



Our Students. Their Moment.

**New York State Testing Program
Grade 8 Common Core
Mathematics Test**

Released Questions

May 2016

New York State administered the Mathematics Common Core Tests in April 2016 and is now making approximately 75% of the questions from these tests available for review and use.

June 28, 2016



New York State Testing Program Grade 3-8 Mathematics

Released Questions from 2016 Exams

Background

In 2013, New York State began administering tests designed to assess student performance in accordance with the instructional shifts and rigor demanded by the new New York State P-12 Learning Standards in Mathematics. To help in this transition to new assessments, the New York State Education Department (SED) has been releasing an increasing numbers of test questions from the tests that were administered to students across the State in the spring. This year, SED is again releasing large portions of the 2016 NYS Grade 3-8 Common Core English Language Arts and Mathematics test materials for review, discussion, and use.

For 2016, included in these released materials are at least 75 percent of the test questions that appeared on the 2016 tests (including all constructed-response questions) that counted toward students' scores. Additionally, SED is also providing a map that details what each released question measures and the correct response to each question. These released materials will help students, families, educators, and the public better understand the tests and the New York State Education Department's expectations for students.

Understanding Math Questions

Multiple-Choice Questions

Multiple-choice questions are designed to assess the New York State P-12 Learning Standards for Mathematics. Mathematics multiple-choice questions will be used mainly to assess standard algorithms and conceptual standards. Multiple-choice questions incorporate both the grade-level standards and the "Standards for Mathematical Practices." Many questions are framed within the context of real-world applications or require students to complete multiple steps. Likewise, many of these questions are linked to more than one standard, drawing on the simultaneous application of multiple skills and concepts.

Short-Response Questions

Short-response questions require students to complete tasks and show their work. Like multiple-choice questions, short-response questions will often require multiple steps, the application of multiple mathematics skills, and real-world applications. Many of the short-response questions will cover conceptual and application of the standards.

Extended-Response Questions

Extended-response questions ask students to show their work in completing two or more tasks or a more extensive problem. Extended-response questions allow students to show their understanding of mathematical procedures, conceptual understanding, and application. Extended-response questions may also assess student reasoning and the ability to critique the arguments of others.

The scoring rubric for short and extended constructed-response questions can be found in the grade-level Educator Guides at <http://www.engageny.org/resource/test-guides-for-english-language-arts-and-mathematics>.

New York State P-12 Learning Standards Alignment

The alignment(s) to the New York State P-12 Learning Standards for Mathematics is/are intended to identify the primary analytic skills necessary to successfully answer each question. However, some questions measure proficiencies described in multiple standards, including a balanced combination of procedure and conceptual understanding. For example, two-point and three-point constructed-response questions require students to show an understanding of mathematical procedures, concepts, and applications.

These Released Questions Do Not Comprise a "Mini Test"

To ensure future valid and reliable tests, some content must remain secure for possible use on future exams. As such, this document is *not* intended to be representative of the entire test, to show how operational tests look, or to provide information about how teachers should administer the test; rather, its purpose is to provide an overview of how the test reflects the demands of the New York State P-12 Learning Standards.

The released questions do not represent the full spectrum of the standards assessed on the State tests, nor do they represent the full spectrum of how the standards should be taught and assessed in the classroom. It should not be assumed that a particular standard will be measured by an identical question in future assessments. Specific criteria for writing test questions, as well as additional assessment information, are available at <http://www.engageny.org/common-core-assessments>.

Name: _____



New York State Testing Program

2016 Common Core Mathematics Test Book 1

Grade 8

April 13–15, 2016

Released Questions

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Book 1



TIPS FOR TAKING THE TEST

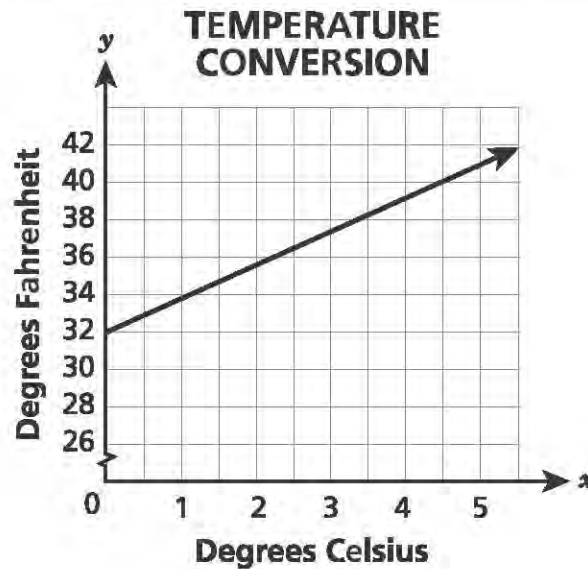
Here are some suggestions to help you do your best:

- Read each question carefully and think about the answer before choosing your response.
- You have been provided with mathematics tools (a ruler and a protractor) and a reference sheet to use during the test. It is up to you to decide when each tool and the reference sheet will be helpful. You should use mathematics tools and the reference sheet whenever you think they will help you to answer the question.
- Plan your time.

1 Mr. Thomsen is buying two types of gift cards to give as prizes to employees at a company meeting. He will buy restaurant gift cards that each cost \$50. He will also buy movie theater gift cards that each cost \$20. He has \$450 to buy a total of 15 gift cards. How many of each type of gift card can Mr. Thomsen buy?

- A He can buy 5 restaurant gift cards and 10 movie theater gift cards.
- B He can buy 8 restaurant gift cards and 7 movie theater gift cards.
- C He can buy 10 restaurant gift cards and 5 movie theater gift cards.
- D He can buy 12 restaurant gift cards and 3 movie theater gift cards.

2 The relationship between temperature in degrees Fahrenheit and degrees Celsius is shown in the graph below.



What is the meaning of the y-intercept?

- A the change in degrees Fahrenheit for every change of one degree Celsius
- B the change in degrees Celsius for every change of one degree Fahrenheit
- C the temperature in degrees Fahrenheit when the temperature is zero degrees Celsius
- D the temperature in degrees Celsius when the temperature is zero degrees Fahrenheit

GO ON

3 Kevin moved from a city to a small town. The population of the city is 6×10^5 , which is about 15 times as great as the small town. Which expression could represent the approximate population of the small town?

A 4×10^3

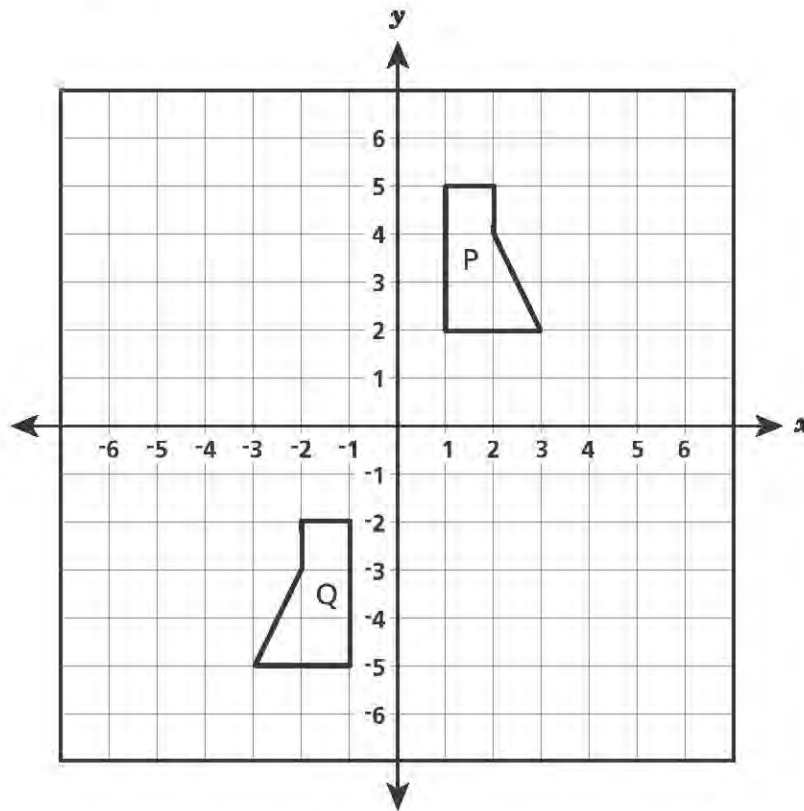
B 4×10^4

C 9×10^5

D 9×10^6

4

Pentagon P and pentagon Q, shown below, are congruent.



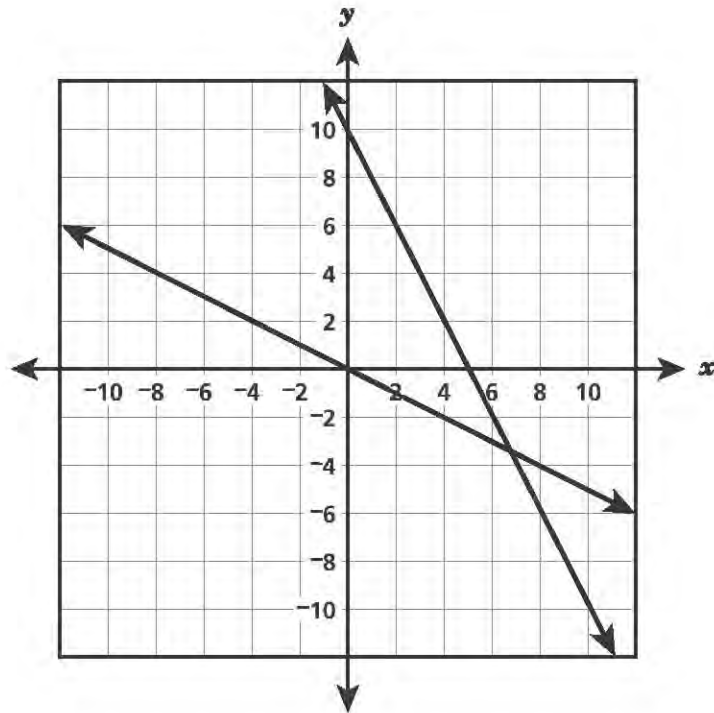
Which sequence could be used to transform pentagon P to pentagon Q?

- A a 180° clockwise rotation about the origin
- B a translation four units left and then a reflection over the x -axis
- C a reflection over the y -axis and then a translation seven units down
- D a translation seven units down and then a 90° clockwise rotation about the origin

GO ON

5

The graph of a system of equations is shown below.



What system of equations represents the graph?

A $y = -2x + 10$
 $y = -\frac{1}{3}x$

B $y = -2x + 10$
 $y = -\frac{1}{2}x$

C $y = -\frac{1}{2}x + 10$
 $y = -2x$

D $y = -\frac{1}{3}x + 10$
 $y = -2x$

6 A cylinder and a cone have congruent heights and radii. What is the ratio of the volume of the cone to the volume of the cylinder?

A 1 : 1

B 1 : 3

C 1 : 6

D 1 : 9

7 Which of the equations listed below are linear equations?

Equation I: $C = 2\pi r$

Equation II: $A = \pi r^2$

Equation III: $V = \frac{4}{3}\pi r^3$

A equation I only

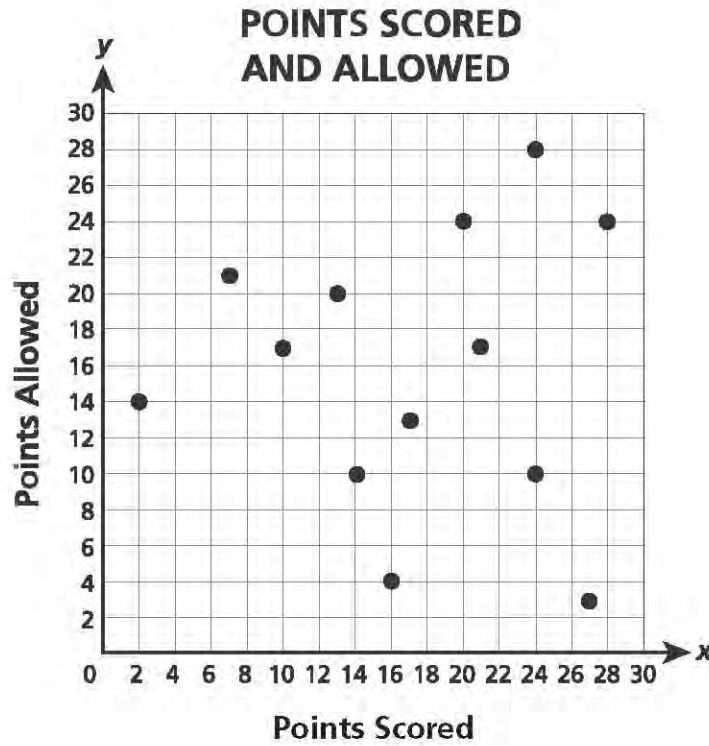
B equation II only

C equations I and III

D equations II and III

GO ON

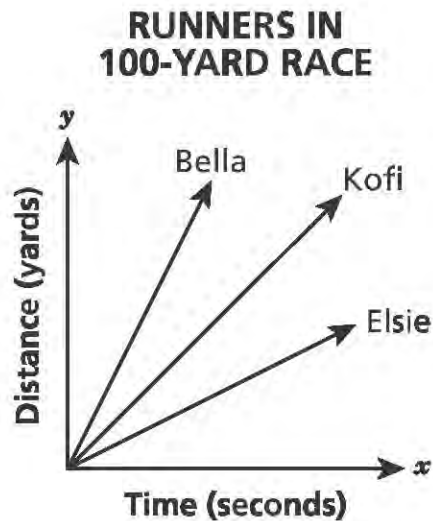
- 8 The scatter plot below shows the points scored and the points allowed by the Bulldogs football team for several games.



Which association (correlation) best describes the data?

- A no association (correlation)
- B positive association (correlation)
- C negative association (correlation)
- D nonlinear association (correlation)

- 9 The graph below shows the relationship between the distances run and the time for three people in a 100-yard race.



The relationship between the distance run and the time for Kofi can be represented by the equation $y = 15.55x$, where he ran y yards in x seconds. Which two equations could be used to represent this relationship for Bella and Elsie?

- A Bella: $y = 15.15x$; Elsie: $y = 15.85x$
- B Bella: $y = 15.85x$; Elsie: $y = 15.65x$
- C Bella: $y = 15.45x$; Elsie: $y = 15.15x$
- D Bella: $y = 15.85x$; Elsie: $y = 15.15x$

GO ON

10

Which table of values represents a linear function?

A

x	y
0	0
1	1
4	16
9	81

C

x	y
0	0
1	2
4	8
9	18

B

x	y
0	1
1	3
4	9
9	20

D

x	y
0	0
1	2
4	4
9	6

11 Simplify.

$$5^{-8} \times 5^4$$

A $\frac{1}{5^4}$

B $\frac{1}{5^{32}}$

C -5^2

D -5^{12}

12 What is the value of t that satisfies the equation below?

$$3(t + 4) - 2(2t + 3) = -4$$

A $-\frac{11}{3}$

B $-\frac{4}{5}$

C 10

D 11

GO ON

- 19 Ellentown College has approximately 3×10^3 students and Pengrove University has approximately 30,000 students. How many times as much is the number of students at Pengrove University as the number of students at Ellentown College?

- A 1
- B 10
- C 30
- D 100

- 20 A series of transformations on quadrilateral S resulted in quadrilateral T.

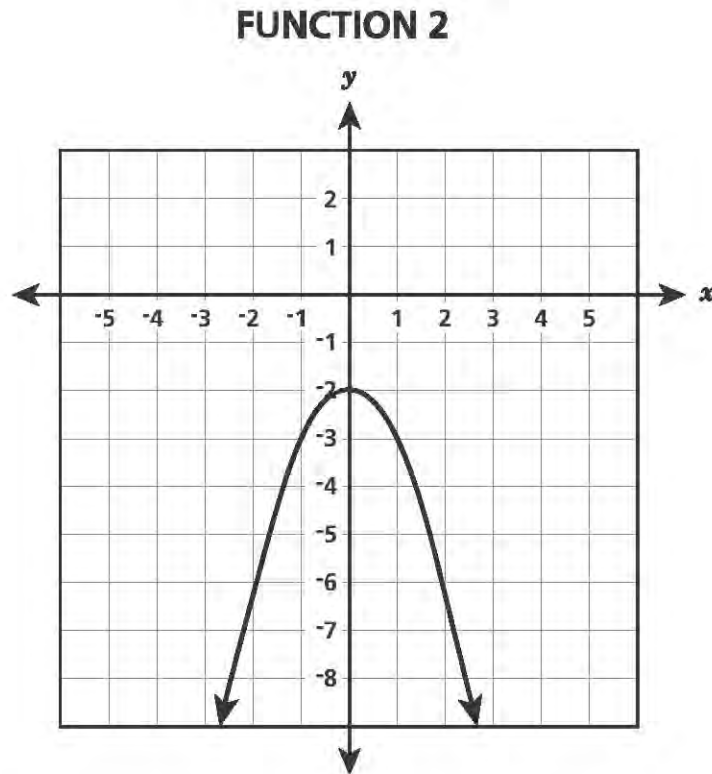
- The angle measures of quadrilateral T are congruent to those of quadrilateral S.
- The side lengths of quadrilateral T are twice as long as those of quadrilateral S.

Which transformation on quadrilateral S **must** be included to result in quadrilateral T?

- A dilation
- B rotation
- C reflection
- D translation

GO ON

- 21 Function 1 is represented by the equation $y = -\frac{4}{5}x - 2$, and function 2 is represented by the graph below.

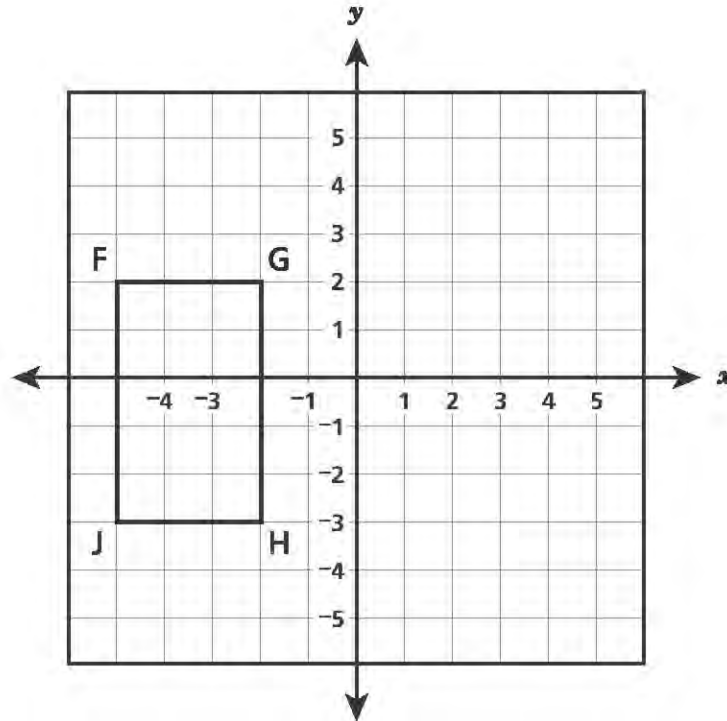


For which of the functions are all the output values less than -1 ?

- A both functions
- B only function 1
- C only function 2
- D neither function

22

Rectangle $FGHJ$, shown below, is translated 6 units right and 1 unit up to produce rectangle $F'G'H'J'$.



Which statement about the side lengths of rectangle $F'G'H'J'$ is true?

- A $F'G' = 3$ and $G'H' = 5$
- B $F'G' = 3$ and $G'H' = 6$
- C $F'G' = 9$ and $G'H' = 5$
- D $F'G' = 9$ and $G'H' = 6$

GO ON

Grade 8
2016 Common Core
Mathematics Test
Book 1
April 13–15, 2016

Name: _____



New York State Testing Program

2016 Common Core Mathematics Test Book 2

Grade 8

April 13–15, 2016

Released Questions

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Book 2



TIPS FOR TAKING THE TEST

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- Read each question carefully and think about the answer before choosing your response.
- You have been provided with mathematics tools (a ruler, protractor, and calculator) and a reference sheet to use during the test. It is up to you to decide when each tool and the reference sheet will be helpful. You should use mathematics tools and the reference sheet whenever you think they will help you to answer the question.
- Plan your time.

27 Solve the system of equations below.

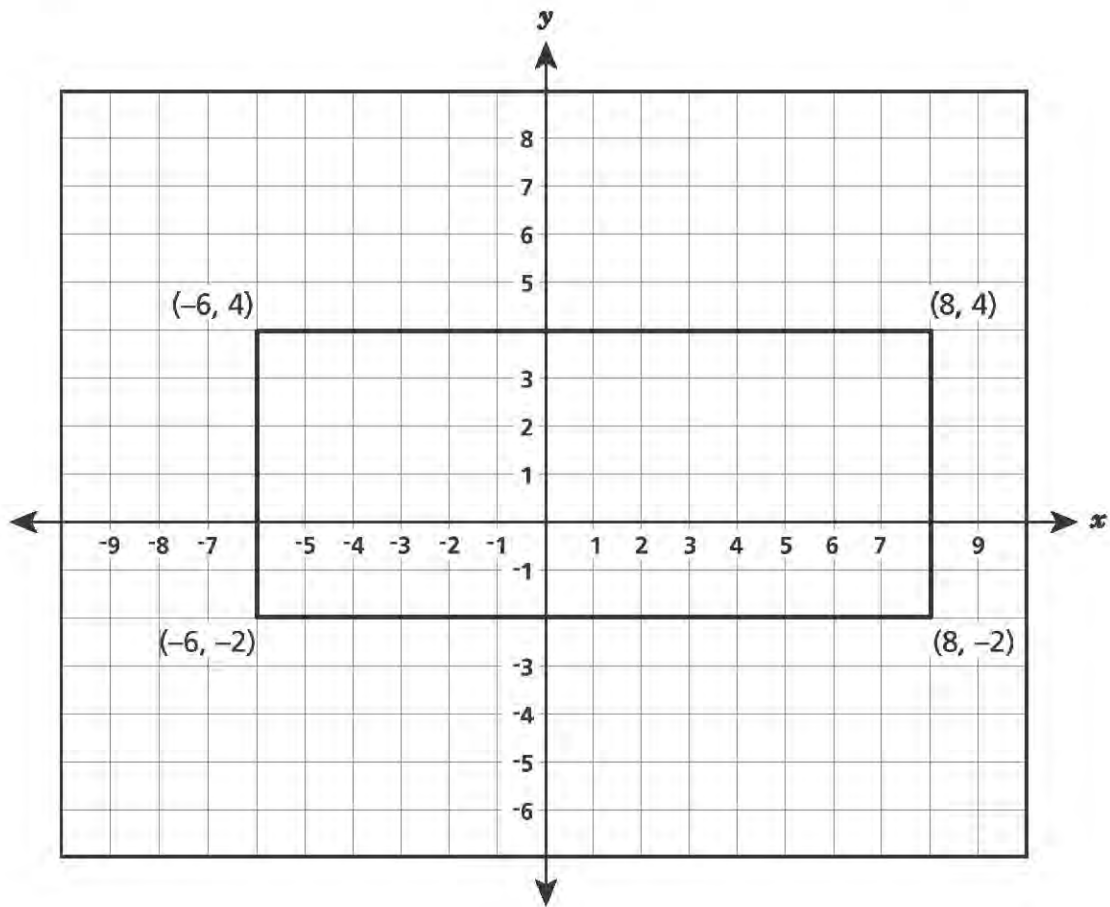
$$2x + 4y = 10$$

$$2x + 4y = -10$$

- A $x = 3, y = 1$
- B $x = 6, y = -4$
- C No solution
- D Infinitely many solutions

GO ON

Mia enlarged a plan for an outdoor stage. The original plan is shown below.



She dilated the outdoor stage by a scale factor of four with the center of dilation at the origin. Which ordered pair will be the coordinates of one of the new vertices?

- A (2, 1)
- B (8, 16)
- C (32, 4)
- D (32, 16)

- 29 Bianca and Nick are both musicians who sell their songs online. During the same year, Bianca sold 8×10^5 downloads of her songs and Nick sold 4×10^6 downloads of his songs. How many times as much is the number of songs that Nick sold than the number of songs that Bianca sold?

- A 2
- B 5
- C 20
- D 40

- 30 Which table represents a relation that is **not** a function?

A

Input	Output
1	1
2	1
3	1
4	1

C

Input	Output
-1	-7
-2	11
-3	13
-4	105

B

Input	Output
2	0
4	1
6	2
8	0

D

Input	Output
3	0
5	2
7	1
3	-4

- 34 The Ecology Club was planning to take a field trip either to the seacoast or the mountains. The club president surveyed all of the members to determine the preferred trip. The results are displayed in the table below.

FIELD TRIP SURVEY

Students	Seacoast	Mountains	Total
Seventh-Grade	42	28	70
Eighth-Grade	30	50	80
Total	72	78	150

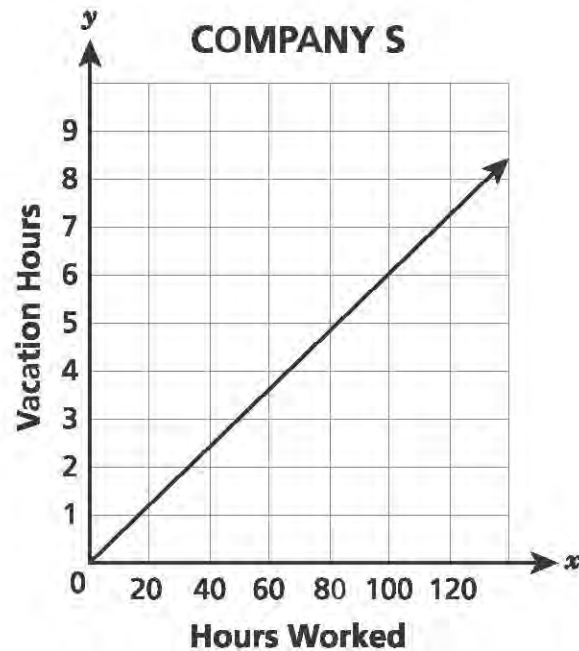
Which statement is true about the results of the survey?

- A 20% of eighth-grade students preferred the seacoast
- B 32% of seventh-grade students preferred the mountains
- C 40% of students preferred the mountains
- D 48% of students preferred the seacoast
- 35 A cylinder has a radius of 3 inches and a height of $4\frac{3}{4}$ inches. A sphere has a radius of 3 inches. What is the difference between the volumes, to the nearest tenth of a cubic inch, of the cylinder and the sphere?
- A 21.2
- B 51.8
- C 68.3
- D 96.6

Two friends work at different companies, P and S. Both companies use the number of hours that an employee works to calculate that employee's vacation hours. The relationship between the number of hours worked and the number of vacation hours for employees at each company is shown in the table and graph, respectively.

COMPANY P

Hours Worked	Vacation Hours
10	0.4
20	0.8
30	1.2
40	1.6
50	2.0



Which statement describes the difference in each friend's vacation hours if both work 2,080 hours?

- A The friend at company S will have about 42 more vacation hours than the friend at company P.
- B The friend at company S will have about 46 more vacation hours than the friend at company P.
- C The friend at company P will have about eight more vacation hours than the friend at company S.
- D The friend at company P will have about nine more vacation hours than the friend at company S.

37 Which equation represents a nonlinear function?

A $y = -3x + 1$

B $y = x^2 + 1$

C $y = \frac{x}{2} + 1$

D $y = 2x + \frac{1}{2}$

38 What is the value of the expression below?

$$\frac{(4.8 \times 10^8)}{(1.2 \times 10^4)} \times (2.2 \times 10^{-6})$$

A 0.88

B 0.088

C 0.0088

D 0.00088

39 A crane is lowering a concrete block from a height of 270 feet above the ground at a constant rate of 2.5 feet per second. Which function can be used to determine h , the height, in feet, above the ground of the concrete block after s seconds?

A $h = 270s + 2.5$

B $h = 2.5s + 270$

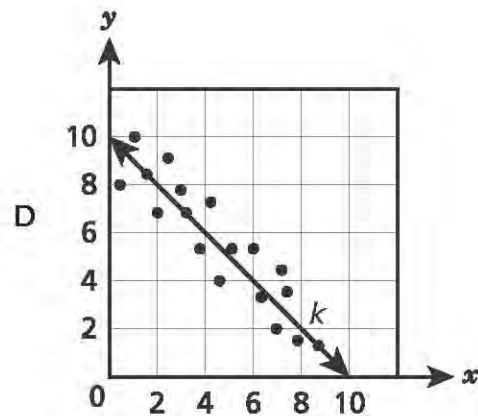
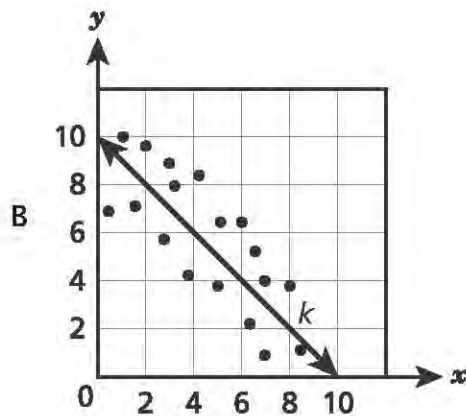
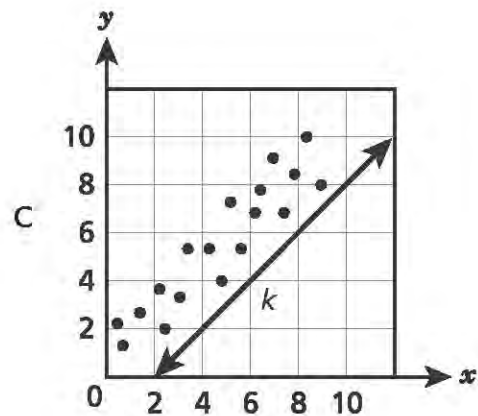
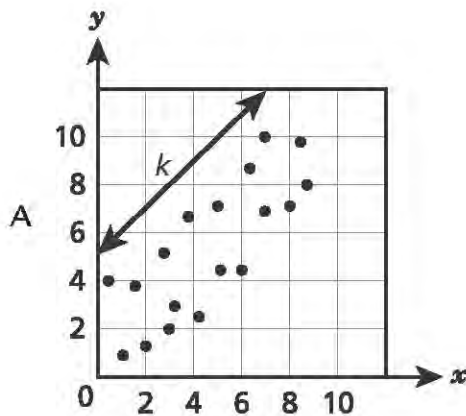
C $h = 270 - 2.5s$

D $h = 2.5s - 270$

- 40 Function P is a linear function with a y-intercept of 5. Function Q is defined by the equation $y = -\frac{1}{3}x + 4$. Which statement **must** be true about functions P and Q?

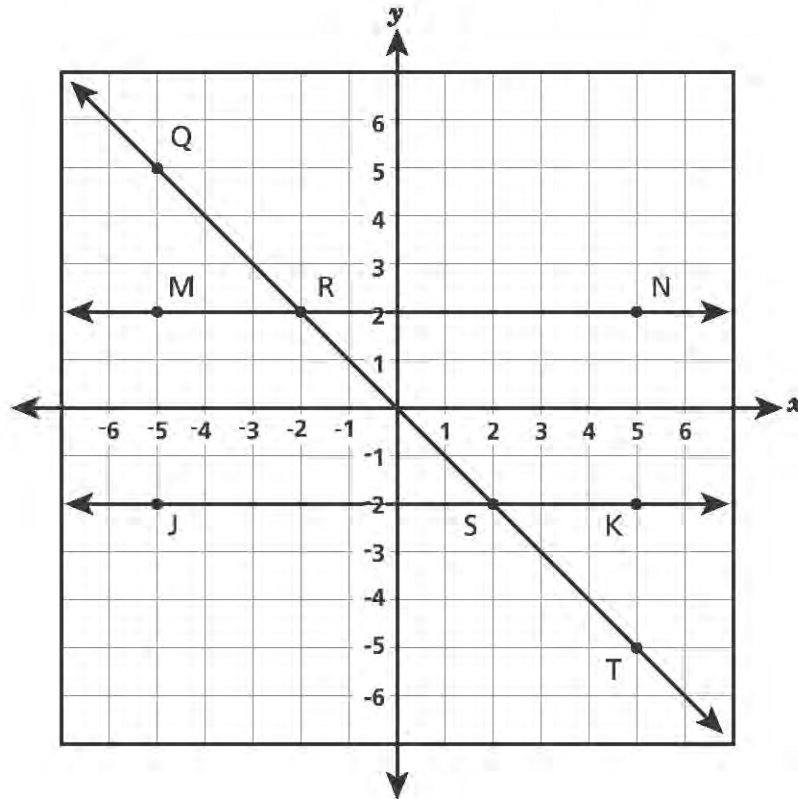
- A Both functions have the same slope.
- B Both functions have a negative slope.
- C The functions will have the same input when $y = 0$.
- D The functions will have different outputs when $x = 0$.

- 41 Line k is the line of best fit for a set of data on a scatter plot. The data show a strong linear association. Which scatter plot **best** represents these data and line k ?



GO ON

In the diagram below, lines MN and JK are parallel and are intersected by line QT .



Which transformation could be used to show that $\angle MRS$ is congruent to $\angle JST$?

- A reflect $\angle MRS$ over the x -axis
- B rotate $\angle MRS$ about the origin
- C translate $\angle MRS$ down and to the right
- D dilate $\angle MRS$ by a scale factor of two with the center at point R

48 What is the equation of the line that passes through points $(-3, 0.5)$ and $(3, -0.5)$?

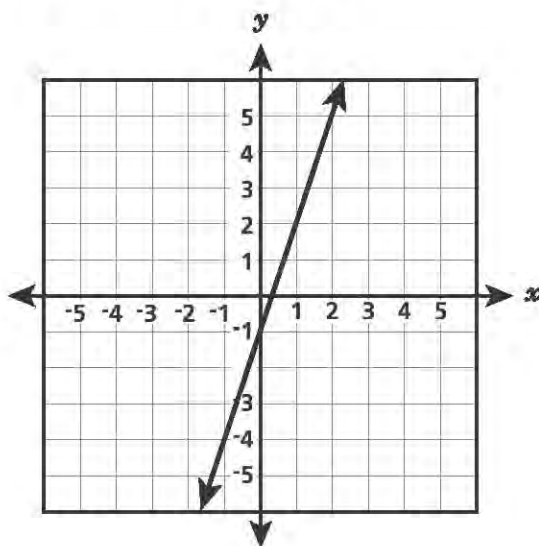
A $y = -\frac{1}{6}x$

B $y = -6x$

C $y = -\frac{1}{6}x + 1$

D $y = -6x - 17.5$

49 Function J is shown on the coordinate grid below.



If the y -intercept of Function R is $\frac{3}{2}$ greater than the y -intercept of Function J, which equation could represent Function R?

A $y = -x + 4.5$

B $y = 0.5x + 3$

C $y = 3x + 0.5$

D $y = 4.5x - 1$

Grade 8
2016 Common Core
Mathematics Test
Book 2
April 13–15, 2016

Name: _____



New York State Testing Program

2016 Common Core Mathematics Test Book 3

Grade 8

April 13–15, 2016

Released Questions

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- Be sure to show your work when asked.
- Plan your time.

Jude incorrectly simplified the expression $\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$, as shown below.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{8}\right)^6 = \frac{1}{262,144}$$

Describe the mistake that Jude made.

Answer

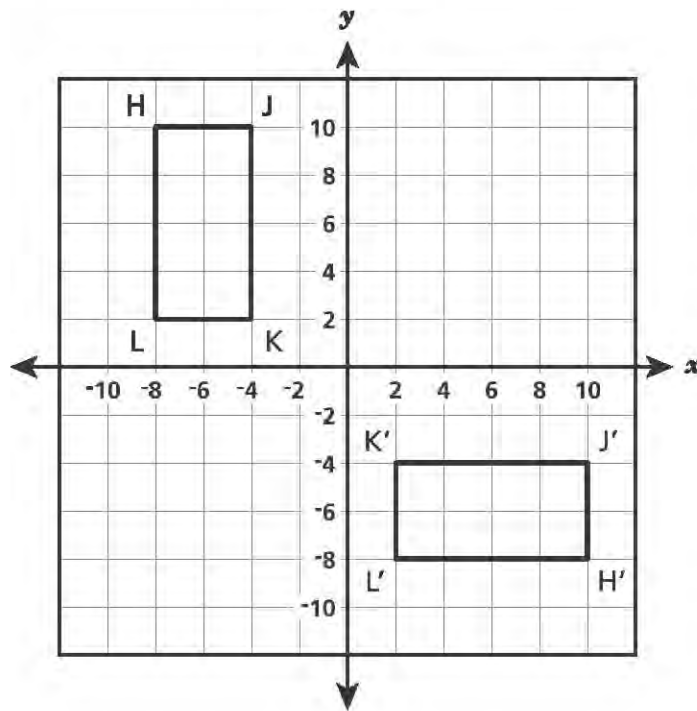
Correctly simplify the expression.

$$\left(\frac{1}{2}\right)^2 \times \frac{1}{2} \times \left(\frac{1}{2}\right)^3$$

Answer _____

GO ON

Congruent rectangles HJKL and H'J'K'L' are shown on the coordinate grid below.



Describe a sequence of transformations on rectangle HJKL that would result in rectangle H'J'K'L'.

Answer

54

Write an equation of a function that is not linear.

Answer _____

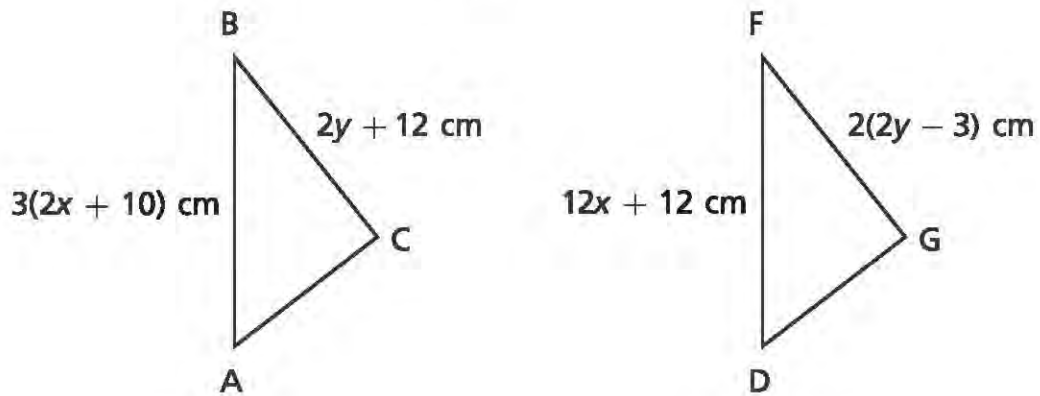
Use your equation to explain why your function is not linear.

Answer

GO ON

55

Triangle ABC is translated to create triangle DFG, as shown below.



In these triangles, side AB is congruent to side DF, and side BC is congruent to side FG. Determine the values of x and y .

Show your work.

Answer $x =$ _____ and $y =$ _____

GO ON

56

A reporter collected data on y , the current market value, in dollars, of a certain car for various years, x , after it had been purchased new. The equation below was fit to the data.

$$y = 16,500 - 1,500x$$

What does the slope of the graph of this equation represent?

Answer

What does the y -intercept of the graph of this equation represent?

Answer

GO ON

57

A triangle with vertices at $A(-1, 1)$, $B(-2, 1)$, and $C(-1, 4)$ is translated. The image of vertex A has coordinates at $(3, -1)$.

Determine the coordinates of either the image of vertex B or the image of vertex C .

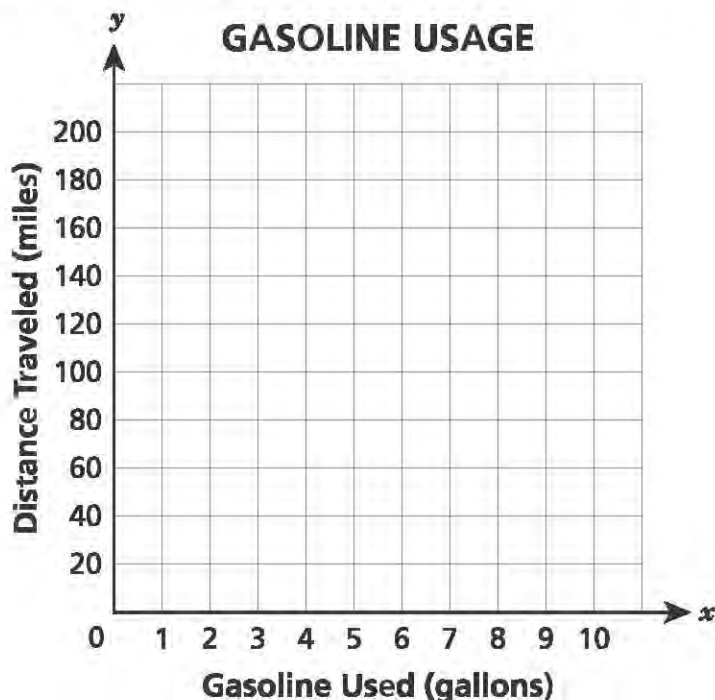
Show your work.

Answer _____

- 58 Stanley drove his car on a business trip. When he left, the mileage was 840 miles, and when he returned, the mileage was 1,200 miles. The car used 12 gallons of gasoline for this trip.

Draw a graph on the grid below to show the relationship between gasoline used, x , and the distance traveled, y , during Stanley's trip.

Carla made the same trip as Stanley, but her car used only 10 gallons of gasoline. Graph the gasoline usage of Carla's car on the same grid as Stanley's car.



How do the slopes for Stanley's and Carla's cars compare?

Explain your answer in terms of the unit rate.

Answer

GO ON

- 59 Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below.

**TOTAL AMOUNT OF MONEY
FROM TICKET SALES**

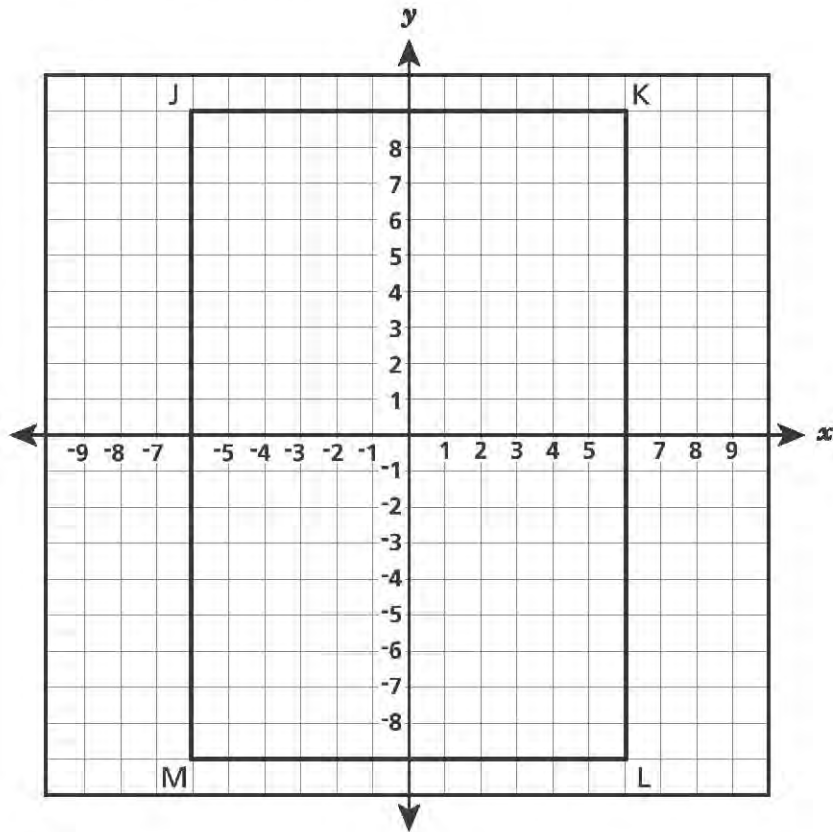
Number of Tickets Sold	Total Money in Box (dollars)
7	108.75
13	146.25
18	177.50

Assuming all the tickets are the same price, write an equation that represents the situation in the table. Explain how to use your equation to determine the amount of money originally in the box before any tickets were sold and the price of each ticket.

Show your work.

Answer

Rectangle JKLM is shown on the coordinate grid below.



GO ON

Rectangle JKLM undergoes a sequence of transformations, resulting in rectangle J'K'L'M'.

The length of side K'L' is 6 units. The coordinates of vertex K' are $(-3, 2)$, and the coordinates of vertex M' are $(3, -2)$.

Describe a sequence of transformations to rectangle JKLM that would result in rectangle J'K'L'M'.

Show your work.

Answer

61

Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds.

Write a system of equations that can be used to determine p , the mass, in pounds, of one paperback, and t , the mass, in pounds, of one textbook.

Answer

Solve the system of equations to find the two masses.

Show your work.

Mass of one paperback _____ pound(s)

Mass of one textbook _____ pound(s)

STOP



Place Student Label Here



Grade 8
2016 Common Core
Mathematics Test
Book 3
April 13–15, 2016

THE STATE EDUCATION DEPARTMENT
THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

2016 Mathematics Tests Map to the Standards

Released Questions Available on EngageNY

Grade 8

Question	Type	Key	Points	Standard	Cluster	Secondary Standard(s)	Multiple Choice Questions:	Constructed Response Questions:	
							Percentage of Students Who Answered Correctly (P-Value)	Average Points Earned	P-Value (Average Points Earned ÷ Total Possible Points)
Book 1									
1	Multiple Choice	A	1	CCSS.Math.Content.8.EE.C.8c	Expressions and Equations		0.83		
2	Multiple Choice	C	1	CCSS.Math.Content.8.F.B.4	Functions		0.51		
3	Multiple Choice	B	1	CCSS.Math.Content.8.EE.A.3	Expressions and Equations		0.46		
4	Multiple Choice	C	1	CCSS.Math.Content.8.G.A.2	Geometry		0.61		
5	Multiple Choice	B	1	CCSS.Math.Content.8.EE.C.8b	Expressions and Equations		0.58		
6	Multiple Choice	B	1	CCSS.Math.Content.8.G.C.9	Geometry		0.51		
7	Multiple Choice	A	1	CCSS.Math.Content.8.F.A.3	Functions		0.44		
8	Multiple Choice	A	1	CCSS.Math.Content.8.SP.A.1	Statistics and Probability		0.49		
9	Multiple Choice	D	1	CCSS.Math.Content.8.EE.B.5	Expressions and Equations		0.39		
10	Multiple Choice	C	1	CCSS.Math.Content.8.F.A.3	Functions		0.55		
11	Multiple Choice	A	1	CCSS.Math.Content.8.EE.A.1	Expressions and Equations		0.57		
12	Multiple Choice	C	1	CCSS.Math.Content.8.EE.C.7b	Expressions and Equations		0.51		
19	Multiple Choice	B	1	CCSS.Math.Content.8.EE.A.3	Expressions and Equations		0.55		
20	Multiple Choice	A	1	CCSS.Math.Content.8.G.A.4	Geometry		0.72		
21	Multiple Choice	C	1	CCSS.Math.Content.8.F.A.2	Functions		0.31		
22	Multiple Choice	A	1	CCSS.Math.Content.8.G.A.1a	Geometry		0.76		
Book 2									
27	Multiple Choice	C	1	CCSS.Math.Content.8.EE.C.8b	Expressions and Equations		0.66		
28	Multiple Choice	D	1	CCSS.Math.Content.8.G.A.3	Geometry		0.52		
29	Multiple Choice	B	1	CCSS.Math.Content.8.EE.A.3	Expressions and Equations		0.58		
30	Multiple Choice	D	1	CCSS.Math.Content.8.F.A.1	Functions		0.53		
34	Multiple Choice	D	1	CCSS.Math.Content.8.SP.A.4	Statistics and Probability		0.50		
35	Multiple Choice	A	1	CCSS.Math.Content.8.G.C.9	Geometry		0.60		
36	Multiple Choice	A	1	CCSS.Math.Content.8.EE.B.5	Expressions and Equations		0.48		
37	Multiple Choice	B	1	CCSS.Math.Content.8.F.A.3	Functions		0.67		
38	Multiple Choice	B	1	CCSS.Math.Content.8.EE.A.4	Expressions and Equations		0.54		

Grade 8

Released Questions Available on EngageNY

Question	Type	Key	Points	Standard	Cluster	Secondary Standard(s)	Multiple Choice Questions:	Constructed Response Questions:	
							Percentage of Students Who Answered Correctly (P-Value)	Average Points Earned	P-Value (Average Points Earned ÷ Total Possible Points)
39	Multiple Choice	C	1	CCSS.Math.Content.8.F.B.4	Functions		0.41		
40	Multiple Choice	D	1	CCSS.Math.Content.8.F.A.2	Functions		0.48		
41	Multiple Choice	D	1	CCSS.Math.Content.8.SP.A.2	Statistics and Probability		0.74		
47	Multiple Choice	C	1	CCSS.Math.Content.8.G.A.5	Geometry	CCSS.Math.Content.8.G.A.1	0.42		
48	Multiple Choice	A	1	CCSS.Math.Content.8.EE.B.6	Expressions and Equations		0.43		
49	Multiple Choice	C	1	CCSS.Math.Content.8.F.A.2	Functions		0.45		
Book 3									
52	Constructed Response		2	CCSS.Math.Content.8.EE.A.1	Expressions and Equations			0.80	0.40
53	Constructed Response		2	CCSS.Math.Content.8.G.A.2	Geometry			0.74	0.37
54	Constructed Response		2	CCSS.Math.Content.8.F.A.3	Functions			0.76	0.38
55	Constructed Response		2	CCSS.Math.Content.8.EE.C.7a	Expressions and Equations	CCSS.Math.Content.8.G.A.1a		0.89	0.45
56	Constructed Response		2	CCSS.Math.Content.8.SP.A.3	Statistics and Probability			0.52	0.26
57	Constructed Response		2	CCSS.Math.Content.8.G.A.3	Geometry			0.76	0.38
58	Constructed Response		3	CCSS.Math.Content.8.EE.B.5	Expressions and Equations			0.82	0.27
59	Constructed Response		3	CCSS.Math.Content.8.F.B.4	Functions			0.68	0.23
60	Constructed Response		3	CCSS.Math.Content.8.G.A.4	Geometry	CCSS.Math.Content.8.G.A.3		0.74	0.25
61	Constructed Response		3	CCSS.Math.Content.8.EE.C.8c	Expressions and Equations			0.56	0.19

*This item map is intended to identify the primary analytic skills necessary to successfully answer each question. However, some questions measure proficiencies described in multiple standards, including a balanced combination of procedural and conceptual understanding.