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

Released Questions

July 2015



2

The speed of light in a vacuum is 299,792,458 meters per second. Which number, written in scientific notation, is the best approximation of the speed of light?

- A** 0.3×10^7 meters per second
- B** 0.3×10^8 meters per second
- C** 3.0×10^7 meters per second
- D** 3.0×10^8 meters per second

Key:

Primary CCLS: 8.EE.3

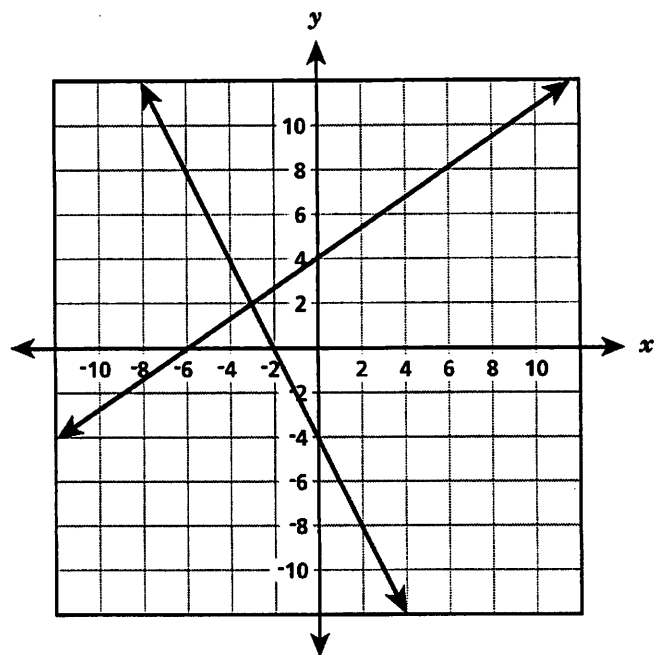
Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9 , and determine that the world population is more than 20 times larger.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 74%

5

The graph of a system of linear equations is shown below.



Which ordered pair is the **best** estimate for the solution of this system of linear equations?

- A** $(-6, -2)$
- B** $(-3, 2)$
- C** $(4, -4)$
- D** $(6, 8)$

Key:

Primary CCLS: 8.EE.8.b

Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 81%

6

Which equation does **not** represent a linear function?

A $y = 2(x - 3)$

B $y = 2^2 - 3x$

C $y = \frac{x + 1}{5}$

D $y = 2x^2 + 3x$

Key:

Primary CCLS: 8.F.3

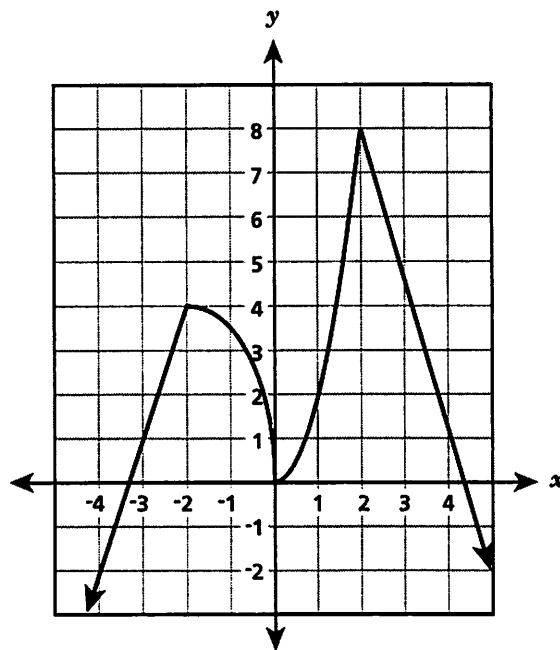
Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1, 1), (2, 4) and (3, 9), which are not on a straight line.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 51%

9

The graph of a function is shown below.



For which interval of x is the function decreasing and nonlinear?

- A** between -4 and -2
- B** between -2 and 0
- C** between 0 and 2
- D** between 2 and 4

Key:

Primary CCLS: 8.F.5

Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 54%

12

Jenny wants to rent a truck for one day. She contacted two companies. Laguna's Truck Rentals charges \$20 plus \$2 per mile. Salvatori's Truck Rentals charges \$3 per mile. After how many miles will the total cost for both companies be the same?

- A 4
- B 6
- C 20
- D 60

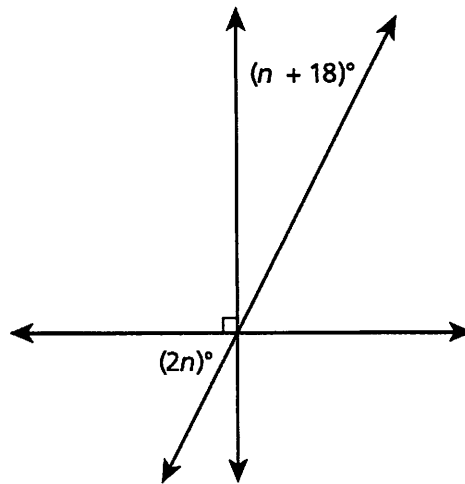
Key:**Primary CCLS: 8.EE.8.c**

Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

Secondary CCLS: None**Percentage of Students Statewide Who Answered Correctly: 61%**

15

What is the value of n in the diagram below?



[not drawn to scale]

- A 18
- B 24
- C 42
- D 48

Key:

Primary CCLS: 7.G.5

Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 48%

16

The cost to rent a paddleboat at the city park includes an initial fee of \$7.00, plus \$3.50 per hour. Which equation models the relationship between the total cost, y , and the number of hours, x , that the paddleboat is rented?

A $y = 3.5x + 7$

B $y = 7x + 3.5$

C $y = \frac{x}{7} + 3.5$

D $y = \frac{x}{3.5} + 7$

Key:

Primary CCLS: 8.F.4

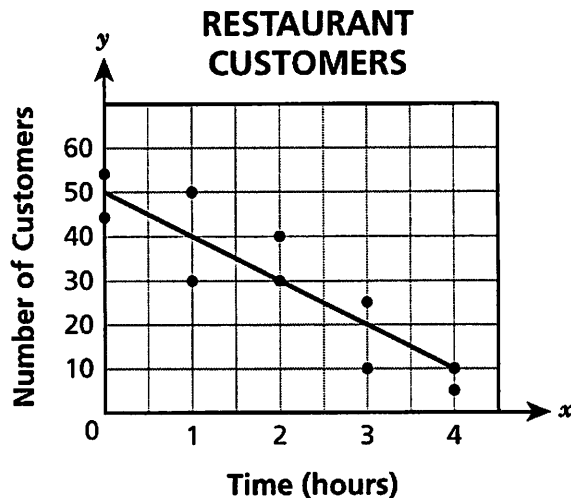
Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 77%

20

The scatter plot below shows the numbers of customers in a restaurant for four hours of the dinner service on two different Saturday nights. The line shown models this relationship, and $x = 0$ represents 7 p.m.



What does the value of the y-intercept represent?

- A the average number of customers at 7 p.m.
- B the average number of customers at 11 p.m.
- C the average change in the number of customers each hour
- D the average change in the number of customers during four hours of the dinner service

Key:

Primary CCLS: 8.SP.3

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 38%

25

Triangle M is similar to triangle N. Triangle M has two angles with measures of 32° and 93° . Which two angle measures could be included in triangle N?

- A 32° and 58°
- B 32° and 74°
- C 93° and 55°
- D 93° and 87°

Key:

Primary CCLS: 8.G.5

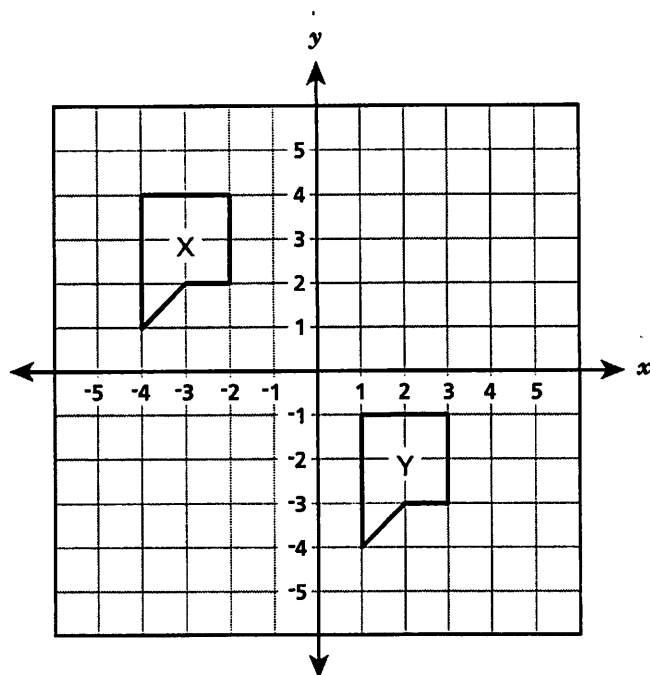
Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 42%

26

Figure X and figure Y are shown on the coordinate grid below.



Which statement about figures X and Y must be true?

- A** A series of translations will transform figure X to figure Y, and the figures will be congruent.
- B** A 180° clockwise rotation will transform figure X to figure Y, and the figures will be congruent.
- C** A series of translations will transform figure X to figure Y, but the figures will not be congruent.
- D** A 180° clockwise rotation will transform figure X to figure Y, but the figures will not be congruent.

Key:

Primary CCLS: 8.G.2

Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 62%

27

Which exponential expression is equal to $2^{-5} \cdot 2^8$?

A $\frac{2^2}{2^{-1}}$

B $(2^3)^{-1}$

C $\frac{2^{-2}}{2^{-1}}$

D $(2^{-1})^3$

Key:

Primary CCLS: 8.EE.1

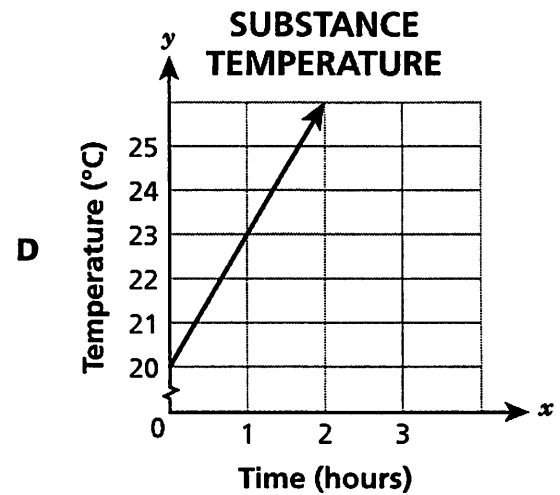
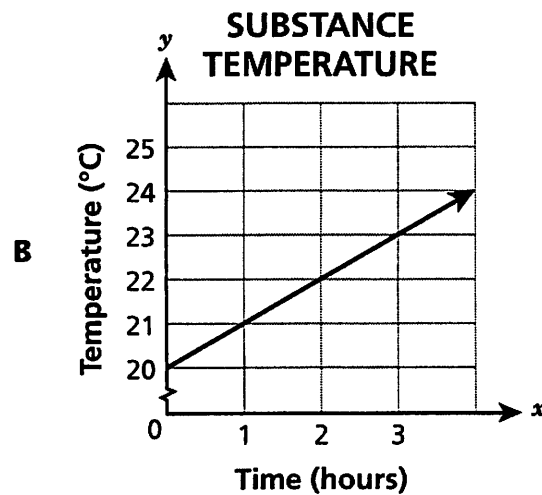
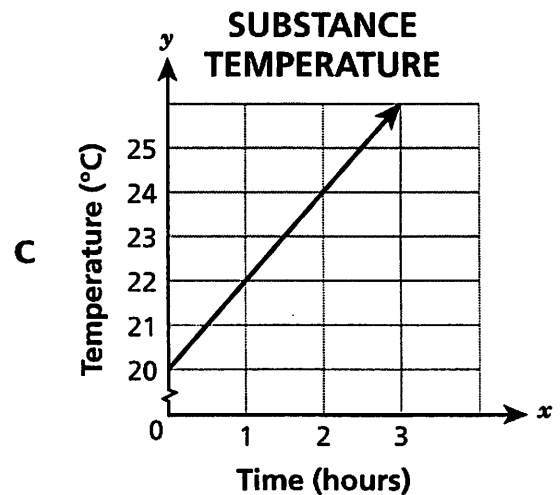
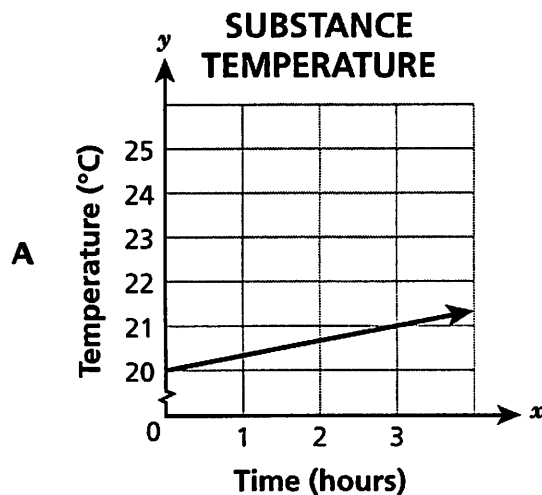
Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 28%

29

During an experiment, the temperature of a substance increased at a constant rate of three degrees Celsius ($^{\circ}\text{C}$) per hour. Which graph represents this relationship?



calculators allowed

Key:

Primary CCLS: 8.EE.5

Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 66%

30

A cone has a radius of 1.2 inches and a height of 2.9 inches. What is the volume, to the nearest tenth of a cubic inch, of the cone?

- A 3.6
- B 4.4
- C 10.6
- D 13.1

calculators allowed

Key:

Primary CCLS: 8.G.9

Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 70%

35

A line contains the points (4, 2) and (0, -1). What is the equation of the line?

- A $y = 2x - 6$
- B $y = \frac{3}{4}x - 1$
- C $y = \frac{1}{4}x + 1$
- D $y = \frac{4}{3}x - \frac{10}{3}$

calculators allowed

Key:

Primary CCLS: 8.EE.6

Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 62%

36

A system of equations is shown below.

$$5x + 3y = -6$$

$$2x + y = -4$$

Which statement about the ordered pair $(-6, 8)$ is true?

- A** It is the only solution to the system.
- B** It is not a solution to either equation.
- C** It is one of many solutions to the system.
- D** It is a solution to the first but not the second equation.

calculators allowed

Key:

Primary CCLS: 8.EE.8,b

Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 42%

38

What is the equation of the line that passes through point $(4, 12)$ and has a y -intercept of -2 ?

- A** $y = \frac{5}{2}x - 2$
- B** $y = \frac{7}{2}x - 2$
- C** $y = 2x - 2$
- D** $y = 6x - 2$

calculators allowed

Key:

Primary CCLS: 8.EE.6

Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 43%

42

A solid object was sliced to form two new objects. Each of the two new objects had a circular base. Which shape could not have been the original object?

- A cone
- B cylinder
- C prism
- D sphere

calculators allowed

Key:

Primary CCLS: 7.G.3

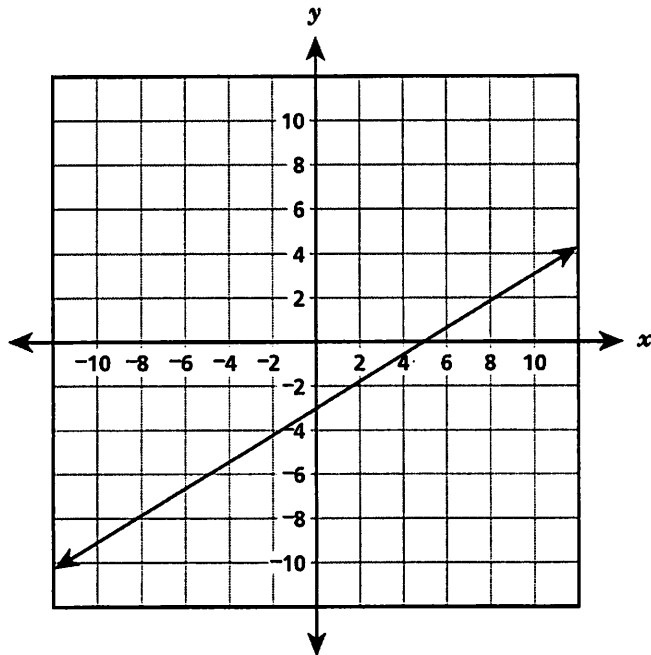
Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 69%

45

Function 1 is defined by the equation $y = \frac{3}{4}x + 1$, and function 2 is represented by the graph below.



Which statement about the functions is true?

- A** Function 1 has the greater rate of change and the greater y-intercept.
- B** Function 2 has the greater rate of change and the greater y-intercept.
- C** Function 1 has the greater rate of change, and function 2 has the greater y-intercept.
- D** Function 2 has the greater rate of change, and function 1 has the greater y-intercept.

calculators allowed

Key:

Primary CCLS: 8.F.2

Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 40%

46

A cylinder has a diameter of 14 centimeters and a volume of 112π cubic centimeters. What is the height, in centimeters, of the cylinder?

A 16

B 4

C $\frac{16}{7}$

D $\frac{4}{7}$

calculators allowed

Key:

Primary CCLS: 8.G.9

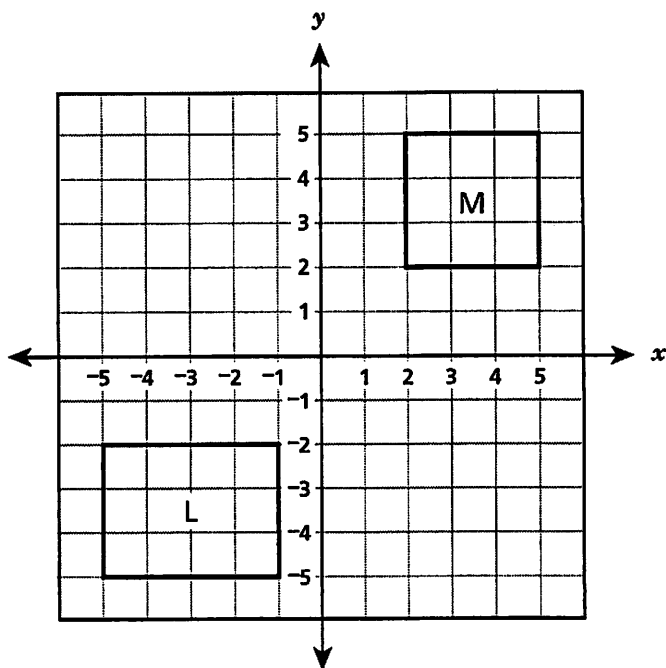
Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 41%

47

Figure L and figure M are shown on the grid below.



Maria wants to transform figure L to figure M using only rotations, reflections, and translations. Which statement is true?

- A The transformation can be done with a reflection followed by a rotation.
- B The transformation can be done with a reflection followed by a translation.
- C The transformation cannot be done because figure L is not congruent to figure M.
- D The transformation cannot be done because figures L and M are in different quadrants.

calculators allowed

Key:

Primary CCLS: 8.G.2

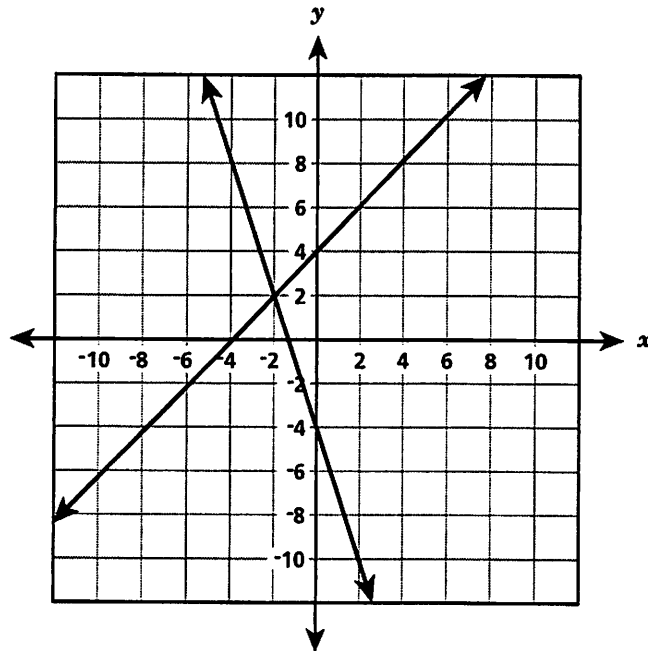
Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 75%

49

Which statement explains why the point $(-2, 2)$ is the solution to the system of linear equations shown below?



- A It lies on the graph of only one of the equations.
- B It lies in the second quadrant of the coordinate plane.
- C It is the only point that satisfies both equations simultaneously.
- D It is one of many points that satisfies both equations simultaneously.

calculators allowed

Key:

Primary CCLS: 8.EE.8.a

Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 72%

53

The winning time for the men's 400-meter race in each of the Olympic Games from 1976 to 1996 can be modeled by the equation $y = -0.054x + 44.54$, where x is the number of years after 1976 and y is the winning time in seconds. If the relationship continues, which equation could be used to predict the winning time in the year 2020?

- A $y = -0.054(1976) + 44.54$
- B $y = -0.054(2020) + 44.54$
- C $y = -0.054(24) + 44.54$
- D $y = -0.054(44) + 44.54$

calculators allowed

Key:

Primary CCLS: 8.SP,3

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 40%

54

An above-ground swimming pool in the shape of a cylinder has a diameter of 18 feet and a height of 4.5 feet. If the pool is filled with water to 6 inches from the top of the pool, what is the volume, to the nearest cubic foot, of the water in the pool?

- A 226
- B 452
- C 1,018
- D 4,072

calculators allowed

Key:

Primary CCLS: 8.G,9

Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Secondary CCLS: None

Percentage of Students Statewide Who Answered Correctly: 49%

56

Determine the number of solutions that exist to the equation below.

$$8(j - 4) = 2(4j - 16)$$

Show your work.

Answer _____

calculators allowed

Primary CCLS: 8.EE.7.a

Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

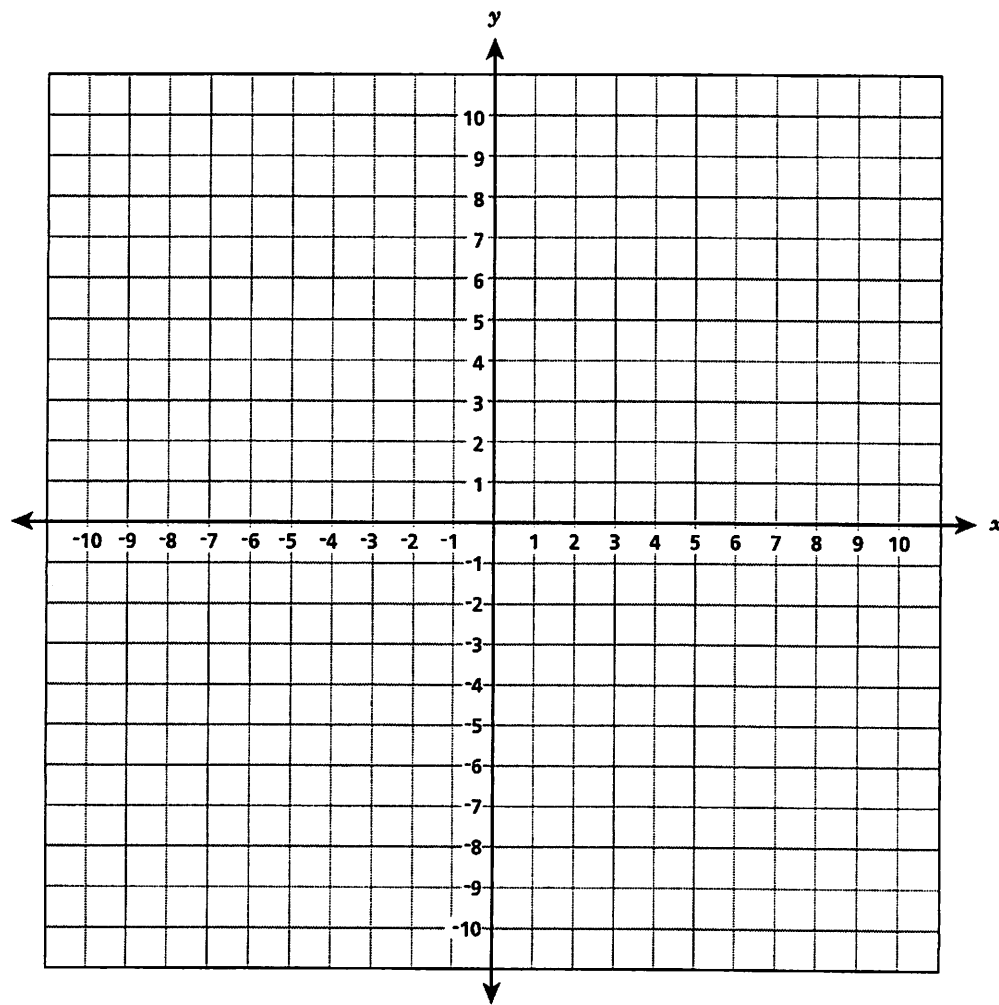
Secondary CCLS: 8.EE.7.b

Statewide Average Points Earned: 1.05 out of 2

57

A certain function is defined as "multiply the input by $-\frac{3}{4}$, then add 2."

Graph the function on the coordinate plane below.



calculators allowed

Primary CCLS: 8.F.3

Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

Secondary CCLS: None

Statewide Average Points Earned: 0.88 out of 2

58

Determine the solution to the system of equations below.

$$x - 3y = 1$$

$$3x - 5y = 11$$

Show your work.**Answer** _____

calculators allowed

Primary CCLS: 8.EE,8,b

Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.

Secondary CCLS: None**Statewide Average Points Earned: 0.56 out of 2**

60

What, if any, are the solutions to the equation $3(0.5x - 4) = \frac{3}{2}x - 1.2$?

Show your work.

Answer _____

calculators allowed

Primary CCLS: 8.EE.7.a

Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

Secondary CCLS: 8.EE.7.b

Statewide Average Points Earned: 0.84 out of 2

61

The table below shows a relation between x and y .

x	y
-4	16
-2	4
0	0
2	4
4	16
6	36

Susie said the relation above is also a function. Explain why Susie is correct or incorrect.

calculators allowed

Primary CCLS: 8.F.1

Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

Secondary CCLS: None

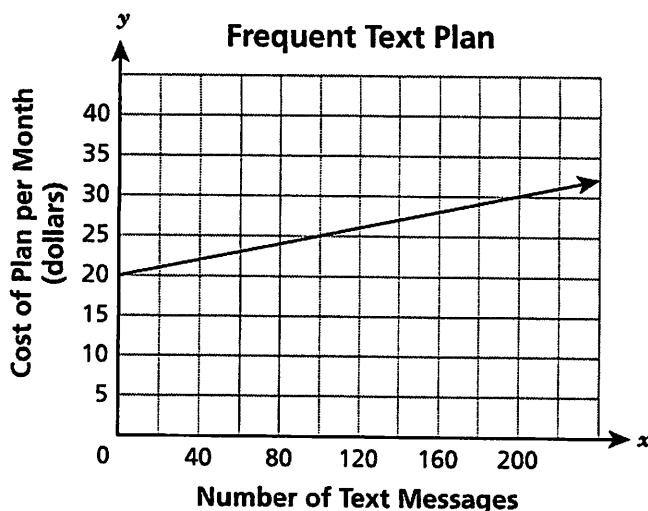
Statewide Average Points Earned: 0.71 out of 2

A customer is comparing two different text message plans at Cellular Bargains. He wants to find out which plan allows the most text messages for the same cost.

The Pay Per Text Plan charges \$10 per month and \$0.10 for each text message. Write a function that models this plan, stating what your variables represent.

Answer _____

The Frequent Text Plan is modeled by the graph shown below.



How many text messages would result in the same cost per month for the two plans?

Show your work.

Answer _____ text messages

calculators allowed

Primary CCLS: 8.F.4

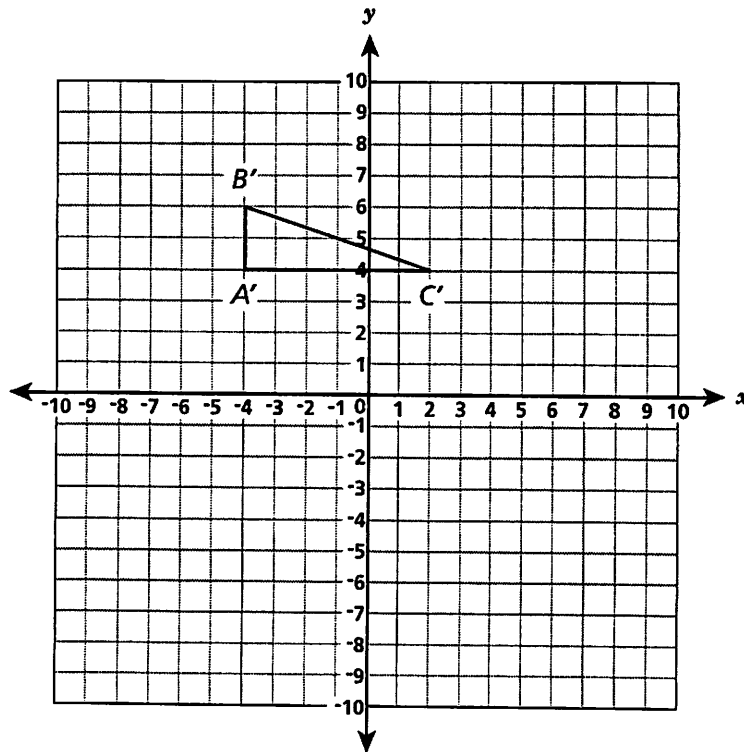
Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Secondary CCLS: 8.EE.8,c

Statewide Average Points Earned: 0.87 out of 3

63

When $\triangle ABC$ was dilated by a scale factor of 2, centered at the origin, the result was its image $\triangle A'B'C'$ shown on the coordinate plane below. The vertices of $\triangle A'B'C'$ are $A'(-4, 4)$, $B'(-4, 6)$, and $C'(2, 4)$.



What are the coordinates of the vertices of $\triangle ABC$?

Vertices A (____, ____), B (____, ____), C (____, ____)

Explain how you determined the coordinates of the vertices of $\triangle ABC$.

Are $\triangle ABC$ and $\triangle A'B'C'$ congruent to each other, similar to each other, or neither?
Explain how you determined your answer.

calculators allowed

Primary CCLS: 8.G.3

Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Secondary CCLS: None

Statewide Average Points Earned: 1.35 out of 3

64

Quadrilateral $ABCD$ is graphed on a coordinate plane.

- Abby reflected $ABCD$ over the x -axis and then rotated it 90° clockwise about the origin. She labeled the final image $EFGH$.
- Manny dilated $ABCD$ by a scale factor of 3 and then translated the resulting figure 2 units left. He labeled the final image $PQRS$.

Identify a pair of quadrilaterals from the three quadrilaterals $ABCD$, $EFGH$, and $PQRS$ that are congruent.

Answer _____

Identify a pair of quadrilaterals from the three quadrilaterals $ABCD$, $EFGH$, and $PQRS$ that are similar but not congruent.

Answer _____

Describe a transformation on Abby's quadrilateral $EFGH$ that would make the resulting image $E'F'G'H'$ congruent to Manny's quadrilateral $PQRS$.

calculators allowed

Primary CCLS: 8.G.4

Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

Secondary CCLS: None

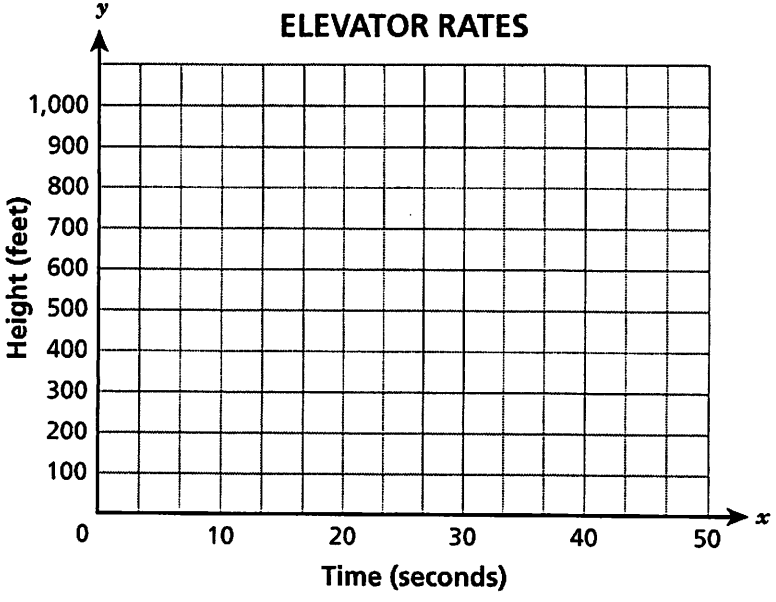
Statewide Average Points Earned: 1.54 out of 3

65

The express elevator in the Empire State Building in New York City travels nonstop from the ground floor to the top floor at a rate of 1,400 feet per minute.

The express elevator in the John Hancock Center in Chicago travels nonstop from the ground floor to the observatory on the top floor at a rate represented by the equation $y = 30x$, where y is the height, in feet, and x is the number of seconds.

Graph the two relationships on the grid below to compare the rates of the two elevators.



Which elevator travels at a faster rate?

Using the information from the graph, explain how you got your answer.

Answer

calculators allowed

Primary CCLS: 8.EE.5

Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

Secondary CCLS: None

Statewide Average Points Earned: 0.99 out of 3