



The Pennsylvania System of School Assessment

Mathematics Item and Scoring Sampler

SUPPLEMENT

2009–2010
Grade 5

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MATHEMATICS

INTRODUCTION

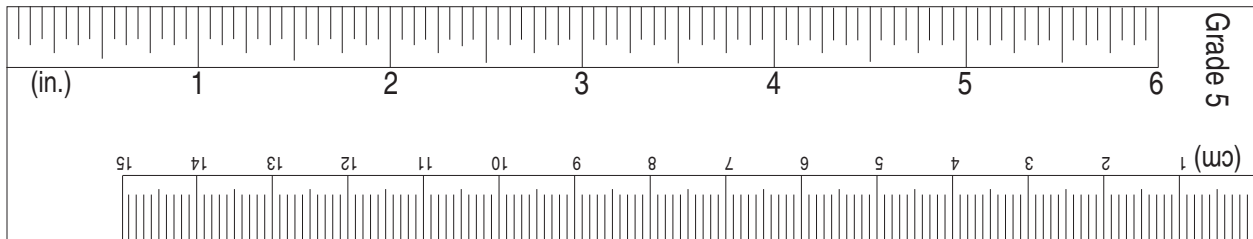
The 2009–2010 Mathematics Item and Scoring Sampler Supplement displays released items from the 2009 PSSA operational test. The sampler supplement is to be used in conjunction with the previous year’s item sampler. The 2008–2009 Mathematics Item and Scoring Sampler can be found on the Pennsylvania Department of Education website at <http://www.pde.state.pa.us/>. Select the “Pre K–12 Schools” tab at the top of the page. Then select “Assessment” in the “Learn About” column to the left. Select “Resource Materials” in the “Learn About” column of the next page, and then scroll down to find the appropriate sampler. Alternately, you may type in or click this link to reach the location of the item samplers: http://www.pde.state.pa.us/a_and_t/cwp/view.asp?a=108&Q=73314&a_and_tNav=|680|&a_and_tNav=|

This item and scoring sampler supplement contains 16 mathematics multiple-choice items and 1 open-ended item. Each item is preceded by the Assessment Anchor and Eligible Content coding. The majority of multiple-choice answer options are followed by a brief analysis or rationale. The correct answer is indicated by an asterisk. The table following each multiple-choice item displays the percentages of students who chose each answer option. The correct answer is also shaded in these tables. The table following the open-ended item indicates the students’ performance for each scorepoint. Sample student responses for each of the scoring levels are also included for the open-ended item.

A ruler similar to that shown below should be used to answer item 8.

GRADE 5 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, etc., the ruler may not accurately reproduce to scale.



MATHEMATICS

MULTIPLE-CHOICE ITEMS

Note: All percentages listed in the tables below the items have been rounded.

A.1.2.1

1. Which shows 125.47 written in words?

A one hundred twenty-five and four sevenths

read 4/7 instead of 47 hundredths

B one hundred twenty-five and forty sevenths

added "-ths" to last digit shown in decimal

C one hundred twenty-five and forty-seven tenths

confused tenths and hundredths

D one hundred twenty-five and forty-seven hundredths *

A	B	C	D
5%	9%	13%	73%

A.1.2.2

2. Bella's height is 128.45 centimeters. Which digit is in the tenths place?

A 2 *tens place*

B 4 *

C 5 *hundredths place*

D 8 *ones place*

A	B	C	D
7%	83%	7%	3%

A.1.3.3

3. Cameron saw the 4 fractions below.

$$\frac{1}{4} \quad \frac{7}{12} \quad \frac{6}{8} \quad \frac{4}{6}$$

Which fraction is the greatest?

A $\frac{1}{4}$ *smallest*

B $\frac{7}{12}$ *next to smallest*

C $\frac{6}{8}$ *

D $\frac{4}{6}$ *next to greatest*

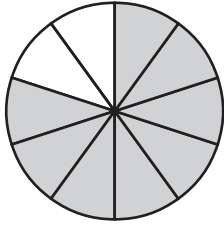
A	B	C	D
13%	25%	49%	12%

MATHEMATICS

A.1.5.1

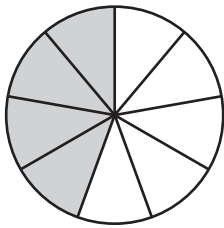
4. Which drawing of a circle is $\frac{4}{5}$ shaded?

A



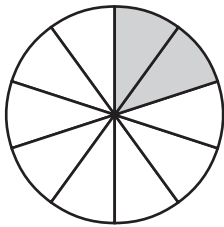
*

B



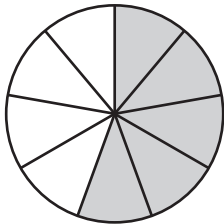
4 shaded and 5 unshaded

C



shaded $\frac{1}{5}$ not $\frac{4}{5}$

D



4 unshaded, 5 shaded

A	B	C	D
52%	36%	2%	9%

A.1.6.2

5. Ryan bought several cans of tennis balls. Each can held 3 tennis balls. Which could be the total number of tennis balls Ryan bought?

A 32

confused 4×8 and 3×8

B 37

number starts with 3

C 48

*

D 53

number ends in 3

A	B	C	D
18%	11%	64%	7%

A.2.1.2

During an assessment, students would not be permitted to use a calculator on item 6.

6. Subtract:

$$\frac{9}{16} - \frac{1}{4}$$

A $\frac{5}{16}$

*

B $\frac{1}{2}$

subtracted numerators and used 16 as denominator, getting $\frac{8}{16}$ or $\frac{1}{2}$

C $\frac{5}{8}$

correctly changed numerator of 2nd fraction to 4, but changed both denominators to 8

D $\frac{2}{3}$

subtracted numerators and denominators getting $\frac{8}{12}$ or $\frac{2}{3}$

A	B	C	D
73%	8%	12%	7%

MATHEMATICS

B.1.1.1

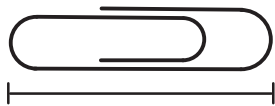
7. Which unit of measure would be best to use to measure the thickness of a penny?

- A meter *too large*
- B centimeter *too large*
- C kilometer *too large*
- D millimeter *

A	B	C	D
7%	27%	7%	59%

B.2.1.1

Use the figure below to answer question 8.



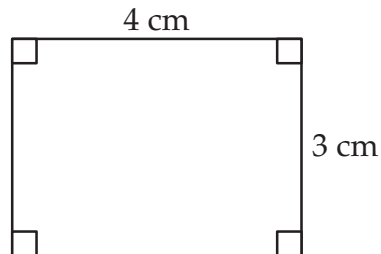
8. Using your ruler, what is the length of the paper clip?

- A $1\frac{1}{8}$ inches *focused on precision unit of one-eighth*
- B $1\frac{3}{8}$ inches *
- C $1\frac{4}{8}$ inches *misread ruler*
- D $1\frac{5}{8}$ inches *counted down $\frac{5}{8}$ from 2*

A	B	C	D
13%	46%	20%	21%

B.2.2.2

Use the rectangle below to answer question 9.



9. What is the area of the rectangle?

- A 7 cm^2 *added two sides*
- B 12 cm^2 *
- C 14 cm^2 *perimeter*
- D 24 cm^2 *twice area*

A	B	C	D
6%	64%	25%	5%

MATHEMATICS

C.1.1.2

10. Which statement about rectangles is true?

A All rectangles have 4 sides of the same length.

true for squares

B All rectangles have 4 angles of the same measure.

*

C All rectangles have only 1 pair of parallel sides.

rectangles have 2 pairs of parallel sides

D All rectangles have only 1 pair of perpendicular sides.

thought of a trapezoid

A	B	C	D
10%	62%	17%	11%

C.2.1.1

11. Irene drew the shape and the point shown below.



Irene rotated the shape about the point. Which shows only a rotation (turn) of the shape about the point?



flip



slide and rotation



slide



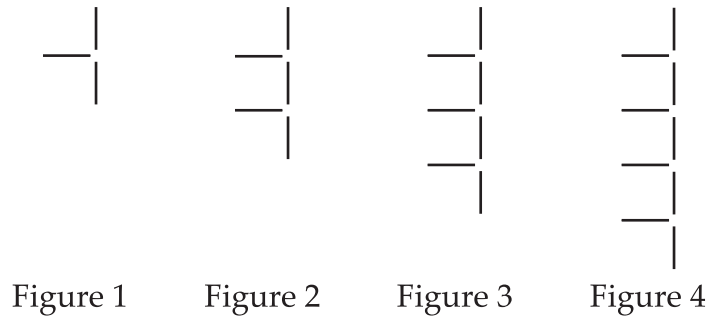
*

A	B	C	D
16%	8%	6%	70%

MATHEMATICS

D.1.1.1

12. Alyssa created the pattern shown below using toothpicks.



The pattern continues. Exactly how many toothpicks are in Figure 8 in the pattern?

- A 11 *next in the pattern*
- B 15 *saw a difference of 6 from figure 1 to figure 4, so added 6 to 9*
- C 17 *
- D 18 *doubled the number in figure 4*

A	B	C	D
18%	7%	51%	23%

MATHEMATICS

D.1.2.1

13. Karen is playing a number game. The rule is: multiply by 2 for the next number, then add 8 for the number after that. The pattern continues. Which sequence of numbers follows the rule?

A 1, 3, 24, 26, 52, 54, 108

added 2, multiplied by 8, added 2, multiplied by 2

B 3, 6, 14, 28, 30, 60, 62

multiplied by 2, added 8, multiplied by 2, added 2, multiplied by 2

C 7, 14, 28, 56, 112, 224, 448

multiplied by 2

D 12, 24, 32, 64, 72, 144, 152

*

A	B	C	D
3%	12%	7%	77%

D.2.1.1

14. The equation below is used to find the number of model cars (x) in Carlos's model car collection.

$$x \div 39 = 3$$

How many cars are in Carlos's collection, x ?

A 13

$39/3$

B 36

$39 - 3$

C 42

$39 + 3$

D 117

*

A	B	C	D
35%	2%	2%	61%

MATHEMATICS

E.2.1.2

15. The total number of days without snow for 6 cities is listed below.

165, 165, 165, 171, 172, 175

What is the **mode** of the set of data?

- A 165 *
- B 168
- C 171
- D 175

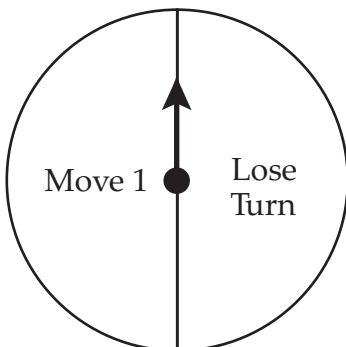
A	B	C	D
89%	5%	3%	3%

MATHEMATICS

E.3.1.1

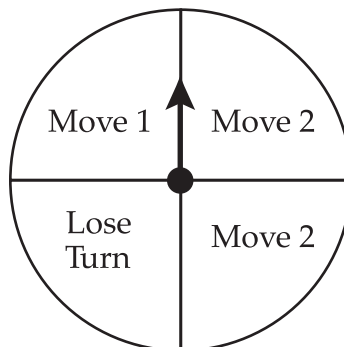
16. On which spinner would a player be **least likely** to land on “Lose Turn”?

A



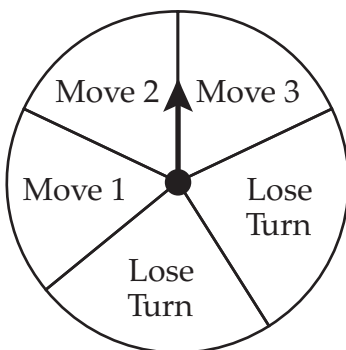
*two sections are equal size;
confuses equally with least*

B



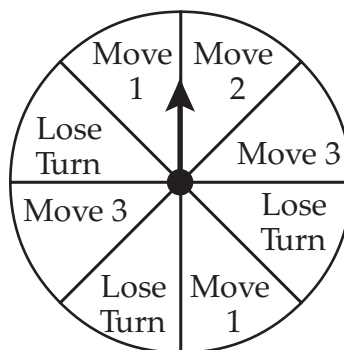
*

C



only counted one “Lose Turn” section

D



*chose the circle with the
smallest $\left(\frac{1}{8}\right)$ “Lose Turn”
sections*

A	B	C	D
16%	56%	5%	23%

MATHEMATICS

OPEN-ENDED ITEM

A.2

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

- A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

B. How many books can Mr. Stevens buy? Show or explain all your work.

Score Point 4	Score Point 3	Score Point 2	Score Point 1	Score Point 0
29%	18%	21%	20%	12%

MATHEMATICS

ITEM-SPECIFIC SCORING GUIDELINE

Item #17

This item will be reported under Category A, Numbers and Operations.

Assessment Anchor:

A.2– Understand the meanings of operations, use operations and understand how they relate to each other.

Specific Eligible Content addressed by this item:

A.2.1.1– Solve problems involving addition, subtraction, multiplication and division of whole numbers (multipliers up to 2 digits – divisors one digit) and decimals including money (answer through hundredths – no division with decimals).

A.2.1.3– Choose the correct operation(s) to solve a problem (no more than 2 operations).

A.3.1.1– Round whole numbers through millions and decimals through hundredths.

Scoring Guide:

Score	In response to this item, the student—
4	demonstrates a <i>thorough</i> understanding of solving problems involving subtraction, multiplication and division of whole numbers including money, choosing the correct operation to solve a problem, and rounding decimals by correctly solving problems and clearly explaining procedures.
3	demonstrates a <i>general</i> understanding of solving problems involving subtraction, multiplication and division of whole numbers including money, choosing the correct operation to solve a problem, and rounding decimals by clearly explaining procedures with only minor errors or omissions.
2	demonstrates a <i>partial</i> understanding of solving problems involving subtraction, multiplication and division of whole numbers including money, choosing the correct operation to solve a problem, and rounding decimals by correctly performing a significant portion of the required task.
1	demonstrates <i>minimal</i> understanding of solving problems involving subtraction, multiplication and division of whole numbers including money, choosing the correct operation to solve a problem, and rounding decimals.
0	The response has no correct answer and <i>insufficient</i> 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.
Non-scorable	BLK – Blank, entirely erased, or written refusal to respond OT – Off Task IL – Illegible LOE – Response in a language other than English

MATHEMATICS

Item #17

Top Scoring Response:

Part A Answer	Support
\$210	$\$11 \times 15 = \165 $\$25 \times 15 = \375 $\$375 - \$165 = \$210$ OR $(\$25 - \$11) \times 15 = \$210$ OR He paid \$11 times 15 (\$165) and sold the books for \$25 times 15 (\$375). I subtracted \$375 from \$165 to get \$210 as the difference. OR equivalent

(2 score points)

1 point for correct answer

1 point for complete support (.5 for correct, but incomplete, support)

Part B Answer	Support
27	$220 \div 8 = 27.5$ OR I divided \$220 by the cost of each book ($\$220 \div \8) to get 27.5. I rounded 27.5 down to 27 for my answer since he can only buy a whole number of books, and he would not have enough money to buy 28 books. OR equivalent

(2 score points)

1 point for correct answer

1 point for complete support (.5 for correct, but incomplete, support)

MATHEMATICS

OPEN-ENDED RESPONSES

A.2 Response Score: 4

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

- A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

The difference between the total amount he sold them for and how much he paid for them is \$210. How I got that was I did $15 \times \$11$ and I got \$165. Then I did $15 \times \$25$ and got \$375. Then I subtracted $\$375 - \165 and got \$210 as my difference between them.

The student has given a correct answer.
The student has shown complete support.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

- B. How many books can Mr. Stevens buy? Show or explain all your work.

$$8 \times 27 = 216$$
$$8 \times 28 = 224$$

Too much

He can buy 27 books
because anything over
27 cost more than he has.

The student has given a correct answer.
The student has shown complete support.

MATHEMATICS

A.2 Response Score: 3

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

$$\begin{array}{r}
 \text{sold} \quad \overset{a}{15} \text{ books} \quad 15 \text{ books} \\
 \times \quad \$25 \quad \times \frac{\$11}{15} \rightarrow \text{bought books} \\
 \hline
 75 \quad 150 \\
 + 300 \quad \hline
 \$375 \text{ total} \quad \$65 \text{ total}
 \end{array}$$

$$\begin{array}{r}
 \$375 \\
 - \$65 \\
 \hline
 \$310 \text{ more}
 \end{array}$$

First I multiplied the books he got and sold by the money that he spent and got. Then to get how much money is the difference I subtracted.

The student has given an incorrect answer.
The student has shown complete support.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

- B. How many books can Mr. Stevens buy? Show or explain all your work.

dollars for books $\begin{array}{r} 27 \text{ books} \\ \overline{) 220} \\ \underline{- 16} \\ 60 \\ \underline{- 56} \\ 4 \end{array}$ that he has

To get how many books he could buy I divided the money he had by the cost of the books to get how many books he could buy

The student has given a correct answer.
The student has shown complete support.

MATHEMATICS

A.2 Response Score: 3

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

- A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

$$\begin{array}{r} \$15 \\ \times \$11 \\ \hline 10 \\ 5 \\ 50 \\ + 100 \\ \hline \end{array}$$

\$165 is what he paid, when he bought them.

$$\begin{array}{r} \$15 \\ \times \$25 \\ \hline 25 \\ 50 \\ 100 \\ + 200 \\ \hline \end{array}$$

\$375 is what he made selling them.

$$\begin{array}{r} \$375 \\ \$165 \\ \hline \$210 \end{array}$$

is the difference

The student has given a correct answer.
The student has shown complete support.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

- B. How many books can Mr. Stevens buy? Show or explain all your work.

$$\begin{array}{r} 8 \overline{) 220} \\ \underline{160} \\ 60 \\ \underline{56} \\ 4 \\ \underline{8} \\ 6 \end{array} \quad \begin{array}{r} 20 \\ 7 \\ + 1 \\ \hline 28 \end{array}$$

He will be able to buy 28 books at \$8 each. He will have \$6 leftover.

The student has given an incorrect answer.
The student has shown complete support.

MATHEMATICS

A.2 Response Score: 2

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

- A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

$$\begin{array}{r} \$25 \\ - \\ \$11 \\ \hline \$14 \end{array}$$

The student has given an incorrect answer. The student has shown incorrect and incomplete support.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

- B. How many books can Mr. Stevens buy? Show or explain all your work.

$$\begin{array}{r} 27 \\ 8 \overline{) \cancel{2} \cancel{2} 0} \\ \underline{16} \\ 60 \\ \underline{56} \\ 4 \end{array}$$

27 Books

The student has given a correct answer.
The student has shown complete support.

MATHEMATICS

A.2 Response Score: 2

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

- A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

$$\begin{array}{r} \overline{165} \\ - 25 \\ \hline 140 \end{array}$$

The difference is
\$140.00

The student has given an incorrect answer.
The student has shown incorrect support.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

- B. How many books can Mr. Stevens buy? Show or explain all your work.

$$\begin{array}{r} 027 \quad 27 \\ 8 \overline{)220} \\ \underline{16} \\ 50 \\ \underline{56} \\ 4 \end{array}$$

He can buy 27 books with
4 dollars left over

The student has given a correct answer.
The student has shown complete support.

MATHEMATICS

A.2 Response Score: 1

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

- A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

$$\begin{array}{r} 11 \\ \times 15 \\ \hline 55 \\ 110 \\ \hline 165 \end{array}$$

for what he had to pay
was \$165.00

$$\begin{array}{r} 25 \\ \times 15 \\ \hline 125 \\ 300 \\ \hline 375 \end{array}$$

Now his price is \$375.00 for all
of the books

The student has given an incorrect answer. The student has shown correct but incomplete support.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

- B.** How many books can Mr. Stevens buy? Show or explain all your work.

He could buy 27 books and still have
Some money left. The money left is
\$4.

The student has given a correct answer. The student has shown no support. Based on PSSA scoring rules, $1\frac{1}{2}$ points count as 1 point.

MATHEMATICS

A.2 Response Score: 1

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

- A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

$11 \times 15 = \$165$
Mr. Stevens paid
\$165 dollars for
all 15 books.
Then he sold the
book for 25 each
and got the
total of \$375
dollars.
 $25 \times 15 = \$375$

Mr. Stevens
sold the books
for a more
expensive
price.

The student has given a partially correct but incomplete answer.
The student has shown correct but incomplete support.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

- B. How many books can Mr. Stevens buy? Show or explain all your work.

If 12 book coast \$104 than add

$$\begin{array}{r} 12 \text{ books} \\ + 12 \text{ books} \\ \hline 24 \\ + 12 \\ \hline 36 \text{ book he can purchase} \end{array}$$
$$\begin{array}{r} 104 = 12 \text{ books} \\ + 104 = 12 \text{ books} \\ \hline 208 \\ + 12 \\ \hline 220 \end{array}$$

The student has given an incorrect answer.
The student has shown incorrect support.

MATHEMATICS

A.2 Response Score: 0

17. Mr. Stevens bought 15 books for his store. He paid \$11 for each book. He then sold all 15 books for \$25 each.

- A. What is the difference between the total amount of money Mr. Stevens sold the books for and the total amount of money he paid for the books? Show or explain all your work.

there is a \$14.00
difference

The student has given an incorrect answer.
The student has shown no support.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

MATHEMATICS

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

Mr. Stevens has \$220 to purchase books at \$8 each (tax included).

B. How many books can Mr. Stevens buy? Show or explain all your work.

2.5 books

The student has given an incorrect answer.
The student has shown no support.

MATHEMATICS

SUMMATIVE DATA TABLE

Multiple-Choice Items

Sampler Sequence	A	B	C	D
1	5%	9%	13%	73%
2	7%	83%	7%	3%
3	13%	25%	49%	12%
4	52%	36%	2%	9%
5	18%	11%	64%	7%
6	73%	8%	12%	7%
7	7%	27%	7%	59%
8	13%	46%	20%	21%
9	6%	64%	25%	5%
10	10%	62%	17%	11%
11	16%	8%	6%	70%
12	18%	7%	51%	23%
13	3%	12%	7%	77%
14	35%	2%	2%	61%
15	89%	5%	3%	3%
16	16%	56%	5%	23%

Open-Ended Item

Sampler Sequence	Score Point 4	Score Point 3	Score Point 2	Score Point 1	Score Point 0
17	29%	18%	21%	20%	12%

Mathematics
Grade 5
Item and Scoring Sampler Supplement

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