New England Common Assessment Program

Released Items
2008

Grade 6
Mathematics

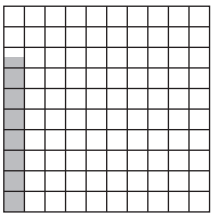
Mathematics

Items with this symbol were selected from Session One—no calculators or other mathematics tools allowed.

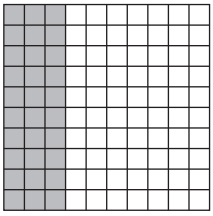
1 A fraction of the fish shown below are shaded gray.

Which grid is shaded gray to represent a fraction with the same value?

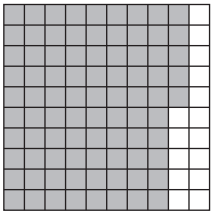
A.



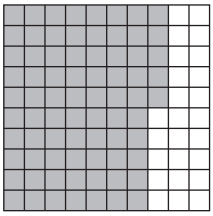
B.



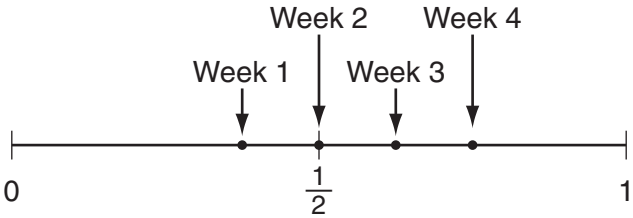
C.



D.



2 Nicole measured the height of a tomato plant at the end of each week. Her measurements are labeled on the number line below.



Height (in yards)

At the end of which week was the height of the tomato plant about $\frac{5}{8}$ yard?

A. Week 1
B. Week 2
C. Week 3
D. Week 4

3 Maria had $\frac{3}{4}$ yard of ribbon. Then she used $\frac{1}{3}$ yard of the ribbon to decorate a box. How much ribbon does Maria have now?

A. $\frac{1}{12}$ yard

B. $\frac{5}{12}$ yard

C. $\frac{1}{2}$ yard

D. $\frac{2}{3}$ yard

4 Which shape is possible?

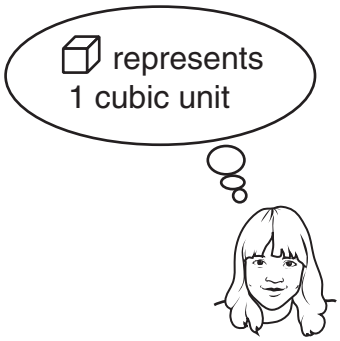
A. a rhombus with 4 acute angles

B. a parallelogram with 4 angles of equal measure

C. a rhombus with sides that measure 4 cm, 4 cm, 8 cm, and 8 cm

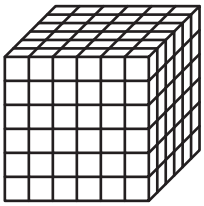
D. a parallelogram with sides that measure 2 cm, 4 cm, 6 cm, and 8 cm

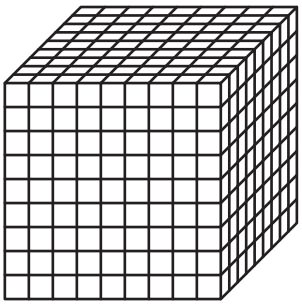
5 Which cube has a volume of 27 cubic units?



A.

B.

C. 

D. 

6 Hannah is stenciling a border on a wall. She plans to repeat pictures of a tulip, a daisy, a rose, and a lily, in that order, as shown below.

tulip, daisy, rose, lily, tulip, daisy, rose, lily, . . .

The first flower Hannah stencils is a tulip. What will be the 30th flower she stencils?

A. a tulip

B. a daisy

C. a rose

D. a lily

7 Keesha has n marbles. Li has 3 fewer than 4 times the number of marbles that Keesha has. Which expression shows the number of marbles Li has?

A. $4 \cdot n - 3$

B. $3 - 4 \cdot n$

C. $4 + n - 3$

D. $3 - 4 + n$

8 One cup of milk has the same amount of calcium as 6 oranges. One orange has the same amount of calcium as 2 eggs. How many eggs have the same amount of calcium as one cup of milk?

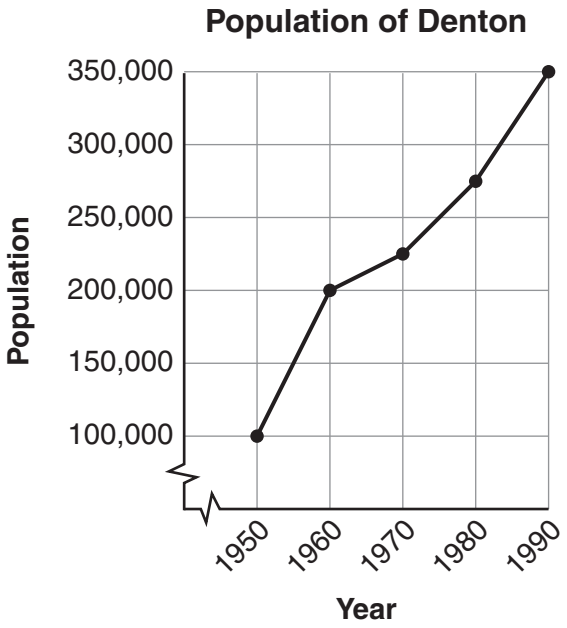
A. 3

B. 4

C. 8

D. 12

9 Look at this graph.



During which time period did Denton's population increase by about 50,000?

A. between 1950 and 1960
B. between 1960 and 1970
C. between 1970 and 1980
D. between 1980 and 1990

10 Three students collected data for a school project.

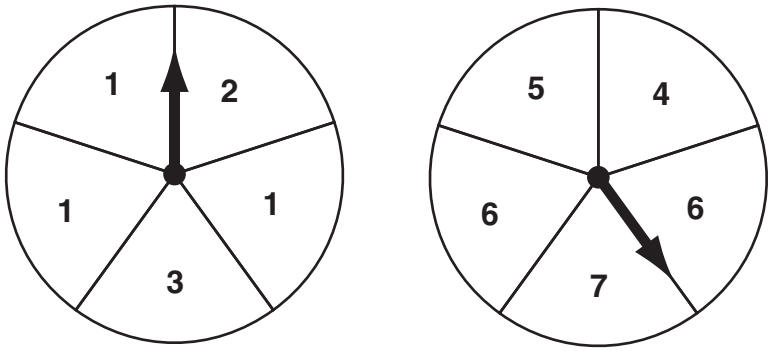
- Anita asked her classmates which season they liked best.
- Kevin measured and recorded the height of the snow in his backyard every 15 minutes during a 2-hour snowstorm.
- Rachel recorded the total snowfall amounts in 3 different towns.

Who should use a line graph to display their data?

A. Kevin only
B. Rachel only
C. Anita and Rachel only
D. Kevin and Rachel only

11 Jeff bought 6 quarts of juice for a party. One glass holds 8 fluid ounces of juice. What is the total number of glasses Jeff can fill with the juice he bought? [1 quart = 32 fluid ounces]

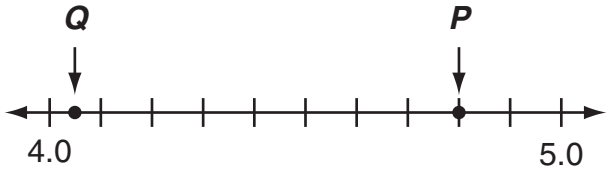
12 Look at these spinners.



Spinner A (tens digit) **Spinner B (ones digit)**

Lydia will use these spinners to form a two-digit number. She will use the number the arrow on Spinner A lands on as the tens digit and the number the arrow on Spinner B lands on as the ones digit. Lydia will spin each arrow once. What two-digit number is Lydia **most likely** to form?

13 Look at this number line.



a. What is the value of point *P*?

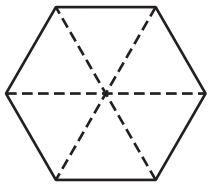
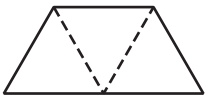
b. What is the value of point *Q*?

14 Sasha painted wooden cylinders and wooden cones.

- She painted a total of 12 bases.
- She painted the same number of cylinders as cones.

How many cones and how many cylinders did Sasha paint? Show your work or explain how you know.

15 Look at the shapes in this chart.

Shape H	Shape R	Shape Z
		

a. If Shape H represents 1, what number does Shape R represent?

b. If Shape Z represents $\frac{3}{4}$, what number does Shape H represent? Show your work or explain how you know.

c. If Shape R represents $\frac{1}{6}$, what number does Shape Z represent? Show your work or explain how you know.

Grade 6 Mathematics Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No Tools Allowed			✓		✓				✓			✓			✓
Content Strand[1]	NO	NO	NO	GM	GM	FA	FA	FA	DP	DP	GM	DP	NO	GM	NO
GLE Code	5-1	5-2	5-4	5-1	5-6	5-1	5-3	5-4	5-1	5-3	5-7	5-5	5-1	5-3	5-1
Depth of Knowledge Code	2	2	2	2	2	2	1	2	2	2	2	2	2	3	3
Item Type[2]	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	SA	SA	SA	SA	CR
Answer Key	D	C	B	B	B	B	A	D	C	A					
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	2	2	4

[1]Content Strand: NO = Numbers & Operations, GM = Geometry & Measurement, FA = Functions & Algebra, DP = Data, Statistics, & Probability

[2]Item Type: MC = Multiple Choice, SA = Short Answer, CR = Constructed Response

New England Common Assessment Program

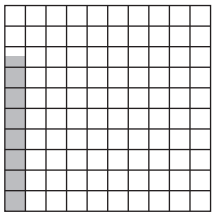
Released Items Support Materials 2008

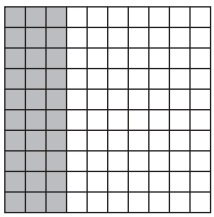
Grade 6 Mathematics

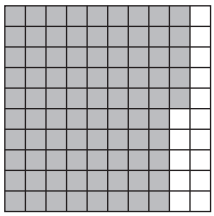
N&O 5.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.

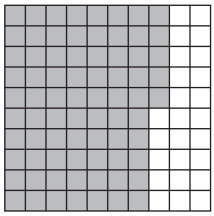
1 A fraction of the fish shown below are shaded gray.

Which grid is shaded gray to represent a fraction with the same value?

A. 

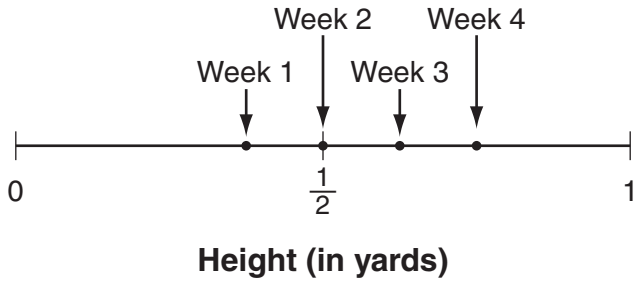
B. 

C. 

D. 

N&O 5.2 **Demonstrates understanding of the relative magnitude of numbers** by ordering, comparing, or identifying equivalent positive fractional numbers, decimals, or benchmark percents within number formats (fractions to fractions, decimals to decimals, or percents to percents); or integers in context using models or number lines.

2 Nicole measured the height of a tomato plant at the end of each week. Her measurements are labeled on the number line below.



At the end of which week was the height of the tomato plant about $\frac{5}{8}$ yard?

A. Week 1
B. Week 2
C. Week 3
D. Week 4

N&O 5.4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors, multiples, prime, or composite numbers; and addition or subtraction of fractions (proper) and decimals to the hundredths place. (Division of whole numbers by up to a two-digit divisor.) (IMPORTANT***:*** *Applies the conventions of order of operations with and without parentheses.*)

3 Maria had $\frac{3}{4}$ yard of ribbon. Then she used $\frac{1}{3}$ yard of the ribbon to decorate a box. How much ribbon does Maria have now?

A. $\frac{1}{12}$ yard

B. $\frac{5}{12}$ yard

C. $\frac{1}{2}$ yard

D. $\frac{2}{3}$ yard

G&M 5.1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish among** different types of triangles (right, acute, obtuse, equiangular, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

4 Which shape is possible?

A. a rhombus with 4 acute angles

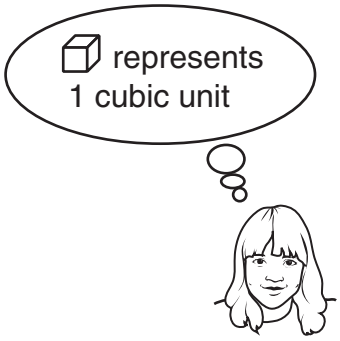
B. a parallelogram with 4 angles of equal measure

C. a rhombus with sides that measure 4 cm, 4 cm, 8 cm, and 8 cm

D. a parallelogram with sides that measure 2 cm, 4 cm, 6 cm, and 8 cm

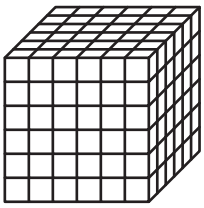
G&M 5.6 **Demonstrates conceptual understanding of perimeter** of polygons, **and the area of** rectangles or right triangles through models, manipulatives, or formulas, the area of polygons or irregular figures on grids, **and volume of** rectangular prisms (cubes) using a variety of models, manipulatives, or formulas. Expresses all measures using appropriate units.

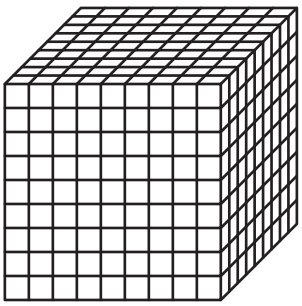
5 Which cube has a volume of 27 cubic units?



A.

B.

C. 

D. 

F&A 5.1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, or in problem situations; and writes a rule in words or symbols for finding specific cases of a linear relationship.

6 Hannah is stenciling a border on a wall. She plans to repeat pictures of a tulip, a daisy, a rose, and a lily, in that order, as shown below.

tulip, daisy, rose, lily, tulip, daisy, rose, lily, . . .

The first flower Hannah stencils is a tulip. What will be the 30th flower she stencils?

A. a tulip
B. a daisy
C. a rose
D. a lily

F&A 5.3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving any two of the four operations; or by evaluating linear algebraic expressions using whole numbers.

7 Keesha has n marbles. Li has 3 fewer than 4 times the number of marbles that Keesha has. Which expression shows the number of marbles Li has?

A. $4 \cdot n - 3$
B. $3 - 4 \cdot n$
C. $4 + n - 3$
D. $3 - 4 + n$

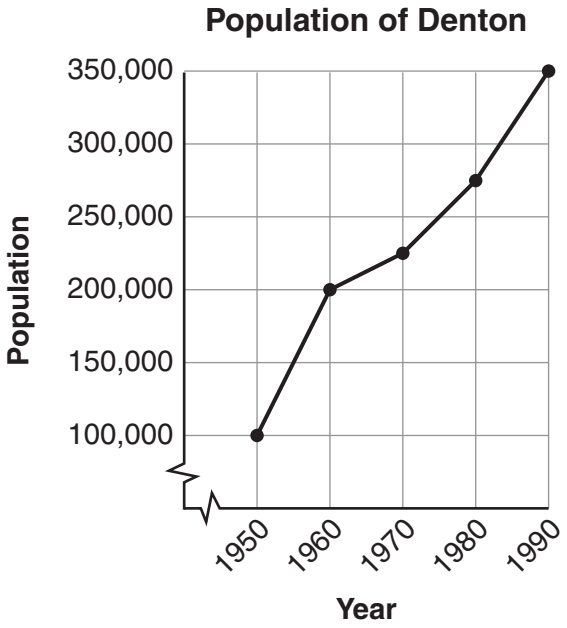
F&A 5.4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–5–3), by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, or $x/a = c$, where a, b, and c are whole numbers with $a \neq 0$; or by determining which values of a replacement set make the equation (multi-step of the form $ax \pm b = c$ where a, b, and c are whole numbers with $a \neq 0$) a true statement (e.g., $2x + 3 = 11$, $\{x: x = 2, 3, 4, 5\}$).

8 One cup of milk has the same amount of calcium as 6 oranges. One orange has the same amount of calcium as 2 eggs. How many eggs have the same amount of calcium as one cup of milk?

A. 3
B. 4
C. 8
D. 12

DSP 5.1 **Interprets a given representation** (tables, bar graphs, circle graphs, or line graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M(DSP)–5–2.*)

9 Look at this graph.



During which time period did Denton's population increase by about 50,000?

A. between 1950 and 1960
B. between 1960 and 1970
C. between 1970 and 1980
D. between 1980 and 1990

DSP 5.3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M(DSP)–5–1.

10 Three students collected data for a school project.

- Anita asked her classmates which season they liked best.
- Kevin measured and recorded the height of the snow in his backyard every 15 minutes during a 2-hour snowstorm.
- Rachel recorded the total snowfall amounts in 3 different towns.

Who should use a line graph to display their data?

A. Kevin only
B. Rachel only
C. Anita and Rachel only
D. Kevin and Rachel only

G&M 5.7 Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems across the content strands.

11 Jeff bought 6 quarts of juice for a party. One glass holds 8 fluid ounces of juice. What is the total number of glasses Jeff can fill with the juice he bought? [1 quart = 32 fluid ounces]

Scoring Guide

Score	Description
1	Student gives the correct answer, **24** (glasses).
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Score Point 1
(Example A)

11

24. 6×32/8=24

Student's response is correct.
(Showing work is not required.)

Score Point 1
(Example B)

11

24

Student's response is correct.

Score Point 0
(Example A)

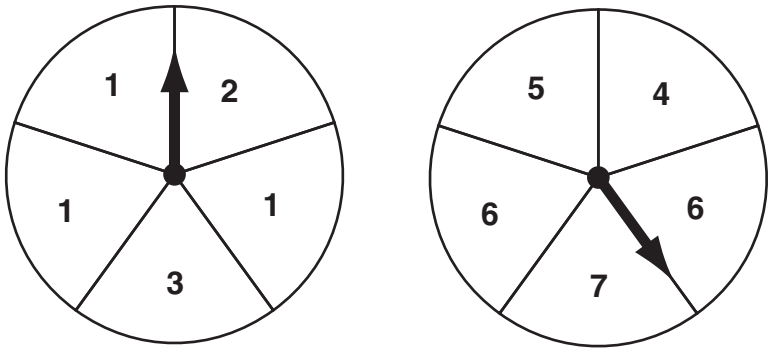
11

8 ounces
+ 6 quarts
14

Student's response is incorrect.

DSP 5.5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event and expresses the result as a fraction.

12 Look at these spinners.



Spinner A (tens digit) **Spinner B (ones digit)**

Lydia will use these spinners to form a two-digit number. She will use the number the arrow on Spinner A lands on as the tens digit and the number the arrow on Spinner B lands on as the ones digit. Lydia will spin each arrow once. What two-digit number is Lydia **most likely** to form?

Scoring Guide

Score	Description
1	Student gives the correct answer, **16**.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Score Point 1
(Example A)

12

The most likely number is 16

Student's response is correct.

Score Point 0
(Example A)

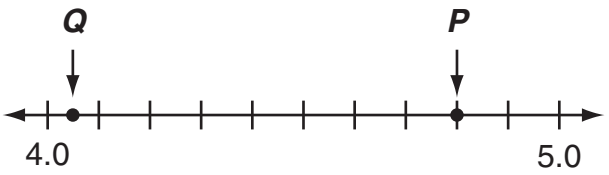
12

17

Student's response is incorrect.

N&O 5.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.

13 Look at this number line.



a. What is the value of point *P*?

b. What is the value of point *Q*?

Scoring Guide

Score	Description
2	Student correctly answers part a, **4.8**, and part b, **4.05**.
1	Student gives the correct answer in part a only. OR Student gives the correct answer in part b only. OR Student gives correct values for both points with point names reversed.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Note: For part b, accept any answer between 4.03 and 4.07.

Score Point 2
(Example A)

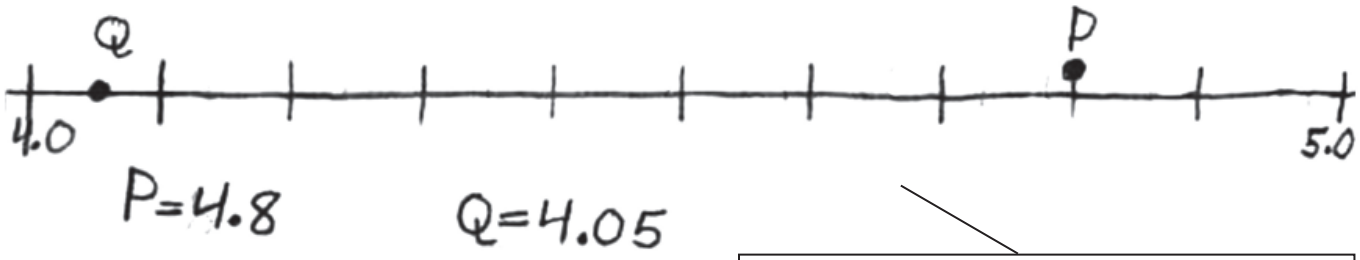
13

A. 4.8
B. 4.05

Student's responses to both parts are correct.

Score Point 2
(Example B)

13



Student's responses to both parts are correct.

Score Point 1
(Example A)

13

A 4.8
B 4.01

Student's response to part a is correct, but the response to part b is outside the acceptable range.

Score Point 1
(Example B)

13

a) P = 4.05
b) Q = 4.8

Student gives correct value for both points with the labels reversed.

Score Point 0
(Example A)

13

a. 4.02
b. 4.85

Student's responses to both parts are incorrect.

G&M 5.3 **Uses properties or attributes** (shape of bases, number of lateral faces, or number of bases) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

14 Sasha painted wooden cylinders and wooden cones.

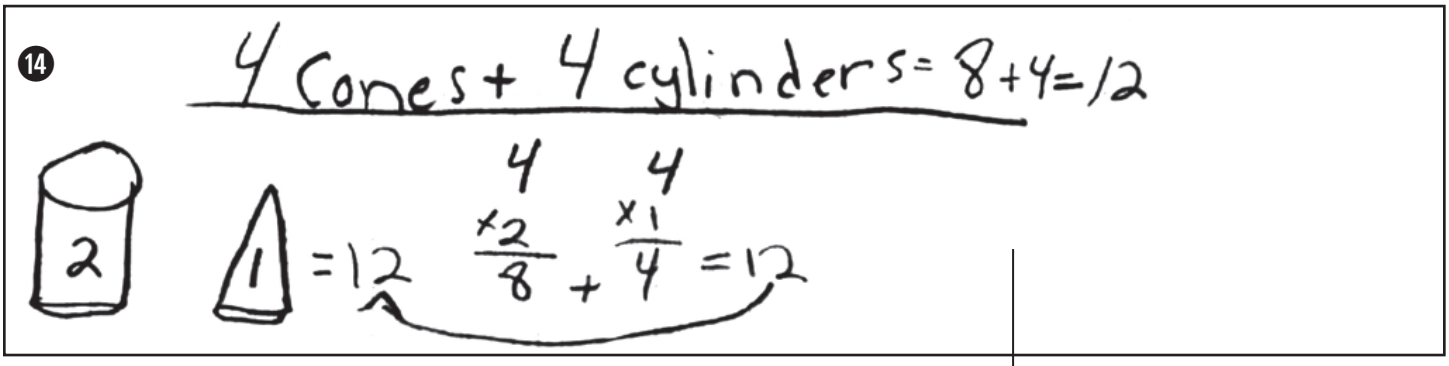
- She painted a total of 12 bases.
- She painted the same number of cylinders as cones.

How many cones and how many cylinders did Sasha paint? Show your work or explain how you know.

Scoring Guide

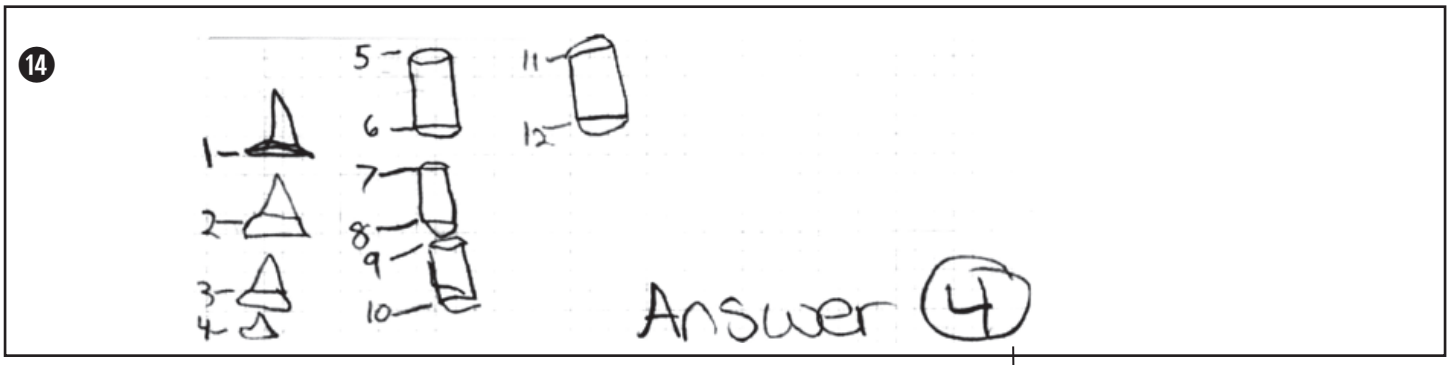
Score	Description
2	Student gives the correct answer, **4** (cones and cylinders) **or equivalent**, with sufficient explanation or work shown to indicate correct strategy.
1	Student gives the correct answer with insufficient or no explanation or work shown. OR Student demonstrates appropriate strategy with incorrect or no answer.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Score Point 2
(Example A)



Student's response is correct, with sufficient work shown to indicate correct strategy.

Score Point 2
(Example B)



Student's response is correct, with sufficient work shown to indicate correct strategy.

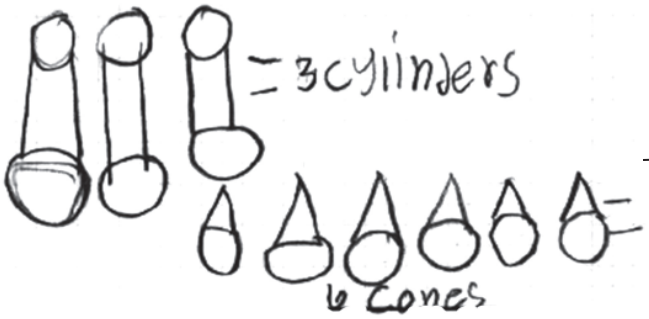
Score Point 1
(Example A)

14

Student's response is correct, with insufficient explanation.

Score Point 1
(Example B)

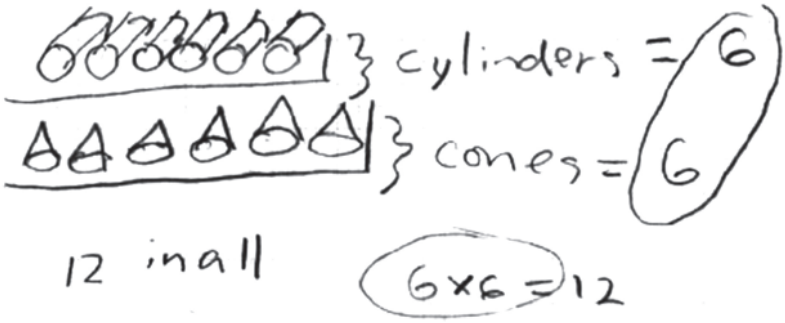
14



Student demonstrates appropriate strategy for finding the total number of bases, but answer is incorrect.

Score Point 0
(Example A)

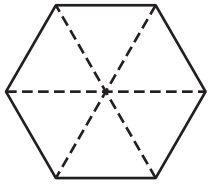
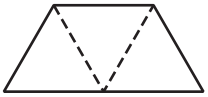
14



Student's response is incorrect.

N&O 5.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.

15 Look at the shapes in this chart.

Shape H	Shape R	Shape Z
		

a. If Shape H represents 1, what number does Shape R represent?

b. If Shape Z represents $\frac{3}{4}$, what number does Shape H represent? Show your work or explain how you know.

c. If Shape R represents $\frac{1}{6}$, what number does Shape Z represent? Show your work or explain how you know.

Scoring Guide

Score	Description
4	5 points
3	4 points OR Correct answers from each part
2	2 or 3 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 1 point for the correct answer, $\frac{1}{3}$ **or equivalent**

Part b: 2 points for the correct answer, $1\frac{1}{2}$ **or equivalent**, with sufficient explanation or work shown to indicate correct strategy

OR

1 point for the correct answer with insufficient or no explanation or no work shown

or

for sufficient strategy with incorrect or no answer

Part c: 2 points for the correct answer, $\frac{1}{4}$ **or equivalent**, with sufficient explanation or work shown to indicate correct strategy

OR

1 point for the correct answer with insufficient or no explanation or work shown

or

for sufficient strategy with incorrect or no answer

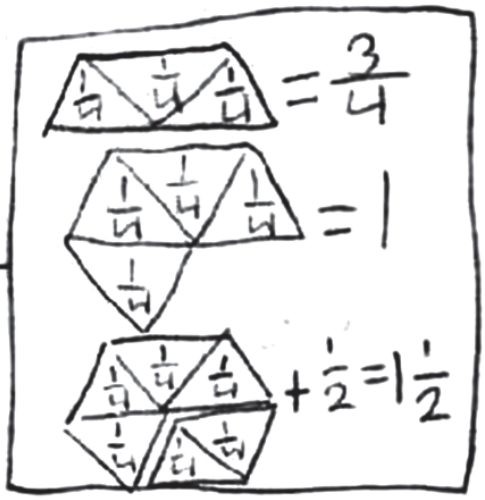
Score Point 4
(Example A)

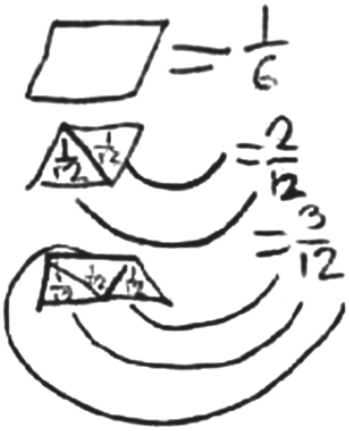
15

a. Shape R = $\frac{1}{3}$

b. H = $1\frac{1}{2}$

c. $\frac{3}{12}$ or $\frac{1}{4}$





c) Student's response is correct, with sufficient explanation to indicate correct strategy.

b) Student's response is correct, with sufficient explanation to indicate correct strategy.

a) Student's response is correct.

SCORE POINT 4
(EXAMPLE B)

15

A. 2/6

B. 6/4 because Shape Z is half of Shape H so 3/4 x 2 = 6/4

C. $\frac{1\frac{1}{2}}{6}$ 2 triangles = $\frac{1}{2}$ so 1 triangle = $\frac{1}{2}$/6 Shape Z has 1 more triangle than Shape R so $\frac{1}{6} + \frac{\frac{1}{2}}{6} = \frac{1\frac{1}{2}}{6}$

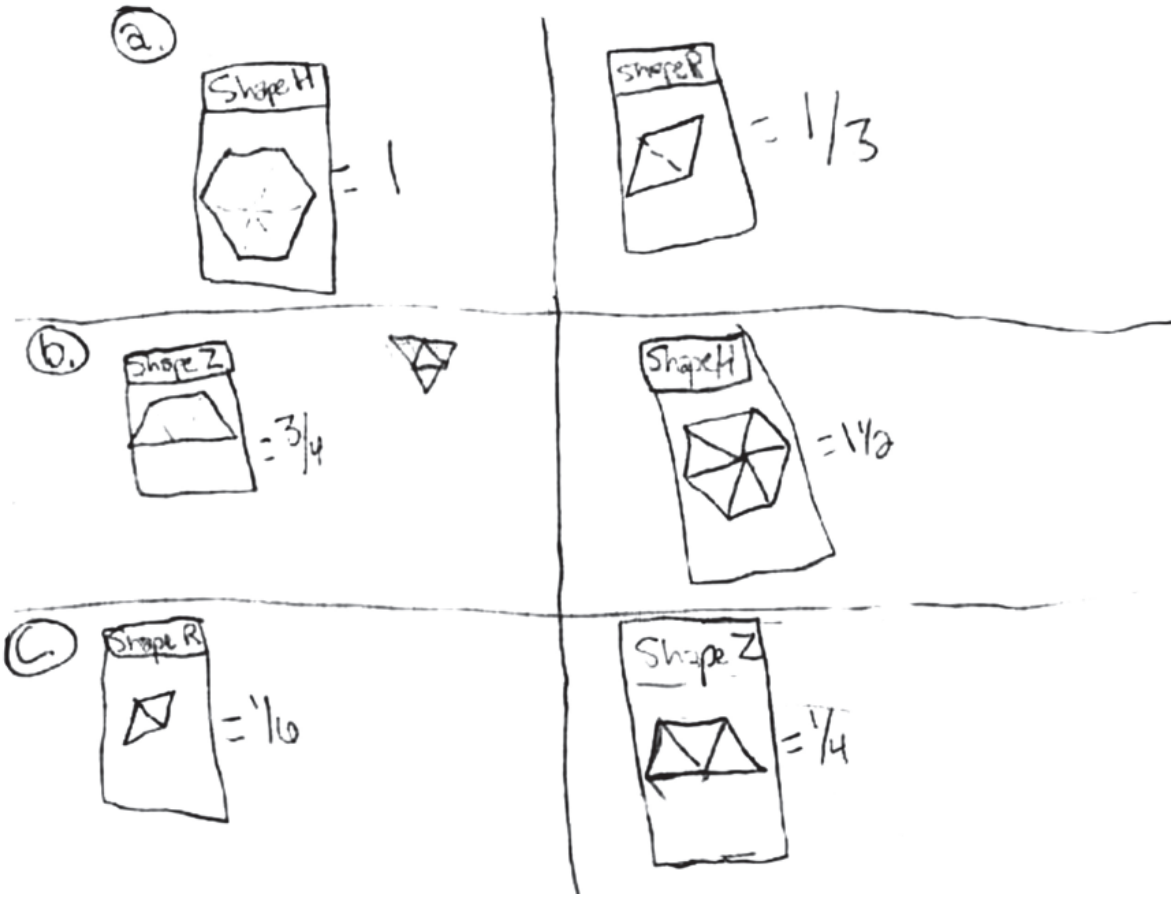
c) Student's response is correct, with sufficient explanation to indicate correct strategy. (Expressing answer as a complex fraction is acceptable.)

b) Student's response is correct, with sufficient explanation to indicate correct strategy.

a) Student's response is correct.

SCORE POINT 3
(EXAMPLE A)

15



Student's response to each part is correct, with no work shown or explanation.

SCORE POINT 3
(EXAMPLE B)

15

A. 1/3

B. 6/4 or 1 2/4 3/4 + 3/4 = 6/4 6/4 = 1 2/4

C. 1/6 + 1/2 of a sixth

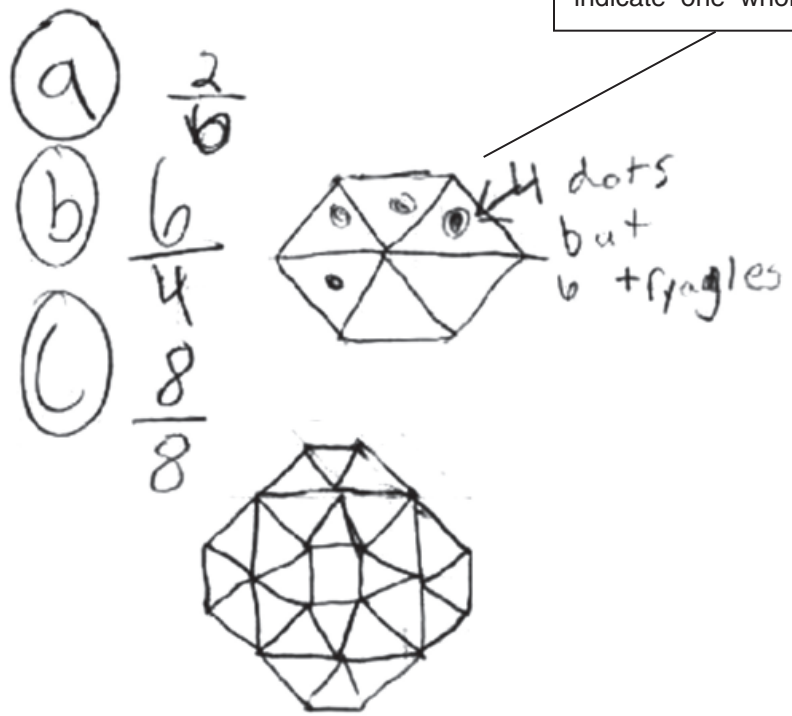
c) Student demonstrates appropriate strategy without giving a final answer.

b) Student's response is correct, with sufficient explanation to indicate correct strategy.

a) Student's response is correct.

Score Point 2
(Example A)

15



The triangles with dots indicate one whole.

c) Student's response is incorrect.

b) Student's response is correct, with sufficient explanation to indicate correct strategy.

a) Student's response is correct.

Score Point 2
(Example B)

15

A. $\frac{2}{6} = \frac{1}{3}$

B. $\frac{4}{4} = 1$

C. $\frac{1\frac{1}{2}}{6}$

c) Student's response is correct, with no explanation.

b) Student's response is incorrect.

a) Student's response is correct.

Score Point 1
(Example A)

15

A. $\frac{1}{3}$

B. $\frac{6}{6}$ its a hole

C. $\frac{2}{6}$ because they're 2 doted lines

c) Student's response is incorrect.

b) Student's response is incorrect.

a) Student's response is correct.

Score Point 0
(Example A)

15

a. Shape R REPresents 2.

B. Shape H Reprents $\frac{6}{7}$. I know because in Shape Z there is only 3 parts and the went up 1 number and it is 4. So I counted how many parts there was and it was six so I went up 1 number and it is 7.

C. Shape Z represents $\frac{1}{7}$. I know because $\frac{1}{6}$ represent R and there is only 2 parts so I guessed they went up 4 and got 6.

So I saw Z and there was only 3 parts so I went up 4 and got 7.

c) Student's response is incorrect.

b) Student's response is incorrect.

a) Student's response is incorrect.

Score Point 0
(Example B)

15

Shape R Represents
2 trinales. Shape H
represents 1 hole.
Shape Z represents
3 out of 1 hole.

Student's responses to each part are incorrect.