A. Describe the likelihood that the pencil is a yellow pencil. Explain your reasoning.

There is no chance of it being yellow because there is no yellow pencil in the table.

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

The pencils have all been placed back in the box.

B. Compare the likelihood of drawing a red pencil to the likelihood of drawing a blue pencil from the box. Explain your reasoning.

They would be the same because in the table they are the same amount.

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

Review/End Test

Pause

Flag

Options

Next

PART C

Question 17
Page 2 of 2



Item ID







The original 25 colored pencils have all been placed back in the box and another 11 colored pencils have been added to the box. The new pencils are either red, blue, or green. The likelihood of drawing a green pencil is now **greater** than the likelihood of drawing a red pencil, but **less** than the likelihood of drawing a blue pencil.

C. How many pencils of each color were added to the box? Explain how you know that your answer is the only possible outcome that meets all of the conditions.

EQ

114 / 1000

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

Back

Review/End Test

Pause

Flag

Options

The table below shows the number of pencils of each color for all 25 pencils in a box.

Pencils in the Box

Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

STUDENT RESPONSE

Response Score: 1 point

17. The table below shows the number of pencils of each color for all 25 pencils in a box.

Pencils in the Box

Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

A single pencil is drawn from the box.

- A. Describe the likelihood that the pencil is a yellow pencil. Explain your reasoning.

it is less likely that you will draw a yellow pencil because there isn't any yellow pencils

The student has given an incorrect answer and a complete explanation.

The pencils have all been placed back in the box.

- B. Compare the likelihood of drawing a red pencil to the likelihood of drawing a blue pencil from the box. Explain your reasoning.

It is possible that you will draw a red & blue pencil because there are more red and blue pencils

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

Go to the next page to finish question 17.

17. *Continued.* Please refer to the previous page for task explanation.

The original 25 colored pencils have all been placed back in the box and another 11 colored pencils have been added to the box. The new pencils are either red, blue, or green. The likelihood of drawing a green pencil is now **greater** than the likelihood of drawing a red pencil, but **less** than the likelihood of drawing a blue pencil.

- C. How many pencils of each color were added to the box? Explain how you know that your answer is the only possible outcome that meets all of the conditions.

there are 50 of each pencil
because if you add $11 + 11 + 3 = 25 +$
 $25 = \boxed{50}$

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

STUDENT RESPONSE

Response Score: 0 points



PARTS A AND B

Question 17
Page 1 of 2

The table below shows the number of pencils of each color for all 25 pencils in a box.

Pencils in the Box	
Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

EQ

A single pencil is drawn from the box.

A. Describe the likelihood that the pencil is a yellow pencil. Explain your reasoning.

$\frac{1}{25}$

2 / 1000

The pencils have all been placed back in the box.

B. Compare the likelihood of drawing a red pencil to the likelihood of drawing a blue pencil from the box. Explain your reasoning.

$\frac{11}{14}$

2 / 1000

The student has given an incorrect answer and no explanation.

The student has given an incorrect answer and no explanation.

PART C

Question 17
Page 2 of 2

Item ID

Line Guide

The table below shows the number of pencils of each color for all 25 pencils in a box.

Pencils in the Box	
Color	Number
red	11
blue	11
green	3

The likelihood of an event occurring may be described as certain, more likely, equally likely, less likely, or impossible.

The original 25 colored pencils have all been placed back in the box and another 11 colored pencils have been added to the box. The new pencils are either red, blue, or green. The likelihood of drawing a green pencil is now **greater** than the likelihood of drawing a red pencil, but **less** than the likelihood of drawing a blue pencil.

C. How many pencils of each color were added to the box? Explain how you know that your answer is the only possible outcome that meets all of the conditions.

EQ

I say 10 because it say 11 so when you pull from the 11 you will be left with 10

80 / 1000

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

Options

Flag

Pause

Review/End Test

MATHEMATICS—SUMMARY DATA

MULTIPLE-CHOICE

Sample Number	Alignment	Answer Key	Depth of Knowledge	p-values			
				A	B	C	D
1	A-N.1.1.1	A	1	57%	11%	23%	9%
2	A-N.1.1	D	2	16%	19%	22%	43%
3	A-N.1.1.2 A-N.1.1.1	B	2	12%	66%	16%	6%
4	A-R.1.1.1	D	2	29%	15%	16%	40%
5	A-R.1.1.2 A-R.1.1.3	B	2	23%	54%	16%	7%
6	A-R.1.1.3	C	1	15%	12%	54%	19%
7	A-R.1.1.4	B	2	16%	63%	12%	9%
8	A-R.1.1.5 A-R.1.1.1	D	1	26%	8%	23%	43%
9	A-R.1.1.6	D	2	17%	19%	23%	41%
10	B-E.2.1.1	A	2	52%	11%	22%	15%
11	B-E.2.2.1	D	1	24%	16%	15%	45%
12	B-E.2.2.2	C	2	9%	8%	57%	26%
13	C-G.1	C	2	25%	11%	55%	9%
14	C-G.1.1.4	C	1	21%	3%	47%	29%
15	C-G.2.1.2	C	2	19%	26%	46%	9%
16	C-G.2.2.1	B	1	21%	37%	19%	23%

OPEN-ENDED

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	D-S.3	4	3	2.16

**THIS PAGE IS
INTENTIONALLY BLANK.**

PSSA Grade 7 Mathematics Item and Scoring Sampler

Copyright © 2016 by the Pennsylvania Department of Education. The materials contained in this publication may be duplicated by Pennsylvania educators for local classroom use. This permission does not extend to the duplication of materials for commercial use.
