Rhode Island RICAS 2023
Grade 6 Math

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RIDE Rhode Island Department of Education

Rhode Island Comprehensive Assessment System
Grade 6 Mathematics Reference Sheet

CONVERSIONS

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon ≈ 3.785 liters
1 liter ≈ 0.264 gallon
1 liter = 1000 cubic centimeters

1 inch = 2.54 centimeters
1 meter ≈ 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile ≈ 1.609 kilometers
1 kilometer ≈ 0.62 mile

1 pound = 16 ounces
1 pound ≈ 0.454 kilogram
1 kilogram ≈ 2.2 pounds
1 ton = 2000 pounds

AREA (*A*) FORMULAS

square . . . . . $A = s^2$

rectangle . . . . . $A = bh$

OR

$A = lw$

parallelogram . . . . . $A = bh$

triangle . . . . . $A = \frac{1}{2}bh$

(b = length of base; h = height)

VOLUME (*V*) FORMULAS

right rectangular prism . . . . . $V = lwh$

(l = length; w = width; h = height)

OR

$V = Bh$

(B = area of base; h = height)

RIDE Rhode Island Department of Education

Release of Spring 2023 RICAS Test Items

from the

Grade 6 Mathematics Paper-Based Test

June 2023
Rhode Island Department of Education

Overview of Grade 6 Mathematics Test

The spring 2023 grade 6 Mathematics test was a next-generation assessment that was administered in two formats: a computer-based version and a paper-based version. Most students took the computer-based test. The paper-based test was offered as an accommodation for eligible students who were unable to use a computer. More information can be found on the MCAS Test Administration Resources page at www.doe.mass.edu/mcas/admin.html.

Most of the operational items on the grade 6 Mathematics test were the same, regardless of whether a student took the computer-based version or the paper-based version. In places where a technology-enhanced item was used on the computer-based test, an adapted version of the item was created for use on the paper test. These adapted paper items were multiple-choice, multiple-select, or short-answer items that tested the same Mathematics content and assessed the same standard as the technology-enhanced item.

This document displays released items from the paper-based test. Released items from the computer-based test are available on the RICAS Resource Center website at ricas.pearsonsupport.com/released-items.

Test Sessions and Content Overview

The grade 6 Mathematics test was made up of two separate test sessions. Each session included selected-response, short-answer, and constructed-response questions. On the paper-based test, the selected-response questions were multiple-choice items and multiple-select items, in which students select the correct answer(s) from among several answer options.

Standards and Reporting Categories

The grade 6 Mathematics test was based on standards in the five domains for grade 6 in the *Massachusetts Curriculum Framework for Mathematics* (2017). The five domains are listed below.

- Ratios and Proportional Relationships
- The Number System
- Expressions and Equations
- Geometry
- Statistics and Probability

The *Massachusetts Curriculum Framework for Mathematics* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

Mathematics test results are reported under five MCAS reporting categories, which are identical to the five framework domains listed above.

The tables at the conclusion of this document provide the following information about each released and unreleased operational item: reporting category, standard(s) covered, item type, and item description. The correct answers for released selected-response and short-answer questions are also displayed in the released item table.

Reference Materials and Tools

Each student taking the paper-based version of the grade 6 Mathematics test was provided with a plastic ruler and a grade 6 Mathematics Reference Sheet. A copy of the reference sheet follows the final question in this document. An image of the ruler is not reproduced in the document.

During both Mathematics test sessions, the use of bilingual word-to-word dictionaries was allowed for current and former English learner students only. No calculators, other reference tools, or materials were allowed.

Grade 6 Mathematics

SESSION 1

This session contains 10 questions.

You may use your reference sheet during this session.
*You may **not** use a calculator during this session.*

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Test & Answer Booklet.

For some questions, you will mark your answers by filling in the circles in your Test & Answer Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

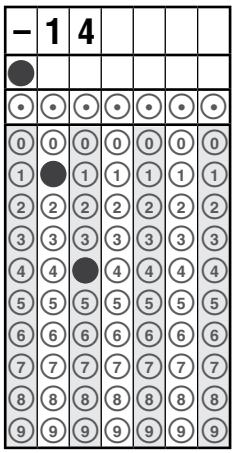
For other questions, you will need to fill in an answer grid. Directions for completing questions with answer grids are provided on the next page.

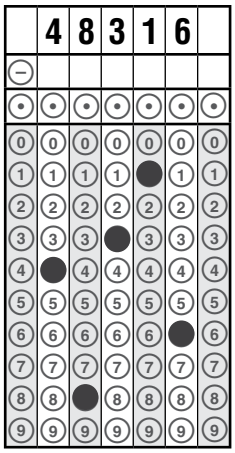
If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

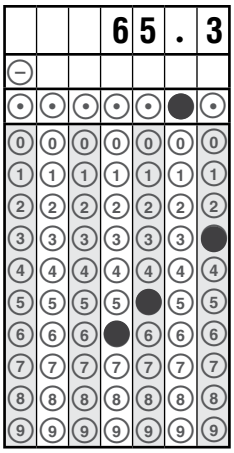
Directions for Completing Questions with Answer Grids

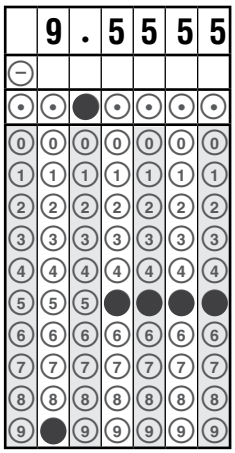
1. Work the question and find an answer.
2. Enter your answer in the answer boxes at the top of the answer grid.
3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
4. Under each answer box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.
5. Do not fill in a circle under an unused answer box.
6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
7. If you need to change an answer, be sure to erase your first answer completely.
8. See below for examples of how to correctly complete an answer grid.

EXAMPLES









1 What is the value of y in this equation?

$$6y - 18 = 42$$

Ⓐ 0

Ⓑ 4

Ⓒ 10

Ⓓ 12

2 Consider the numbers −24 and −18.

Which of the following statements about the numbers are true?

Select the **two** correct answers.

Ⓐ The number −24 is less than the number −18.

Ⓑ The number −24 is greater than the number −18.

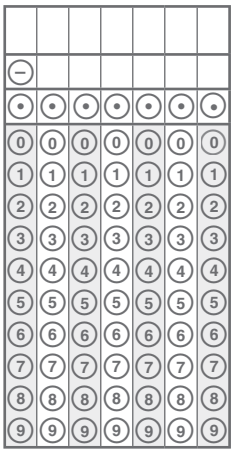
Ⓒ The expression |−24| is equal to the expression |−18|.

Ⓓ The expression |−24| is less than the expression |−18|.

Ⓔ The expression |−24| is greater than the expression |−18|.

3 A store sells 3 hats for a total of $47.25. The cost of each hat is the same. What is the cost, in dollars, of one hat at the store?

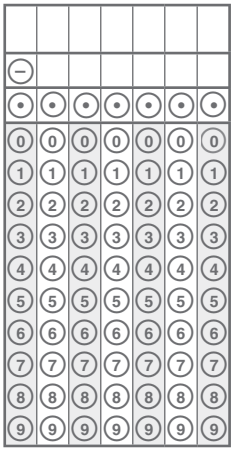
Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.



4 What is the value of this expression when $b = 4$?

$$15 - 3(b)$$

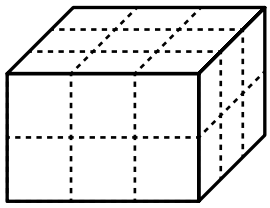
Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.



5 A jeweler sells rings in boxes.

- Each box is in the shape of a cube.
- The edge length of each box is $\frac{1}{6}$ foot.

The boxes are stacked in a container so that the container is completely full. The container is in the shape of a right rectangular prism, as shown.



Which of the following expressions can be used to find the volume, in cubic feet, of the container?

Ⓐ $6^2 \times 18$

Ⓑ $6^3 \times 18$

Ⓒ $\left(\frac{1}{6}\right)^2 \times 18$

Ⓓ $\left(\frac{1}{6}\right)^3 \times 18$

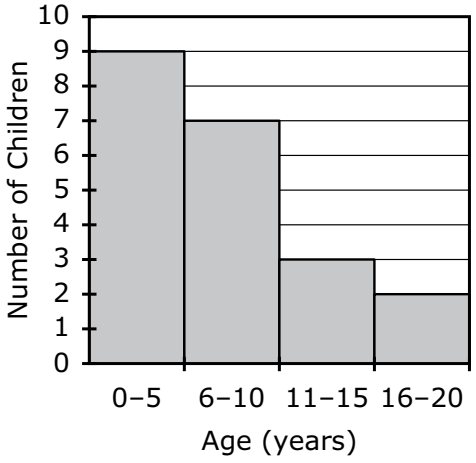
6 A museum worker recorded the ages, in years, of the first 20 children who visited a new exhibit, as shown.

4	9	1	15	12
3	5	8	1	11
2	17	3	10	16
7	2	6	9	8

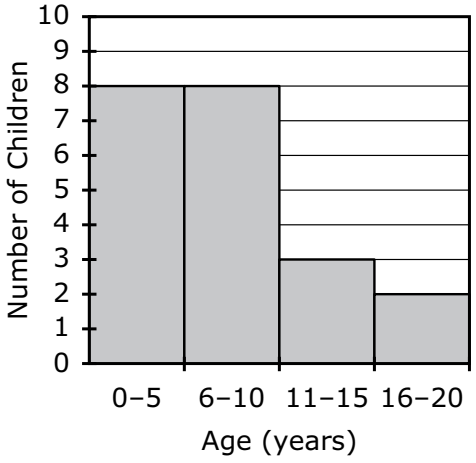
The museum worker will use her data to create a histogram to represent the ages of the first 20 children who visited the new exhibit.

Which of the following histograms represents the data?

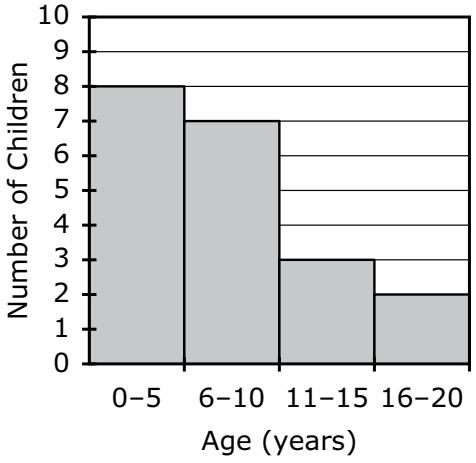
Ⓐ



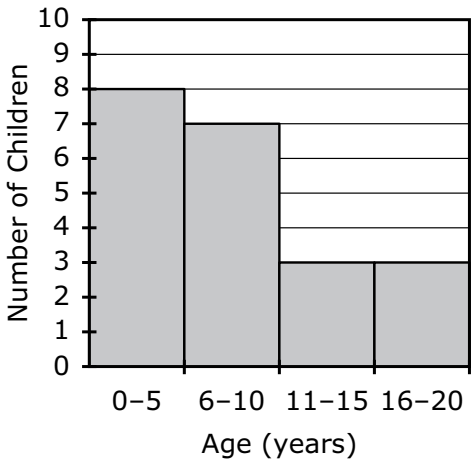
Ⓑ



Ⓒ



Ⓓ



This question has four parts. Be sure to label each part of your response.

7 A store received a shipment of the following items:

- 256 cans of soup
- 1,632 eggs

A. A store clerk will arrange the cans of soup in 4 rows. There will be an equal number of cans in each row.

How many cans of soup will the clerk arrange in each row? Show or explain how you got your answer.

B. What is another way the clerk could arrange the 256 cans of soup in rows and still have an equal number of cans in each row? Show or explain how you got your answer.

C. The 1,632 eggs the store received were shipped in cartons that each contain 12 eggs.

- The clerk will place all the eggs in an empty cooler.
- Each shelf of the cooler holds 17 cartons of eggs.

How many shelves are needed to hold all of the cartons of eggs? Show or explain how you got your answer.

D. The store sells 34 cartons of eggs each day.

How many days will it take until the store sells all the eggs it received? Show or explain how you got your answer.

7

8 A zookeeper counted the birds at a zoo. He recorded the following number of birds for each type of bird:

- 21 flamingos
- 24 penguins
- 6 storks

Which relationship between the different types of birds at the zoo can be represented by the ratio 7:8?

Ⓐ flamingos to storks

Ⓑ flamingos to penguins

Ⓒ storks to all birds at the zoo

Ⓓ penguins to all birds at the zoo

9 At a middle school, the sixth-grade students and seventh-grade students collected cans for recycling.

- Of the 2000 cans the sixth-grade students collected, 65% were soda cans.
- Of the 1500 cans the seventh-grade students collected, 80% were soda cans.

Which of the following statements about the numbers of soda cans the students collected are true?

Select the **two** correct answers.

Ⓐ The sixth-grade students collected 1200 soda cans.

Ⓑ The sixth-grade students collected 1875 soda cans.

Ⓒ The sixth-grade students collected 1300 soda cans.

Ⓓ The seventh-grade students collected 1200 soda cans.

Ⓔ The seventh-grade students collected 1875 soda cans.

Ⓕ The seventh-grade students collected 1300 soda cans.

10 Consider this expression.

$$5m + 7$$

Which of the following is equivalent to the expression?

Ⓐ $12m$

Ⓑ $7 + 5m$

Ⓒ $7m + 5$

Ⓓ $5(m + 7)$

Grade 6 Mathematics

SESSION 2

This session contains 10 questions.

You may use your reference sheet during this session.
*You may **not** use a calculator during this session.*

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Test & Answer Booklet.

For some questions, you will mark your answers by filling in the circles in your Test & Answer Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

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11 A teacher wrote this expression on the board.

$$40a - 16b$$

Which of the following are equivalent to the expression the teacher wrote?

Select the **two** equivalent expressions.

Ⓐ $4(10a - 16b)$

Ⓑ $4(10a - 4b)$

Ⓒ $8a(5 - 2)$

Ⓓ $8(5a - 2b)$

Ⓔ $24ab$

12 A barber recorded the number of customers whose hair he cut each day last week.

Which of the following measures **best** describes the spread of the barber's data?

Ⓐ mean

Ⓑ mode

Ⓒ range

Ⓓ median

13 Diego writes 6 poems per week.

Which of the following expressions can be used to show the number of poems Diego writes in w weeks?

Ⓐ $6 \div w$

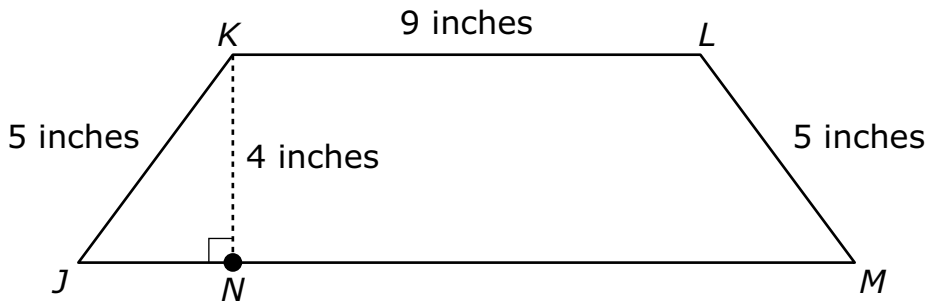
Ⓑ $6 \times w$

Ⓒ $6 + w$

Ⓓ $6 - w$

This question has four parts. Be sure to label each part of your response.

14 Figure *JKLM* is composed of triangle *JKN* and trapezoid *KLMN*, as shown.



The base of figure *JKLM* is 15 inches in length. Line segment *JN* is 3 inches in length.

A. What is the length, in inches, of line segment *NM*?

B. What is the area, in square inches, of triangle *JKN*? Show or explain how you got your answer.

C. What is the area, in square inches, of trapezoid *KLMN*? Show or explain how you got your answer.

D. What is the total area, in square inches, of figure *JKLM*? Show or explain how you got your answer.

14

15 A student wrote this word expression.

the quotient of four cubed and three to the fourth power

Which of the following is equivalent to the word expression?

Ⓐ $3^4 \times 4^3$

Ⓑ $3^4 \div 4^3$

Ⓒ $4^3 + 3^4$

Ⓓ $4^3 \div 3^4$

16 A group of middle school students went to an aquarium for a class trip. Afterward, the principal asked them several questions about their trip to the aquarium.

Which of the following questions that the principal asked are statistical questions?

Select the **two** statistical questions.

Ⓐ Did the aquarium have a gift shop?

Ⓑ Did the aquarium have an elevator?

Ⓒ Is the aquarium open on Tuesdays?

Ⓓ Would you like to visit this aquarium again?

Ⓔ What was your favorite exhibit at the aquarium?

This question has two parts.

17 A cookie recipe requires the following ingredients:

- $\frac{1}{2}$ cup of butter
- 3 cups of flour
- 2 cups of sugar

A chef will make several batches of cookies using the recipe.

Part A

Which of the following statements about the ratios of the ingredients in the recipe is true?

Ⓐ There are 4 cups of butter for every 1 cup of sugar.

Ⓑ There are 4 cups of sugar for every 1 cup of butter.

Ⓒ There are 4 cups of flour for every 1 cup of sugar.

Ⓓ There are 4 cups of sugar for every 1 cup of flour.

Part B

Which of the following statements about the ratios of the ingredients in the recipe is true?

Ⓐ There are $\frac{3}{2}$ cups of flour for every 1 cup of sugar.

Ⓑ There are $\frac{3}{2}$ cups of sugar for every 1 cup of flour.

Ⓒ There are $\frac{3}{2}$ cups of butter for every 1 cup of sugar.

Ⓓ There are $\frac{3}{2}$ cups of sugar for every 1 cup of butter.

18 Which of the following expressions represents "4 more than 5 times y"?

Ⓐ $5(4 + y)$

Ⓑ $y(4 + 5)$

Ⓒ $4y + 5$

Ⓓ $5y + 4$

19 This table lists the amount of money, in dollars, collected from movie ticket sales for 5 different showtimes.

Movie Ticket Sales

Showtime	Amount of Money ($)
12:45 p.m.	880
3:00 p.m.	1050
5:15 p.m.	995
7:30 p.m.	1215
9:45 p.m.	1320

Based on the table, what is the mean amount of money, in dollars, collected per showtime?

Ⓐ $440

Ⓑ $995

Ⓒ $1050

Ⓓ $1092

20 A teacher wrote this expression on the board.

$$2(9x + 10y)$$

Which of the following expressions are equivalent to the teacher's expression?

Select the **two** correct answers.

Ⓐ $2(19xy)$

Ⓑ $11x + 12y$

Ⓒ $18x + 20y$

Ⓓ $2(9x) + 2(19y)$

Ⓔ $2(9x) + 2(10y)$

Grade 6 Mathematics
Spring 2023 Released Operational Items

PBT Item No.	Page No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	4	*Expressions and Equations*	6.EE.B.5	SR	Solve a two-step equation for an unknown value.	C
2	4	*The Number System*	6.NS.C.7	SR	Evaluate inequality statements with and without absolute values.	A,E
3	5	*Ratios and Proportional Relationships*	6.RP.A.2	SA	Determine the unit rate within a real-world context.	15.75
4	5	*Expressions and Equations*	6.EE.A.2	SA	Evaluate an expression using substitution.	3
5	6	*Geometry*	6.G.A.2	SR	Solve a real-world problem involving the volume of a right rectangular prism.	D
6	7	*Statistics and Probability*	6.SP.B.4	SR	Determine which histogram represents given data from a real-world situation.	C
7	8–9	*The Number System*	6.NS.B.2	CR	Solve a real-world problem by dividing multi-digit numbers.	
8	10	*Ratios and Proportional Relationships*	6.RP.A.1	SR	Determine which relationship can be represented by a given ratio.	B
9	10	*Ratios and Proportional Relationships*	6.RP.A.3	SR	Solve a real-world problem that involves finding the part given the percent and the whole.	C,D
10	11	*Expressions and Equations*	6.EE.A.4	SR	Determine which expression is equivalent to a given variable expression.	B
11	14	*Expressions and Equations*	6.EE.A.3	SR	Use the distributive property to determine equivalent expressions given a variable expression.	B,D
12	14	*Statistics and Probability*	6.SP.A.3	SR	Determine the best measure of variability for a real-world situation.	C
13	15	*Expressions and Equations*	6.EE.B.6	SR	Determine which expression represents a given real-world context.	B
14	16–17	*Geometry*	6.G.A.1	CR	Solve mathematical problems that involve decomposing a figure into a right triangle and a trapezoid to determine the total area of the figure.	
15	18	*Expressions and Equations*	6.EE.A.1	SR	Translate a given verbal expression to a numerical expression with exponents.	D
16	18	*Statistics and Probability*	6.SP.A.1	SR	Identify multiple statistical questions.	D,E
17	19	*Ratios and Proportional Relationships*	6.RP.A.3	SR	Use ratio and rate reasoning to solve a real-world problem.	B;A
18	20	*Expressions and Equations*	6.EE.A.2	SR	Determine which mathematical expression represents a verbal description.	D
19	20	*Statistics and Probability*	6.SP.B.5	SR	Determine the mean for a set of data represented in a table.	D
20	21	*Expressions and Equations*	6.EE.A.4	SR	Use the distributive property to determine which expressions are equivalent to a given variable expression.	C,E

* Mathematics item types are: selected-response (SR), short-answer (SA), and constructed-response (CR).

** Answers are provided here for selected-response and short-answer items only. Sample responses and scoring guidelines for any constructed-response items will be posted to the Department's website later this year.

Grade 6 Mathematics
Spring 2023 Unreleased Operational Items

PBT Item No.	Reporting Category	Standard	Item Type*	Item Description
21	*The Number System*	6.NS.C.8	SR	Use absolute value to determine the distance between two points on a coordinate plane given a mathematical context.
22	*Statistics and Probability*	6.SP.B.5	SA	Identify the number of observations on a histogram.
23	*Statistics and Probability*	6.SP.A.1	SR	Identify multiple statistical questions.
24	*Expressions and Equations*	6.EE.B.6	CR	Create and evaluate expressions based on a real-world situation.
25	*The Number System*	6.NS.B.2	SR	Determine whether given division equations are true or false.
26	*The Number System*	6.NS.C.7	SA	Identify a rational number that is within a range of other rational numbers.
27	*Geometry*	6.G.A.4	SR	Use the net of a triangular prism to find its surface area.
28	*The Number System*	6.NS.C.6	SR	Determine the value of a given point on a number line.
29	*Expressions and Equations*	6.EE.C.9	SR	Interpret the relationship between two variables and use the relationship to create an equation.
30	*Geometry*	6.G.A.3	SA	Find the length of the side of a polygon by finding the distance between points on a coordinate plane.
31	*Statistics and Probability*	6.SP.B.4	SR	Determine which histogram represents a given set of data.
32	*The Number System*	6.NS.C.8	SR	Identify the location of a given point on a coordinate plane.
33	*Ratios and Proportional Relationships*	6.RP.A.3	CR	Using ratio and proportional reasoning, solve real-world problems involving fractions, decimals, percentages, and whole numbers.
34	*Ratios and Proportional Relationships*	6.RP.A.2	SR	Determine which ratios are equivalent to a given unit rate.
35	*The Number System*	6.NS.C.8	SR	Determine the location of a point on a coordinate plane based on its distance from a given point.
36	*Statistics and Probability*	6.SP.A.2	SR	Analyze a dot plot using median, mode, and range.
37	*Expressions and Equations*	6.EE.A.2	SR	Identify the expression that represents a quotient.
38	*Expressions and Equations*	6.EE.A.2	SR	Identify a verbal description that represents a mathematical expression.
39	*Geometry*	6.G.A.3	SR	Determine the type of a polygon given the coordinates of its vertices.
40	*Ratios and Proportional Relationships*	6.RP.A.3	SR	Solve a real-world problem involving percentages.

* Mathematics item types are: selected-response (SR), short-answer (SA), and constructed-response (CR).