Pennsylvania PSSA 2021 Grade 7 Math

Reference Materials
Page 2

Exam & Answer Key Materials
Pages 3 - 39

Grade 7 Formula Sheet

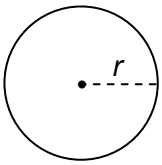
Formulas that you may need on this test are found below.
You may refer back to this page at any time during the mathematics test.
You may use calculator π or the number 3.14 as an approximation of π.

2021
Grade 7

Simple Interest

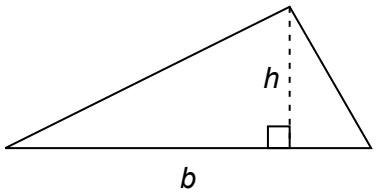
$I = Prt$

Circle



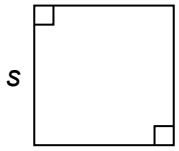
$C = 2\pi r$ $A = \pi r^2$

Triangle



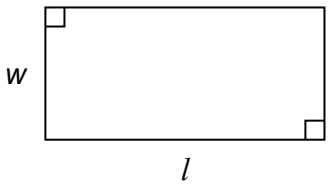
$A = \frac{1}{2}bh$

Square



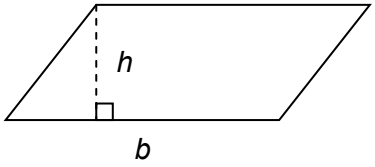
$A = s^2$

Rectangle



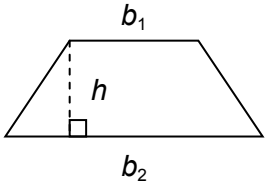
$A = lw$ $P = 2l + 2w$

Parallelogram



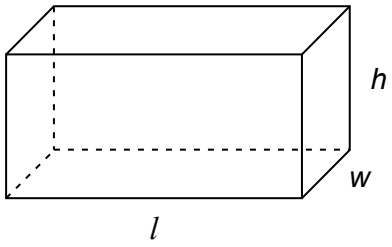
$A = bh$

Trapezoid



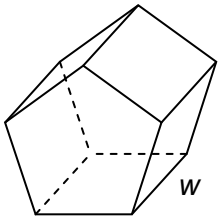
$A = \frac{1}{2}h(b_1 + b_2)$

Rectangular Prism



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

Polygonal Prism

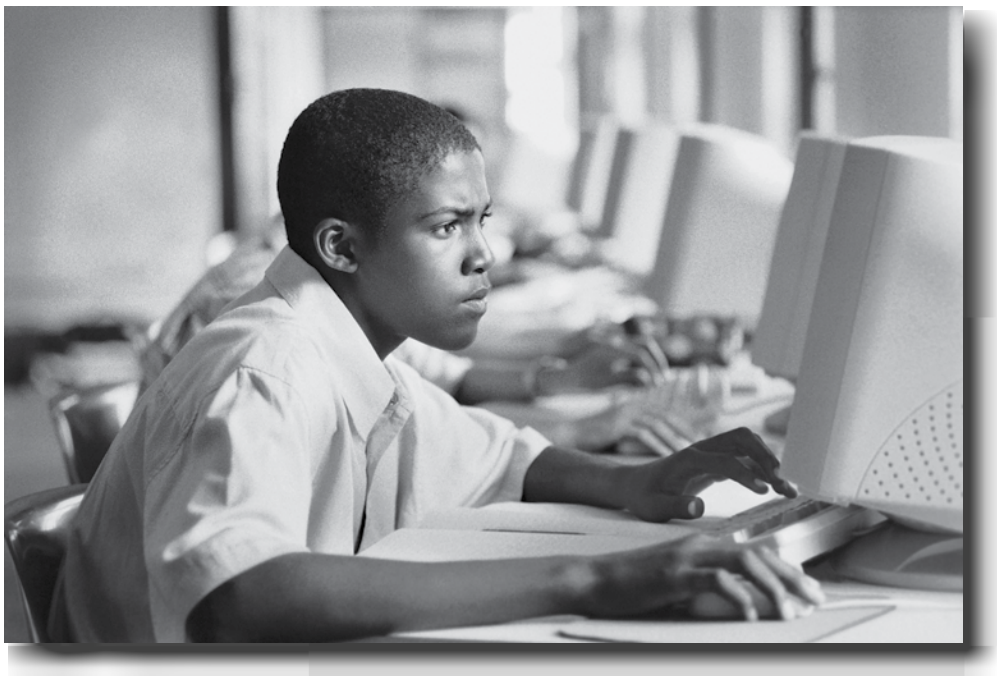


$V = Bw$, where B = area of the base
$SA = Pw + 2B$, where P = perimeter of base

pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Mathematics
Item and Scoring Sampler



2021*
Grade 7

* This is a revised version of the 2017 Item and Scoring Sampler.

Pennsylvania Department of Education Bureau of Curriculum, Assessment and Instruction—September 2021

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.

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).....Is blank, is entirely erased, or gives a written refusal to respond

OT.....Is off-task

LOE.....Is in a language other than English

IL.....Is illegible

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

MULTIPLE-CHOICE ITEMS

1. Multiply: $1\frac{3}{7} \bullet \frac{-3}{7}$

A. $-4\frac{2}{7}$

B. $-2\frac{2}{7}$

C. $\frac{-30}{49}$

D. 1

Item Information	
Alignment	A-N.1.1.3
Answer Key	C
Depth of Knowledge	1
p-value A	14%
p-value B	22%
p-value C	47% (correct answer)
p-value D	17%
Option Annotations	A. correctly sets up as $\frac{10}{7} \bullet \frac{-3}{7}$ but only multiplies numerators because of the common denominator B. multiplies fractional parts $\left(\frac{3}{7} \bullet \frac{3}{7}\right)$ but only multiplies numerators because of the common denominator, adds $1 + \left(1\frac{2}{7}\right)$, and then makes the sum negative C. Correct: converts $1\frac{3}{7}$ to $\frac{10}{7}$ and then multiplies the numerators and the denominators to get $\frac{10 \bullet -3}{7 \bullet 7} = \frac{-30}{49}$ D. subtracts fractional parts $\left(\frac{3}{7} - \frac{3}{7}\right)$, leaving only the whole number

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

2. The price of a company stock that Meredith owns is $31.89 on the morning of day 1. At the end of each day for five days, Meredith records the change in the price of the stock. The changes she records are shown in the chart below, but some information is missing.

Meredith's Stock

Day	Change in Price ($)
1	+0.13
2	
3	⁻0.45
4	+0.37
5	

The change in the price for day 2 is $\frac{1}{3}$ of the change in the price for day 3. At the end of day 5, the price of Meredith's stock is $32.05. What is the change, in dollars, in the price of the stock for day 5?

A. ⁻0.04

B. +0.11

C. +0.16

D. +0.26

Item Information	
Alignment	A-N.1.1
Answer Key	D
Depth of Knowledge	2
p-value A	15%
p-value B	17%
p-value C	27%
p-value D	41% (correct answer)
Option Annotations	A. makes a sign error on day 2 and uses +0.15 for change in price for day 2 B. ignores day 2 information (i.e., treats as no change) C. determines the total change in price from day 1 to day 5 (32.05 – 31.89) D. Correct: determines the change in price for day 2 by multiplying the price for day 3 ($^{-}0.45$) by $\frac{1}{3}$ to get $^{-}0.15$, determines the total amount of change by subtracting the value on the morning of day 1 ($31.89) from the value at the end of day 5 ($32.05), and then determines the change in price for day 5 by solving $0.13 + {}^{-}0.15 + {}^{-}0.45 + 0.37 + x = 0.16$, which simplifies to $^{-}0.10 + x = 0.16$ or $x = 0.26$

3. Jellybeans cost \$0.80 per pound. Howard buys $4\frac{1}{2}$ pounds of jellybeans for himself and 1 pound for his friend. What is the total cost of the jellybeans Howard buys?

A. \$4.00

B. \$4.40

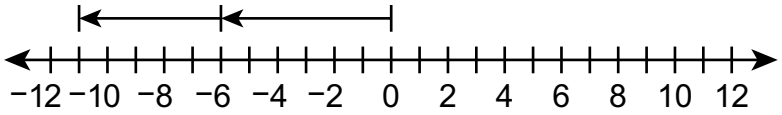
C. \$4.50

D. \$4.60

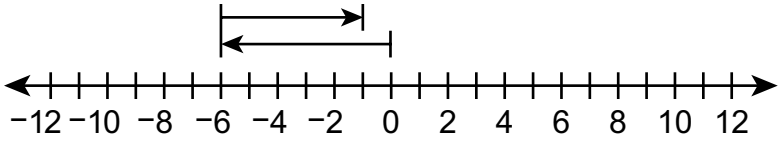
Item Information	
Alignment	A-N.1.1.1 A-N.1.1.3
Answer Key	B
Depth of Knowledge	2
p-value A	8%
p-value B	70% (correct answer)
p-value C	10%
p-value D	12%
Option Annotations	A. adds 1 to the numerator of the fraction instead of to the whole number B. Correct: determines the total number of pounds bought by adding 1 to $4\frac{1}{2}$ and then multiplies the sum by \$0.80 OR determines the value for $4\frac{1}{2}$ pounds by multiplying $4\frac{1}{2}$ by \$0.80 and then adds \$0.80 for the value of the other 1 pound C. multiplies 5 by \$0.80 and then adds \$0.50 for the $\frac{1}{2}$ D. determines the price for $4\frac{1}{2}$ pounds and then adds 1 to the dollar amount

4. Which number line represents $^{-}6 - 5$?

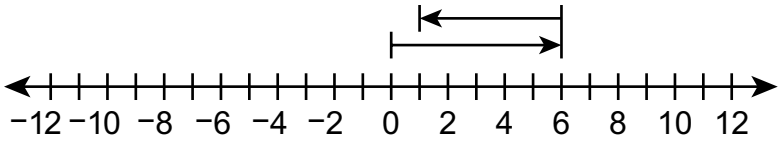
A.



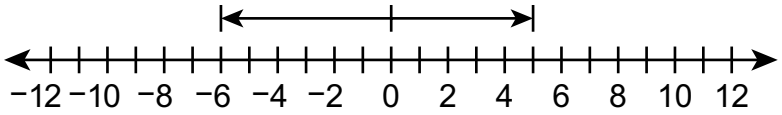
B.



C.



D.



Item Information	
Alignment	A-N.1.1.2
Answer Key	A
Depth of Knowledge	2
p-value A	63% (correct answer)
p-value B	16%
p-value C	3%
p-value D	18%
Option Annotations	A. Correct: starts at 0, draws a ray that goes 6 units to the left to represent the initial $^{-}6$, and then draws another ray that goes 5 units to the left of the $^{-}6$ to represent subtracting 5 from $^{-}6$ B. goes to $^{-}6$ and then subtracts 5 by going 5 in the opposite direction C. goes to 6 first and then subtracts 5 D. goes to $^{-}6$ in one direction and to 5 in the opposite direction

5. Coach Patrick is ordering football jerseys for his team. The table below shows the relationship between the number of jerseys ordered and the total cost of the jerseys.

Football Jerseys

Number of Jerseys	Total Cost ($)
10	75
20	150
30	225
40	300

Based on the information shown in the table, what is the total cost of ordering 52 jerseys?

A. $352

B. $375

C. $390

D. $450

Item Information	
Alignment	A-R.1.1
Answer Key	C
Depth of Knowledge	2
p-value A	5%
p-value B	15%
p-value C	73% (correct answer)
p-value D	7%
Option Annotations	A. adds 52 to the last total cost in the table B. extends total cost to next expected entry in table (i.e., uses rule "add 75") C. Correct: determines the total cost is always 7.5 times the number of jerseys, so multiplies 52 by 7.5 D. adds 75 × 2 to the last total cost in the table

6. A turtle traveled $\frac{1}{10}$ mile in $\frac{1}{2}$ hour. What was the turtle's rate in miles per hour?

A. $\frac{1}{20}$

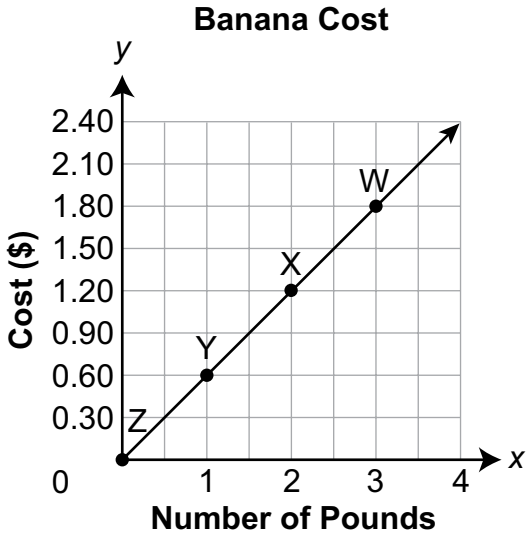
B. $\frac{1}{12}$

C. $\frac{1}{6}$

D. $\frac{1}{5}$

Item Information	
Alignment	A-R.1.1.1
Answer Key	D
Depth of Knowledge	2
p-value A	28%
p-value B	6%
p-value C	4%
p-value D	62% (correct answer)
Option Annotations	A. multiplies $\frac{1}{10}$ and $\frac{1}{2}$ B. adds the denominators C. adds the numerators and denominators and simplifies $\frac{2}{12}$ D. Correct: divides the number of miles $\left(\frac{1}{10}\right)$ by the number of hours $\left(\frac{1}{2}\right)$

7. The graph below shows the relationship between the number of pounds of bananas purchased and the cost of the bananas. Four points on the graph are labeled.



Based on the graph, which statement about the unit price of the bananas is true?

A. Point Z indicates that the unit price is $0.00 per pound.

B. Together, point W and point X indicate that the unit price is $0.50 per pound.

C. Point Y indicates that the unit price is $0.60 per pound.

D. Together, point X and point Z indicate that the unit price is $2.40 per pound.

Item Information	
Alignment	A-R.1.1.5
Answer Key	C
Depth of Knowledge	2
p-value A	11%
p-value B	8%
p-value C	74% (correct answer)
p-value D	7%
Option Annotations	A. interprets the value of the *y*-intercept as the rate of change B. calculates (1.80 + 1.20) ÷ (3 × 2) as the rate of change C. Correct: recognizes the relationship shown in the graph as proportional and interprets the *y*-value of the point (1, 0.60) as representing the unit rate ($0.60 for each pound) D. calculates (1.20 – 0) × (2 – 0) as the rate of change

8. A principal buys x small tables and y large tables for a computer lab.

- Each small table costs $34.
- Each large table costs $52.
- The total cost of the tables is less than $3,500.
- The principal buys fewer than 50 tables.

Which two inequalities could represent this situation?

A. $34x + 52y < 3{,}500$
$x + y < 50$

B. $34x + 52y < 3{,}500$
$x + y > 50$

C. $52x + 34y < 3{,}500$
$x + y < 50$

D. $52x + 34y < 3{,}500$
$x + y > 50$

Item Information	
Alignment	B-E.2.2
Answer Key	A
Depth of Knowledge	2
p-value A	52% (correct answer)
p-value B	24%
p-value C	14%
p-value D	10%
Option Annotations	A. Correct: sets up the first inequality by multiplying the coefficient and variable for small tables, multiplying the coefficient and variable for large tables, and setting their sum to be less than $3,500 and then sets up the second inequality by setting the sum of the variables to be less than 50 B. reverses the direction of the second inequality C. reverses the coefficients of the first inequality D. reverses the coefficients of the first inequality and reverses the direction of the second inequality

9. Nadia is selling tickets for a school event. She has already sold 17 tickets. Her goal is to sell at least 100 tickets. Each day she is able to sell up to 10 tickets. What is the **minimum** number of days Nadia will need to sell tickets to reach her goal?

A. 5

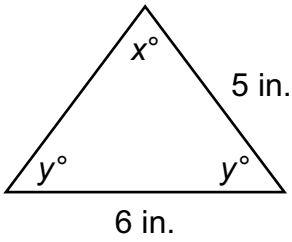
B. 6

C. 8

D. 9

Item Information	
Alignment	B-E.2.2.2 B-E.2.3.1
Answer Key	D
Depth of Knowledge	2
p-value A	9%
p-value B	9%
p-value C	23%
p-value D	59% (correct answer)
Option Annotations	A. sets up equation as $17x + 10 = 100$, solves for x, and rounds down B. sets up equation as $17x + 10 = 100$, solves for x, and (correctly) rounds up C. correctly solves for x but then rounds down D. Correct: sets up the inequality as $17 + 10x \geq 100$ (or as $17 + 10x > 100$) and solves for x by subtracting 17 from each side, dividing the difference (83) by 10, and then rounding the quotient (8.3) up to the next whole value since rounding down would result in a total less than 100

10. A scale drawing of a triangle that will be used on a banner is shown below.



Scale
1 in. : $1\frac{1}{2}$ ft

What is the perimeter, in feet, of the actual triangle used on the banner?

A. $20\frac{1}{2}$

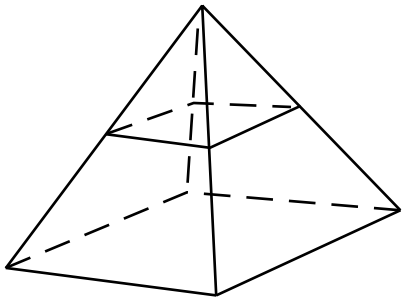
B. 24

C. $25\frac{1}{2}$

D. 27

Item Information	
Alignment	C-G.1.1.1 C-G.1.1.2
Answer Key	B
Depth of Knowledge	2
p-value A	17%
p-value B	61% (correct answer)
p-value C	15%
p-value D	7%
Option Annotations	A. applies scale by adding $1\frac{1}{2}$ to each side length B. Correct: recognizes the triangle as isosceles since the two base angles are both $y°$, identifies the length of the missing side as 5 inches since the sides opposite the base angles of an isosceles triangle are equal, determines that the perimeter of the triangle is $5 + 5 + 6 = 16$, and then applies the scale by multiplying 16 by $1\frac{1}{2}$ OR recognizes the triangle as isosceles since the two base angles are both $y°$, identifies the length of the missing side as 5 inches since the sides opposite the base angles of an isosceles triangle are equal, applies the scale by multiplying each side length by $1\frac{1}{2}$, and then determines that the perimeter is $7\frac{1}{2} + 7\frac{1}{2} + 9$ C. recognizes the triangle is isosceles but uses 6 in., 6 in., 5 in. as the side lengths D. does not recognize the triangle is isosceles and makes the unknown side longer than the others by using 5 in., 6 in., 7 in. as the side lengths

11. Barb has a jewelry box in the shape of a rectangular pyramid. The top opens at a cross section parallel to the base.



What is the shape of the opening of the jewelry box?

A. rectangle

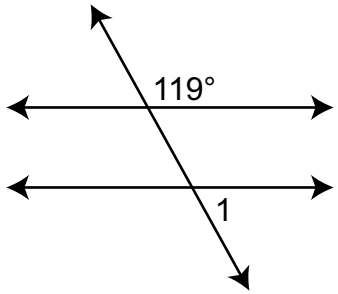
B. rhombus

C. trapezoid

D. triangle

Item Information	
Alignment	C-G.1.1.4
Answer Key	A
Depth of Knowledge	1
p-value A	48% (correct answer)
p-value B	15%
p-value C	11%
p-value D	26%
Option Annotations	A. Correct: recognizes that a cross section that is parallel to the base would be similar to the base (i.e., have the same shape as the base) B. misidentifies the sides of the cross section as being congruent and may not recognize the angle measures of the cross section must be right angles (to match the parallel face) C. identifies the shape of the lateral faces below the cross section D. identifies the shape of the lateral faces above the cross section

12. Two parallel lines are intersected by another line, as shown below.



What is the measure of ∠1?

A. 61°

B. 74°

C. 81°

D. 119°

Item Information	
Alignment	C-G.2.1.2
Answer Key	A
Depth of Knowledge	1
p-value A	65% (correct answer)
p-value B	10%
p-value C	9%
p-value D	16%
Option Annotations	A. Correct: recognizes that the known angle and angle 1 are supplementary and their measures have a sum of 180°, so writes and solves the equation $119° + x = 180°$ B. misidentifies same-side exterior angles as having a difference of 45° C. recognizes that the angles are supplementary but uses 200° as the sum D. misidentifies same-side exterior angles as being congruent instead of supplementary

13. Concrete is poured to create a slab in the shape of a rectangular prism. The slab is 50 yards long, 1.5 yards wide, and 0.25 yard thick. How many cubic yards of concrete are needed to create the slab?

A. 18.75

B. 25.75

C. 155.25

D. 175.75

Item Information	
Alignment	C-G.2.2.2
Answer Key	A
Depth of Knowledge	1
p-value A	63% (correct answer)
p-value B	12%
p-value C	13%
p-value D	12%
Option Annotations	A. Correct: uses the volume formula for a rectangular prism ($V = lwh$) to multiply 50 by 1.5 by 0.25 B. determines perimeter using length and width and then multiplies the perimeter by the thickness C. adds the given dimensions, then multiplies the sum by 3 D. calculates the surface area

14. Customers in two randomly selected groups at a yogurt shop are asked their preference of yogurt flavors. The responses for the customers in each group are summarized in the table below.

Customer Yogurt Flavor Preference

	Peach	Strawberry	Vanilla	Total
Group 1	40	25	10	75
Group 2	50	10	15	75

Based on the information shown in the table, which statement **best** describes the preferences of the customers in the two groups?

A. In both groups, more customers prefer peach-flavored yogurt than either of the other two flavors.

B. In both groups, fewer customers prefer vanilla-flavored yogurt than either of the other two flavors.

C. In group 2, the same number of customers prefer strawberry-flavored yogurt and vanilla-flavored yogurt.

D. In group 1, more customers prefer either strawberry-flavored yogurt or vanilla-flavored yogurt than peach-flavored yogurt.

Item Information	
Alignment	D-S.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	79% (correct answer)
p-value B	8%
p-value C	7%
p-value D	6%
Option Annotations	A. Correct: compares the values for Peach to the sums of the values for the non-Peach flavors (40 > 35 and 50 > 25) OR recognizes that the values for Peach (40 and 50) are both more than half of each group's total (75) B. selects a statement that is true for Group 1 only C. compares the 10 under Strawberry for Group 2 to the 10 under Vanilla for Group 1 D. does not recognize that more than half of Group 1 prefers Peach

15. A team of 10 basketball players have their heights recorded to make a data set. The mean, median, mode, and range of the data set are recorded. Then, the height of the team's coach is included to make a new data set. The coach is shorter than all but one of the basketball players. Which measure **must** be the same when the coach's height is included?

A. mean

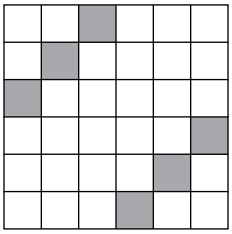
B. median

C. mode

D. range

Item Information	
Alignment	D-S.2
Answer Key	D
Depth of Knowledge	2
p-value A	12%
p-value B	16%
p-value C	26%
p-value D	46% (correct answer)
Option Annotations	A. does not consider that the coach's height could be different from the mean height and would change the value of the mean B. does not consider that the fifth and sixth tallest players could be different heights and that adding a height that is shorter than either of these heights to the data set would change the value of the median C. does not consider that the coach could be the same height as the shortest player and that this height could be the new mode D. Correct: recognizes that the range is determined by subtracting the smallest value (shortest height) from the largest value (tallest height) and determines that the new value (the coach's height) would not affect either of these values

16. Some of the squares on the grid below are shaded.



One square on the grid is randomly selected. What is the probability that the square is **not** shaded?

A. $\frac{1}{36}$

B. $\frac{1}{30}$

C. $\frac{29}{36}$

D. $\frac{5}{6}$

Item Information	
Alignment	D-S.3.2.2
Answer Key	D
Depth of Knowledge	2
p-value A	15%
p-value B	17%
p-value C	18%
p-value D	50% (correct answer)
Option Annotations	A. determines probability using 1 randomly selected square out of 36 squares B. determines probability using 1 randomly selected square out of the 30 squares that are not shaded C. subtracts 1 randomly selected square from the 30 squares that are not shaded and determines probability using this difference out of 36 squares D. Correct: determines the probability using the 30 unshaded squares out of 36 squares to write the fraction $\frac{30}{36}$ before simplifying OR uses the 6 shaded squares out of 36 squares to write the fraction $\frac{6}{36}$, simplifies it to $\frac{1}{6}$, and then determines the probability by subtracting $\frac{1}{6}$ from 1

OPEN-ENDED QUESTION

17. Bella bought gardening materials from different stores.

At Garden Mart, Bella bought g packets of geranium seeds, m packets of marigold seeds, and z packets of zinnia seeds. All of the plant seeds were on sale for half price. The expression shown below represents the total cost of the plant seeds Bella bought.

$$\frac{1}{2}(2.48g + 1.74m + 1.96z)$$

A. Write an expression without parentheses that also represents Bella's total cost at Garden Mart.

At Plant World, Bella bought a hose and a shovel. The hose was priced at $29.68, but Bella had a coupon for x dollars off. The price of the shovel was $14.45.

B. Write an expression to represent how much money, in dollars, Bella spent at Plant World.

Go to the next page to finish question 17.

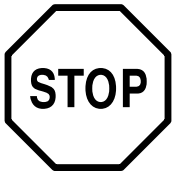
17. ***Continued.*** Please refer to the previous page for task explanation.

Bella went to Yard Depot multiple times. Each time she was there, Bella bought a gardening hat and y pairs of gardening gloves. The expression shown below represents the total amount of money, in dollars, Bella spent at Yard Depot.

$$a(by + c)$$

C. Explain what a, b, and c each mean in terms of the situation.

After you have checked your work, close your answer booklet and test booklet so your teacher will know you are finished.



Item-Specific Scoring Guideline

#17 Item Information

Alignment	B-E.1	Depth of Knowledge	2	Mean Score	0.99

Assessment Anchor this item will be reported under:

M07.B-E.1—Represent expressions in equivalent forms.

Specific Anchor Descriptor addressed by this item:

M07.B-E.1.1—Use properties of operations to generate equivalent expressions.

Scoring Guide

Score	In this item, the student . . .
4	Demonstrates a thorough understanding of representing expressions in equivalent forms by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of representing expressions in equivalent forms by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of representing expressions in equivalent forms by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of representing expressions in equivalent forms.
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 expressions in equivalent forms.
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?
$1.24g + 0.87m + 0.98z$ **OR** $\frac{1}{2} \times 2.48g + \frac{1}{2} \times 1.74m + \frac{1}{2} \times 1.96z$ **OR EQUIVALENT**	

Part B (1 point):

1 point for correct answer

What?	Why?
$44.13 - x$ **OR** $29.68 - x + 14.45$ **OR EQUIVALENT**	

Part C (2 points):

2 points for 3 correct and complete explanations
OR 1 point for 2 of 3 correct and complete explanations

What?	Why?
	Sample Explanation: The *a* represents the number of times Bella goes to Yard Depot. The *b* represents the price for each pair of gloves. The *c* represents the price for a gardening hat.

STUDENT RESPONSE

Response Score: 4 points

17. Bella bought gardening materials from different stores.

At Garden Mart, Bella bought *g* packets of geranium seeds, *m* packets of marigold seeds, and *z* packets of zinnia seeds. All of the plant seeds were on sale for half price. The expression shown below represents the total cost of the plant seeds Bella bought.

$$\frac{1}{2}(2.48g + 1.74m + 1.96z)$$

A. Write an expression without parentheses that also represents Bella's total cost at Garden Mart.

$$\frac{2.48g}{2} + \frac{1.74m}{2} + \frac{1.96z}{2}$$

The student has given a correct expression $\left(\frac{2.48g}{2} + \frac{1.74m}{2} + \frac{1.96z}{2}\right)$ by distributing the $\frac{1}{2}$ to each term inside the parentheses. [1 point]

At Plant World, Bella bought a hose and a shovel. The hose was priced at $29.68, but Bella had a coupon for *x* dollars off. The price of the shovel was $14.45.

B. Write an expression to represent how much money, in dollars, Bella spent at Plant World.

$$29.68 - x + 14.45$$

The student has given a correct expression (*29.68 – x + 14.45*) by subtracting the value of the coupon (*x*) from the price of the hose (29.68) and then adding the price of the shovel (14.45). [1 point]

Go to the next page to finish question 17.

GO ON

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

Bella went to Yard Depot multiple times. Each time she was there, Bella bought a gardening hat and y pairs of gardening gloves. The expression shown below represents the total amount of money, in dollars, Bella spent at Yard Depot.

$$a(by + c)$$

C. Explain what a, b, and c each mean in terms of the situation.

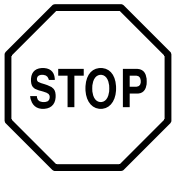
A is the number of times Bella visited Yard Depot.

B is the price of one pair of gardening gloves.

C is the price of one gardening hat.

The student has given 3 correct and complete explanations (*A is the number of times Bella visited Yard Depot, B is the price of one pair of gardening gloves, C is the price of one gardening hat*). [2 points]

After you have checked your work, close your answer booklet and test booklet so your teacher will know you are finished.



STUDENT RESPONSE

Response Score: 3 points

PART A

Question 17
Page 1 of 2

Line Guide | Item ID | ?

Bella bought gardening materials from different stores.

At Garden Mart, Bella bought g packets of geranium seeds, m packets of marigold seeds, and z packets of zinnia seeds. All of the plant seeds were on sale for half price. The expression shown below represents the total cost of the plant seeds Bella bought.

$$\frac{1}{2}(2.48g + 1.74m + 1.96z)$$

A. Write an expression without parentheses that also represents Bella's total cost at Garden Mart.

EQ

$1.24g + 0.87m + 0.98z$

The student has given a correct expression (*1.24g + 0.87m + 0.98z*) by multiplying each term inside the parentheses by $\frac{1}{2}$. [1 point]

At Plant World, Bella bought a hose and a shovel. The hose was priced at $29.68, but Bella had a coupon for x dollars off. The price of the shovel was $14.45.

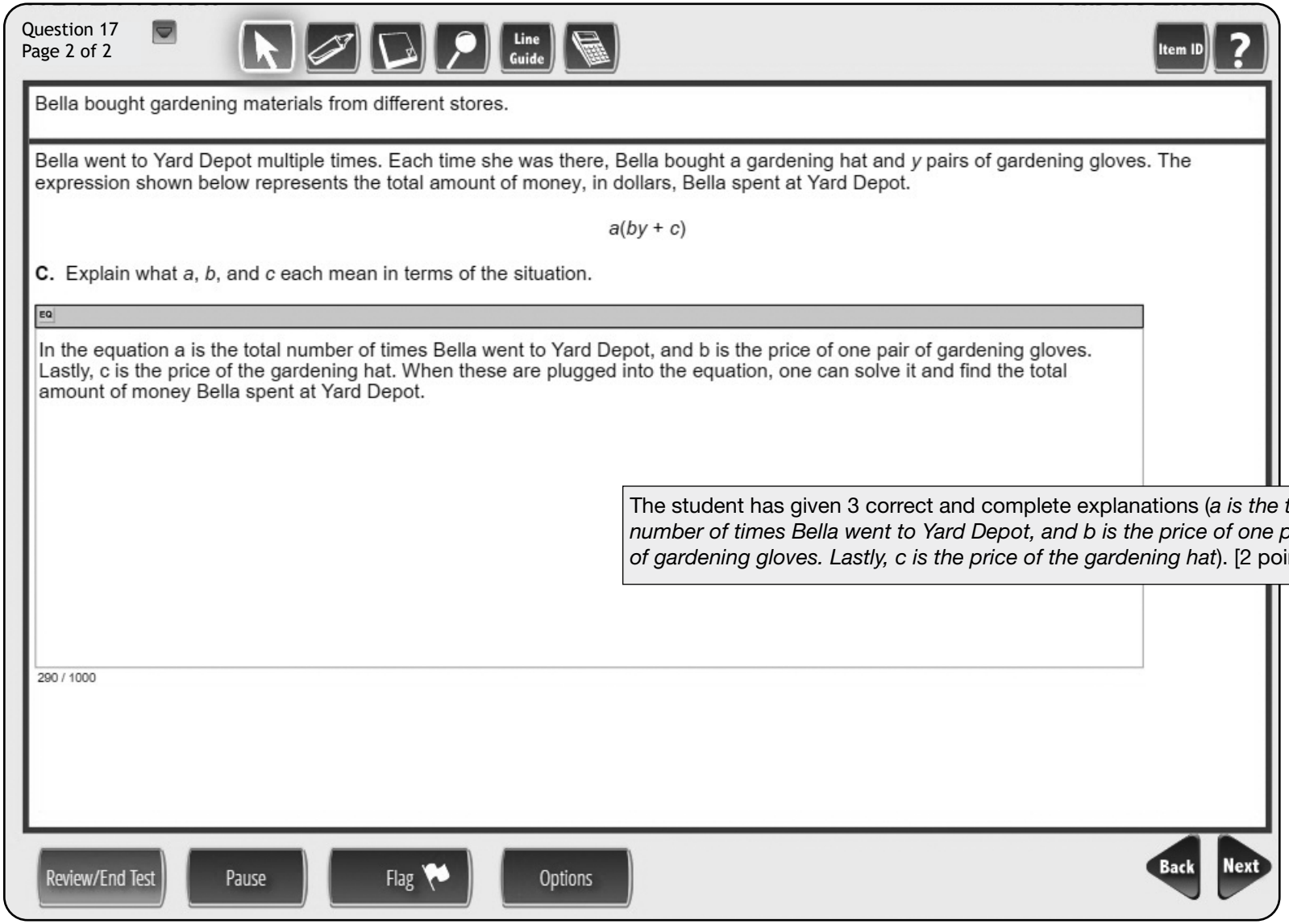
B. Write an expression to represent how much money, in dollars, Bella spent at Plant World.

EQ

$\left(\frac{29.68}{x}\right) + 14.45 = m(\$)$

The student has given an incorrect answer in the form of an equation ($\left(\frac{29.68}{x}\right) + 14.45 = m(\$)$). Any answer written in the form of an equation receives no credit since the prompt states "write an expression." Additionally, the first term of the left side of the equation $\left(\frac{29.68}{x}\right)$ is incorrect. [0 points]

Review/End Test | Pause | Flag | Options | Next



The student has given 3 correct and complete explanations (*a is the total number of times Bella went to Yard Depot, and b is the price of one pair of gardening gloves. Lastly, c is the price of the gardening hat*). [2 points]

STUDENT RESPONSE

Response Score: 2 points

17. Bella bought gardening materials from different stores.

At Garden Mart, Bella bought *g* packets of geranium seeds, *m* packets of marigold seeds, and *z* packets of zinnia seeds. All of the plant seeds were on sale for half price. The expression shown below represents the total cost of the plant seeds Bella bought.

$$\frac{1}{2}(2.48g + 1.74m + 1.96z)$$

A. Write an expression without parentheses that also represents Bella's total cost at Garden Mart.

$2.48g + 1.74m + 1.96z \cdot 0.5$

The student has given an incorrect expression (*2.48g + 1.74m + 1.96z • 0.5*). The student did not multiply the 2.48*g* or the 1.74*m* by 0.5. [0 points]

At Plant World, Bella bought a hose and a shovel. The hose was priced at $29.68, but Bella had a coupon for *x* dollars off. The price of the shovel was $14.45.

B. Write an expression to represent how much money, in dollars, Bella spent at Plant World.

$\$29.68 - x = \$14.45$

The student has given an incorrect answer in the form of an equation (*$29.68 – x = $14.45*). Any answer written in the form of an equation receives no credit since the prompt states "write an expression." Additionally, the $14.45 should be added to the 29.68 – *x*. [0 points]

Go to the next page to finish question 17.

GO ON

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

Bella went to Yard Depot multiple times. Each time she was there, Bella bought a gardening hat and y pairs of gardening gloves. The expression shown below represents the total amount of money, in dollars, Bella spent at Yard Depot.

$$a(by + c)$$

C. Explain what a, b, and c each mean in terms of the situation.

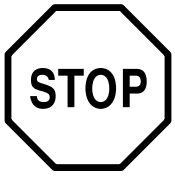
a = how many times Bella went to Yard Depot and bought something

b = the price of one pair of gloves

c = the price of the gardening hat

The student has given 3 correct and complete explanations (*a = how many times Bella went to Yard Depot, b = the price of one pair of gloves, c = the price of the gardening hat*). [2 points]

After you have checked your work, close your answer booklet and test booklet so your teacher will know you are finished.



STUDENT RESPONSE

Response Score: 1 point

PART A

Question 17
Page 1 of 2

Line Guide | Item ID | ?

Bella bought gardening materials from different stores.

At Garden Mart, Bella bought g packets of geranium seeds, m packets of marigold seeds, and z packets of zinnia seeds. All of the plant seeds were on sale for half price. The expression shown below represents the total cost of the plant seeds Bella bought.

$$\frac{1}{2}(2.48g + 1.74m + 1.96z)$$

A. Write an expression without parentheses that also represents Bella's total cost at Garden Mart.

EQ

$\frac{1}{2}2.48g + 1.74 + 1.96z$

The student has given an incorrect expression $\left(\frac{1}{2}\ 2.48g + 1.74 + 1.96z\right)$.

The student did not multiply the 1.74 or the 1.96z by $\frac{1}{2}$, and the answer is also missing the variable m. [0 points]

At Plant World, Bella bought a hose and a shovel. The hose was priced at $29.68, but Bella had a coupon for x dollars off. The price of the shovel was $14.45.

B. Write an expression to represent how much money, in dollars, Bella spent at Plant World.

EQ

$29.68 - x + 14.45

The student has given a correct expression ($\$29.68 - x + 14.45$) by subtracting the value of the coupon (x) from the price of the hose ($29.68) and then adding the price of the shovel (14.45). [1 point]

Review/End Test | Pause | Flag | Options | Next

Question 17
Page 2 of 2

Line Guide | Item ID | ?

Bella bought gardening materials from different stores.

Bella went to Yard Depot multiple times. Each time she was there, Bella bought a gardening hat and y pairs of gardening gloves. The expression shown below represents the total amount of money, in dollars, Bella spent at Yard Depot.

$$a(by + c)$$

C. Explain what a, b, and c each mean in terms of the situation.

EQ

A is the price of the hat
B is the gardening gloves
C is how much they were

75 / 1000

Review/End Test | Pause | Flag | Options | Back | Next

The student has given no correct explanations. *B is the gardening gloves* is incorrect as the student needs to specify that B is the price of the gardening gloves. [0 points]

STUDENT RESPONSE

Response Score: 0 points

17. Bella bought gardening materials from different stores.

At Garden Mart, Bella bought g packets of geranium seeds, m packets of marigold seeds, and z packets of zinnia seeds. All of the plant seeds were on sale for half price. The expression shown below represents the total cost of the plant seeds Bella bought.

$$\frac{1}{2}(2.48g + 1.74m + 1.96z)$$

A. Write an expression without parentheses that also represents Bella's total cost at Garden Mart.

$\frac{1}{2}(2.48 + 1.740 + 1.960)$

add all together and get $\underline{\$6.18}$ Dollars

$\frac{1}{2}2.48 + 1.74 + 1.96)$ ← add

The student has given an incorrect answer by adding the original numeric values (*add all together and get $6.18*), disregarding the variables and the $\frac{1}{2}$. [0 points]

At Plant World, Bella bought a hose and a shovel. The hose was priced at $29.68, but Bella had a coupon for x dollars off. The price of the shovel was $14.45.

B. Write an expression to represent how much money, in dollars, Bella spent at Plant World.

15.23 ← coupon she gave
+ 14.45 ← she had before the coupon
29.68

The coupon was 15.23 Dollars off when she bought the shovel.

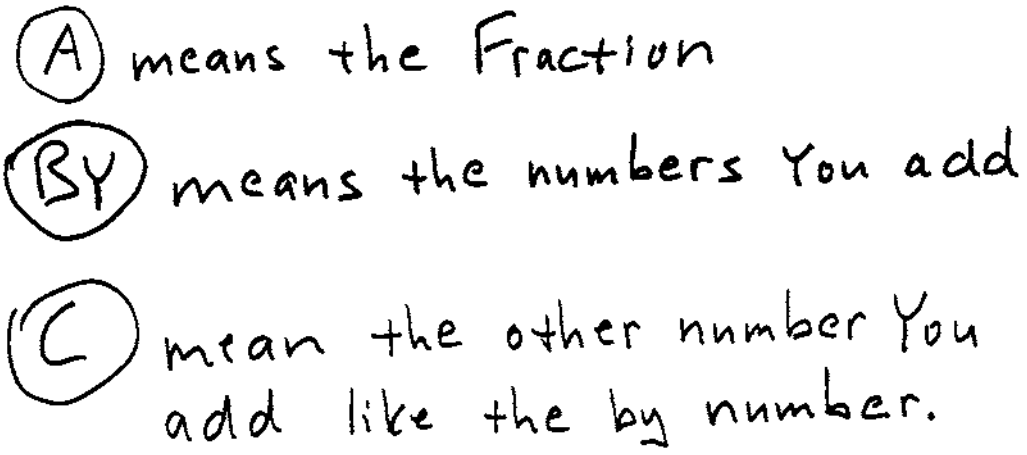
The student has given an incorrect answer (*The coupon was 15.23*). The student demonstrates misunderstanding of the prompt and finds the difference of the two prices given in the prompt. [0 points]

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

Bella went to Yard Depot multiple times. Each time she was there, Bella bought a gardening hat and y pairs of gardening gloves. The expression shown below represents the total amount of money, in dollars, Bella spent at Yard Depot.

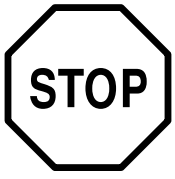
$$a(by + c)$$

C. Explain what a, b, and c each mean in terms of the situation.



The student has given no correct explanations.
[0 points]

After you have checked your work, close your answer booklet and test booklet so your teacher will know you are finished.



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-N.1.1.3	C	1	14%	22%	47%	17%
2	A-N.1.1	D	2	15%	17%	27%	41%
3	A-N.1.1.1 A-N.1.1.3	B	2	8%	70%	10%	12%
4	A-N.1.1.2	A	2	63%	16%	3%	18%
5	A-R.1.1	C	2	5%	15%	73%	7%
6	A-R.1.1.1	D	2	28%	6%	4%	62%
7	A-R.1.1.5	C	2	11%	8%	74%	7%
8	B-E.2.2	A	2	52%	24%	14%	10%
9	B-E.2.2.2 B-E.2.3.1	D	2	9%	9%	23%	59%
10	C-G.1.1.1 C-G.1.1.2	B	2	17%	61%	15%	7%
11	C-G.1.1.4	A	1	48%	15%	11%	26%
12	C-G.2.1.2	A	1	65%	10%	9%	16%
13	C-G.2.2.2	A	1	63%	12%	13%	12%
14	D-S.1.1	A	2	79%	8%	7%	6%
15	D-S.2	D	2	12%	16%	26%	46%
16	D-S.3.2.2	D	2	15%	17%	18%	50%

Open-Ended

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	B-E.1	4	2	0.99