Pennsylvania PSSA 2018 Grade 3 Math

Exam & Answer Key Materials
Pages 2 - 37

pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Mathematics
Item and Scoring Sampler

2018–2019
Grade 3

Pennsylvania Department of Education Bureau of Curriculum, Assessment and Instruction—September 2018

Mathematics Test Directions

Directions: On the following pages are the Mathematics questions.

- 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 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 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.

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.

Special Categories within zero reported separately:

Blank.....Blank, entirely erased, entirely crossed out, or consists entirely of whitespace

Refusal.....Refusal to respond to the task

Off Task.....Makes no reference to the item but is not an intentional refusal

Foreign Language.....Written entirely in a language other than English

Illegible .....Illegible or incoherent

MULTIPLE-CHOICE ITEMS

1. Alden and his family go bowling.

Alden's scores are listed below.

55 79 92

Which expression can be used to find Alden's total score when each score is rounded to the nearest ten?

Ⓐ 50 + 70 + 90

Ⓑ 50 + 80 + 90

Ⓒ 60 + 80 + 90

Ⓓ 60 + 80 + 100

Item Information	
Alignment	A-T.1.1.1
Answer Key	C
Depth of Knowledge	1
p-value A	19%
p-value B	14%
p-value C	60% (correct answer)
p-value D	7%
Option Annotations	A. rounds each number down B. rounds 55 down C. correct D. rounds each number up

2. Esther makes 40 bags of granola mix.

Each bag has 3 ounces of raisins.

How many ounces of raisins, in total, does Esther use to make 40 bags of granola mix?

Ⓐ 37

Ⓑ 43

Ⓒ 80

Ⓓ 120

Item Information	
Alignment	A-T.1.1.3
Answer Key	D
Depth of Knowledge	1
p-value A	9%
p-value B	26%
p-value C	7%
p-value D	58% (correct answer)
Option Annotations	A. subtracts 40 – 3 B. adds 40 + 3 C. doubles 40 + 40 D. correct

3. Pablo lives in Hershey, Pennsylvania.

The distances to four cities from Hershey are listed in the table shown below.

Distance from Hershey

City	Distance (miles)
Beaver Falls	247
Bradford	225
Butler	233
Erie	285

Pablo visits the cities in order from the **greatest** distance from Hershey to the **least** distance.

Which city will Pablo visit second?

Ⓐ Beaver Falls

Ⓑ Bradford

Ⓒ Butler

Ⓓ Erie

Item Information	
Alignment	A-T.1.1.4 D-M.2.1
Answer Key	A
Depth of Knowledge	2
p-value A	58% (correct answer)
p-value B	17%
p-value C	11%
p-value D	14%
Option Annotations	A. correct B. selects fewest miles away C. selects city visited third D. selects city visited first

4. Craig has 8 flowers and 2 vases.

He puts the same number of flowers into each vase.

What fraction of the flowers does Craig put into each vase?

Ⓐ $\frac{1}{8}$

Ⓑ $\frac{1}{6}$

Ⓒ $\frac{1}{4}$

Ⓓ $\frac{1}{2}$

Item Information	
Alignment	A-F.1.1.1 A-F.1.1.3
Answer Key	D
Depth of Knowledge	2
p-value A	29%
p-value B	6%
p-value C	32%
p-value D	33% (correct answer)
Option Annotations	A. uses the total number of flowers as the denominator B. solves 8 – 2 and uses the answer as the denominator C. solves 8 ÷ 2 and uses the answer as the denominator D. correct

5. Ben notices that $\frac{6}{8}$ of the shoes in a store window have laces.

Which also shows the fraction of the shoes that have laces?

Ⓐ $\frac{2}{8}$

Ⓑ $\frac{4}{6}$

Ⓒ $\frac{3}{4}$

Ⓓ $\frac{12}{8}$

Item Information	
Alignment	A-F.1.1.3
Answer Key	C
Depth of Knowledge	1
p-value A	24%
p-value B	27%
p-value C	36% (correct answer)
p-value D	13%
Option Annotations	A. uses number of shoes without laces used for numerator B. subtracts two for the two without laces from both numerator and denominator C. correct D. doubles the numerator

6. The table below lists the amounts of time, in hours, it takes three students to go to school each morning.

Going to School

Student	Amount of Time (hours)
1	$\frac{1}{6}$
2	$\frac{4}{6}$
3	$\frac{3}{6}$

Which statement correctly compares the amounts of time, in hours, it takes two of the students to go to school?

Ⓐ $\frac{1}{6} > \frac{3}{6}$ because 1 is less than 3.

Ⓑ $\frac{4}{6} > \frac{3}{6}$ because 4 is greater than 3.

Ⓒ $\frac{1}{6} < \frac{4}{6}$ because the numerators are less than the denominators.

Ⓓ $\frac{4}{6} < \frac{3}{6}$ because both fractions have the same denominator.

Item Information	
Alignment	A-F.1.1.5
Answer Key	B
Depth of Knowledge	2
p-value A	18%
p-value B	56% (correct answer)
p-value C	20%
p-value D	6%
Option Annotations	A. uses the incorrect comparison symbol B. correct C. compares a numerator to a denominator D. compares denominators instead of numerators

7. At a park, Calvin sees a total of 27 birds sitting in 3 trees.

He sees the same number of birds in each tree.

Which number sentence correctly shows how many birds Calvin sees in each tree?

Ⓐ $3 \times 3 = 27$

Ⓑ $3 + 27 = 30$

Ⓒ $27 \div 3 = 9$

Ⓓ $27 - 3 = 24$

Item Information	
Alignment	B-O.1.1
Answer Key	C
Depth of Knowledge	2
p-value A	10%
p-value B	16%
p-value C	70% (correct answer)
p-value D	4%
Option Annotations	A. chooses an incorrect sentence B. chooses a correct sentence, but one that shows the sum of the number of birds and the number of trees C. correct D. chooses a correct number sentence, but one that shows the difference between the number of birds and the number of trees

8. Mrs. Harris rode her bike 40 miles.

She biked 8 miles each day.

How many days did Mrs. Harris ride her bike?

Ⓐ 5

Ⓑ 6

Ⓒ 7

Ⓓ 8

Item Information	
Alignment	B-O.1.2.1
Answer Key	A
Depth of Knowledge	1
p-value A	64% (correct answer)
p-value B	7%
p-value C	10%
p-value D	19%
Option Annotations	A. correct B. thinks that $\frac{40}{8} = 6$ C. thinks $\frac{40}{8} = 7$ D. thinks $\frac{40}{8} = 8$

9. Which expression is equal to 10×6?

Ⓐ $2 \times 5 \times 6$

Ⓑ $10 + 2 \times 3$

Ⓒ $2 + 5 + 2 + 3$

Ⓓ $6 \times 2 \times 6 \times 5$

Item Information	
Alignment	B-O.2.1
Answer Key	A
Depth of Knowledge	1
p-value A	70% (correct answer)
p-value B	14%
p-value C	4%
p-value D	12%
Option Annotations	A. correct B. uses addition instead of multiplication C. finds the correct factors, but adds instead of multiplies D. distributes the 6 and multiplies

10. Jason puts 28 cans of food into 4 bags.

The equation below can be used to find the number of cans he puts into each bag.

$$28 \div 4 = ?$$

Which equation can also be used to find the number of cans Jason puts into each bag?

Ⓐ $4 + ? = 28$

Ⓑ $4 \times ? = 28$

Ⓒ $4 \times 28 = ?$

Ⓓ $4 \div ? = 28$

Item Information	
Alignment	B-O.2.2.1
Answer Key	B
Depth of Knowledge	1
p-value A	4%
p-value B	67% (correct answer)
p-value C	15%
p-value D	14%
Option Annotations	A. uses addition instead of multiplication B. correct C. changes the order and sign D. keeps division and rearranges the numbers

11. Anya buys 6 packs of cards.

There are 35 cards in each pack.

Anya has a total of 210 cards.

Which sentence explains how many cards Anya would have if she had bought 12 packs of cards instead of 6 packs of cards?

Ⓐ Anya would have 6 more cards because 6 + 6 = 12.

Ⓑ Anya would have half as many cards because 12 ÷ 2 = 6.

Ⓒ Anya would have twice as many cards because 6 × 2 = 12.

Ⓓ Anya would have 6 times as many cards because 6 + 6 = 12.

Item Information	
Alignment	B-O.3
Answer Key	C
Depth of Knowledge	2
p-value A	15%
p-value B	18%
p-value C	54% (correct answer)
p-value D	13%
Option Annotations	A. uses an additive comparison B. compares in the wrong direction C. correct D. combines an additive and multiplicative comparison

12. Rosa bought 42 cups to use at her lemonade stand.

She used 17 cups for lemonade on Monday and 18 cups on Tuesday.

How many cups does Rosa have remaining?

Ⓐ 7

Ⓑ 13

Ⓒ 24

Ⓓ 25

Item Information	
Alignment	B-O.3.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	59% (correct answer)
p-value B	12%
p-value C	10%
p-value D	19%
Option Annotations	A. correct B. subtracts in the wrong direction C. subtracts number sold on Tuesday D. subtracts number sold on Monday

13. Mr. Hernandez is training for a race.

The table below shows the numbers of times he ran around a track on four different days.

Mr. Hernandez's Training

Day	Number of Times Ran around the Track
2	6
3	9
4	12
5	15

Which statement describes the pattern shown by the numbers of times Mr. Hernandez ran around the track?

Ⓐ add 1

Ⓑ add 3

Ⓒ add 4

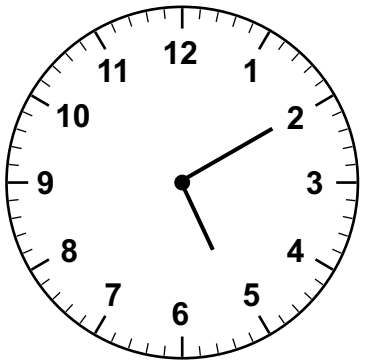
Ⓓ add 10

Item Information	
Alignment	B-O.3.1.5
Answer Key	B
Depth of Knowledge	2
p-value A	7%
p-value B	70% (correct answer)
p-value C	11%
p-value D	12%
Option Annotations	A. finds the pattern in the days column B. correct C. adds 4 to day 2 to get 6 laps D. adds 10 to day 5 to get 15 laps

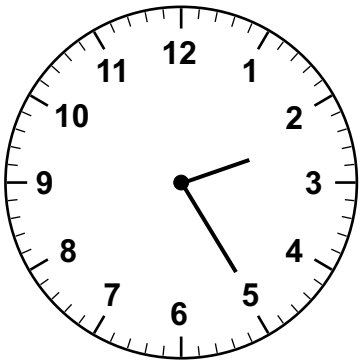
14. Terra leaves her house for soccer practice at 10 minutes to 5:00.

Which clock shows the time Terra leaves her house for soccer practice?

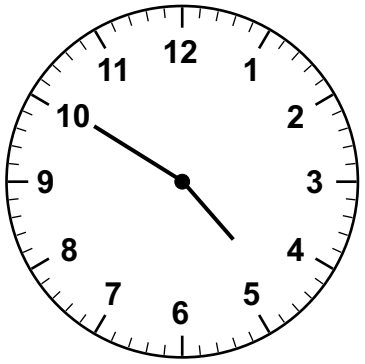
Ⓐ



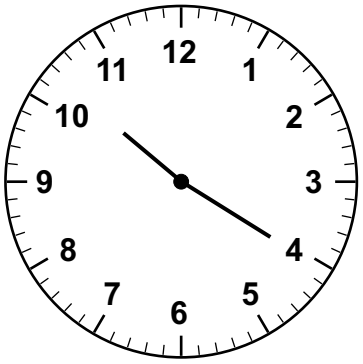
Ⓑ



Ⓒ

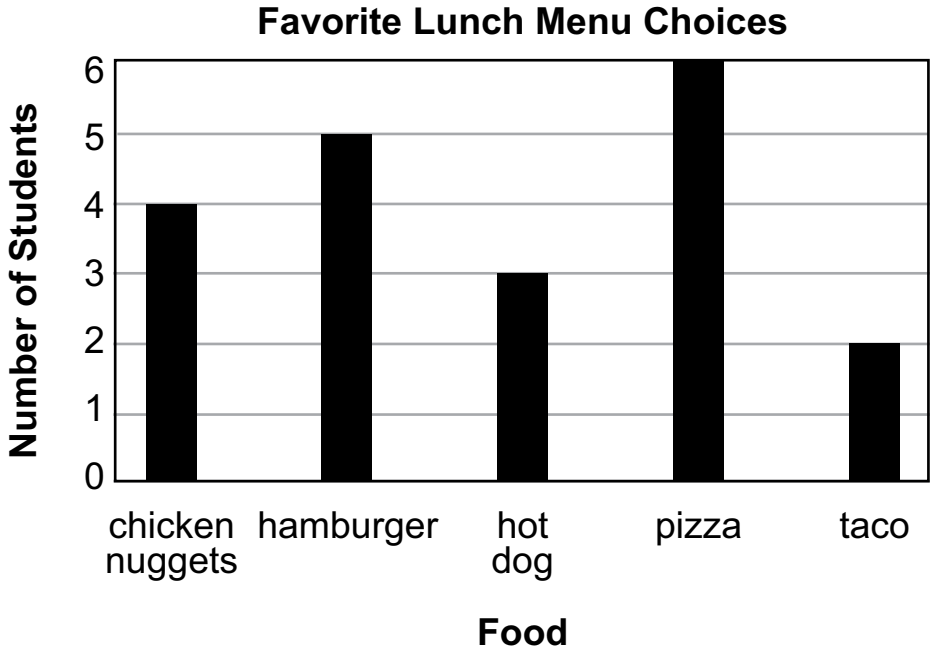


Ⓓ



Item Information	
Alignment	D-M.1.1.1
Answer Key	C
Depth of Knowledge	1
p-value A	26%
p-value B	7%
p-value C	58% (correct answer)
p-value D	9%
Option Annotations	A. finds 5:10; ten minutes after 5:00 B. finds 2:25; ten minutes after 5:00 and reverses hands C. correct D. finds 10:20; reverses hands

15. The graph shows the favorite lunch menu choices of Tamara's third-grade class.



How many students chose chicken nuggets or hot dog as their favorite lunch menu choices?

Ⓐ 1

Ⓑ 3

Ⓒ 4

Ⓓ 7

Item Information	
Alignment	D-M.2.1.2
Answer Key	D
Depth of Knowledge	2
p-value A	9%
p-value B	6%
p-value C	28%
p-value D	57% (correct answer)
Option Annotations	A. finds how many more students prefer chicken nuggets than hot dogs B. finds number of hot dogs C. finds number of chicken nuggets D. correct

OPEN-ENDED QUESTION

16. Dorie has the five shapes listed below.

octagon, pentagon, rectangle, square, triangle

Dorie only wants quadrilateral shapes for an art project.

A. Which shapes from the list can Dorie use for her art project?

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

Answer: _____

B. **EXPLAIN** how a square and a rhombus are alike.

_____

_____

_____

_____

C. **EXPLAIN** how a square and a rhombus could be different.

_____

_____

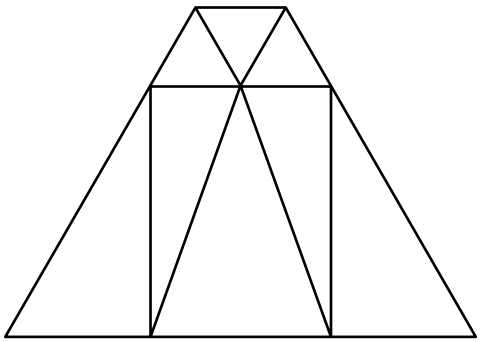
_____

_____

Go to the next page to finish question 16.

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

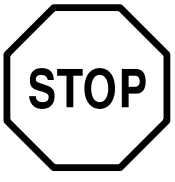
Dorie draws the picture below for another part of her art project.



Dorie states each section inside the shape is $\frac{1}{8}$ of the whole shape.

D. EXPLAIN why Dorie is **not** correct.

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

#16 Item Information

Alignment	C-G.1 A-F.1	**Depth of Knowledge**	2	**Mean Score**	1.86

Assessment Anchor this item will be reported under:

M03.C-G.1—Reason with shapes and their attributes.

Specific Anchor Descriptor addressed by this item:

M03.C-G.1.1—Analyze characteristics of polygons.
M03.A-F.1.1—Develop and apply number theory concepts to compare quantities and magnitudes of fractions and whole numbers.

Scoring Guide

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

Top-Scoring Student Response and Training Notes

Score	Description
4	Student earns 4 points.
3	Student earns 3.0–3.5 points.
2	Student earns 2.0–2.5 points.
1	Student earns 0.5–1.5 points. OR Student demonstrates minimal understanding of how to reason with shapes and their attributes.
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 <u>each</u> correct answer

Note: No credit if any other shape is listed.

What?	Why?
rectangle, square	

Part B (1 point):

1 point for correct and complete explanation

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

What?	Why?
	Sample Explanation: Both shapes have four sides. **OR** All four sides are the same length. **OR equivalent**

Part C (1 point):

1 point for correct and complete explanation

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

What?	Why?
	Sample Explanation: A square has four right angles where a rhombus has four angles of any measure. **OR equivalent**

Part D (1 point):

1 point for correct and complete explanation

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

What?	Why?
	Sample Explanation: The inside sections are not each $\frac{1}{8}$ of the whole shape, because they do not cover equal areas. **OR equivalent**

STUDENT RESPONSE

Response Score: 4 points

16. Dorie has the five shapes listed below.

octagon, pentagon, rectangle, square, triangle

Dorie only wants quadrilateral shapes for an art project.

A. Which shapes from the list can Dorie use for her art project?

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

The response provides both correct shapes.

Answer: Square, and a rectangle

B. **EXPLAIN** how a square and a rhombus are alike.

They're both polygons and quadrilaterals

The response correctly explains how a square and a rhombus are alike.

C. **EXPLAIN** how a square and a rhombus could be different.

A rhombos doesn't have right angles, and a square does

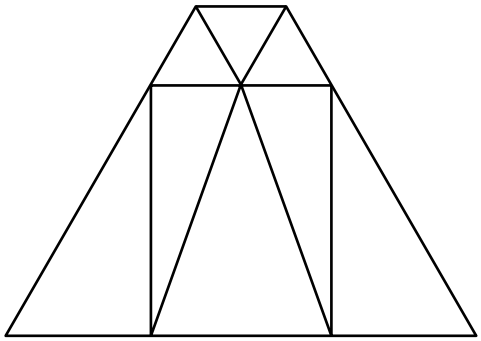
The response correctly explains how a square and a rhombus could be different.

Go to the next page to finish question 16.

GO ON

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

Dorie draws the picture below for another part of her art project.



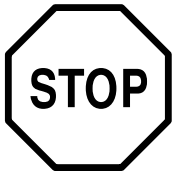
Dorie states each section inside the shape is $\frac{1}{8}$ of the whole shape.

D. EXPLAIN why Dorie is **not** correct.

Dorie isn't correct becuse the shapes aren't the same size.

The response provides a correct and complete explanation.

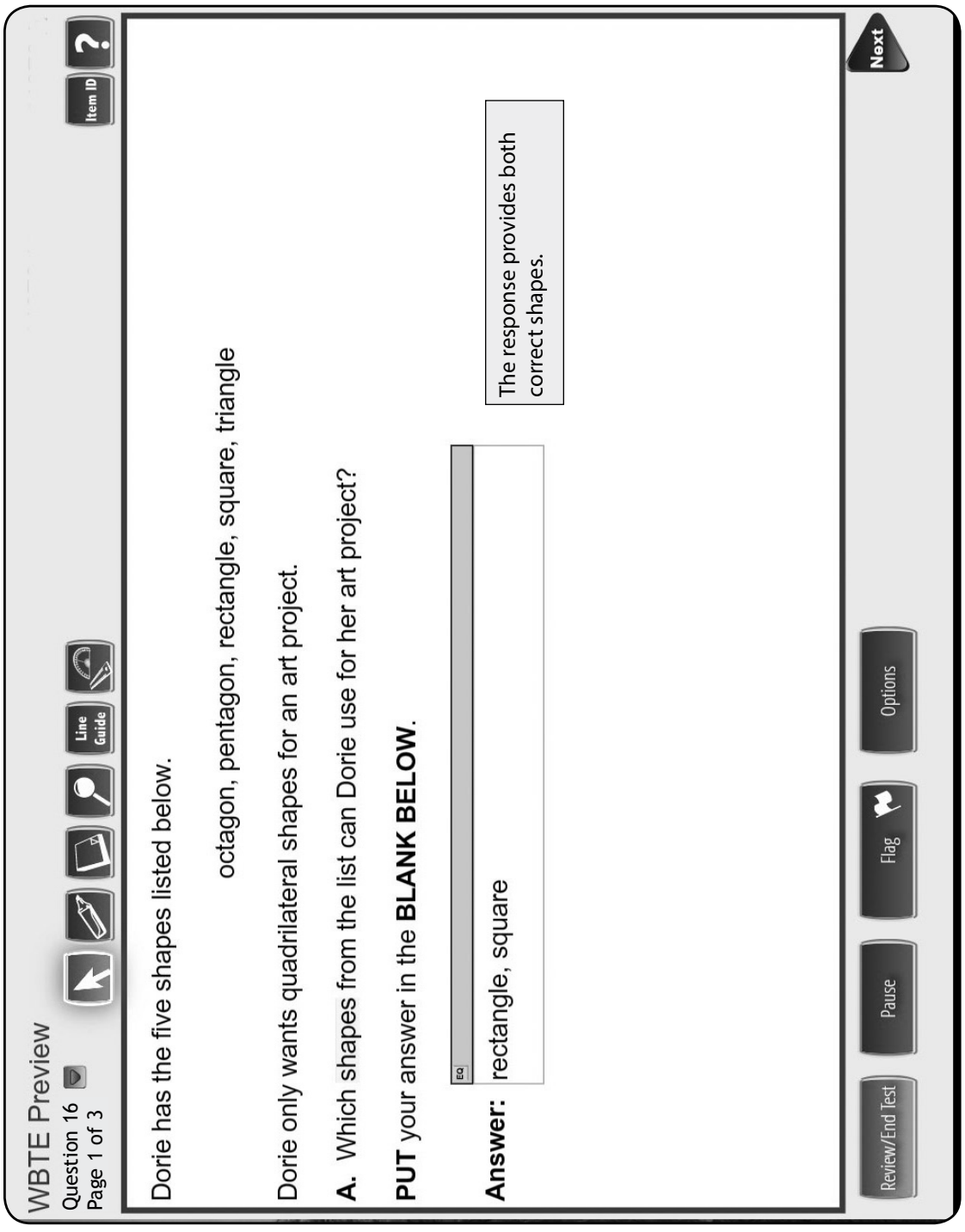
After you have checked your work, close your answer booklet and test booklet so your teacher will know you are finished.



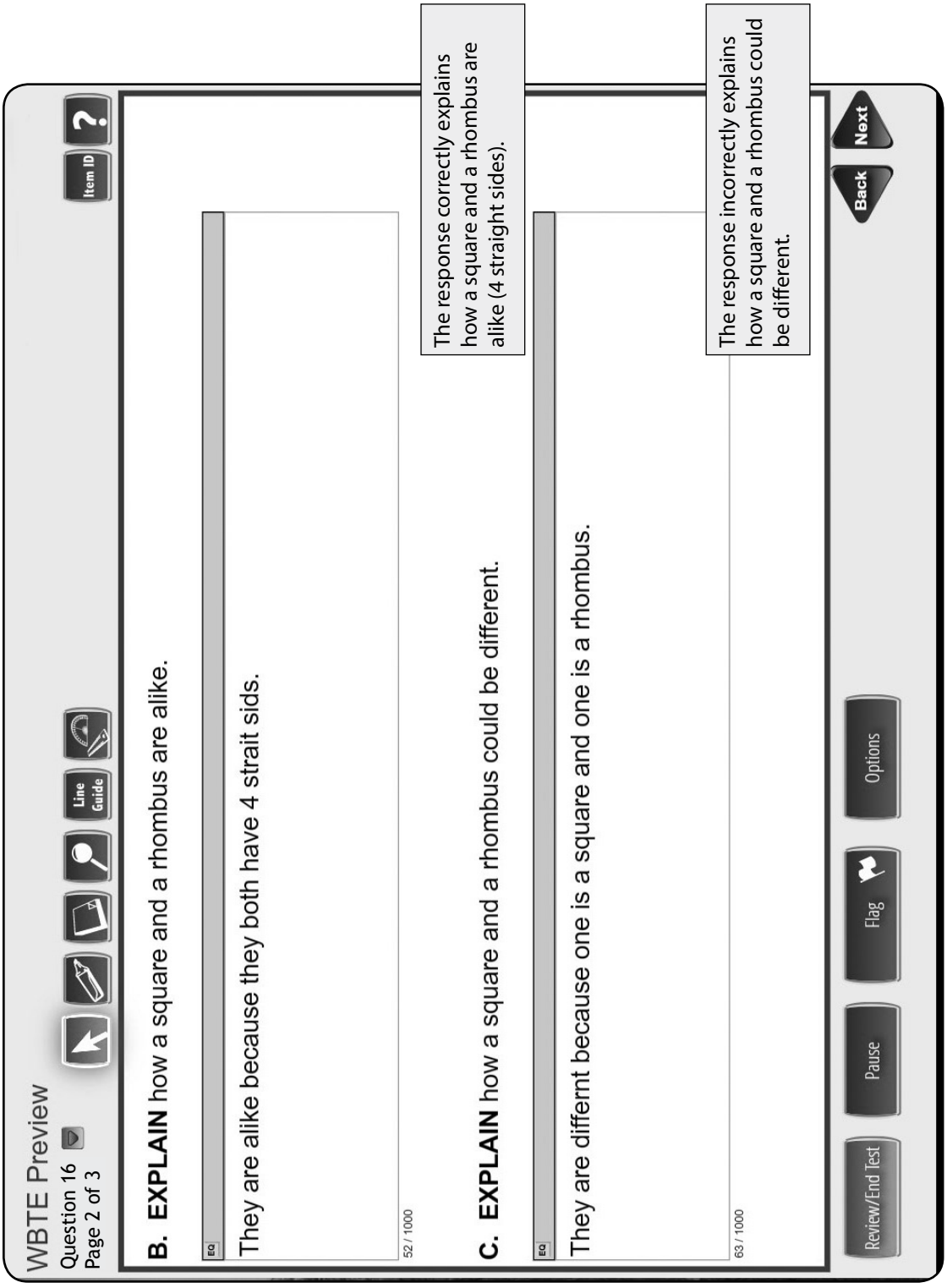
STUDENT RESPONSE

Response Score: 3 points

PART A



PARTS B AND C


WBTE Preview
Question 16
Page 2 of 3
Line Guide
Item ID
B. EXPLAIN how a square and a rhombus are alike.
EQ
They are alike because they both have 4 strait sids.
52 / 1000
The response correctly explains how a square and a rhombus are alike (4 straight sides).
C. EXPLAIN how a square and a rhombus could be different.
EQ
They are differnt because one is a square and one is a rhombus.
63 / 1000
The response incorrectly explains how a square and a rhombus could be different.
Review/End Test
Pause
Flag
Options
Back
Next

PART D

The response provides a correct and complete explanation (*not split into equal parts*).

STUDENT RESPONSE

Response Score: 2 points

16. Dorie has the five shapes listed below.

octagon, pentagon, rectangle, square, triangle

Dorie only wants quadrilateral shapes for an art project.

A. Which shapes from the list can Dorie use for her art project?

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

Answer: rectangle Square

The response provides both correct shapes.

B. **EXPLAIN** how a square and a rhombus are alike.

the rhombus and square are both quadrilateral

The response correctly explains how a square and a rhombus are alike.

C. **EXPLAIN** how a square and a rhombus could be different.

one comes from a rectangle and the other is a Polygon

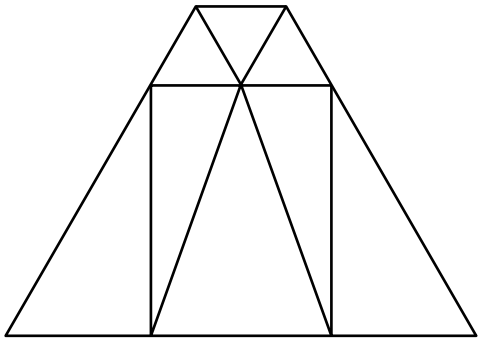
The response incorrectly explains how a square and a rhombus could be different.

Go to the next page to finish question 16.

GO ON

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

Dorie draws the picture below for another part of her art project.



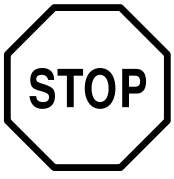
Dorie states each section inside the shape is $\frac{1}{8}$ of the whole shape.

D. EXPLAIN why Dorie is **not** correct.

no because it is $\frac{1}{3}$

The response provides an incorrect explanation.

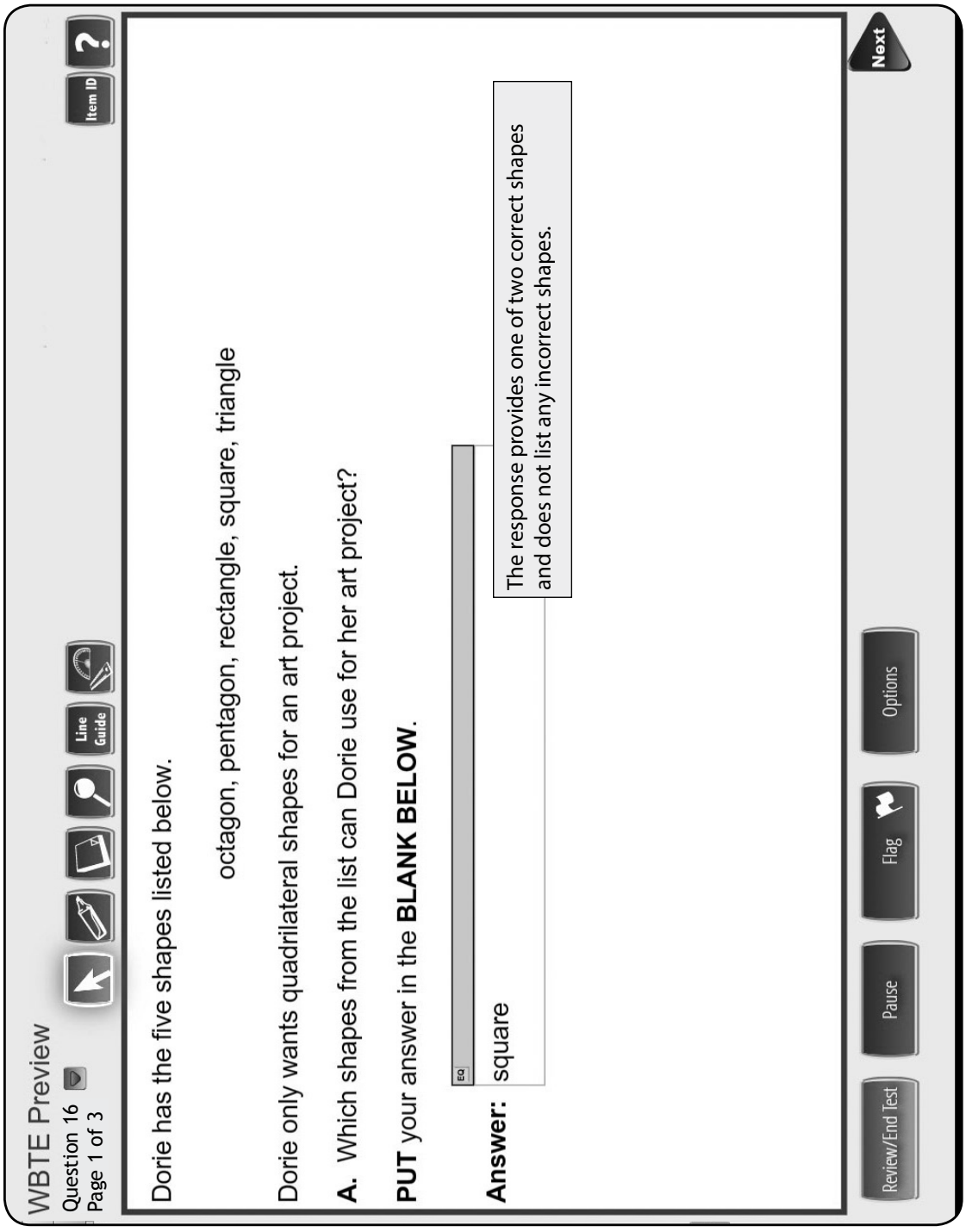
After you have checked your work, close your answer booklet and test booklet so your teacher will know you are finished.



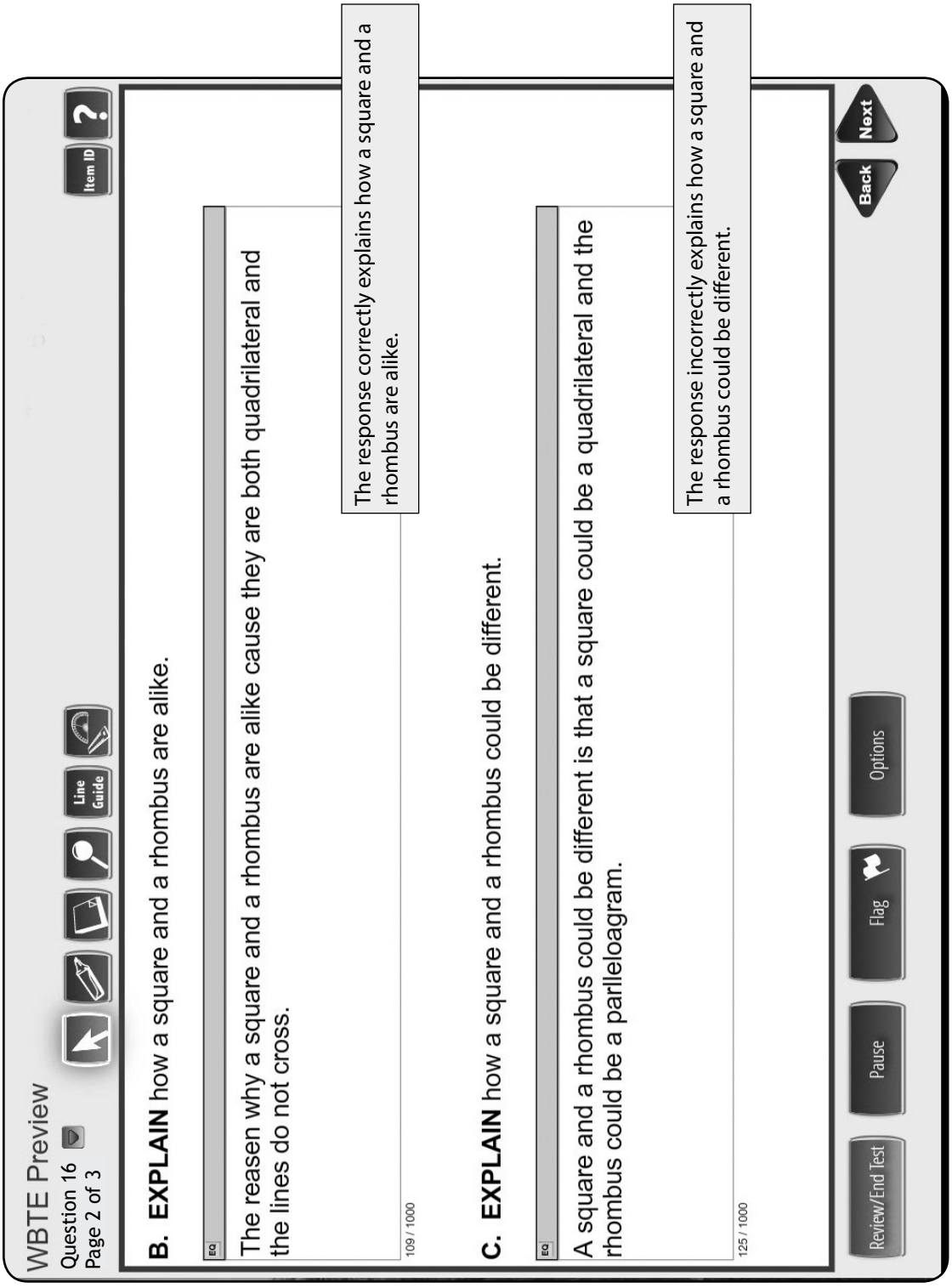
STUDENT RESPONSE

Response Score: 1 point

PART A



PARTS B AND C


WBTE Preview
Question 16
Page 2 of 3
Line Guide
Item ID
B. EXPLAIN how a square and a rhombus are alike.
EQ
The reasen why a square and a rhombus are alike cause they are both quadrilateral and the lines do not cross.
109 / 1000
The response correctly explains how a square and a rhombus are alike.
C. EXPLAIN how a square and a rhombus could be different.
EQ
A square and a rhombus could be different is that a square could be a quadrilateral and the rhombus could be a parlleloagram.
125 / 1000
The response incorrectly explains how a square and a rhombus could be different.
Review/End Test
Pause
Flag
Options
Back
Next

PART D

WBTE Preview
Question 16
Page 3 of 3
Line Guide
Item ID
Dorie draws the picture below for another part of her art project.
Dorie states each section inside the shape is $\frac{1}{8}$ of the whole shape.
D. EXPLAIN why Dorie is **not** correct.
EQ
The reasen why Dorie is not correct becuase she states each section is $\frac{1}{8}$ their is 8 shapes but their is not one shaded.
118 / 1000
The response provides an incorrect explanation.
Review/End Test
Pause
Flag
Options
Back
Next

STUDENT RESPONSE

Response Score: 0 points

16. Dorie has the five shapes listed below.

octagon, pentagon, rectangle, square, triangle

Dorie only wants quadrilateral shapes for an art project.

A. Which shapes from the list can Dorie use for her art project?

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

Answer: The penagon

The response provides an incorrect shape.

B. **EXPLAIN** how a square and a rhombus are alike.

They are alike because when you look at them they look the some.

The response incorrectly explains how a square and rhombus are alike.

C. **EXPLAIN** how a square and a rhombus could be different.

The could be different because a rombus a four point and a triangle has three

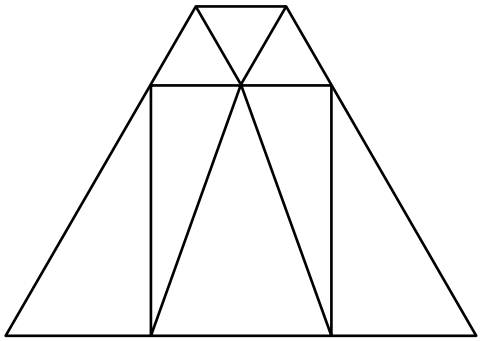
The response incorrectly explains how a square and a rhombus could be different.

Go to the next page to finish question 16.

GO ON

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

Dorie draws the picture below for another part of her art project.



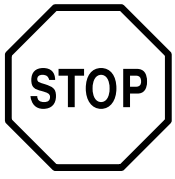
Dorie states each section inside the shape is $\frac{1}{8}$ of the whole shape.

D. EXPLAIN why Dorie is **not** correct.

Dorie is not correct because there is nothing shaded so that means she is wrong.

The response provides an incorrect explanation.

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*-values A	*p*-values B	*p*-values C	*p*-values D
1	A-T.1.1.1	C	1	19%	14%	60%	7%
2	A-T.1.1.3	D	1	9%	26%	7%	58%
3	A-T.1.1.4 D-M.2.1	A	2	58%	17%	11%	14%
4	A-F.1.1.1 A-F.1.1.3	D	2	29%	6%	32%	33%
5	A-F.1.1.3	C	1	24%	27%	36%	13%
6	A-F.1.1.5	B	2	18%	56%	20%	6%
7	B-O.1.1	C	2	10%	16%	70%	4%
8	B-O.1.2.1	A	1	64%	7%	10%	19%
9	B-O.2.1	A	1	70%	14%	4%	12%
10	B-O.2.2.1	B	1	4%	67%	15%	14%
11	B-O.3	C	2	15%	18%	54%	13%
12	B-O.3.1.1	A	2	59%	12%	10%	19%
13	B-O.3.1.5	B	2	7%	70%	11%	12%
14	D-M.1.1.1	C	1	26%	7%	58%	9%
15	D-M.2.1.2	D	2	9%	6%	28%	57%

OPEN-ENDED

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
16	C-G.1 A-F.1	4	2	1.86