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.

MULTIPLE-CHOICE ITEMS

1. Devon rode his bike a total of 4 miles.

When he stopped for lunch, he had ridden his bike 2 miles.

Which number shows the fraction of the bike ride Devon had completed when he stopped for lunch?

Ⓐ $\frac{2}{1}$

Ⓑ $\frac{2}{4}$

Ⓒ $\frac{4}{2}$

Ⓓ $\frac{4}{4}$

Item Information	
Alignment	A-F.1.1
Answer Key	B
Depth of Knowledge	1
p-value A	6%
p-value B	69% (correct answer)
p-value C	21%
p-value D	4%
Option Annotations	A. uses the number of miles biked B. Correct: uses the partial distance (2 miles) as the numerator and the whole distance (4 miles) as the denominator C. uses the reciprocal D. uses an incorrect numerator

2. Susan and Tamara each make a pizza.

Their pizzas are the same size.

Susan cuts her pizza into 3 equal slices.

Tamara cuts her pizza into 6 equal slices.

Which pair of sentences correctly describes whose slices of pizza are bigger?

Ⓐ Susan's slices are bigger.
Each slice is $\frac{2}{6}$ of the pizza.

Ⓑ Susan's slices are bigger.
Each slice is $\frac{4}{6}$ of the pizza.

Ⓒ Tamara's slices are bigger.
Each slice is $\frac{1}{6}$ of the pizza.

Ⓓ Tamara's slices are bigger.
Each slice is $\frac{1}{3}$ of the pizza.

Item Information	
Alignment	A-F.1.1.1 A-F.1.1.3 A-F.1.1.5
Answer Key	A
Depth of Knowledge	2
p-value A	46% (correct answer)
p-value B	20%
p-value C	18%
p-value D	16%
Option Annotations	A. Correct: either recognizes that a pizza cut into 3 pieces would have larger pieces than a same-size pizza cut into 6 pieces and converts $\frac{1}{3}$ to $\frac{2}{6}$ by multiplying the numerator and the denominator by 2 OR converts $\frac{1}{3}$ to $\frac{2}{6}$ by multiplying the numerator and the denominator by 2 and recognizes that $\frac{2}{6}$ is greater than $\frac{1}{6}$ by comparing the numerators B. adds 3 to the numerator and denominator to change $\frac{1}{3}$ to $\frac{4}{6}$ C. gets the right fraction but does not compare correctly D. gets the wrong fraction and wrong comparison

5. Colby is making a comic book.

He draws 48 pictures for his comic book.

There are 6 pictures on each page.

How many pages are in Colby's comic book?

Ⓐ 6

Ⓑ 7

Ⓒ 8

Ⓓ 12

Item Information	
Alignment	B-O.1.1.2
Answer Key	C
Depth of Knowledge	2
p-value A	8%
p-value B	8%
p-value C	60% (correct answer)
p-value D	24%
Option Annotations	A. confuses the products of 6 × 8 and 6 × 6 B. confuses the products of 6 × 8 and 6 × 7 C. Correct: divides 48 by 6 and determines the quotient is 8 D. either uses 6 × 10 – 6 × 2 to get 48 but then adds 10 and 2 rather than subtracting 2 from 10 OR identifies an incorrect factor of 48

7. Bruce has 8 baskets and 56 apples.

He wants to put an equal number of apples into each basket.

Which number sentence shows a way Bruce could find the number of apples in each basket?

Ⓐ $56 - 8 = ?$

Ⓑ $8 \div ? = 56$

Ⓒ $8 \times ? = 56$

Ⓓ $56 \times 8 = ?$

Item Information	
Alignment	B-O.2.2.1
Answer Key	C
Depth of Knowledge	2
p-value A	13%
p-value B	21%
p-value C	54% (correct answer)
p-value D	12%
Option Annotations	A. confuses division and subtraction B. understands this as a division problem but confuses the relation between the numbers C. Correct: recognizes that 56 ÷ 8 represents the situation and understands that a division problem can be represented as a related multiplication equation, using the number of baskets (8) and the unknown quantity as the numbers to be multiplied and the total number of apples (56) as the product D. understands that division is related to multiplication but confuses the relation between the numbers

8. Which method describes a way to find the value of 6 × 9?

Ⓐ Multiply 6 × 1 and then add 8.

Ⓑ Multiply 1 × 9 and then add 5.

Ⓒ Multiply 6 × 10 and then subtract 1.

Ⓓ Multiply 6 × 10 and then subtract 6.

Item Information	
Alignment	B-O.3.1
Answer Key	D
Depth of Knowledge	2
p-value A	12%
p-value B	10%
p-value C	17%
p-value D	61% (correct answer)
Option Annotations	A. thinks 1 + 8 = 9 B. thinks 1 + 5 = 6 C. thinks subtracting 1 from 6 × 10 is the same as 6 × 9 since 10 – 1 = 9 D. Correct: either recognizes that 10 groups of 6, represented by (6 × 10), can be changed into 9 groups of 6, represented by (6 × 9), by removing 6 OR recognizes that 10 – 1 = 9, and therefore 9 groups of 6 can be represented by (6 × 10) – (6 × 1)

9. Malcolm learned to spell 8 new words during the first week of school.

The table below shows the total number of new words he has learned to spell by the end of each week.

Spelling New Words

Week	Total Number of New Words
1	8
2	14
3	20
4	26
5	
6	38

The total number of new words Malcolm learns to spell makes a pattern.

How many new words had Malcolm learned to spell by the end of week 5?

Ⓐ 28

Ⓑ 30

Ⓒ 32

Ⓓ 34

Item Information	
Alignment	B-O.3.1.5
Answer Key	C
Depth of Knowledge	2
p-value A	9%
p-value B	18%
p-value C	58% (correct answer)
p-value D	15%
Option Annotations	A. recognizes that the numbers in the pattern are all even, so selects the next even number after 26 B. either selects a multiple of 10 between 26 and 38 OR subtracts the week 1 words (8) from the week 6 words (38) C. Correct: recognizes that the rule for the pattern is “add 6,” so adds 6 to the previous number of words (26) and determines the sum is 32 D. adds the week 1 words (8) to the week 4 words (26)

10. Which statement about polygons is true?

- Ⓐ The sides may be curved.
- Ⓑ All polygons have exactly 4 sides.
- Ⓒ All polygons have at least 3 sides.
- Ⓓ The sides are always the same length.

Item Information	
Alignment	C-G.1.1
Answer Key	C
Depth of Knowledge	1
p-value A	14%
p-value B	23%
p-value C	36% (correct answer)
p-value D	27%
Option Annotations	A. does not understand that the sides of a polygon must be straight B. identifies the definition of a quadrilateral C. Correct: recognizes that polygons have straight sides, 3 or more sides, and that the sides may have different lengths D. considers only regular polygons

Item Information	
Alignment	D-M.1.1.1 D-M.1.1.2
Answer Key	B
Depth of Knowledge	1
p-value A	23%
p-value B	47% (correct answer)
p-value C	18%
p-value D	12%
Option Annotations	A. recognizes that the time is before 6:00, so selects an hour hand pointing between the 5 and 6, but selects a minute hand pointing to 23 minutes after the hour rather than 23 minutes before the hour B. Correct: recognizes that the clock should show 23 minutes before 6:00, so selects an hour (shorter) hand pointing between the 5 and 6 and a minute (longer) hand pointing at the third tick mark before the 8 since this represents 23 minutes before the hour C. selects a clock showing 23 minutes after 6:00 rather than 23 minutes before 6:00 D. selects a minute hand pointing to 23 minutes before the hour but selects an hour hand pointing to a time after 6:00 (between the 6 and 7) rather than before 6:00 (between the 5 and 6)

Item Information	
Alignment	D-M.1.3.1
Answer Key	D
Depth of Knowledge	2
p-value A	21%
p-value B	19%
p-value C	13%
p-value D	47% (correct answer)
Option Annotations	A. either selects the amount of money Kendra has OR confuses the values of nickels and dimes, for a total of \$2.46 B. counts each quarter as 5 cents, for a total of \$2.35 C. determines that the value of the coins is 57 cents, which is between 31 cents and 76 cents, but does not consider that there is only one \$1 bill D. Correct: calculates \$1 bill = \$1.00, 5 quarters = \$1.25, 2 dimes = \$0.20, 3 nickels = \$0.15, and 1 penny = \$0.01 for a total of \$2.61, which is more than \$2.31 and less than \$2.76

Item Information	
Alignment	D-M.2.1.3
Answer Key	B
Depth of Knowledge	2
p-value A	13%
p-value B	55% (correct answer)
p-value C	9%
p-value D	23%
Option Annotations	A. uses only 1 mark for each length B. Correct: determines that the length of each of the three smaller beans is $1\frac{3}{4}$ inches long and each of the two longer beans is $2\frac{1}{2}$ inches long; on the line plot, indicates these measurements by using three marks at $1\frac{3}{4}$ and two marks at $2\frac{2}{4}$, since $\frac{2}{4}$ is equivalent to $\frac{1}{2}$ C. measures the beans to the nearest half inch, rounding each of the smaller measurements up to 2 inches, and uses only 1 mark for each length D. measures the beans to the nearest half inch, rounding each of the smaller measurements up to 2 inches

OPEN-ENDED QUESTION

17. Elyssa, Kendra, Hendrix, and Mike played a game.

- Elyssa scored 132 points.
- Kendra scored 97 points.
- Hendrix scored 105 points.
- Mike scored 68 points.

A. What is the difference between the number of points Elyssa scored and the number of points Kendra scored?

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

Answer: __________ points

B. **WRITE** a number sentence using <, >, or = to compare the number of points Elyssa scored to the number of points Kendra scored.

Number Sentence: ____________________________

Go to the next page to finish question 17.

GO ON

Item-Specific Scoring Guideline

#17 Item Information

Alignment	A-T.1 B-O.3	**Depth of Knowledge**	2	**Mean Score**	2.00

Assessment Anchor this item will be reported under:

M03.A-T.1—Use place-value understanding and properties of operations to perform multi-digit arithmetic.

Specific Anchor Descriptor addressed by this item:

M03.A-T.1.1—Apply place-value strategies to solve problems.

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

Scoring Guide

Score	In this item, the student . . .
4	Demonstrates a thorough understanding of how to use place-value understanding and properties of operations to perform multi-digit arithmetic by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of how to use place-value understanding and properties of operations to perform multi-digit arithmetic by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of how to use place-value understanding and properties of operations to perform multi-digit arithmetic by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of how to use place-value understanding and properties of operations to perform multi-digit 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 use place-value understanding and properties of operations to perform multi-digit 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?	Why?
35 (points)	

Part B (1 point):

1 point for correct answer

What?	Why?
132 > 97 **OR** 97 < 132	

Part C (2 points):

1 point for correct answer

OR $\frac{1}{2}$ point for reverse order (least to greatest)

1 point for correct and complete explanation

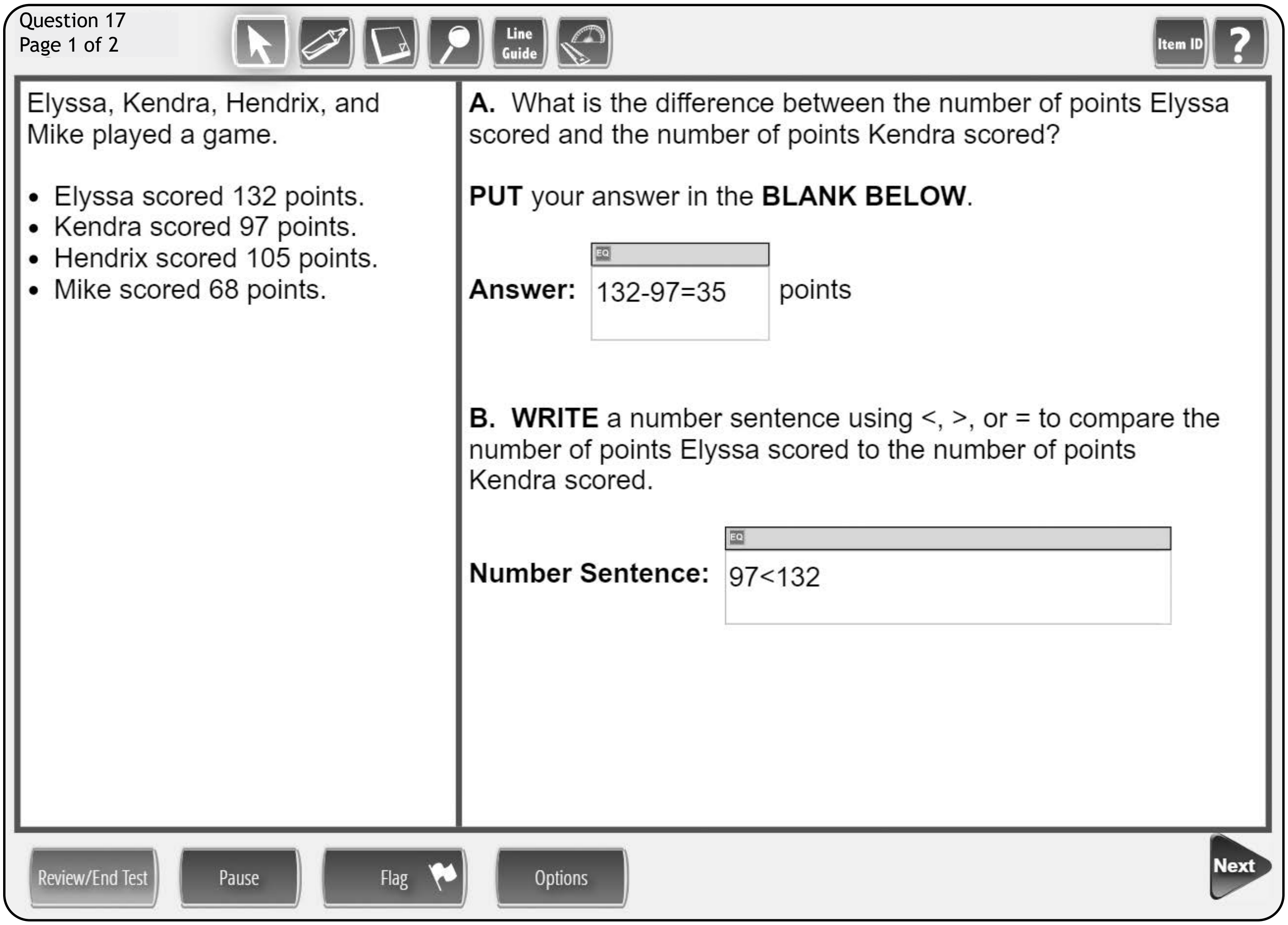
OR $\frac{1}{2}$ point for correct but incomplete explanation

What?	Why?
132 105 97 68 **greatest** **least** **OR** Elyssa Hendrix Kendra Mike **greatest** **least**	**Sample Explanation:** The two three-digit numbers are greater than the two two-digit numbers. The hundreds place is the same in both three-digit numbers, so I looked at the tens place. Since 3 tens is larger than 0 tens, I know that 132 is the greatest. **OR equivalent**

STUDENT RESPONSE

Response Score: 3 points

PARTS A and B



Question 17
Page 1 of 2

Elyssa, Kendra, Hendrix, and Mike played a game.

- Elyssa scored 132 points.
- Kendra scored 97 points.
- Hendrix scored 105 points.
- Mike scored 68 points.

A. What is the difference between the number of points Elyssa scored and the number of points Kendra scored?

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

Answer: 132-97=35 points

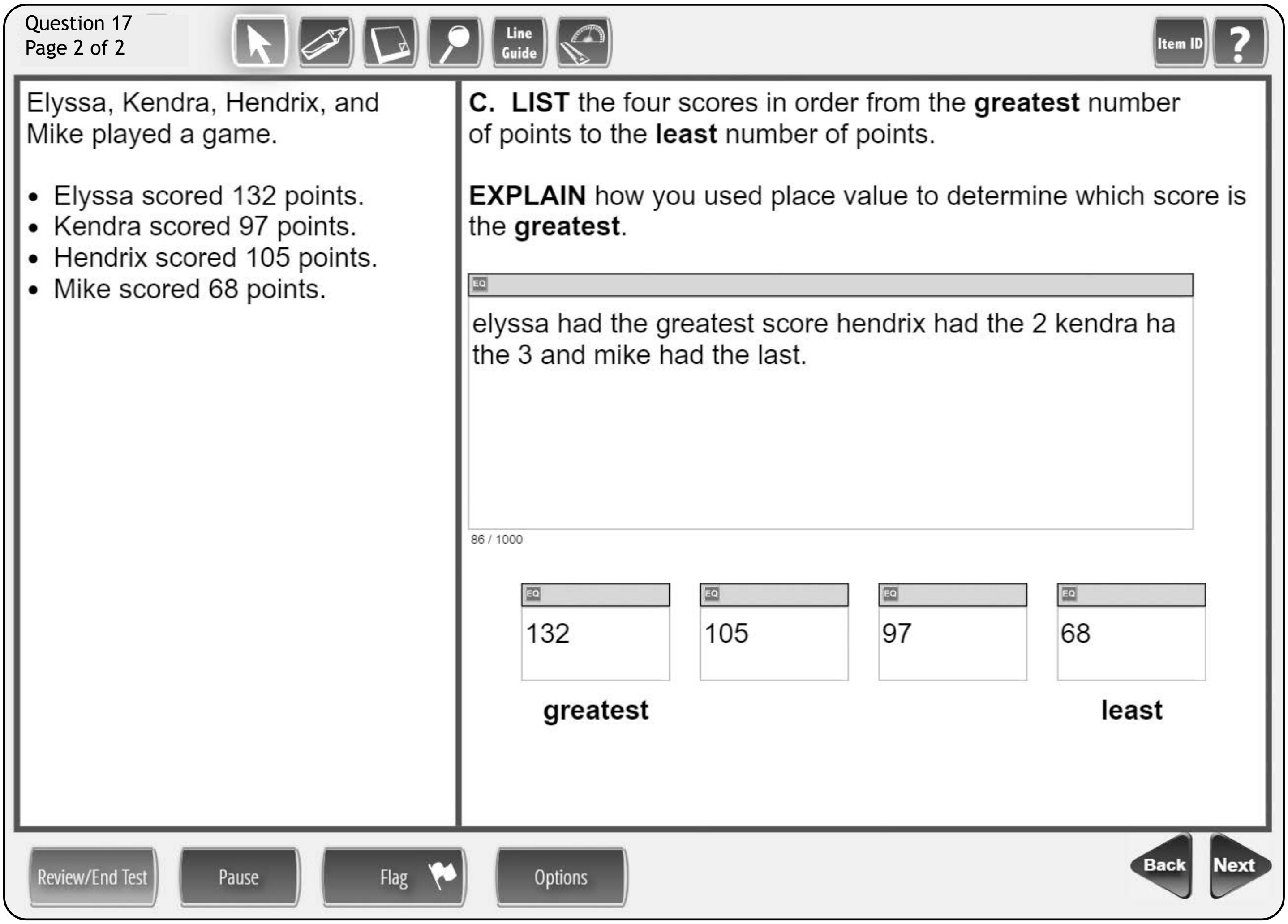
B. **WRITE** a number sentence using <, >, or = to compare the number of points Elyssa scored to the number of points Kendra scored.

Number Sentence: 97<132

Part A. The student provided the correct answer (*35*). The work shown is correct, though not required. The student subtracted Kendra's total number of points from Elyssa's total number of points (*132-97=35*). [1 point]

Part B. The student provided the correct number sentence (*97<132*), using the "less than" symbol (<) to show that 97 is less than 132. [1 point]

PART C



Elyssa, Kendra, Hendrix, and Mike played a game.

- Elyssa scored 132 points.
- Kendra scored 97 points.
- Hendrix scored 105 points.
- Mike scored 68 points.

C. LIST the four scores in order from the **greatest** number of points to the **least** number of points.

EXPLAIN how you used place value to determine which score is the **greatest**.

elyssa had the greatest score hendrix had the 2 kendra ha the 3 and mike had the last.

132	105	97	68
greatest			**least**

Part C. The student provided a correct list of the four scores in order from the greatest number of points to the least number of points (*132, 105, 97, 68*) with an incorrect explanation. The explanation provided (*elyssa had the greatest score hendrix had the 2 kendra ha the 3 and mike had the last.*) identifies to whom each score belonged, but the explanation does not describe how place value could be used to determine which score is the greatest. [1 point]

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

C. **LIST** the four scores in order from the **greatest** number of points to the **least** number of points.

EXPLAIN how you used place value to determine which score is the **greatest**.

The greatest is Elyssa 132 and
Hendrix is second and Kendra
and Mike. Elyssa has 132
and Hendrix has 105 and Kendra
has 97 and finally Mike he has
68

Elyssa Hendrix Kendra Mike

greatest **least**

Part C. The student provided a correct list of names representing the four scores in order from the greatest number of points to the least number of points (*Elyssa, Hendrix, Kendra, Mike*). Providing the names in the correct order rather than the numerical values was accepted for credit. The explanation provided is incorrect (*The greatest is Elyssa 132 and Hendrix is second and Kendra and Mike. Elyssa has 132 and Hendrix has 105 and Kendra has 97 and finally Mike he has 68*) as it does not describe how place value could be used to determine which score is the greatest. [1 point]

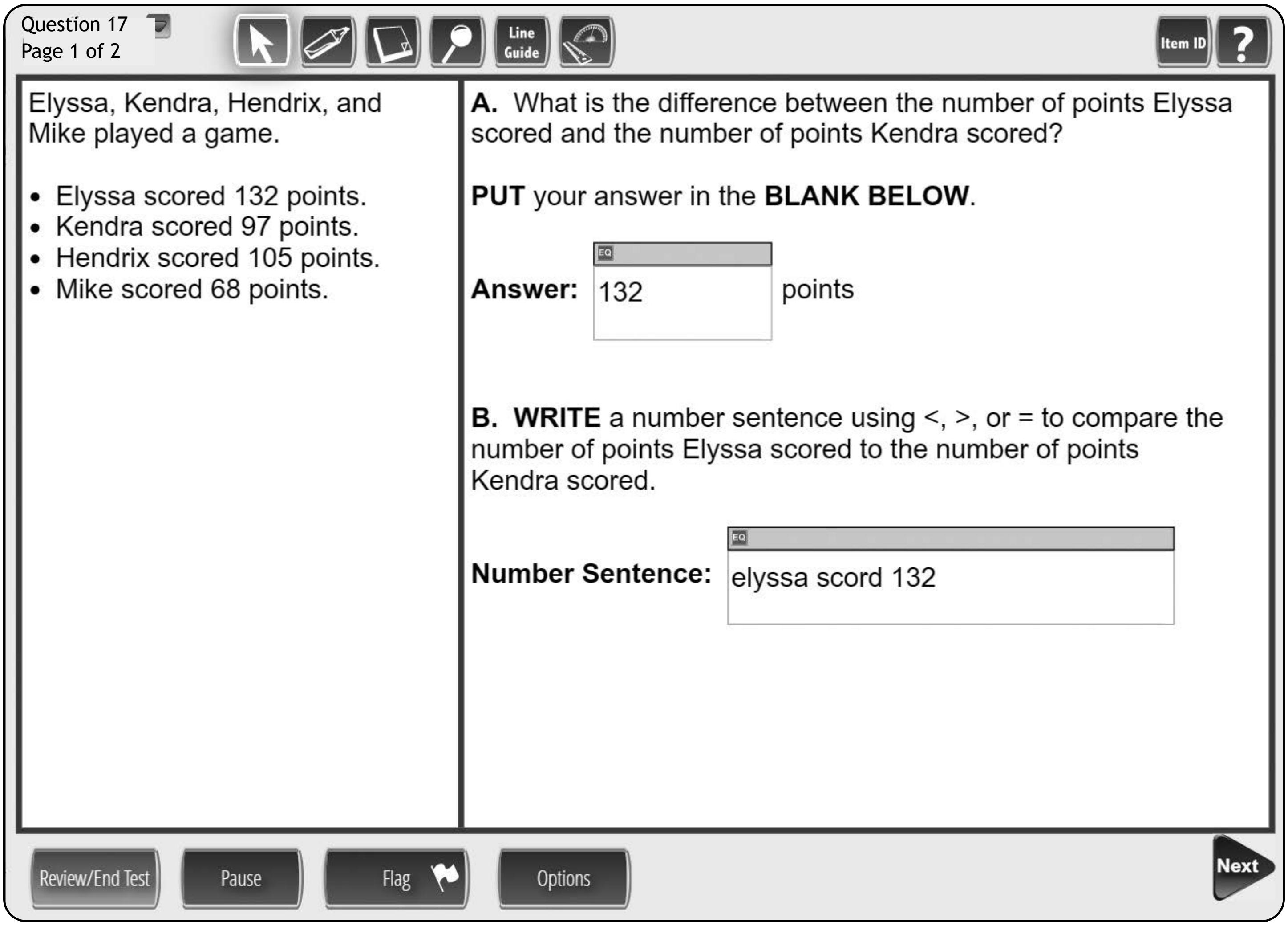
After you have finished your work, close this booklet so your teacher will know you are finished.

STOP

STUDENT RESPONSE

Response Score: 1 point

PARTS A and B



Elyssa, Kendra, Hendrix, and Mike played a game.

- Elyssa scored 132 points.
- Kendra scored 97 points.
- Hendrix scored 105 points.
- Mike scored 68 points.

A. What is the difference between the number of points Elyssa scored and the number of points Kendra scored?

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

Answer: 132 points

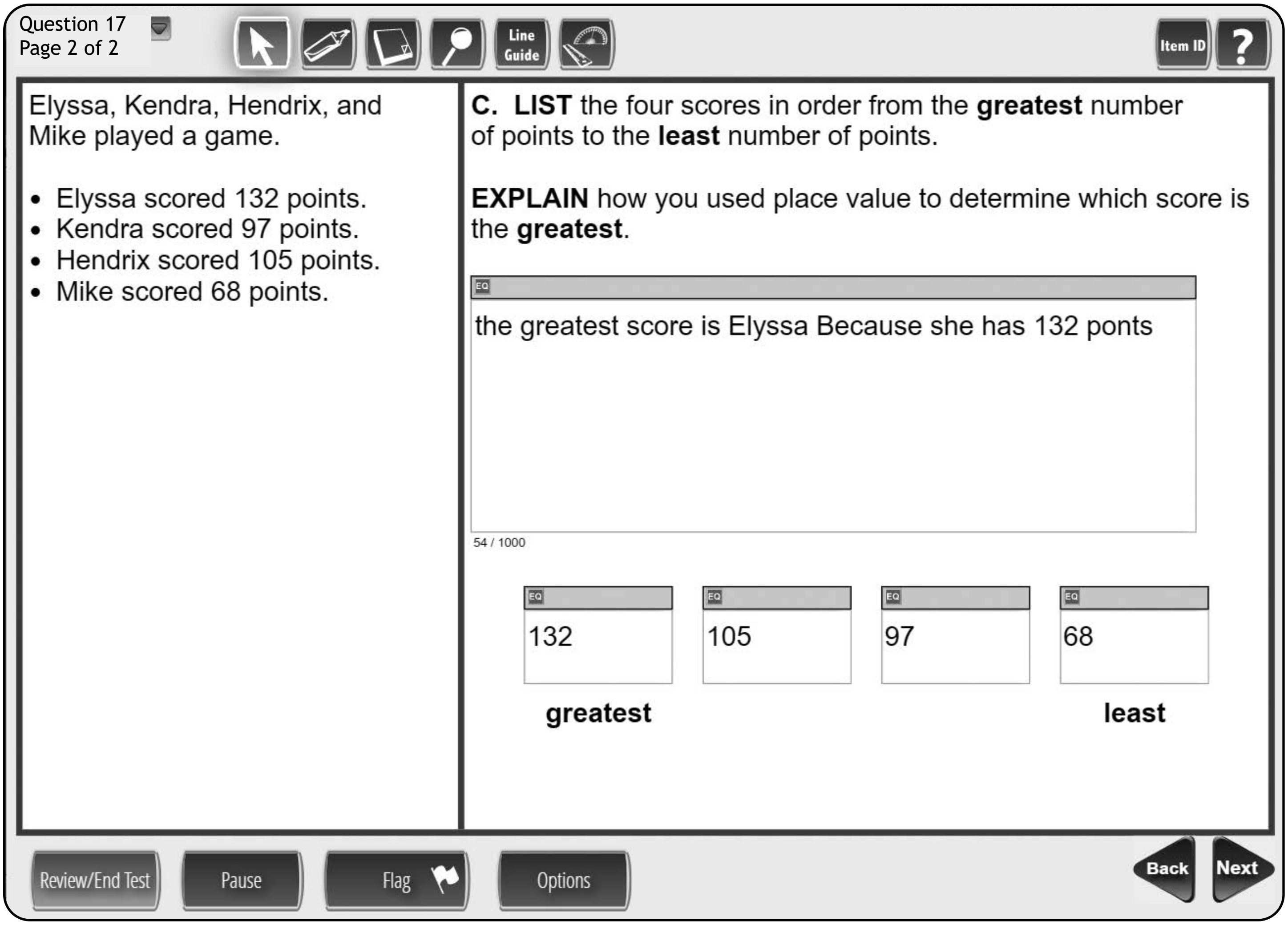
B. WRITE a number sentence using <, >, or = to compare the number of points Elyssa scored to the number of points Kendra scored.

Number Sentence: elyssa scord 132

Part A. The student provided an incorrect answer (*132*). No support (work or explanation) is required, so it is unclear where an error was made. The student may have written the total number of points Elyssa scored. [0 points]

Part B. The student provided an incorrect response (*elyssa scord 132*). The response is not a number sentence comparing the number of points Elyssa scored (132) to the number of points Kendra scored (97). [0 points]

PART C



Elyssa, Kendra, Hendrix, and Mike played a game.

- Elyssa scored 132 points.
- Kendra scored 97 points.
- Hendrix scored 105 points.
- Mike scored 68 points.

C. LIST the four scores in order from the **greatest** number of points to the **least** number of points.

EXPLAIN how you used place value to determine which score is the **greatest**.

the greatest score is Elyssa Because she has 132 ponts

54 / 1000

132	105	97	68
greatest			**least**

Part C. The student provided a correct list of the four scores in order from the greatest number of points to the least number of points (*132, 105, 97, 68*) with an incorrect explanation. The explanation provided (*the greatest score is Elyssa Because she has 132 ponts*) identifies Elyssa as having the greatest number of points, but the explanation does not describe how place value could be used to determine which score is the greatest. [1 point

STUDENT RESPONSE

Response Score: 0 points

17. Elyssa, Kendra, Hendrix, and Mike played a game.

- Elyssa scored 132 points.
- Kendra scored 97 points.
- Hendrix scored 105 points.
- Mike scored 68 points.

A. What is the difference between the number of points Elyssa scored and the number of points Kendra scored?

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

Part A. The student provided an incorrect answer (*97*). No support (work or explanation) is required, so it is unclear where an error was made. The student may have written the total number of points Kendra scored. [0 points]

Answer: 97 points

B. **WRITE** a number sentence using <, >, or = to compare the number of points Elyssa scored to the number of points Kendra scored.

Part B. The student provided an incorrect response (*97 = 97 < 98*). Although the response contains a number sentence, it does not compare the number of points Elyssa scored (132) to the number of points Kendra scored (97). [0 points]

Number Sentence: 97 = 97 < 98

Go to the next page to finish question 17.

GO ON

MATHEMATICS—SUMMARY DATA

Multiple-Choice

Sample Number	Alignment	Answer Key	Depth of Knowledge	*p*-value A	*p*-value B	*p*-value C	*p*-value D
1	A-F.1.1	B	1	6%	69%	21%	4%
2	A-F.1.1.1 A-F.1.1.3 A-F.1.1.5	A	2	46%	20%	18%	16%
3	A-F.1.1.2	A	1	61%	19%	9%	11%
4	B-O.1.1	B	2	10%	60%	17%	13%
5	B-O.1.1.2	C	2	8%	8%	60%	24%
6	B-O.1.2.2	A	1	76%	12%	8%	4%
7	B-O.2.2.1	C	2	13%	21%	54%	12%
8	B-O.3.1	D	2	12%	10%	17%	61%
9	B-O.3.1.5	C	2	9%	18%	58%	15%
10	C-G.1.1	C	1	14%	23%	36%	27%
11	C-G.1.1.3	A	2	67%	7%	20%	6%
12	D-M.1.1.1 D-M.1.1.2	B	1	23%	47%	18%	12%
13	D-M.1.3.1	D	2	21%	19%	13%	47%
14	D-M.2.1.3	B	2	13%	55%	9%	23%
15	D-M.3.1.1	C	1	5%	12%	78%	5%
16	D-M.4.1.1	C	1	8%	5%	80%	7%

Open-Ended

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	A-T.1 B-O.3	4	2	2.00