pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Mathematics
Item and Scoring Sampler

2024–2025
Grade 3

Pennsylvania Department of Education Bureau of Curriculum, Assessment and Instruction—August 2024

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INFORMATION ABOUT MATHEMATICS

Introduction

General Introduction

The Pennsylvania Department of Education (PDE) provides districts and schools with tools to assist in delivering focused instructional programs aligned with the Pennsylvania Core Standards (PCS). These tools include Academic Standards, Assessment Anchors and Eligible Content (AAEC) documents, assessment handbooks, and content-based Item and Scoring Samplers. This Item and Scoring Sampler is a useful tool for Pennsylvania educators in preparing local instructional programs by providing samples of test item types and scored student responses. The Item and Scoring Sampler is not designed to be used as a pretest, a curriculum, or any other benchmark for operational testing.

This Item and Scoring Sampler is available in Braille format. For more information regarding Braille, call (717) 901-2238.

Pennsylvania Core Standards (PCS)

This Item and Scoring Sampler contains examples of test questions designed to assess the Pennsylvania Assessment Anchors and Eligible Content aligned to the PCS. 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 PCS-aligned Assessment Anchors and Eligible Content documents are posted on this portal:

- *www.education.pa.gov* [Hover over “Data and Reporting,” select “Assessment and Accountability,” and select “PSSA-PA System of School Assessment.” Then select “Assessment Anchors/Eligible Content” on the right side of the screen.]

What Is Included

This Item and Scoring Sampler contains test questions, or test “items,” that have been written to align to the Assessment Anchors that are based on the PCS. The sample test questions model the types of items that may appear on an operational PSSA. Each sample test question has been through a rigorous review process to ensure alignment with the Assessment Anchors prior to being piloted in an embedded field test within a PSSA assessment and then used operationally on a PSSA assessment. Answer keys, scoring guidelines, and any related stimulus material are also included. Additionally, sample student responses are provided with each open-ended (OE) item to demonstrate the range of responses that students provided in response to these items.

Purpose and Uses

The items in this Item and Scoring Sampler may be used[1] as examples for creating assessment items at the classroom level. Classroom teachers may find it beneficial to have students respond to the open-ended item in this Item and Scoring Sampler. Educators may then use the Item and Scoring Sampler as a guide to score the responses either independently or together with colleagues within a school or district. This Item and Scoring 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 may be distributed to students for use during local assessments and may also be used by educators when scoring local assessments.

Item Format and Scoring Guidelines

The multiple-choice (MC) items have four answer choices. Each correct response to an MC item is worth one point.

Each OE item in mathematics is scored using an item-specific scoring guideline based on a 0–4-point scale. In this Item and Scoring 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.

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.

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

Testing Time and Mode of Test Delivery for the PSSA

The PSSA is delivered in a 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. The estimated response time for each item type is listed below.

- **Multiple-Choice:** 2 minutes
- **Open-Ended:** 10 to 15 minutes

During an official test administration, students are given as much additional time as is necessary to complete the test questions.

Mathematics Reporting Categories

The Assessment Anchors are organized into four classifications as listed below.

- A = Numbers and Operations
- B = Algebraic Concepts
- C = Geometry
- D = Data Analysis and Probability

These four classifications are used throughout the grade levels. In addition to these classifications, there are five Reporting Categories for each grade level. The first letter of each Reporting Category represents the classification; the second letter represents the Domain as stated in the Common Core State Standards for Mathematics. Listed below are the Reporting Categories for Grade 3.

- A–T = Numbers and Operations in Base Ten
- A–F = Numbers and Operations—Fractions
- B–O = Operations and Algebraic Thinking
- C–G = Geometry
- D–M = Measurement and Data

Examples of MC and OE items assessing these categories are included in this Item and Scoring Sampler.

Item and Scoring Sampler Format

This Item and Scoring Sampler includes the test directions and scoring guidelines that appear in the PSSA Mathematics assessments. Each MC item is followed by a table that includes the item alignment, the answer key, the depth of knowledge (DOK) level, the percentage[2] of students who chose each answer option, and a brief answer-option analysis or rationale. The OE item is followed by a table that includes the item alignment, the DOK level, and the 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. The student responses in this Item and Scoring Sampler are actual student responses; however, the handwriting has been changed to protect the students' identities and to make the Item and Scoring Sampler accessible to as many people as possible.

Example Multiple-Choice Item Information Table

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

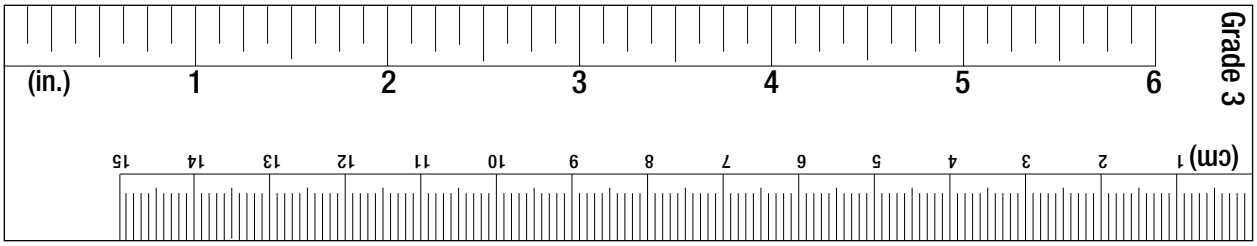
Example Open-Ended Item Information Table

Category	Item-Specific Information
Alignment	Assigned AAEC
Depth of Knowledge	Assigned DOK
Mean Score	Average Score

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

Grade 3 Ruler

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



General Description of Scoring Guidelines for Mathematics Open-Ended Questions

4 –The response demonstrates a *thorough* understanding of the mathematical concepts and procedures required by the task.

The response provides correct answer(s) with clear and complete mathematical procedures shown and a correct explanation, as required by the task. The response may contain a minor "blemish" or omission in work or explanation that does not detract from demonstrating a *thorough* understanding.

3 –The response demonstrates a *general* understanding of the mathematical concepts and procedures required by the task.

The response and explanation (as required by the task) are mostly complete and correct. The response may have minor errors or omissions that do not detract from demonstrating a *general* understanding.

2 –The response demonstrates a *partial* understanding of the mathematical concepts and procedures required by the task.

The response is somewhat correct with *partial* understanding of the required mathematical concepts and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

1 –The response demonstrates a *minimal* understanding of the mathematical concepts and procedures required by the task.

0 –The response has no correct answer and *insufficient* evidence to demonstrate any understanding of the mathematical concepts and procedures required by the task for that grade level.

Response may show only information copied from the question.

Special Categories within zero reported separately:

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

PSSA MATHEMATICS GRADE 3

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 asks you to explain, be sure to use words to explain your reasoning in the space provided.
- If the question does not ask you to show your work or explain your reasoning, you may use the space provided, but only those parts of your response that the question specifically asks for will be scored.
- Write your response in the appropriate location within the response box in the booklet. Some answers may require graphing, plotting, labeling, drawing, or shading. If you use scratch paper, be sure to transfer your final response and any needed work or reasoning to the booklet.

Multiple-Choice Items

1. The table below shows the number of movie tickets that were sold each of four days.

Movie Tickets

Day	Number of Tickets Sold
Thursday	539
Friday	563
Saturday	675
Sunday	641

The number of tickets sold each day is rounded to the nearest hundred.

On which two days do the numbers of tickets sold round to 600?

Ⓐ Thursday and Friday

Ⓑ Thursday and Saturday

Ⓒ Friday and Sunday

Ⓓ Saturday and Sunday

Category	Item-Specific Information
Alignment	A-T.1.1.1
Answer Key	C
Depth of Knowledge	1
p-value A	14%
p-value B	6%
p-value C	60% (correct answer)
p-value D	20%
Option Annotations	A. rounds all the numbers up B. misapplies rounding rules (rounds numbers up that should be rounded down and rounds numbers down that should be rounded up) C. Correct: looks at the digit in the tens place and applies the rule “less than 5, round down; 5 or greater, round up” for each number, resulting in 500, 600, 700, 600, and then identifies that Friday and Sunday both round to 600 D. selects the numbers with a 6 in the hundreds place or truncates instead of rounds

2. James makes 70 bookmarks.

He uses 6 inches of ribbon to make each bookmark.

How many inches of ribbon does James use to make all the bookmarks?

Ⓐ 64

Ⓑ 76

Ⓒ 420

Ⓓ 480

Category	Item-Specific Information
Alignment	A-T.1.1.3
Answer Key	C
Depth of Knowledge	1
p-value A	16%
p-value B	28%
p-value C	48% (correct answer)
p-value D	8%
Option Annotations	A. uses subtraction rather than multiplication (interprets as James starts with 70 inches of ribbon and uses 6 inches to make a bookmark) B. uses addition rather than multiplication (interprets as James already used 70 inches of ribbon and uses 6 inches more to make another bookmark) C. Correct: multiplies 6 by 7, determines the product is 42, and then appends a 0 to the right side of the product since 70 is a 2-digit multiple of 10 D. confuses the product of 6 times 7 with the product of 6 times 8 (48) before appending a 0 to the right side of the product since 70 is a 2-digit multiple of 10

3. The winner of a game is the person with the greatest number of points.

- The winner of the game has a total of 2,341 points.
- The person in third place has a total of 1,768 points.

How many points could the person in second place have?

Ⓐ 1,657

Ⓑ 1,899

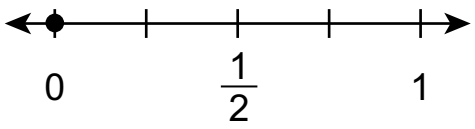
Ⓒ 2,361

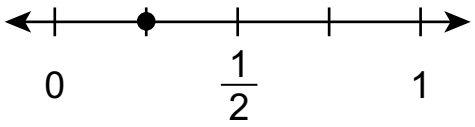
Ⓓ 2,543

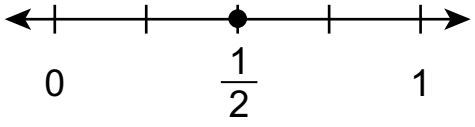
Category	Item-Specific Information
Alignment	A-T.1.1.4
Answer Key	B
Depth of Knowledge	1
p-value A	11%
p-value B	73% (correct answer)
p-value C	8%
p-value D	8%
Option Annotations	A. compares 341, 657, and 768 B. Correct: recognizes that the number of points must be less than 2,341 and greater than 1,768; compares each of the answer choices to 2,341, identifies 1,657 and 1,899 are both less than 2,341 by comparing the digits in the thousands place (1,000 < 2,000) and eliminating 2,361 (2,000 = 2,000, 300 = 300, 60 > 40) and 2,543 (2,000 = 2,000, 500 > 300); and compares the two remaining choices to 1,768, identifies 1,899 is greater than 1,768 (1,000 = 1,000, 800 > 700) and eliminating 1,657 (1,000 = 1,000, 600 < 700), resulting in 1,899 being the only answer choice that is less than 2,341 and greater than 1,768 C. compares 41, 61, and 68 D. compares 341, 543, and 768

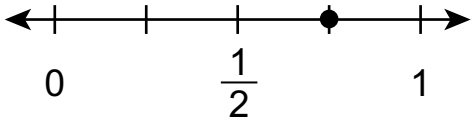
4. On a field trip, $\frac{1}{4}$ of the people are adults.

Which number line has a point at the fraction of people on the field trip who are adults?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

Category	Item-Specific Information
Alignment	A-F.1.1.2
Answer Key	B
Depth of Knowledge	1
p-value A	9%
p-value B	49% (correct answer)
p-value C	15%
p-value D	27%
Option Annotations	A. counts the tick mark at 0 as a part B. Correct: identifies that the number line is divided into 4 equal parts and that the point is on the 1st tick mark (of 4) after 0, so this point represents $\frac{1}{4}$ C. selects the point where the numerator is the same as the given fraction D. selects the point $\frac{1}{4}$ from the right end

5. The table shows the distance, in miles, four students walk to school.

Walking to School

Student	Distance (miles)
Alberto	$\frac{2}{3}$
Darnell	$\frac{1}{4}$
Hailey	$\frac{2}{4}$
Nicole	$\frac{4}{6}$

Which students walk an equal distance to school?

Ⓐ Alberto and Nicole

Ⓑ Alberto and Hailey

Ⓒ Darnell and Hailey

Ⓓ Hailey and Nicole

Category	Item-Specific Information
Alignment	A-F.1.1.3
Answer Key	A
Depth of Knowledge	1
p-value A	38% (correct answer)
p-value B	21%
p-value C	17%
p-value D	24%
Option Annotations	A. Correct: recognizes that $\frac{2}{4}$ and $\frac{4}{6}$ can both be simplified by dividing each numerator and each denominator by 2, resulting in $\frac{1}{2}$ and $\frac{2}{3}$, and then identifies that Alberto's distance and Nicole's distance are both $\frac{2}{3}$ mile B. selects fractions with the same numerators C. selects fractions with the same denominators D. selects fractions with the same difference between numerators (4 − 2 = 2) as between denominators (6 − 4 = 2)

6. Mrs. Warren made sandwiches for a school activity.

She cut each sandwich in half and put all of them on a large plate.

There were 18 halves on the large plate.

What are two ways to represent the number of sandwiches Mrs. Warren made for the school activity?

Ⓐ $\frac{18}{2}$ and 9

Ⓑ $\frac{18}{2}$ and 16

Ⓒ 18 − 2 and 16

Ⓓ 18 × 2 and 36

Category	Item-Specific Information
Alignment	A-F.1.1.4
Answer Key	A
Depth of Knowledge	1
p-value A	58% (correct answer)
p-value B	18%
p-value C	10%
p-value D	14%
Option Annotations	A. Correct: recognizes that “18 halves” is the same as $\frac{18}{2}$, simplifies this fraction by dividing the numerator and the denominator by 2, resulting in $\frac{9}{1}$, and then recognizes that a fraction with a 1 in the denominator can be rewritten as a whole number equal to the numerator B. recognizes that “18 halves” is the same as $\frac{18}{2}$ but then subtracts rather than divides to simplify the fraction C. uses subtraction rather than setting up the numbers as a fraction D. uses multiplication rather than setting up the numbers as a fraction

7. A waiter has 32 napkins.

He uses 4 napkins to set each table.

Which expression shows the number of tables the waiter can set?

Ⓐ 32 + 4

Ⓑ 32 − 4

Ⓒ 32 × 4

Ⓓ 32 ÷ 4

Category	Item-Specific Information
Alignment	B-O.1.1.2
Answer Key	D
Depth of Knowledge	1
p-value A	11%
p-value B	25%
p-value C	11%
p-value D	53% (correct answer)
Option Annotations	A. uses addition rather than division B. uses subtraction rather than division C. identifies the keyword “each” but does not recognize that the total amount (32 napkins) is given, so uses multiplication rather than division D. Correct: recognizes that the total amount (32 napkins) is being divided into equal-sized groups (4 napkins to set each table), so uses division to write the expression

8. Rikki walks 4 dogs each day.

She is paid $6 for walking each dog.

She walks dogs 5 days each week.

To determine the total amount, in dollars, she will be paid for walking dogs 5 days each week, Rikki follows the rule shown below.

multiply the total amount paid each day
by the number of days

Which expression can also be used to determine the total amount, in dollars, Rikki will be paid?

Ⓐ $4 \times (6 \times 5)$

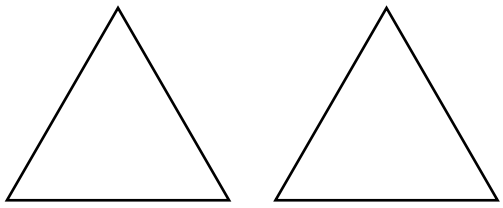
Ⓑ $4 + (6 \times 5)$

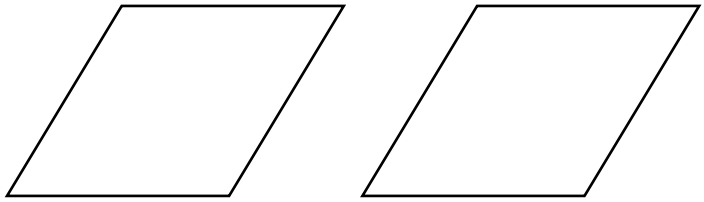
Ⓒ $(4 \times 6) + 5$

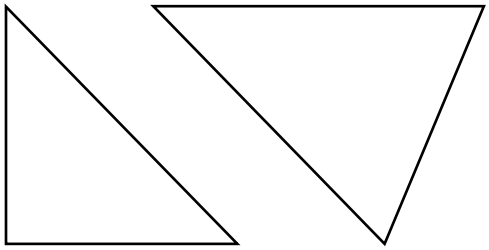
Ⓓ $(4 + 6) \times 5$

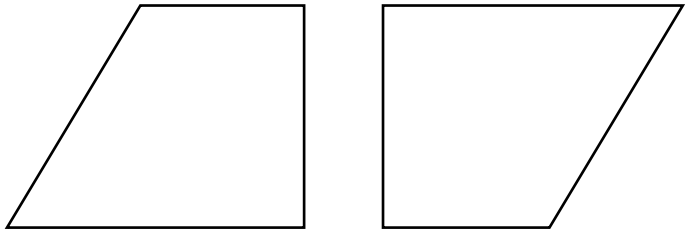
Category	Item-Specific Information
Alignment	B-O.2.1.2
Answer Key	A
Depth of Knowledge	2
p-value A	43% (correct answer)
p-value B	21%
p-value C	24%
p-value D	12%
Option Annotations	A. Correct: determines a correct expression for 1 dog per week (6 × 5) and then multiplies the number of dogs (4) by this expression B. determines a correct expression for 1 dog per week (6 × 5) but then adds this expression to the number of dogs (4) C. determines a correct expression for 1 day of pay (4 × 6) but then adds the number of days (5) to this expression D. determines an incorrect expression for 1 day of pay by using addition rather than multiplication and then multiplies this expression by the number of days (5)

9. Which pair of shapes can be put together, without overlapping, to make a rhombus?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

Category	Item-Specific Information
Alignment	C-G.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	33% (correct answer)
p-value B	26%
p-value C	21%
p-value D	20%
Option Annotations	A. Correct: recognizes that when the shapes are put together the resulting shape will have exactly 4 sides and that the 4 sides will all be equal in length B. recognizes that each figure is a rhombus but does not consider that, when put together, they do not make a rhombus C. recognizes that the two triangles fit together to make a quadrilateral but does not consider that all the sides must be equal in length D. recognizes that the two trapezoids fit together to make a parallelogram but does not consider that all the sides must be equal in length

10. Which statement about all rectangles, squares, and pentagons is true?

Ⓐ They are all rhombi.

Ⓑ They are all polygons.

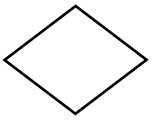
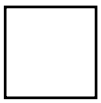
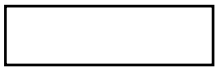
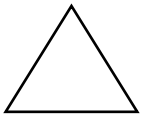
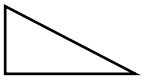
Ⓒ They all have equal angles.

Ⓓ They all have exactly four sides.

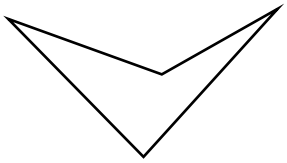
Category	Item-Specific Information
Alignment	C-G.1.1.1
Answer Key	B
Depth of Knowledge	2
p-value A	7%
p-value B	48% (correct answer)
p-value C	23%
p-value D	22%
Option Annotations	A. does not recognize that not all rectangles have equal sides and that pentagons have 5 sides, whereas rhombi have only 4 sides B. Correct: recognizes that all three shapes are closed plane figures that are formed using only line segments C. considers only regular pentagons D. does not recognize that pentagons have 5 sides

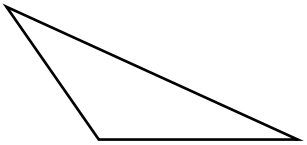
11. Gabe has some shapes.

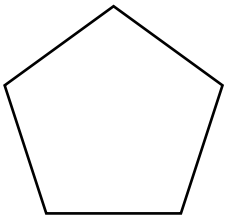
He puts them into two groups based on their properties as shown below.

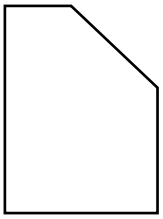
Group A	Group B
  	  

Which shape should be placed into group A?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

Category	Item-Specific Information
Alignment	C-G.1.1.2
Answer Key	A
Depth of Knowledge	2
p-value A	62% (correct answer)
p-value B	7%
p-value C	20%
p-value D	11%
Option Annotations	A. Correct: recognizes that the shapes in group A are all quadrilaterals and selects a shape that has exactly 4 sides B. selects a figure that belongs in group B (a triangle) rather than in group A (a quadrilateral) C. selects a figure that has equal side lengths, as do two figures in group A, but does not consider the shape that does not have equal side lengths D. selects a figure with right angles resembling a rectangle or square but does not recognize that the shape is 5-sided rather than 4-sided

12. Kailyn drinks juice with her breakfast.

Which measurement is **most likely** the amount of juice Kailyn drinks with her breakfast?

Ⓐ 6 cups

Ⓑ 6 gallons

Ⓒ 6 ounces

Ⓓ 6 pints

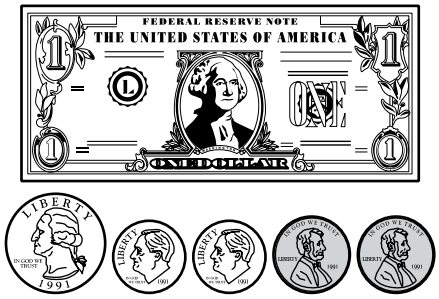
Category	Item-Specific Information
Alignment	D-M.1.2.1
Answer Key	C
Depth of Knowledge	1
p-value A	29%
p-value B	8%
p-value C	49% (correct answer)
p-value D	14%
Option Annotations	A. identifies cups as an appropriate unit for beverages but does not consider the value of the number B. confuses ounces and gallons (amount is equivalent to 96 cups) C. Correct: recognizes that the amount is a little less than 1 cup, which would be an appropriate amount of juice to drink with breakfast D. confuses ounces and pints (amount is equivalent to 12 cups)

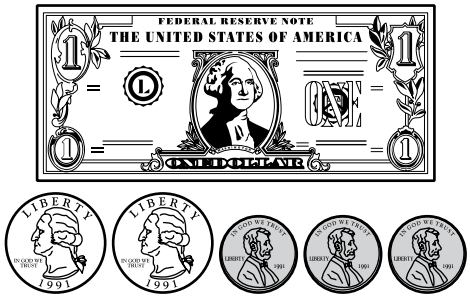
13. Zavia buys a toy for $3.57.

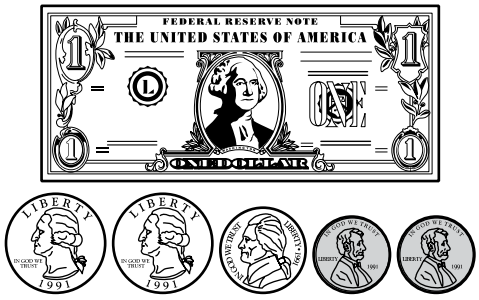
She pays with a $5 bill.

Which group of coins and bills shows the amount of money Zavia should receive as change?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

Category	Item-Specific Information
Alignment	D-M.1.3.2
Answer Key	A
Depth of Knowledge	1
p-value A	45% (correct answer)
p-value B	12%
p-value C	17%
p-value D	26%
Option Annotations	A. Correct: either starts with $3.57, adds the 3 pennies to make this total $3.60, adds the dime ($0.10) and nickel ($0.05) to make this total $3.75, adds the quarter to make this total $4.00, and then adds the dollar to make the total $5.00 OR subtracts $3.57 from $5.00 by regrouping from the ones place (dollars) and from the tenths place (dimes), resulting in $0.10 − $0.07 = $0.03, $0.90 − $0.50 = $0.40, $4.00 − $3.00 = $1.00 for a total amount of $1.43, and then identifies a group of coins and bills with this value ($1.00 + $0.25 + $0.10 + $0.05 + $0.03 = $1.43) B. recognizes the change should be close to $1.45 but adds 2 pennies to $1.45 rather than subtracting 2 pennies from $1.45 C. recognizes that the change should include a $1 bill but does not reduce the tenths place (dimes) by 1 when subtracting $0.57 from $1.00, resulting in $0.53 for the coins D. recognizes that the change should include a $1 bill but subtracts the low digit from the high digit (5 − 0, 7 − 0) when determining the value of the coins needed

14. Manny has 10 books in his book collection.

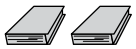
Nancy has 25 books in her book collection.

Rutger has 20 books in his book collection.

Which pictograph shows the number of books these children have in each of their collections?

Ⓐ

Book Collections

Name	Number of Books
Manny	
Nancy	
Rutger	

Key:  = 10 books

Ⓑ

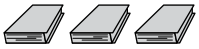
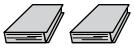
Book Collections

Name	Number of Books
Manny	
Nancy	
Rutger	

Key:  = 10 books

Ⓒ

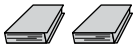
Book Collections

Name	Number of Books
Manny	
Nancy	
Rutger	

Key:  = 10 books

Ⓓ

Book Collections

Name	Number of Books
Manny	
Nancy	
Rutger	

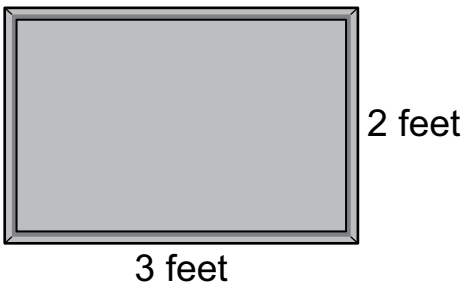
Key:  = 10 books

Category	Item-Specific Information
Alignment	D-M.2.1.1
Answer Key	B
Depth of Knowledge	2
p-value A	5%
p-value B	77% (correct answer)
p-value C	5%
p-value D	13%
Option Annotations	A. puts the pictures in ascending order B. Correct: applies the key to each number of books (1 picture = 10 books, 2 pictures = 20 books) and uses a half picture for the 5 extra books in Nancy's collection C. uses only whole pictures, rounding 25 up to 30 since Nancy has more books in her collection than Rutger has in his collection D. uses a scale of 5 rather than 10 and includes 1 too many pictures for Rutger's collection

15. Mrs. Von buys a new doormat.

A picture of her new doormat is shown below.

Doormat



What is the area, in square feet, of Mrs. Von's doormat?

Ⓐ 5

Ⓑ 6

Ⓒ 10

Ⓓ 12

Category	Item-Specific Information
Alignment	D-M.3.1.2
Answer Key	B
Depth of Knowledge	1
p-value A	21%
p-value B	41% (correct answer)
p-value C	32%
p-value D	6%
Option Annotations	A. adds the two given measurements B. Correct: recognizes that area of a rectangle is determined by multiplying the side lengths, resulting in 3 × 2 = 6 C. determines the value, in feet, of the perimeter (i.e., 2 + 3 + 2 + 3) D. confuses the area formula with the perimeter formula and doubles the product of the side lengths

16. Tami's rectangle has side lengths of 5 inches and 4 inches.

The perimeter of Ryan's rectangle is two times the perimeter of Tami's rectangle.

Which measurements could describe Ryan's rectangle?

Ⓐ side lengths of 5 inches and 8 inches

Ⓑ side lengths of 7 inches and 6 inches

Ⓒ side lengths of 10 inches and 2 inches

Ⓓ side lengths of 10 inches and 8 inches

Category	Item-Specific Information
Alignment	D-M.4.1
Answer Key	D
Depth of Knowledge	2
p-value A	22%
p-value B	17%
p-value C	14%
p-value D	47% (correct answer)
Option Annotations	A. doubles only the 4-inch side length, which would result in doubling the area rather than the perimeter B. adds 2 to each side length C. doubles the 5-inch side length and divides the 4-inch side length by 2 (i.e., considers larger perimeter with same area) D. Correct: either recognizes that each side length of Ryan's rectangle should be two times as long as the side lengths of Tami's rectangle for the perimeter of Ryan's rectangle to be two times the perimeter of Tami's rectangle OR determines the perimeter of Tami's rectangle to be 18 inches (5 + 4 + 5 + 4 = 18) and identifies a perimeter that is two times this amount (10 + 8 + 10 + 8 = 18 + 18 = 36)

Open-Ended Item

17. Jon, Kara, Lyle, and Mandy are bowling at a local bowling alley.

For the first game, Jon scored 100 points, Lyle scored 29 more points than Jon scored, and Kara scored 162 points.

A. WRITE a number sentence using <, >, or = to compare the number of points Kara scored to the number of points Jon scored for the first game.

Number Sentence: _____

B. What was the total number of points all three players scored for the first game?

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

Answer: _____ points

Lyle uses a one-dollar bill to buy a snack from a vending machine.

The price of the snack is 70 cents.

C. CIRCLE a combination of coins that Lyle could receive as the correct amount of change.

Go to the next page to finish question 17.

GO ON

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

Mandy has $25 to spend at the bowling alley.

She will pay $3 to rent bowling shoes for the day.

She will pay $5 for each game she bowls.

D. **SHOW** or **EXPLAIN** whether Mandy has enough money to rent bowling shoes and pay for 4 games at the bowling alley.

After you have finished your work, close this booklet so your teacher will know you are finished.

Item-Specific Scoring Guideline

#17 Item Information

Category	Item-Specific Information
Alignment	B-O.3 D-M.1.3.2
Depth of Knowledge	2
Mean Score	1.87

Assessment Anchor this item will be reported under:

M03.B-O.3 Solve problems involving the four operations, and identify and explain patterns in arithmetic.

Specific Anchor Descriptor addressed by this item:

M03.B-O.3.1 Use operations, patterns, and estimation strategies to solve problems (may include word problems).

M03.D-M.1.3 Count, compare, and make change using a collection of coins and one-dollar bills.

Item-Specific Scoring Guideline

Score	In this item, the student . . .
4	Demonstrates a thorough understanding of how to solve problems involving the four operations, and identify and explain patterns in arithmetic by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of how to solve problems involving the four operations, and identify and explain patterns in arithmetic by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of how to solve problems involving the four operations, and identify and explain patterns in arithmetic by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of how to solve problems involving the four operations, and identify and explain patterns in arithmetic.
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 solve problems involving the four operations, and identify and explain patterns in arithmetic.
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?

162 > 100 OR equivalent

OR

100 < 129 < 162 OR equivalent

OR

129 > 100 < 162 OR equivalent

Part B (1 point):

1 point for correct answer

What?

391 (points)

Part C (1 point):

1 point for correct answer

What?

Answers may vary. Accept any combination of coins that total $0.30.

Sample Response:

Part D (1 point):

1 point for correct and complete explanation

Why?

Sample Explanation:

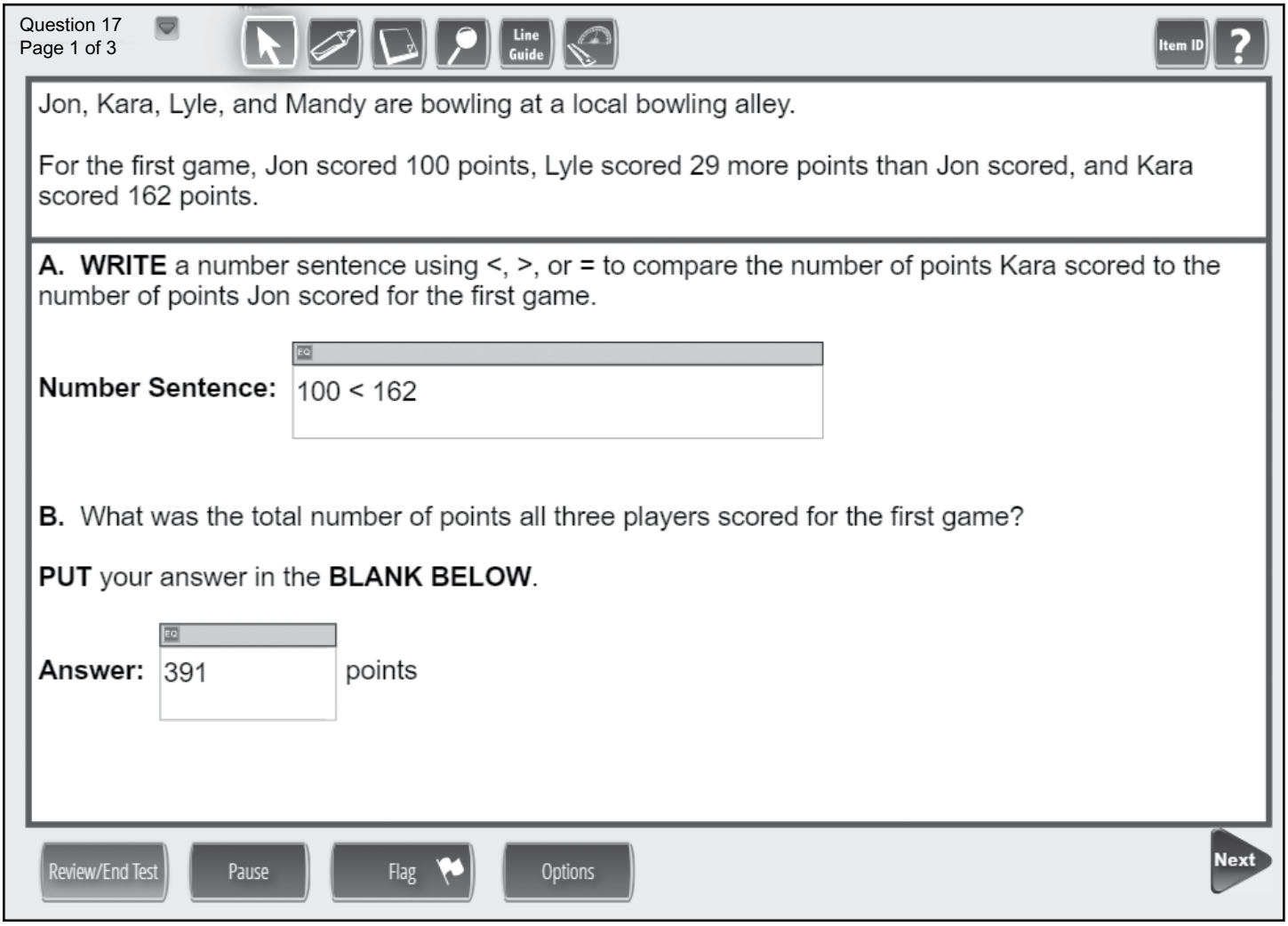
Since each game is $5 and Mandy wants to play 4 games, she will spend $5 × 4 = $20 for the games. She will also spend $3 to rent bowling shoes, so she will spend a total of $20 + $3 = $23. Since she has $25 to spend, Mandy has enough money to rent bowling shoes and pay for 4 games at the bowling alley.

OR equivalent

STUDENT RESPONSE

Computer Response Score: 4 points

PARTS A and B



Part A: The student provided a correct number sentence (*100 < 162*), using the "less than" symbol (<) to show that 100 is less than 162. [1 point]

Part B: The student provided the correct answer (*391*). While support is not required for Part B, the student likely first calculated the number of points Lyle scored by adding 29 points to Jon's 100 points and then added all three players' points together (100 + 129 + 162 = 391). [1 point]

PART C

Question 17
Page 2 of 3

Line Guide

Item ID

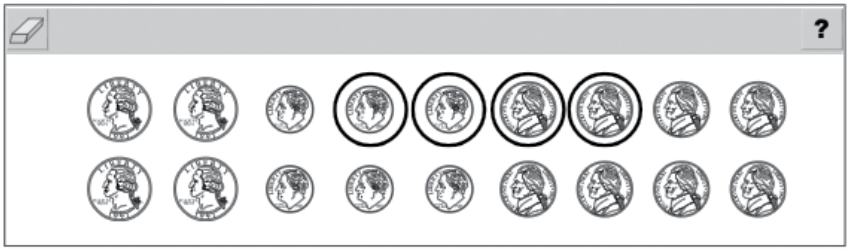
Jon, Kara, Lyle, and Mandy are bowling at a local bowling alley.

For the first game, Jon scored 100 points, Lyle scored 29 more points than Jon scored, and Kara scored 162 points.

Lyle uses a one-dollar bill to buy a snack from a vending machine.

The price of the snack is 70 cents.

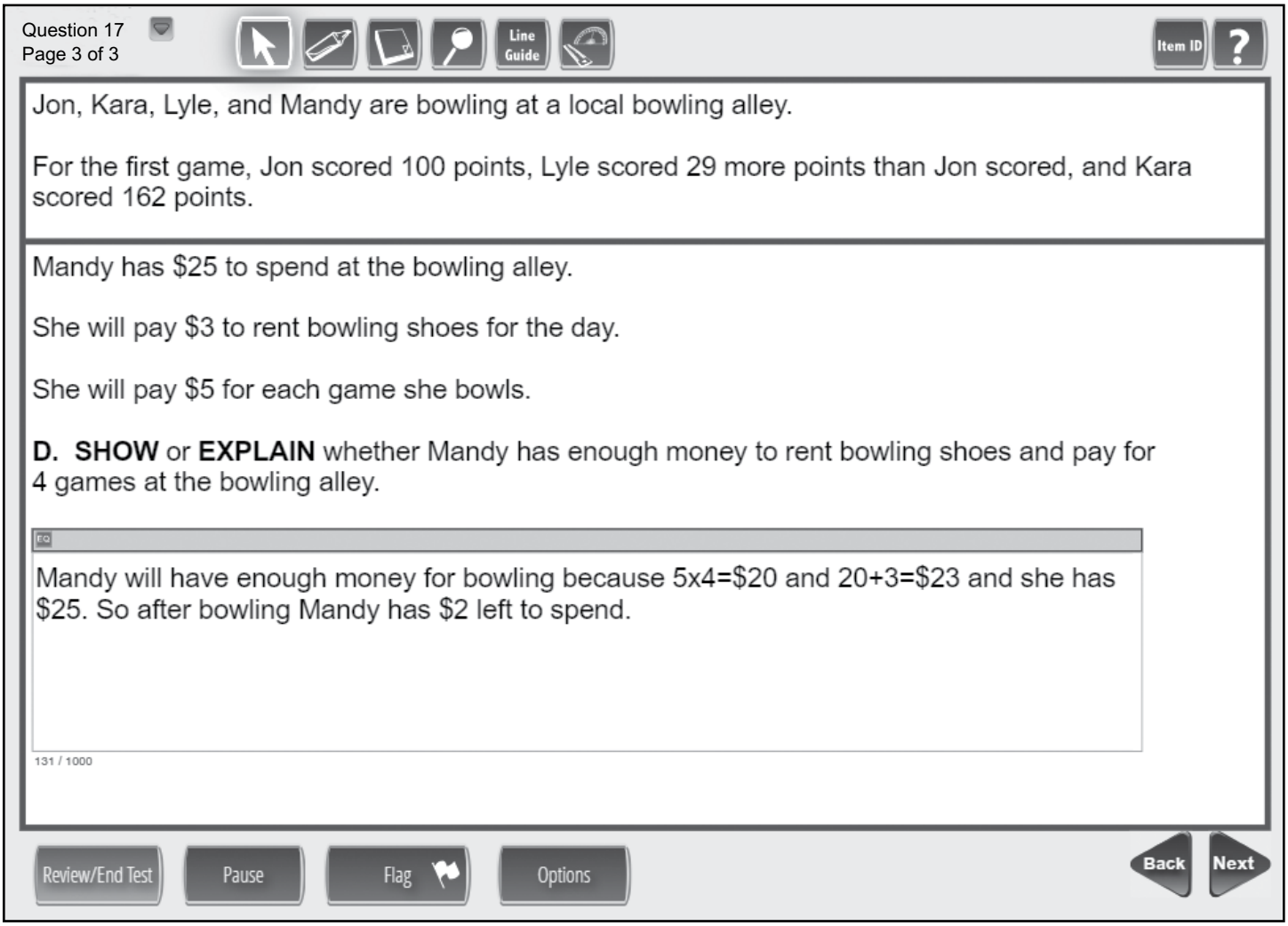
C. CIRCLE a combination of coins that Lyle could receive as the correct amount of change.



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

Part C: The student provided a correct answer by circling a combination of coins that total $0.30 (2 dimes and 2 nickels). [1 point]

PART D



Part D: The student provided a correct and complete explanation as to whether Mandy has enough money to rent bowling shoes and pay for 4 games at the bowling alley (*Mandy will have enough money . . . because 5x4=$20 and 20+3=$23 and she has $25. . . . Mandy has $2 left*). [1 point]

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STUDENT RESPONSE

Response Score: 3 points

17. Jon, Kara, Lyle, and Mandy are bowling at a local bowling alley.

For the first game, Jon scored 100 points, Lyle scored 29 more points than Jon scored, and Kara scored 162 points.

A. WRITE a number sentence using <, >, or = to compare the number of points Kara scored to the number of points Jon scored for the first game.

Number Sentence: 100<129<162

B. What was the total number of points all three players scored for the first game?

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

Answer: 391 points

Lyle uses a one-dollar bill to buy a snack from a vending machine.

The price of the snack is 70 cents.

C. CIRCLE a combination of coins that Lyle could receive as the correct amount of change.

Go to the next page to finish question 17.

GO ON

Part A: The student provided a correct number sentence (*100* < *129* < *162*), using the "less than" symbol to show that 100 is less than 162. Though not necessary for credit, the student also correctly included the number of points Lyle scored in the number sentence (*129*). [1 point]

Part B: The student provided the correct answer (*391*). While support is not required for Part B, the student likely first calculated the number of points Lyle scored by adding 29 points to Jon's 100 points and then added all 3 players' points together (100 + 129 + 162 = 391). [1 point]

Part C: The student provided a correct answer by circling a combination of coins that total $0.30 (6 nickels). [1 point]

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

Mandy has $25 to spend at the bowling alley.

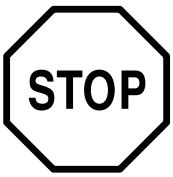
She will pay $3 to rent bowling shoes for the day.

She will pay $5 for each game she bowls.

D. **SHOW** or **EXPLAIN** whether Mandy has enough money to rent bowling shoes and pay for 4 games at the bowling alley.

yes she does because if you add up the prices you get $23. That is less than $25.

After you have finished your work, close this booklet so your teacher will know you are finished.

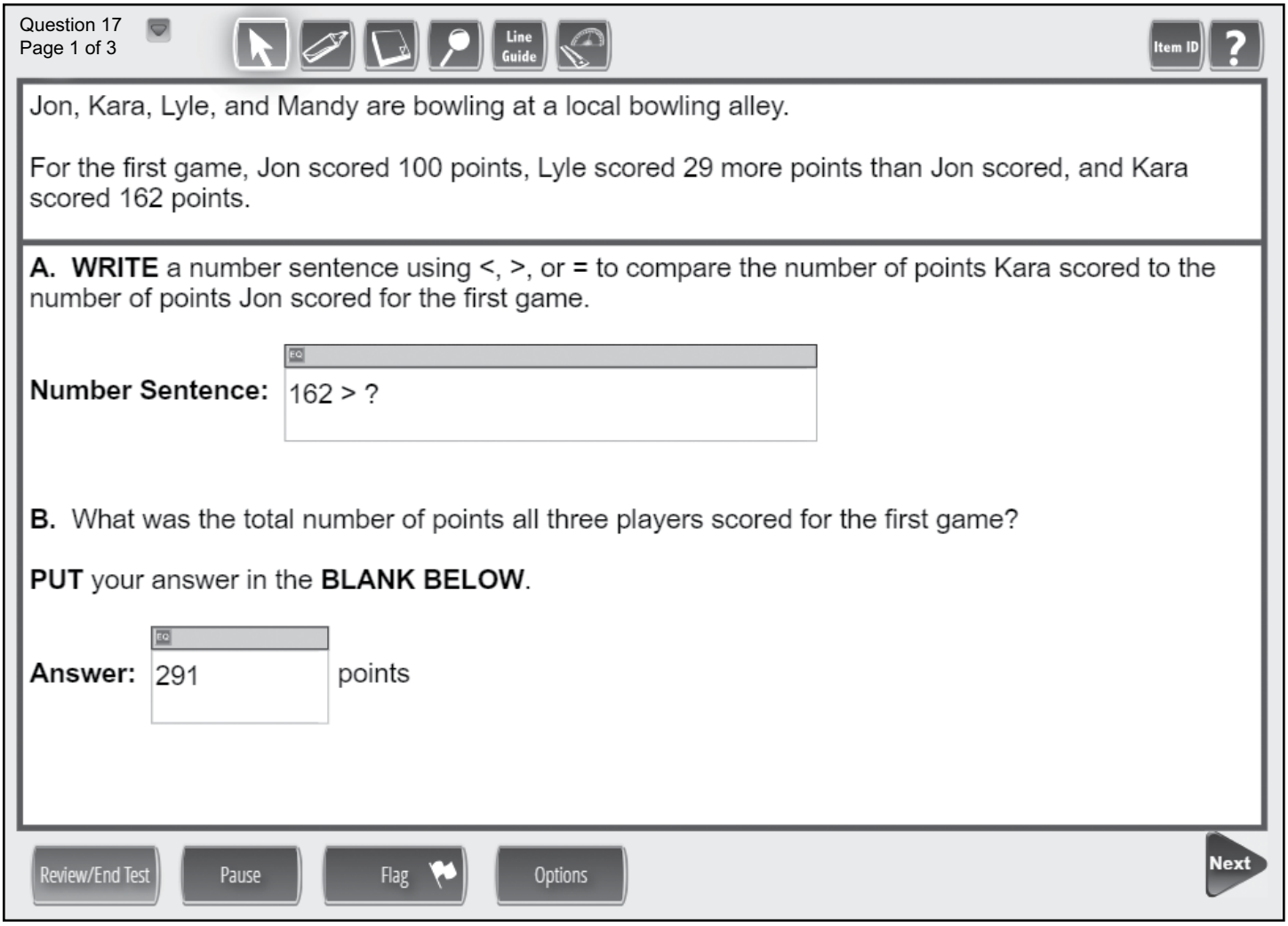


Part D: The student provided an insufficient explanation (*yes she does because if you add up the prices you get $23*). There is no work or explanation to show that 4 games and shoe rental add up to $23. [0 points]

STUDENT RESPONSE

Computer Response Score: 2 points

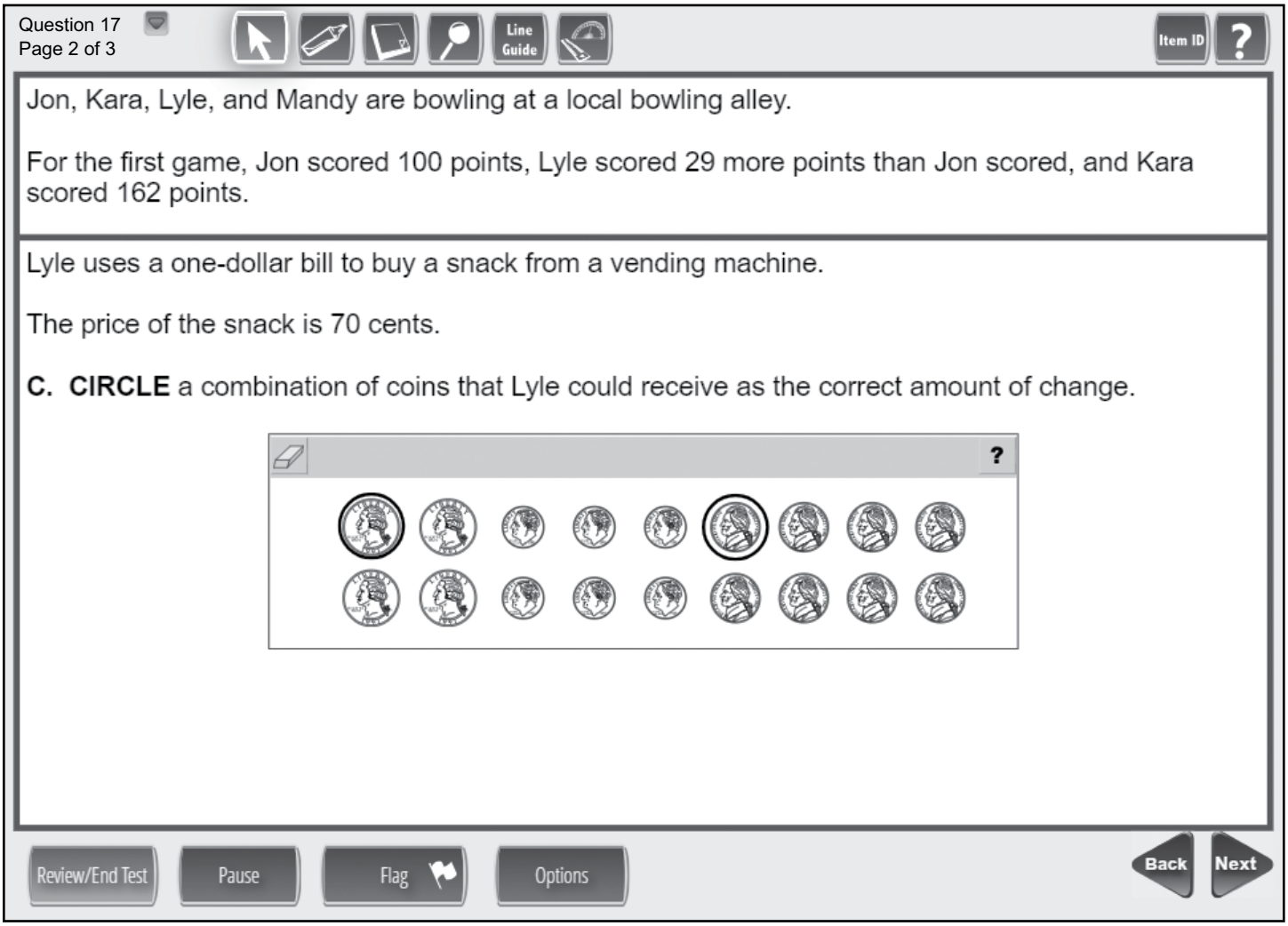
PARTS A and B



Part A: The student provided an incorrect response (*162 > ?*). This response does not compare the number of points Kara scored (162) to the number of points Jon scored (100). [0 points]

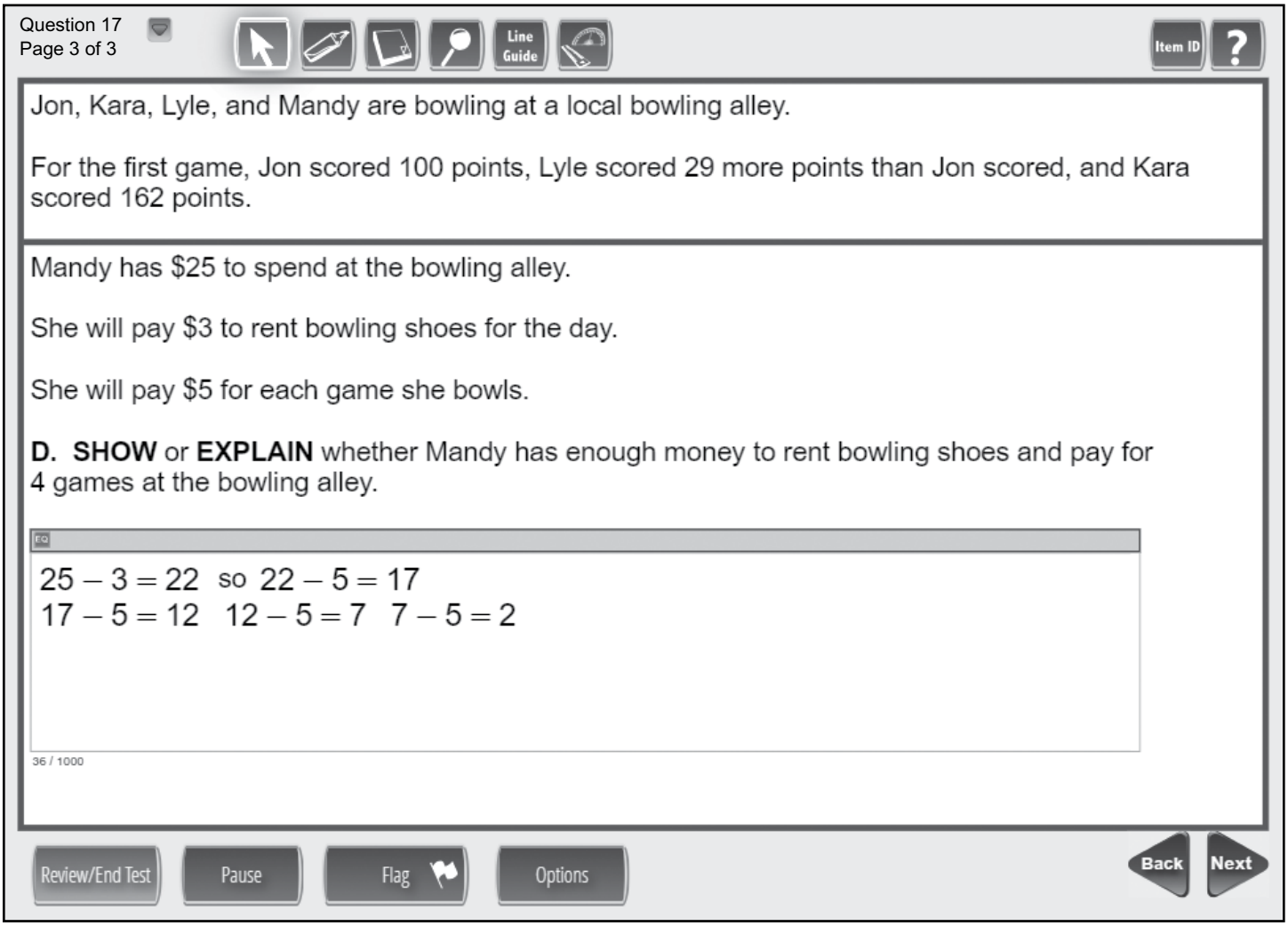
Part B: The student provided an incorrect answer (*291*). No support (work or explanation) is required, so it is unclear where an error was made. The student may have added 29 for Lyle instead of 129 (100 + 29 + 162 = 291). [0 points]

PART C



Part C: The student provided a correct answer by circling a combination of coins that total $0.30 (1 quarter and 1 nickel). [1 point]

PART D



Part D: The student provided correct and complete support showing whether Mandy has enough money to rent bowling shoes and pay for 4 games at the bowling alley. The student started with Mandy's total money, subtracted the cost of rental shoes (*25 − 3 = 22*), and then subtracted each game's cost from the remainder (*so 22 − 5 = 17*, *17 − 5 = 12*, *12 − 5 = 7*, *7 − 5 = 2*). [1 point]

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STUDENT RESPONSE

Response Score: 1 point

17. Jon, Kara, Lyle, and Mandy are bowling at a local bowling alley.

For the first game, Jon scored 100 points, Lyle scored 29 more points than Jon scored, and Kara scored 162 points.

A. WRITE a number sentence using <, >, or = to compare the number of points Kara scored to the number of points Jon scored for the first game.

Number Sentence: 162 > 100.

B. What was the total number of points all three players scored for the first game?

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

Answer: 29 points

Lyle uses a one-dollar bill to buy a snack from a vending machine.

The price of the snack is 70 cents.

C. CIRCLE a combination of coins that Lyle could receive as the correct amount of change.

Go to the next page to finish question 17.

GO ON

Part A: The student provided a correct number sentence (*162 > 100*), using the "greater than" symbol (>) to show that 162 is greater than 100. [1 point]

Part B: The student provided an incorrect answer (*29*). No support (work or explanation) is required, so it is unclear where an error was made. The student may have written the 29 from the given information. [0 points]

Part C: The student provided an incorrect answer by circling a combination of coins that do not total $0.30. The student circled 2 quarters, 4 dimes, and 2 nickels for a total of $1.00 (the amount of money that Lyle started with). [0 points]

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

Mandy has $25 to spend at the bowling alley.

She will pay $3 to rent bowling shoes for the day.

She will pay $5 for each game she bowls.

D. **SHOW** or **EXPLAIN** whether Mandy has enough money to rent bowling shoes and pay for 4 games at the bowling alley.

yes she dose have unof money for bowling shoes and money for ench game.

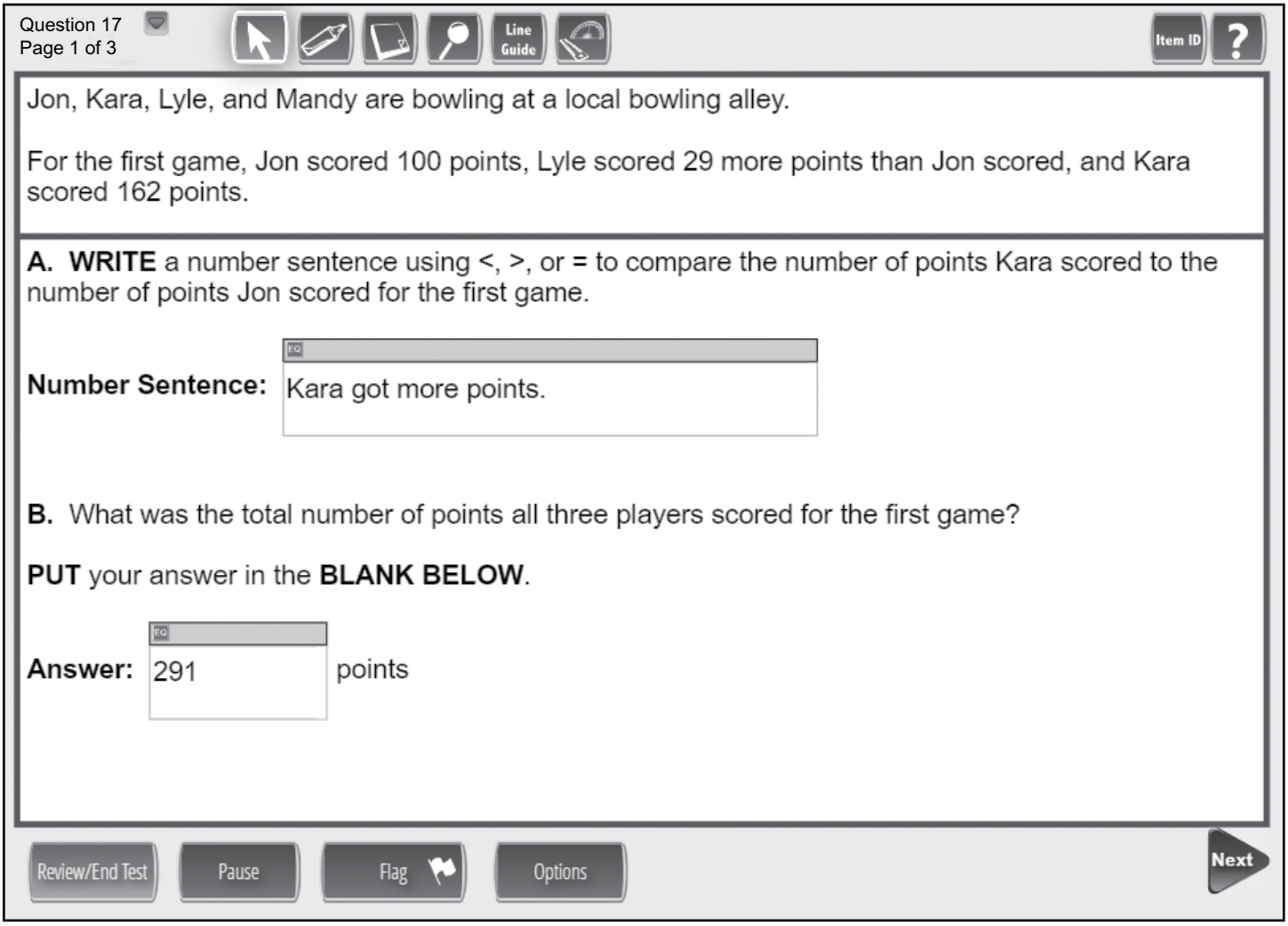
After you have finished your work, close this booklet so your teacher will know you are finished.

Part D: The student provided an insufficient explanation (*yes she dose have unof* [enough] *money*). There is no work or explanation to show that Mandy has enough money for 4 games and shoe rental. [0 points]

STUDENT RESPONSE

Computer Response Score: 0 points

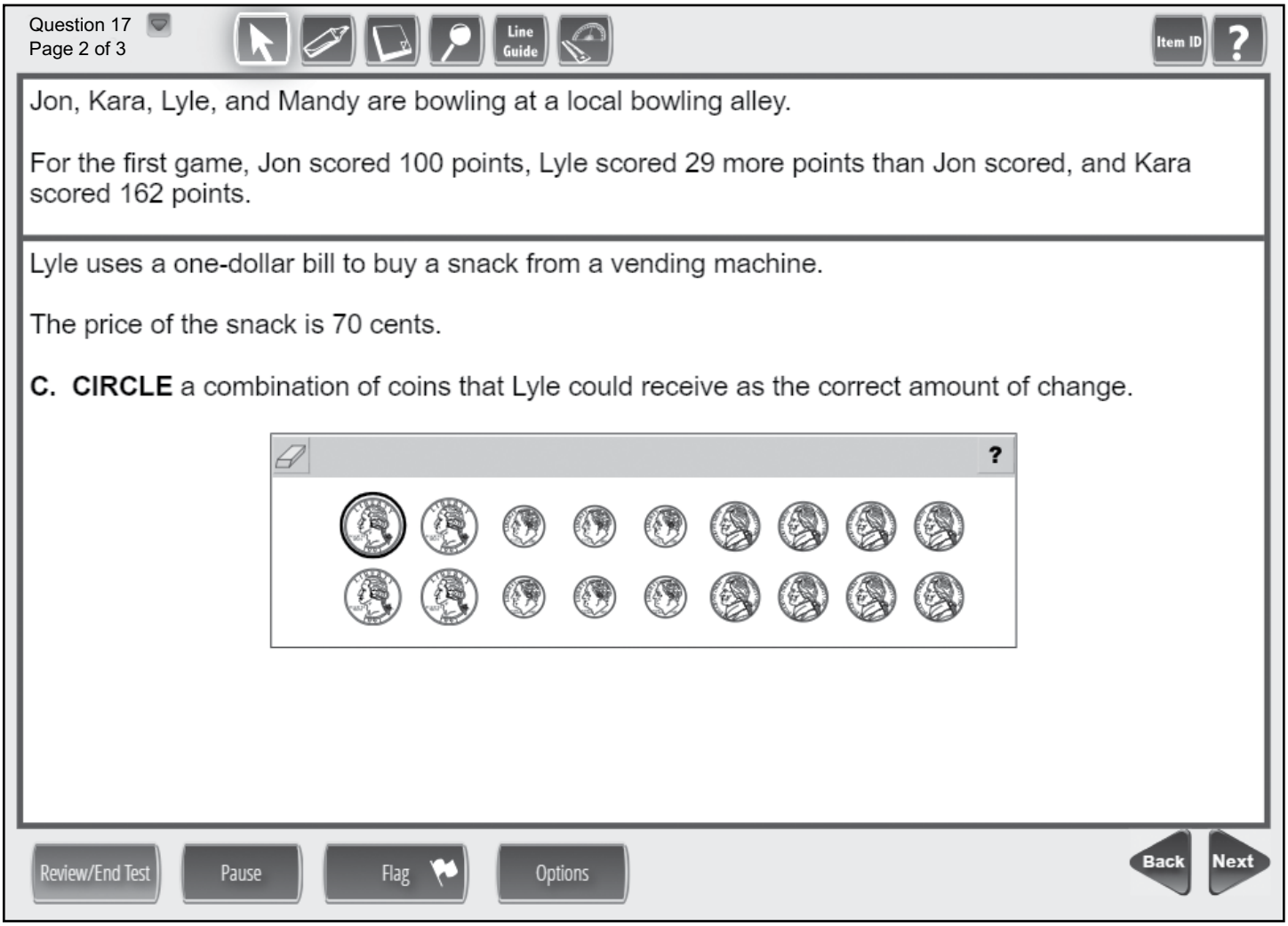
PARTS A and B



Part A: The student provided an incorrect response (*Kara got more points*). The response is not a number sentence comparing the number of points Kara scored (162) to the number of points Jon scored (100). [0 points]

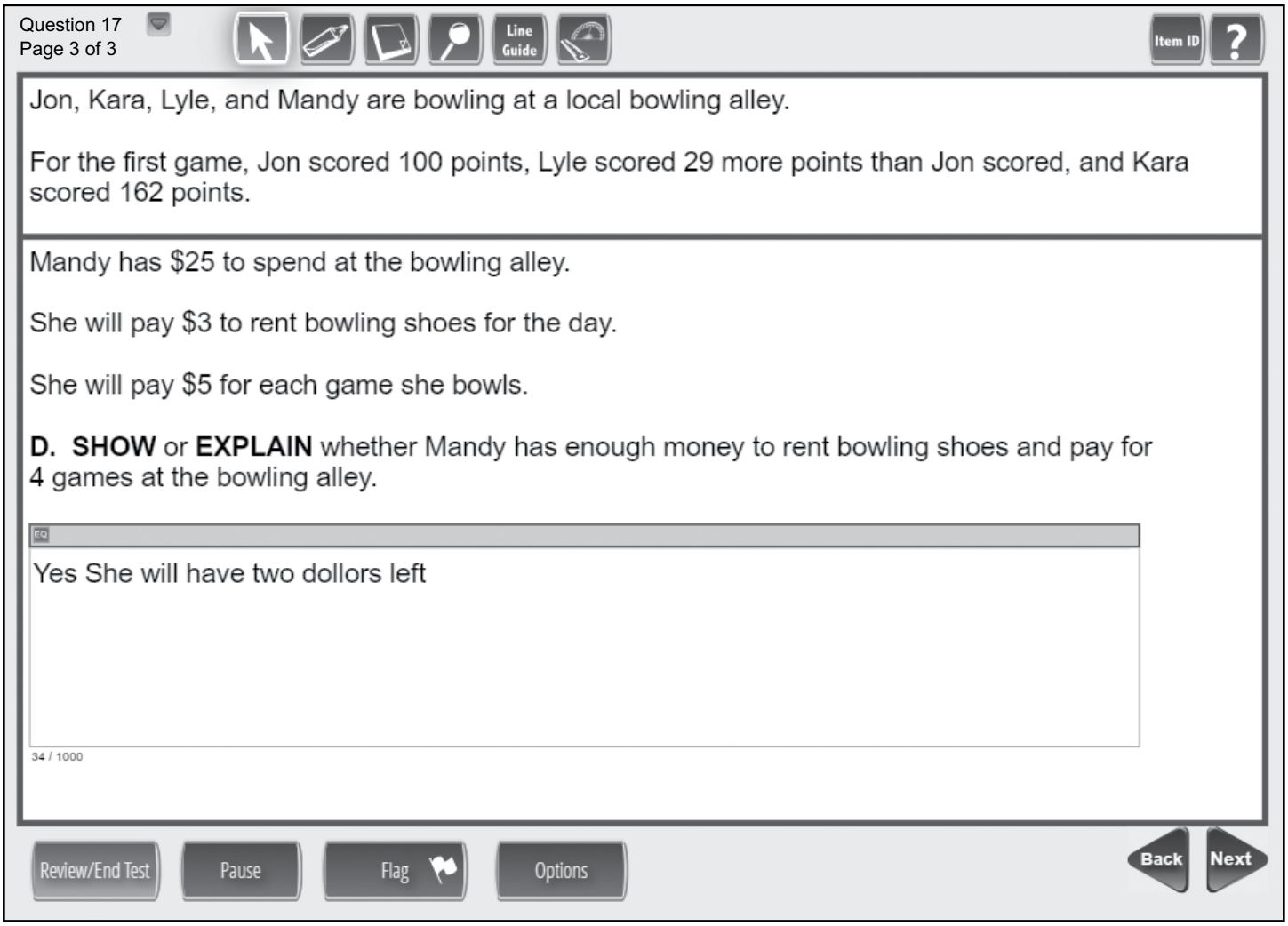
Part B: The student provided an incorrect answer (*291*). No support (work or explanation) is required, so it is unclear where an error was made. The student may have added 29 for Lyle instead of 129 (100 + 29 + 162 = 291). [0 points]

PART C



Part C: The student provided an incorrect answer by circling a combination of coins that do not total $0.30. The student circled 1 quarter for a total of $0.25. [0 points]

PART D



Part D: The student provided an insufficient explanation (*Yes She will have two dollors left*). There is no work or explanation to show how Mandy will have $2 left. [0 points]

Mathematics—Summary Data

Multiple-Choice

An asterisk (*) indicates the key.

Sample Number	Alignment	Answer Key	Depth of Knowledge	*p*-value A	*p*-value B	*p*-value C	*p*-value D
1	A-T.1.1.1	C	1	14%	6%	60%*	20%
2	A-T.1.1.3	C	1	16%	28%	48%*	8%
3	A-T.1.1.4	B	1	11%	73%*	8%	8%
4	A-F.1.1.2	B	1	9%	49%*	15%	27%
5	A-F.1.1.3	A	1	38%*	21%	17%	24%
6	A-F.1.1.4	A	1	58%*	18%	10%	14%
7	B-O.1.1.2	D	1	11%	25%	11%	53%*
8	B-O.2.1.2	A	2	43%*	21%	24%	12%
9	C-G.1.1	A	2	33%*	26%	21%	20%
10	C-G.1.1.1	B	2	7%	48%*	23%	22%
11	C-G.1.1.2	A	2	62%*	7%	20%	11%
12	D-M.1.2.1	C	1	29%	8%	49%*	14%
13	D-M.1.3.2	A	1	45%*	12%	17%	26%
14	D-M.2.1.1	B	2	5%	77%*	5%	13%
15	D-M.3.1.2	B	1	21%	41%*	32%	6%
16	D-M.4.1	D	2	22%	17%	14%	47%*

Open-Ended

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	B-O.3 D-M.1.3.2	4	2	1.87

PSSA Grade 3 Mathematics
Item and Scoring Sampler