XI. Mathematics, Grade 5

Grade 5 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.
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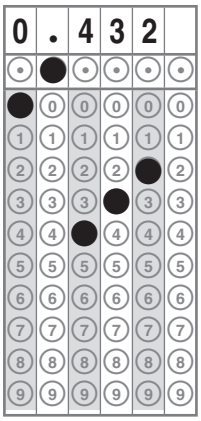
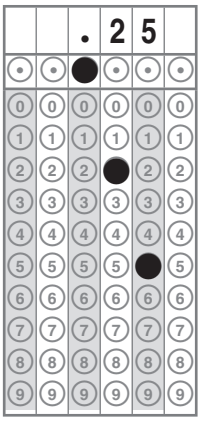
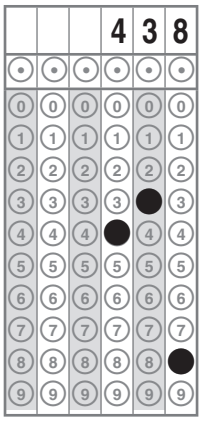
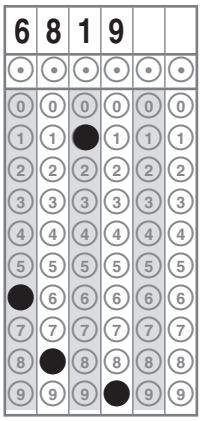
7. See below for examples of how to correctly complete an answer grid.

EXAMPLES









MASSACHUSETTS DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION

Massachusetts Comprehensive Assessment System
Grade 5 Mathematics Reference Sheet

CONVERSIONS

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts

1 mile = 5280 feet
1 mile = 1760 yards

1 pound = 16 ounces
1 ton = 2000 pounds

AREA (A) FORMULAS

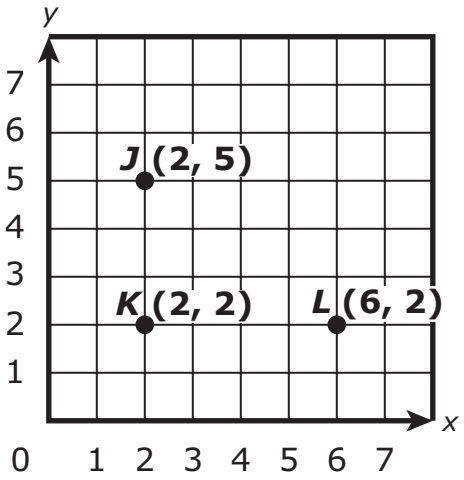
square . . . . . $A = s \times s$
(s = length of a side)

rectangle . . . . . $A = b \times h$
(b = length of base; h = height)
OR
$A = l \times w$
(l = length; w = width)

VOLUME (V) FORMULAS

right rectangular prism . . . . $V = l \times w \times h$
(l = length; w = width; h = height)
OR
$V = B \times h$
(B = area of base; h = height)

1 Points *J*, *K*, and *L* are located on a coordinate plane, as shown.



A student will add point *M* on the grid so that points *J*, *K*, *L*, and *M* are the vertices of a rectangle. What will be the coordinates of point *M*?

Ⓐ (2, 6)

Ⓑ (5, 2)

Ⓒ (5, 6)

Ⓓ (6, 5)

2 Which of the following show a numerical expression and a word expression that are equivalent?

Select the **three** correct answers.

Ⓐ $6 \times 5 + 3$ is equivalent to "add 3 to the product of 6 and 5"

Ⓑ $5 + 6 + 3$ is equivalent to "add 3 to the product of 6 and 5"

Ⓒ $5 \times (3 + 6)$ is equivalent to "add 3 and 6, then multiply by 5"

Ⓓ $5 + 6 + 3$ is equivalent to "5 greater than the sum of 6 and 3"

Ⓔ $3 \times 6 \times 5$ is equivalent to "5 greater than the sum of 6 and 3"

Ⓕ $6 \times 5 + 3$ is equivalent to "5 times as large as the product of 3 and 6"

3 A baker can decorate one cake in $\frac{2}{3}$ hour.

What is the total number of hours the baker needs to decorate $4\frac{1}{2}$ cakes?

Ⓐ 3 hours

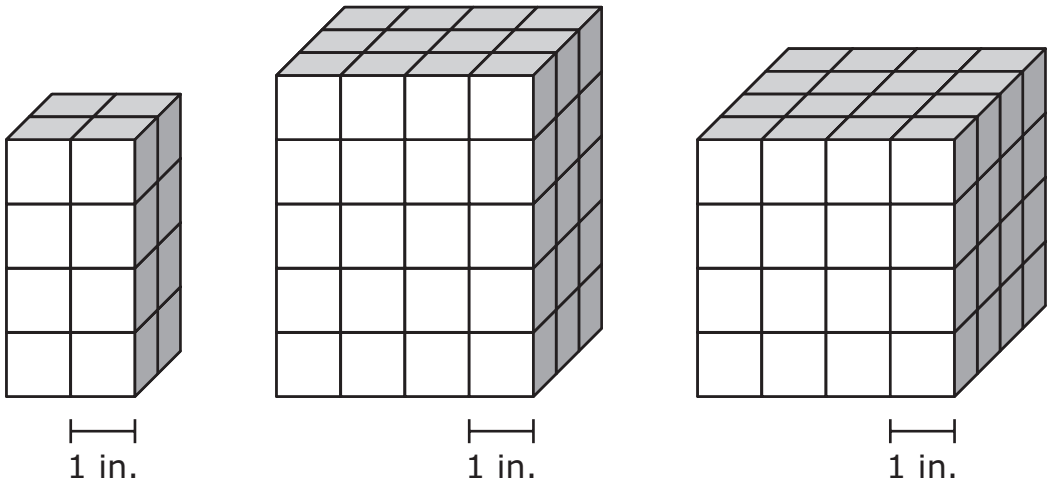
Ⓑ $4\frac{2}{6}$ hours

Ⓒ $5\frac{1}{6}$ hours

Ⓓ 6 hours

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

4 Olga, Dave, and Peter each built a right rectangular prism using 1-inch cubes, as shown.



A. What is the volume, in cubic inches, of Olga's prism?

B. What is the difference in volume, in cubic inches, between Dave's prism and Olga's prism? Show or explain how you got your answer.

C. Peter claims that the volume of his prism is 16 cubic inches. Is Peter correct? Explain why or why not.

Write your answers on the next page.

4

5 Which of the following show a number rounded to the nearest **hundredth**?

Select the **three** correct answers.

Ⓐ 10.826 rounds to 10.82

Ⓑ 10.826 rounds to 10.83

Ⓒ 23.647 rounds to 23.64

Ⓓ 23.647 rounds to 23.65

Ⓔ 54.182 rounds to 54.18

Ⓕ 54.182 rounds to 54.19

6 A student will estimate the value of this expression.

$$\frac{491}{972} + \frac{101}{299}$$

Which of the following is **closest** to the value of the expression?

Ⓐ $\frac{1}{2} + \frac{1}{2}$

Ⓑ $\frac{1}{2} + \frac{1}{3}$

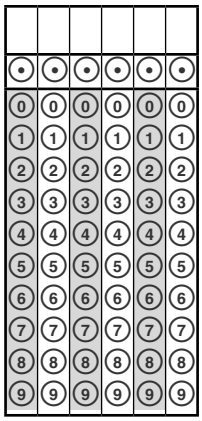
Ⓒ $\frac{4}{9} + \frac{1}{2}$

Ⓓ $\frac{4}{9} + \frac{1}{3}$

7 Find the quotient.

$$7.5 \div 10^2$$

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



8 Curt wrote a number pattern.

- He used the rule "to get from each number to the next, add 4."
- The first number in his pattern is 1.

Kristy wrote a different number pattern.

- She used the rule "to get from each number to the next, add 2."
- The first number in her pattern is 1.

Which of the following statements is true about **both** Curt's and Kristy's number patterns?

Ⓐ All the numbers are odd.

Ⓑ All the numbers are even.

Ⓒ The number 2 is in both patterns.

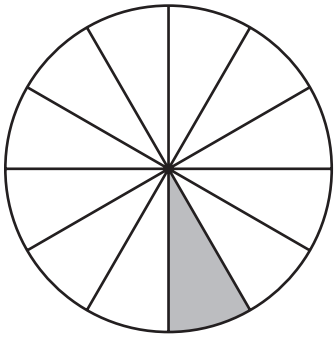
Ⓓ The number 3 is in both patterns.

9 A student shaded a fraction model to show the product of this expression.

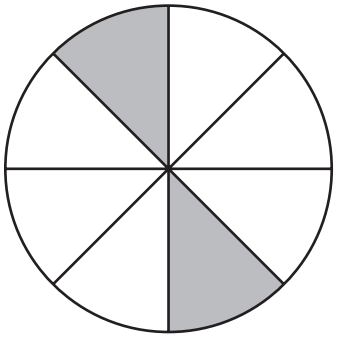
$$\frac{2}{8} \times 3$$

Which of the following fraction models shows the product of the expression?

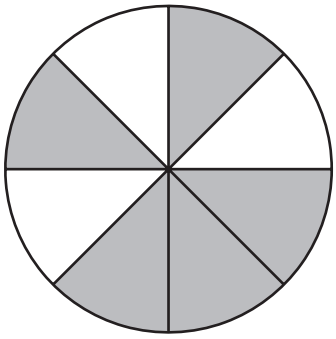
Ⓐ



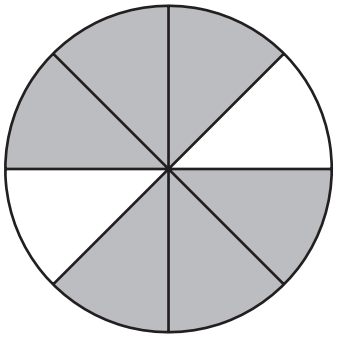
Ⓑ



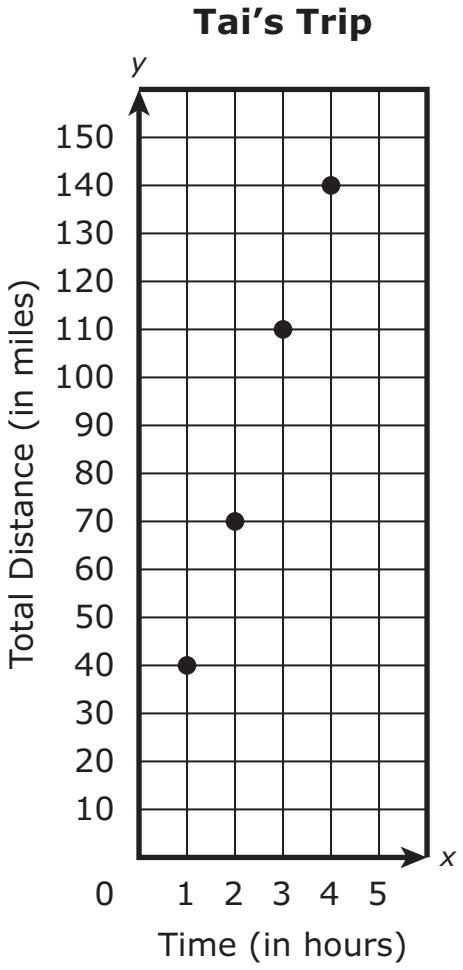
Ⓒ



Ⓓ



10 This graph shows y, the total distance in miles Tai drove in the first x hours of a road trip.



Based on the graph, what is the total distance, in miles, Tai drove in the first 3 hours?

Ⓐ 40

Ⓑ 70

Ⓒ 110

Ⓓ 140

Grade 5 Mathematics

SESSION 2

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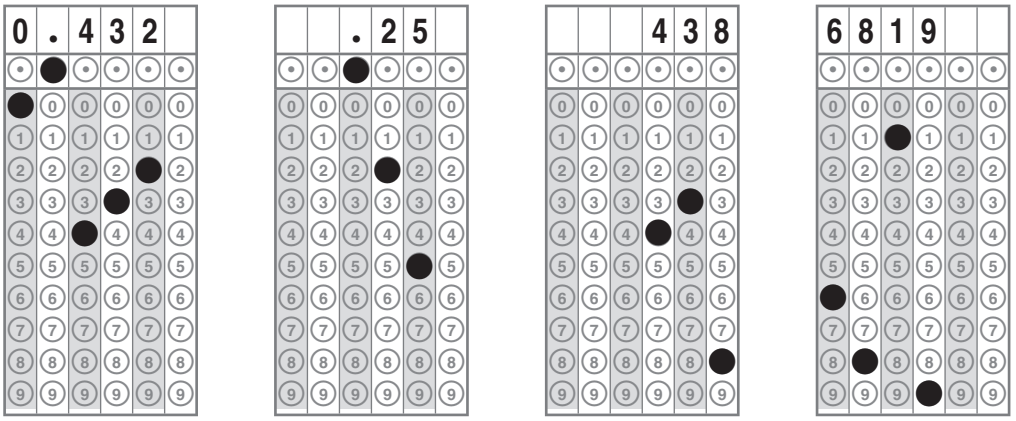
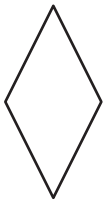
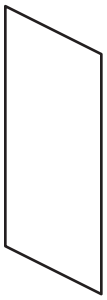
EXAMPLES



11 Which of the following shapes appears to be a rhombus?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

12 Which of the following show a correct comparison?

Select the **three** correct answers.

Ⓐ $3.372 < 3.381$

Ⓑ $3.372 > 3.381$

Ⓒ $3.381 < 3.368$

Ⓓ $3.381 > 3.368$

Ⓔ $3.368 < 3.372$

Ⓕ $3.368 > 3.372$

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

13 A museum receives an average of 488 visitors per day. The museum is open every day.

A. Estimate the number of visitors the museum receives during a **month**. Show or explain how you got your answer.

B. Use your answer to Part A to write an expression that can be used to predict the total number of visitors the museum would receive in *m* months.

C. Use your answer to Part B to predict the total number of visitors the museum would receive in 12 months. Show or explain how you got your answer.

Write your answers on the next page.

13

14 A case of soda has 12 cans. Each can holds 360 milliliters of soda. What is the total number of **liters** of soda in the case?

Ⓐ 3.00 liters

Ⓑ 4.32 liters

Ⓒ 30.0 liters

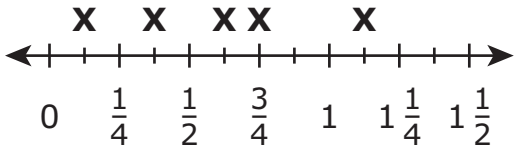
Ⓓ 43.2 liters

15 The distances, in miles, that seven students live from school are shown.

$$1\frac{1}{8},\ 1\frac{1}{8},\ \frac{3}{4},\ \frac{7}{8},\ \frac{3}{4},\ \frac{1}{8},\ \frac{3}{8}$$

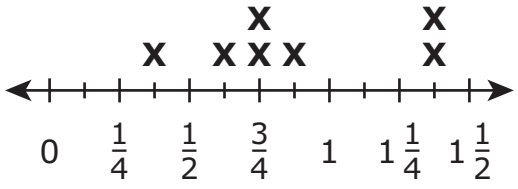
Which of the following line plots shows the distances the seven students live from school?

Ⓐ **Distances from School**



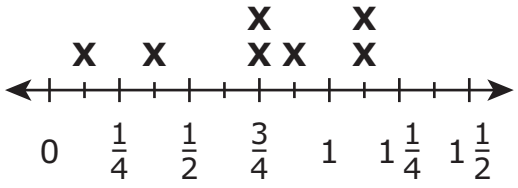
Distance (miles)

Ⓑ **Distances from School**



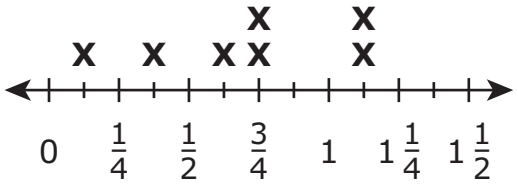
Distance (miles)

Ⓒ **Distances from School**



Distance (miles)

Ⓓ **Distances from School**



Distance (miles)

This question has two parts.

16 Mr. Shapiro divides 3 cups of raisins into equal servings of $\frac{1}{4}$ cup each.

Part A

Which equation can be used to determine r, the number of $\frac{1}{4}$-cup servings Mr. Shapiro makes?

Ⓐ $r = 3 \div \frac{1}{4}$

Ⓑ $r = \frac{1}{4} \div 3$

Ⓒ $3 = r \div \frac{1}{4}$

Ⓓ $\frac{1}{4} = r \div 3$

Part B

Mr. Shapiro divides one of the $\frac{1}{4}$-cup servings of raisins into 2 smaller servings of equal size.

What is the total amount of raisins, in cups, in each smaller serving?

Ⓐ $\frac{1}{2}$

Ⓑ $\frac{1}{5}$

Ⓒ $\frac{1}{6}$

Ⓓ $\frac{1}{8}$

17 What is the value of this expression?

$$(10 + 4 \times 3) + 5 \times 2$$

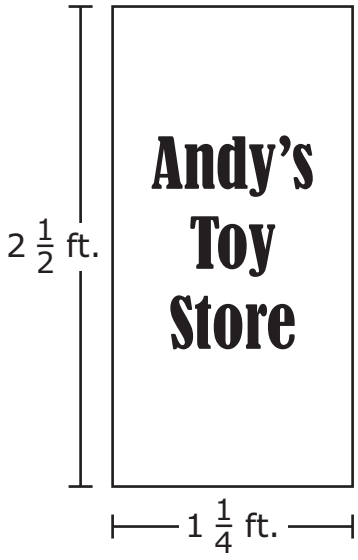
Ⓐ 32

Ⓑ 52

Ⓒ 54

Ⓓ 94

18 Andy is painting a sign for his store. The sign is $2\frac{1}{2}$ feet high and $1\frac{1}{4}$ feet wide, as shown.



What is the area of Andy's sign?

Ⓐ $2\frac{1}{8}$ square feet

Ⓑ $3\frac{1}{8}$ square feet

Ⓒ $3\frac{2}{8}$ square feet

Ⓓ $4\frac{2}{8}$ square feet

19 The value of the 5 in 40.52 is how many times the value of the 5 in 115.78?

Ⓐ $\frac{1}{10}$

Ⓑ $\frac{1}{100}$

Ⓒ 10

Ⓓ 100

20 There are 144 pages in a book. Conner will read 16 pages of the book each night. Which equation can be used to find t, the total number of nights it will take Conner to read the entire book?

Ⓐ $144 \div 16 = t$

Ⓑ $144 \times t = 16$

Ⓒ $16 \times 144 = t$

Ⓓ $t \div 16 = 144$

Grade 5 Mathematics
Spring 2019 Released Operational Items

PBT Item No.	Page No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	244	*Geometry*	5.G.A.2	SR	Determine the coordinates of a point in the first quadrant that will create a rectangle when the first three points of the rectangle are given.	D
2	245	*Operations and Algebraic Thinking*	5.OA.A.2	SR	Match numerical expressions that involve two operations with equivalent word expressions.	A,C,D
3	245	*Number and Operations-Fractions*	5.NF.B.6	SR	Determine the solution of a real-world problem that involves multiplying a fraction by a mixed number.	A
4	246	*Measurement and Data*	5.MD.C.4	CR	Determine the volume of right rectangular prisms by counting unit cubes and using volume to solve problems.	
5	248	*Number and Operations in Base Ten*	5.NBT.A.4	SR	Round decimals to the nearest hundredth.	B,D,E
6	248	*Number and Operations-Fractions*	5.NF.A.2	SR	Estimate the sum of two fractions that are both less than one.	B
7	249	*Number and Operations in Base Ten*	5.NBT.A.2	SA	Determine the quotient of a decimal and a power of ten.	0.075
8	250	*Operations and Algebraic Thinking*	5.OA.B.3	SR	Determine which statement describes two given number patterns.	A
9	251	*Number and Operations-Fractions*	5.NF.B.4	SR	Determine the fraction model that represents the product of a fraction and a whole number.	D
10	252	*Geometry*	5.G.A.2	SR	Interpret coordinate values of given points on a coordinate plane to solve a real-world problem.	C
11	255	*Geometry*	5.G.B.4	SR	Given drawings of shapes, determine which shape is a rhombus.	A
12	255	*Number and Operations in Base Ten*	5.NBT.A.3	SR	Compare two decimals to the thousandths place.	A,D,E
13	256	*Number and Operations in Base Ten*	5.NBT.B.5	CR	Solve a problem involving multiplying whole numbers and estimating products of larger numbers.	
14	258	*Measurement and Data*	5.MD.A.1	SR	Solve a multi-step real-world word problem by converting milliliters to liters.	B
15	258	*Measurement and Data*	5.MD.B.2	SR	Determine the line plot that represents given fractions and mixed numbers.	C
16	259	*Number and Operations-Fractions*	5.NF.B.7	SR	Solve real-world problems involving division of a whole number by a unit fraction and division of a unit fraction by a whole number.	A;D
17	260	*Operations and Algebraic Thinking*	5.OA.A.1	SR	Evaluate a numerical expression that contains parentheses.	A
18	261	*Number and Operations-Fractions*	5.NF.B.4	SR	Determine the area of a rectangle with fractional side lengths.	B
19	262	*Number and Operations in Base Ten*	5.NBT.A.1	SR	Compare the value of a digit in one number to the value of the same digit in another number.	A
20	262	*Number and Operations in Base Ten*	5.NBT.B.6	SR	Determine the equation that can be used to solve a problem by dividing whole numbers.	A

* 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 5 Mathematics
Spring 2019 Unreleased Operational Items

PBT Item No.	Reporting Category	Standard	Item Type*	Item Description
21	*Number and Operations in Base Ten*	5.NBT.B.6	SR	Solve a word problem by finding the quotient of a four-digit dividend and a two-digit divisor.
22	*Number and Operations in Base Ten*	5.NBT.B.7	SR	Determine the product of a whole number and a decimal to hundredths.
23	*Measurement and Data*	5.MD.B.2	SR	Use information from a given line plot to solve problems that involve adding and dividing fractions.
24	*Operations and Algebraic Thinking*	5.OA.A.1	CR	Identify and correct an error in the computation of a numerical expression and place parentheses to make the numerical expression equivalent to a different given value.
25	*Measurement and Data*	5.MD.C.5	SR	Determine the total volume of two non-overlapping right rectangular prisms.
26	*Number and Operations in Base Ten*	5.NBT.A.3	SR	Compare values from a table that include mixed numbers and decimals.
27	*Measurement and Data*	5.MD.A.1	SR	Solve a multi-step real-world problem converting yards to inches.
28	*Number and Operations-Fractions*	5.NF.B.3	SR	Solve a problem involving division of two whole numbers that results in a fraction as an answer.
29	*Number and Operations in Base Ten*	5.NBT.A.3	SA	Determine a missing value in the expanded form of a given decimal to thousandths.
30	*Geometry*	5.G.B.3	SR	Select statements that correctly compare categories of two-dimensional figures, and then identify shapes as belonging to specific subcategories.
31	*Measurement and Data*	5.MD.C.5	SR	Determine the volume of a right rectangular prism.
32	*Geometry*	5.G.A.1	SR	Describe the relationships between the coordinates of a given point graphed on a coordinate plane and the origin and the x- and y-axes.
33	*Number and Operations-Fractions*	5.NF.A.2	SR	To solve a word problem, estimate the difference of two fractions that are less than one.
34	*Number and Operations-Fractions*	5.NF.B.3	SR	Determine the expression that represents a fractional relationship in a word problem.
35	*Number and Operations in Base Ten*	5.NBT.B.5	SA	Multiply a three-digit whole number by a two-digit whole number.
36	*Number and Operations-Fractions*	5.NF.A.1	CR	Use a fraction model to solve real-world problems involving addition and subtraction of fractions.
37	*Number and Operations in Base Ten*	5.NBT.A.4	SR	Round a given decimal number in thousandths to the nearest tenth.
38	*Number and Operations in Base Ten*	5.NBT.A.2	SR	Identify which whole number is equivalent to a given power of ten.
39	*Number and Operations in Base Ten*	5.NBT.B.7	SA	Solve a word problem by dividing a decimal by a whole number.
40	*Operations and Algebraic Thinking*	5.OA.B.3	SR	Create ordered pairs using corresponding terms from two given patterns and determine which coordinate plane shows the ordered pairs plotted correctly.

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