



# The Pennsylvania System of School Assessment

## Mathematics Item and Scoring Sampler

# SUPPLEMENT

2009–2010  
Grade 4

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# MATHEMATICS

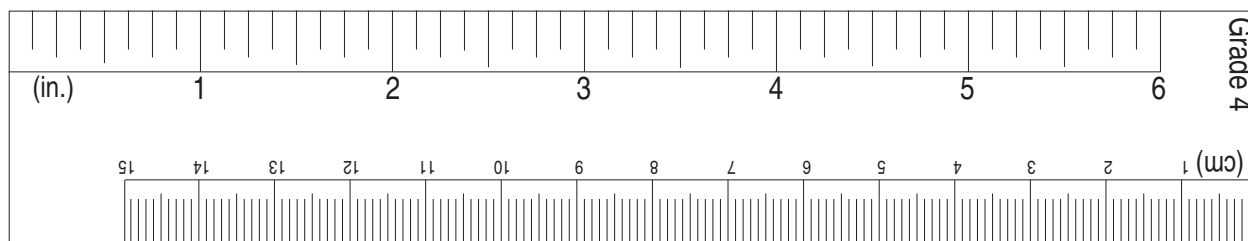
## INTRODUCTION

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=](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.

## GRADE 4 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.



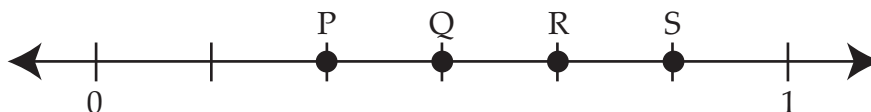
# MATHEMATICS

## MULTIPLE-CHOICE ITEMS

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

### A.1.2.1

Use the number line below to answer question 1.



1. Which point shows  $\frac{4}{6}$ ?

A P   $\frac{2}{6}$

B Q   $\frac{3}{6}$

C R  \*

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

A	B	C	D
4%	23%	60%	13%

# MATHEMATICS

## A.1.3.1

2. Leonard started writing factors of the number 9 below, but did not finish.

1, 3, —

Which factor of 9 is missing?

- A 4 *added 1 and 3*
- B 5 *saw numbers were increasing by 2 and added 2 to 3*
- C 6 *doubled the 3*
- D 9 \*

A	B	C	D
4%	26%	19%	51%

## A.1.3.2

3. Which shows only multiples of 3?

- A 43, 53, 63 *all end in 3, only 63 is a multiple of 3*
- B 49, 56, 63 *all numbers end in a number divisible by 3*
- C 43, 46, 49 *goes up by 3, first number ends in 3*
- D 60, 63, 66 \*

A	B	C	D
14%	7%	21%	58%

## A.2.1.1

4. A baker uses 2 cups of wheat flour and 4 cups of white flour to bake a loaf of bread. How much flour in all will the baker use to bake 5 loaves of bread?

- A 10 cups  $2 \times 5$
- B 20 cups  $4 \times 5$
- C 30 cups \*
- D 40 cups  $2 \times 4 \times 5$

A	B	C	D
15%	15%	54%	16%

## A.2.1.2

5. Tim bought 2 paintbrushes that each cost \$2.55. He also bought 1 bucket that cost \$1.60. How much did Tim pay in all?

- A \$3.50  $2.55 \times 2 - 1.60$
- B \$4.15  $2.55 + 1.60$
- C \$6.15  $2 + 2.55 + 1.60$
- D \$6.70 \*

A	B	C	D
2%	36%	4%	57%

# MATHEMATICS

## A.3.1.3

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

6. A flower shop sold a total of 6,283 flowers. The shop sold 2,195 daisies and 1,716 tulips. The rest of the flowers were roses. Which is the **closest estimate** to the number of roses that were sold?

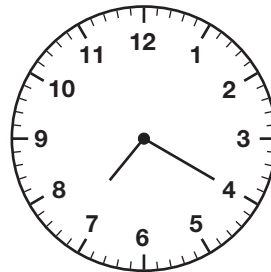
- A 1,000  $6,000 - 3,000 - 2,000$   
 B 2,000 \*
- C 4,000  $7,000 - 2,000 - 1,000$   
 D 5,000  $7,000 - 2,000, \text{ forgot the tulips}$

A	B	C	D
8%	58%	24%	10%

## B.1.1.1

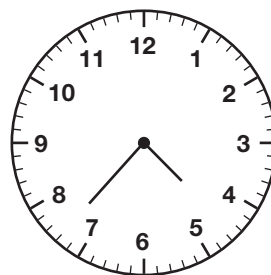
7. Gail started swimming at 4:37. Which clock shows 4:37?

A



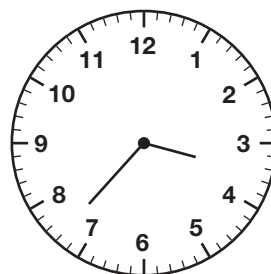
*7:20—confused minute hand with hour hand*

B



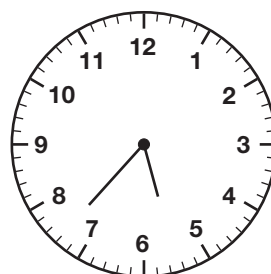
\*

C



*3:37—hour hand close to 4*

D



*5:37—added an hour*

A	B	C	D
9%	82%	8%	2%

# MATHEMATICS

## B.1.1.2

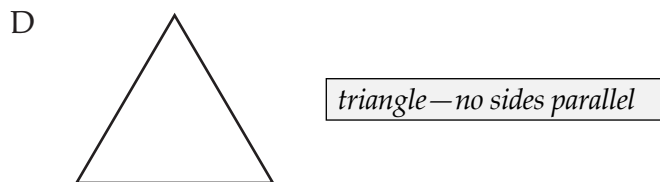
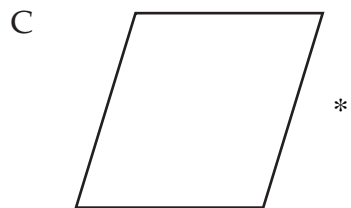
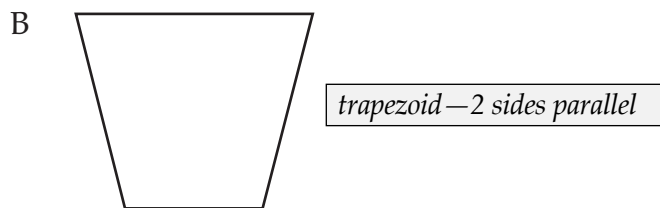
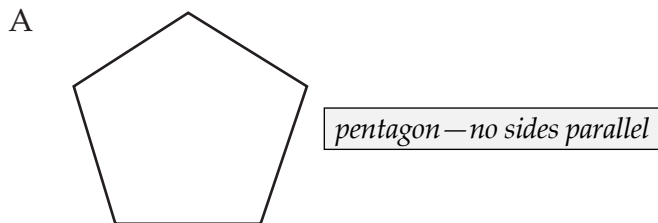
8. Nadia called Tara at a quarter after one. What time did Nadia call Tara?

- A 1:15 \*
- B 1:25 *thinks quarter equals 25, as in .25*
- C 1:40 *thinks quarter is 4, as in 1/4*
- D 1:45 *quarter to two*

A	B	C	D
68%	23%	3%	5%

## C.1.1.1

9. Mrs. Schmidt gave her students the pattern blocks shown below and asked them to choose the parallelogram. Which is the parallelogram?



A	B	C	D
14%	13%	69%	4%

# MATHEMATICS

## C.1.2.1

10. Which road sign most resembles a ray?

A



*a line because it continues in both directions*

B



*continues in one direction, but isn't straight*

C



\*

D



*not a ray because it branches off*

A	B	C	D
24%	2%	69%	5%

## C.1.2.2

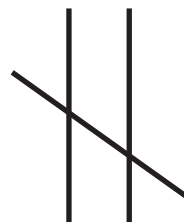
11. Louise saw 3 sticks that were parallel to each other. Which sticks could Louise have seen?

A



*one is perpendicular*

B



*one intersects the other two*

C



*not equal distance from one another at all points*

D



\*

A	B	C	D
8%	7%	3%	83%

# MATHEMATICS

## D.1.1.1

Use the pattern below to answer question 12.

2, 6, 18, 54, \_\_\_\_\_

12. What is the next number in the pattern?

- A 58 *noticed that  $2 + 4 = 6$ , so added 4 to 54*
- B 72 *added 18 and 54*
- C 108 *multiplied 54 by 2*
- D 162 \*

A	B	C	D
15%	22%	12%	51%

## D.1.2.2

13. The table below shows the costs of mail order items and the shipping amounts.

**Mail Order Items**

Cost (\$)	Shipping Amount (\$)
25	10
35	20
45	30
55	40

What is the rule to find the shipping amount?

- A multiply cost by 2.5  
*inverse of first row operation only*
- B add \$15 to cost  
*inverse of correct operation*
- C divide cost by 2.5  
*works for first row only*
- D subtract \$15 from cost  
\*

A	B	C	D
10%	20%	7%	63%

# MATHEMATICS

## D.2.1.1

14. Yolanda builds birdhouses. She uses 24 nails for each birdhouse. Which shows how to find the number of nails she uses to build 12 birdhouses?

- A  $12 + 24$
- B  $12 - 24$
- C  $24 - 12$
- D  $24 \times 12$  \*

A	B	C	D
14%	3%	9%	73%

# MATHEMATICS




## E.1.2.1

15. Last week a pie shop sold:


- 12 cherry pies
- 6 pumpkin pies
- 18 apple pies

Which pictograph correctly shows how many pies were sold?




A

Pies Sold	
Type	Number Sold
cherry	
pumpkin	
apple	


\*

Key:  = 3 pies




B

Pies Sold	
Type	Number Sold
cherry	
pumpkin	
apple	


*counted each unit as representing 2 pies, not 3 pies*

Key:  = 3 pies




C

Pies Sold	
Type	Number Sold
cherry	
pumpkin	
apple	


*ignored key; counts each unit as 1 pie*

Key:  = 3 pies

D

Pies Sold	
Type	Number Sold
cherry	
pumpkin	
apple	

*cherry is correct, but pumpkin and apple each have 1 extra unit*

Key:  = 3 pies

A	B	C	D
92%	1%	6%	1%

# MATHEMATICS

## E.1.2.2

16. Jacob has marbles in 4 different colors, as shown in the table below.

**Jacob's Marbles**

Color	Number
blue	8
yellow	5
green	12
orange	3

Which pictograph shows the data in the table?

A

**Jacob's Marbles**

Color	Number
blue	○○○○
yellow	○○○
green	○○○○○○○○○○
orange	○○

Key: ○ = 2 marbles

\*

B

**Jacob's Marbles**

Color	Number
blue	○○○○○○○○○○○○○○
yellow	○○○○○○○○
green	○○○○○○○○○○○○○○○○○○○○
orange	○○○○

Key: ○ = 2 marbles

*counts 1 symbol as 1 marble;  
didn't use key*

C

**Jacob's Marbles**

Color	Number
blue	○○○○○○
yellow	○○○○
green	○○○○○○○○○○○○
orange	○○

Key: ○ = 2 marbles

*rounded partial symbols to whole symbols*

D

**Jacob's Marbles**

Color	Number
blue	○○○○○○
yellow	○○○○
green	○○○○○○○○○○○○
orange	○

Key: ○ = 2 marbles

*didn't use partial symbols*

A	B	C	D
81%	16%	1%	1%

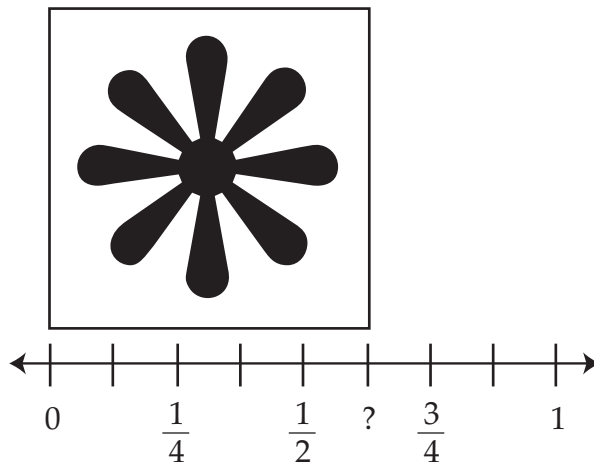
# MATHEMATICS

## OPEN-ENDED ITEM

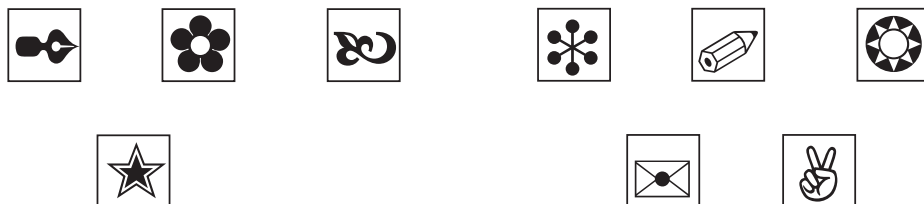
### A.1

17. Andre has a sticker collection. He measured a sticker on the number line below.

A. What fraction represents the length of the sticker?



Some of Andre's stickers are shown below. He will give  $\frac{2}{3}$  of the stickers to his sister.



B. Put an X on  $\frac{2}{3}$  of the stickers.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

# MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

- He wants stickers on more than 1 page.
- He wants more than 1 sticker on each page.
- He wants the same number of stickers on each page.

C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

\_\_\_\_\_ pages with \_\_\_\_\_ stickers on each page

\_\_\_\_\_ pages with \_\_\_\_\_ stickers on each page

Score Point 4	Score Point 3	Score Point 2	Score Point 1	Score Point 0
14%	19%	21%	14%	33%

# MATHEMATICS

## ITEM-SPECIFIC SCORING GUIDELINE

Item #17

This item is reported under Category A, Numbers and Operations

Assessment Anchor:

A.1–Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

Specific Eligible Content addressed by this item:

A.1.2.1–Locate/identify fractions or decimals on a number line (decimals and fractions through the tenths – do not mix fractions and decimals).

A.1.1.2–Create a drawing or set that represents a given fraction or decimal, including mixed numbers (through the tenths).

A.1.3.1–Find/list/identify all factors through 10 of any given number.

Scoring Guide:

Score	In response to this item, the student—
4	demonstrates a <i>thorough</i> understanding of identifying fractions on a number line, creating a drawing that represents a fraction and identifying factors of a given number by correctly solving problems and clearly explaining procedures.
3	demonstrates a <i>general</i> understanding of identifying fractions on a number line, creating a drawing that represents a fraction and identifying factors of a given number by clearly explaining procedures with only minor errors or omissions.
2	demonstrates a <i>partial</i> understanding of identifying fractions on a number line, creating a drawing that represents a fraction and identifying factors of a given number by correctly performing a significant portion of the required task.
1	demonstrates <i>minimal</i> understanding of identifying fractions on a number line, creating a drawing that represents a fraction and identifying factors of a given number.
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
$\frac{5}{8}$

(1 score point)

1 point for correct answer

Part B Answer
<u>Any</u> 6 of the 9 stickers (or 9 boxes) should be marked with an <b>X</b>

(1 score point)

1 point for correct answer

Part C Answer
Any <u>two</u> correct pairs: 3 pages with <b>21</b> stickers on each page <b>OR</b> 21 pages with <b>3</b> stickers on each page <b>OR</b> 7 pages with <b>9</b> stickers on each page <b>OR</b> 9 pages with <b>7</b> stickers on each page

(2 score points)

1 point for each correct pair of answers

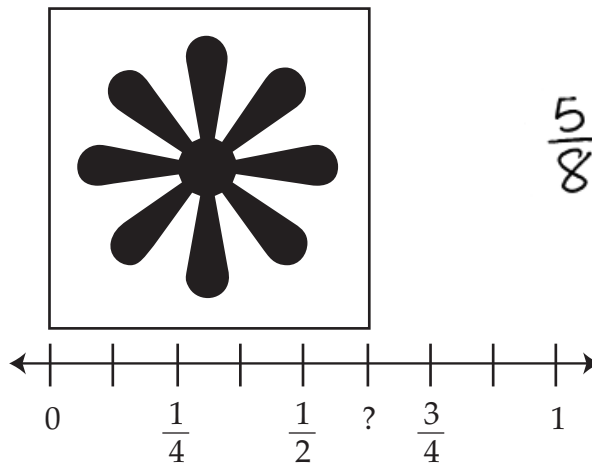
# MATHEMATICS

## OPEN-ENDED ITEM RESPONSES

### A.1 Response Score: 4

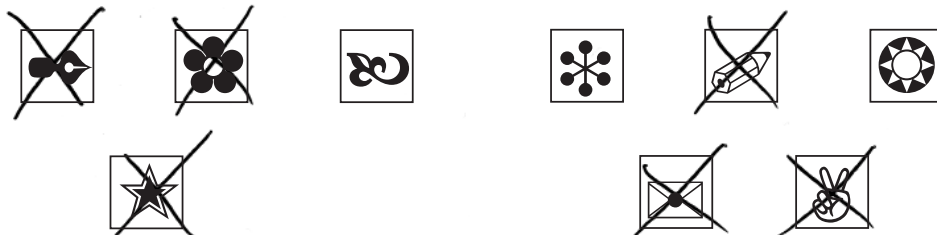
17. Andre has a sticker collection. He measured a sticker on the number line below.

A. What fraction represents the length of the sticker?



The student has given a correct answer.

Some of Andre's stickers are shown below. He will give  $\frac{2}{3}$  of the stickers to his sister.



B. Put an X on  $\frac{2}{3}$  of the stickers.

The student has given a correct answer.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

- He wants stickers on more than 1 page.
- He wants more than 1 sticker on each page.
- He wants the same number of stickers on each page.

C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

3 pages with 21 stickers on each page

7 pages with 9 stickers on each page

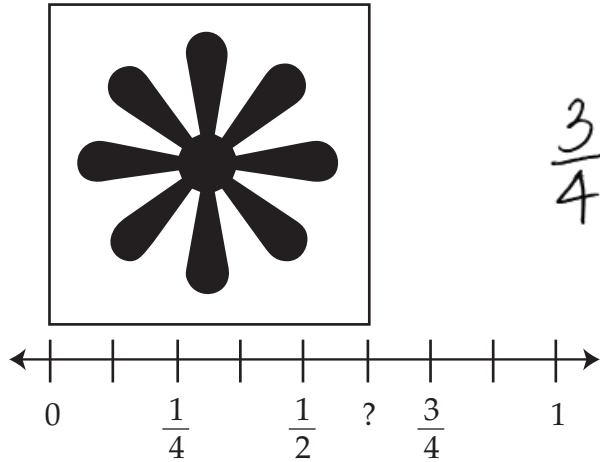
The student has given two correct answer pairs.

# MATHEMATICS

## A.1 Response Score: 3

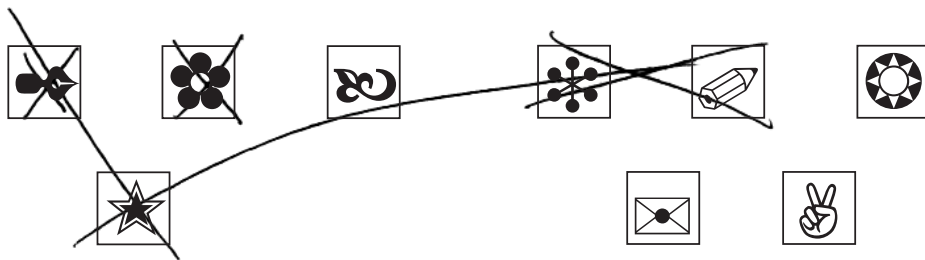
17. Andre has a sticker collection. He measured a sticker on the number line below.

A. What fraction represents the length of the sticker?



The student has given an incorrect answer.

Some of Andre's stickers are shown below. He will give  $\frac{2}{3}$  of the stickers to his sister.



B. Put an X on  $\frac{2}{3}$  of the stickers.

The student has given a correct answer. (In this instance, the student was given credit for crossing out the third symbol box in the first row, since part of an "X" runs through the corner of box.)

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

- He wants stickers on more than 1 page.
- He wants more than 1 sticker on each page.
- He wants the same number of stickers on each page.

C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

$\frac{9}{7}$  pages with  $\frac{7}{9}$  stickers on each page  
 $\frac{7}{9}$  pages with  $\frac{9}{7}$  stickers on each page

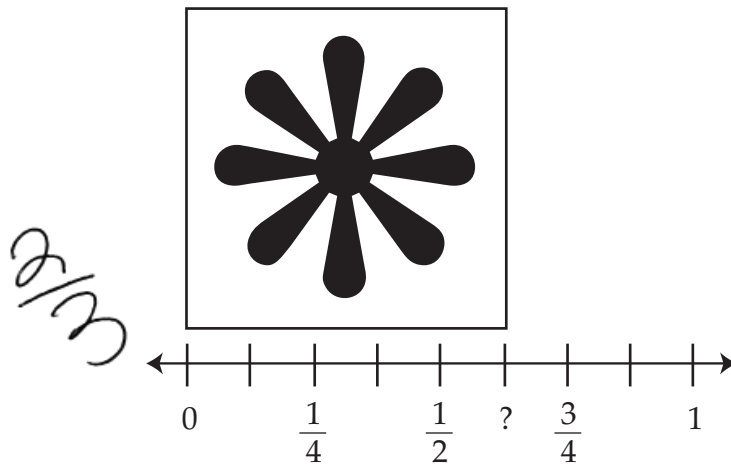
The student has given two correct answer pairs.

# MATHEMATICS

## A.1 Response Score: 3

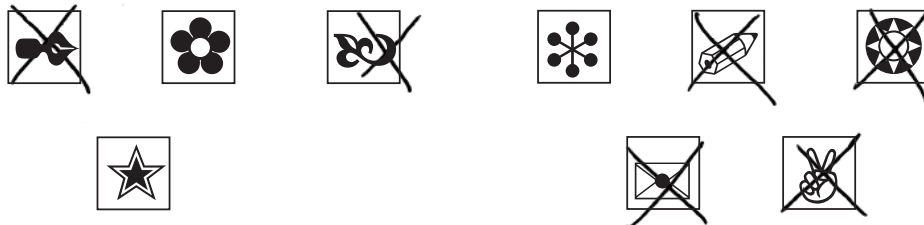
17. Andre has a sticker collection. He measured a sticker on the number line below.

A. What fraction represents the length of the sticker?



The student has given an incorrect answer.

Some of Andre's stickers are shown below. He will give  $\frac{2}{3}$  of the stickers to his sister.



B. Put an X on  $\frac{2}{3}$  of the stickers.

The student has given a correct answer.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

- He wants stickers on more than 1 page.
- He wants more than 1 sticker on each page.
- He wants the same number of stickers on each page.

C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

7 pages with 9 stickers on each page

9 pages with 7 stickers on each page

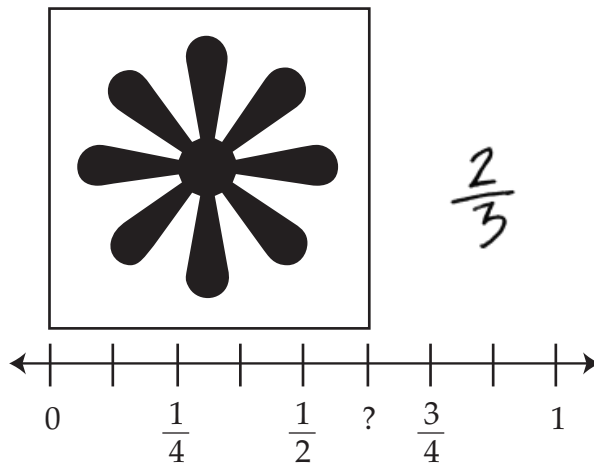
The student has given two correct answer pairs.

# MATHEMATICS

## A.1 Response Score: 2

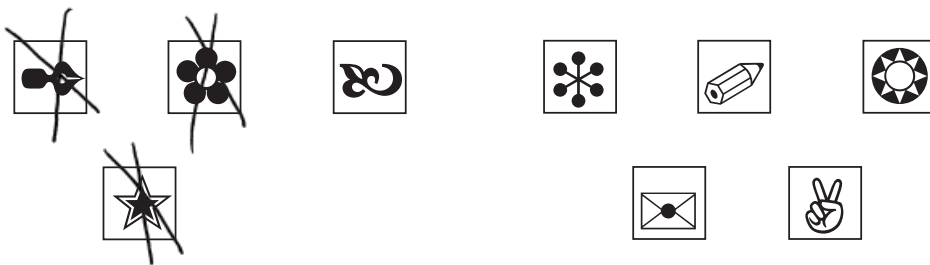
17. Andre has a sticker collection. He measured a sticker on the number line below.

A. What fraction represents the length of the sticker?



The student has given an incorrect answer.

Some of Andre's stickers are shown below. He will give  $\frac{2}{3}$  of the stickers to his sister.



B. Put an X on  $\frac{2}{3}$  of the stickers.

The student has given an incorrect answer.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

- He wants stickers on more than 1 page.
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- He wants the same number of stickers on each page.

C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

9 pages with 7 stickers on each page  
7 pages with 9 stickers on each page

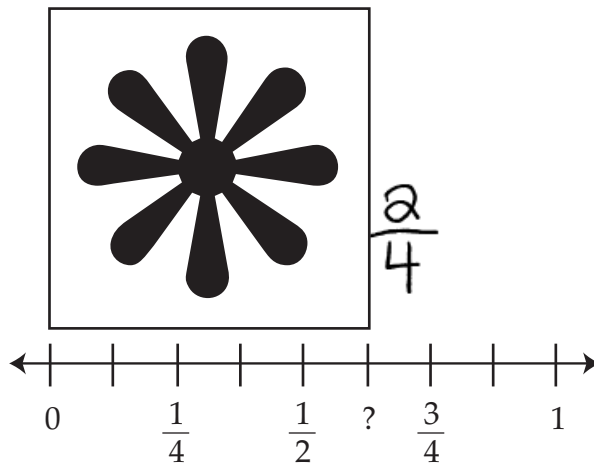
The student has given two correct answer pairs.

# MATHEMATICS

## A.1 Response Score: 2

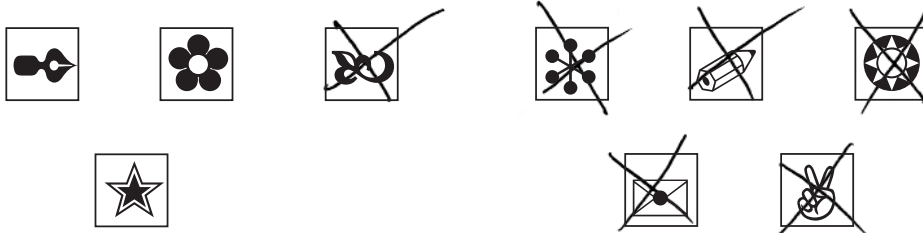
17. Andre has a sticker collection. He measured a sticker on the number line below.

A. What fraction represents the length of the sticker?



The student has given an incorrect answer.

Some of Andre's stickers are shown below. He will give  $\frac{2}{3}$  of the stickers to his sister.



B. Put an X on  $\frac{2}{3}$  of the stickers.

The student has given a correct answer.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

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C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

3 pages with 21 stickers on each page

5 pages with 11 stickers on each page

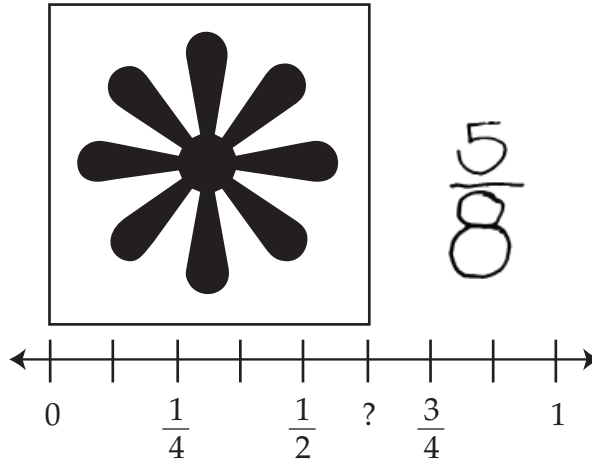
The student has given only one correct answer pair.

# MATHEMATICS

## A.1 Response Score: 1

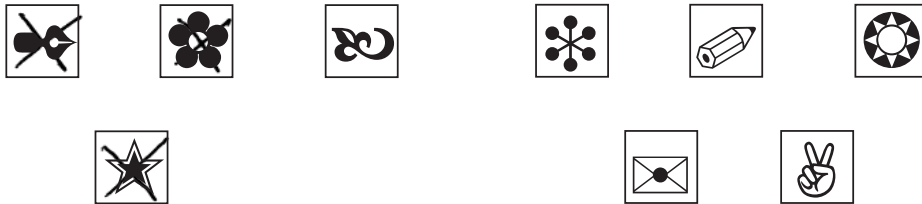
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B. Put an X on  $\frac{2}{3}$  of the stickers.

The student has given an incorrect answer.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

- He wants stickers on more than 1 page.
- He wants more than 1 sticker on each page.
- He wants the same number of stickers on each page.

C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

10 pages with 6 stickers on each page  
6 pages with 10 stickers on each page

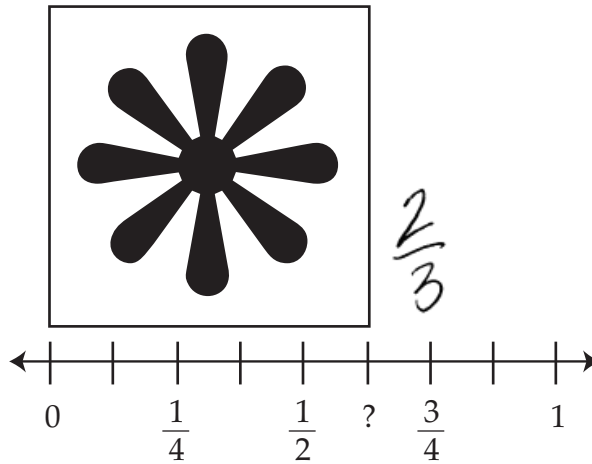
The student has given two incorrect answer pairs.

# MATHEMATICS

## A.1 Response Score: 1

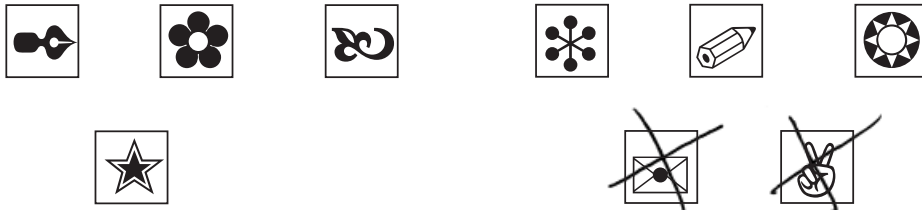
17. Andre has a sticker collection. He measured a sticker on the number line below.

A. What fraction represents the length of the sticker?



The student has given an incorrect answer.

Some of Andre's stickers are shown below. He will give  $\frac{2}{3}$  of the stickers to his sister.



B. Put an X on  $\frac{2}{3}$  of the stickers.

The student has given an incorrect answer.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

- He wants stickers on more than 1 page.
- He wants more than 1 sticker on each page.
- He wants the same number of stickers on each page.

C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

  9   pages with   7   stickers on each page

       pages with        stickers on each page

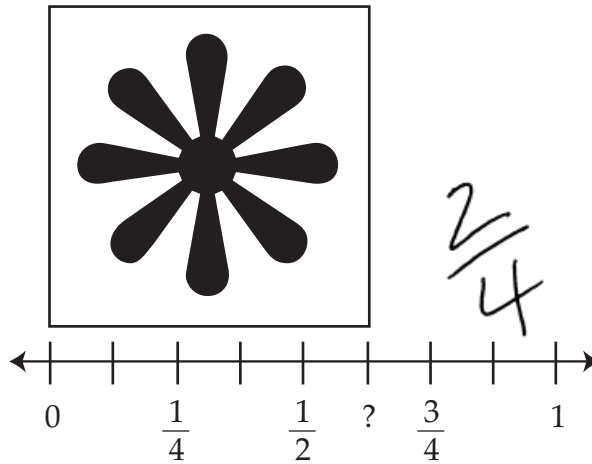
The student has given one correct answer pair.

# MATHEMATICS

## A.1 Response Score: 0

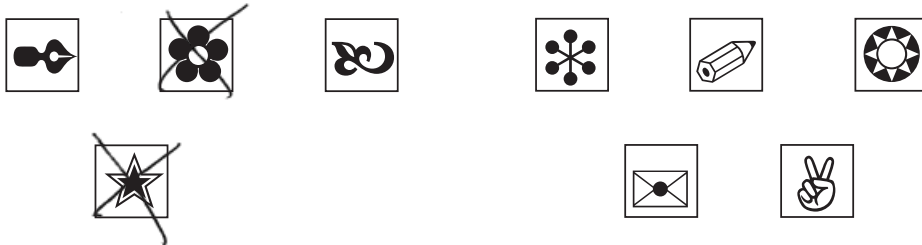
17. Andre has a sticker collection. He measured a sticker on the number line below.

A. What fraction represents the length of the sticker?



The student has given an incorrect answer.

Some of Andre's stickers are shown below. He will give  $\frac{2}{3}$  of the stickers to his sister.



B. Put an X on  $\frac{2}{3}$  of the stickers.

The student has given an incorrect answer.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

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

Andre wants to put 63 of his stickers in a book.

- He wants stickers on more than 1 page.
- He wants more than 1 sticker on each page.
- He wants the same number of stickers on each page.

C. Show 2 different ways Andre could put his stickers in the book. Put the answers in the spaces provided.

0 pages with 10 stickers on each page

3 pages with 10 stickers on each page

The student has given two incorrect answer pairs.

# MATHEMATICS

## SUMMATIVE DATA TABLE

### Multiple-Choice Items

Sampler Sequence	A	B	C	D
1	4%	23%	60%	13%
2	4%	26%	19%	51%
3	14%	7%	21%	58%
4	15%	15%	54%	16%
5	2%	36%	4%	57%
6	8%	58%	24%	10%
7	9%	82%	8%	2%
8	68%	23%	3%	5%
9	14%	13%	69%	4%
10	24%	2%	69%	5%
11	8%	7%	3%	83%
12	15%	22%	12%	51%
13	10%	20%	7%	63%
14	14%	3%	9%	73%
15	92%	1%	6%	1%
16	81%	16%	1%	1%

### Open-Ended Item

Sampler Sequence	Score Point 4	Score Point 3	Score Point 2	Score Point 1	Score Point 0
17	14%	19%	21%	14%	33%

**Mathematics**  
**Grade 4**  
**Item and Scoring Sampler Supplement**

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