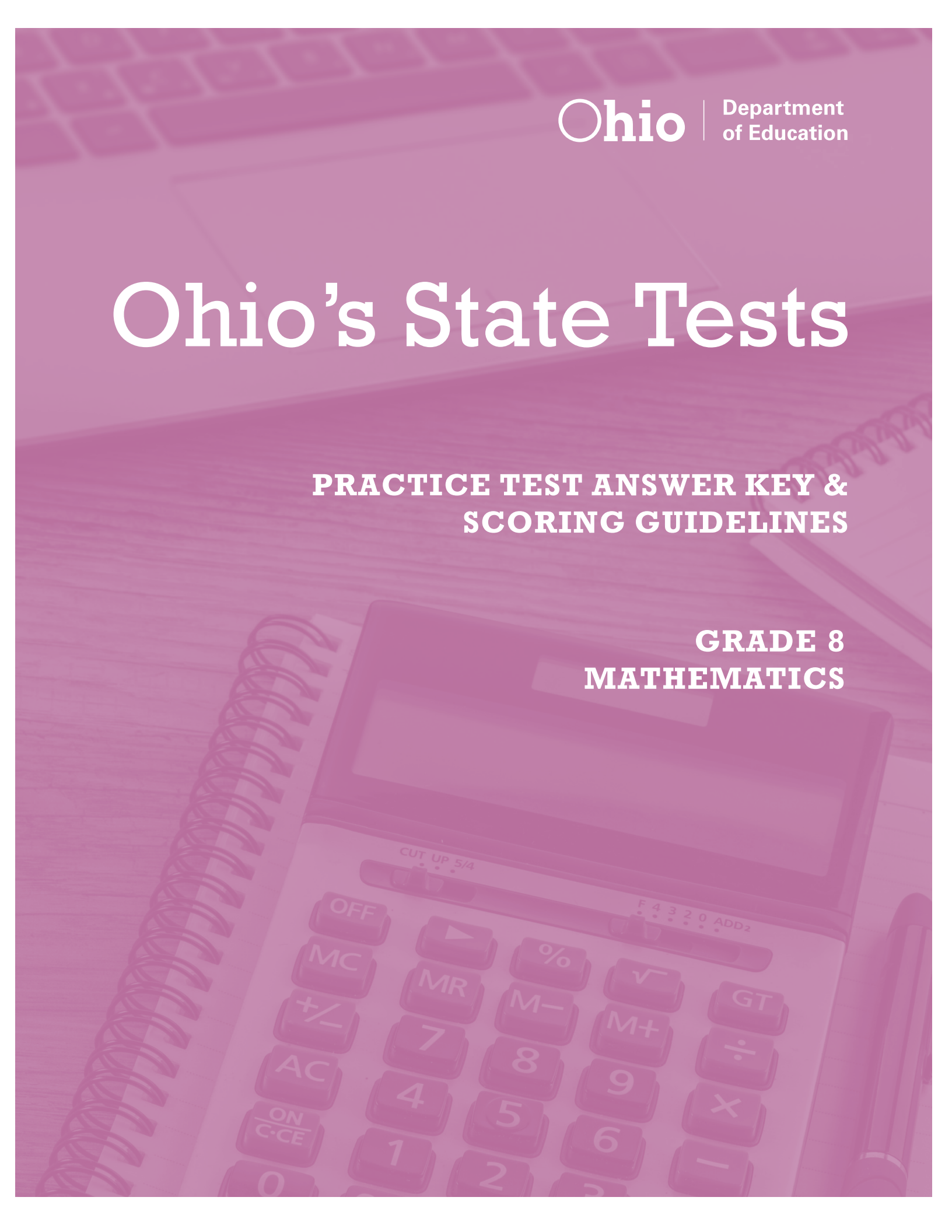
Ohio | Department of Education

Ohio's State Tests

PRACTICE TEST ANSWER KEY & SCORING GUIDELINES

GRADE 8 MATHEMATICS



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Grade 8 Math
Practice Test
Content Summary and Answer Key

Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
1	Equation Item	Understand congruence and similarity using physical models, transparencies, or geometry software.	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. *(8.G.3)*	---	1 point
2	Multiple Choice	Define, evaluate, and compare functions.	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. (8.F.3)*	D	1 point
3	Multi-Select Item	Know that there are numbers that are not rational, and approximate them by rational numbers.	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions, e.g., π^2. *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. (8.NS.2)*	C, D	1 point

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Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
4	Multiple Choice	Investigate patterns of association in bivariate data.	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering; outliers; positive, negative, or no association; and linear association, and nonlinear association. *(8.SP.1)*	C	1 point
5	Equation Item	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	Solve real-world and mathematical problems involving volumes of cones, cylinders, and spheres. *(8.G.9)*	---	1 point
6	Multi-Select Item	Define, evaluate, and compare functions.	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. (8.F.3)*	A, D	1 point
7	Table Item	Understand the connections between proportional relationships, lines, and linear equations.	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. *(8.EE.6)*	---	1 point

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Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
8	Multiple Choice	Work with radicals and integer exponents.	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities, e.g., use millimeters per year for seafloor spreading. Interpret scientific notation that has been generated by technology. *(8.EE.4)*	B	1 point
9	Equation Item	Understand congruence and similarity using physical models, transparencies, or geometry software.	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. (8.G.5)*	---	1 point
10	Multiple Choice	Use functions to model relationships between quantities.	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. *(8.F.5)*	C	1 point

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Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
11	Matching Item	Analyze and solve linear equations and pairs of simultaneous linear equations.	Solve linear equations in one variable. *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). *(8.EE.7a)*	---	1 point
12	Equation Item	Understand and apply the Pythagorean Theorem.	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. *(8.G.7)*	---	1 point
13	Multiple Choice	Work with radicals and integer exponents.	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities, e.g., use millimeters per year for seafloor spreading. Interpret scientific notation that has been generated by technology. *(8.EE.4)*	B	1 point
14	Graphic Response	Define, evaluate, and compare functions.	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. Function notation is not required in Grade 8. *(8.F.1)*	---	1 point

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Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
15	Multiple Choice	Understand congruence and similarity using physical models, transparencies, or geometry software.	Verify experimentally the properties of rotations, reflections, and translations (include examples both with and without coordinates). *c*. Parallel lines are taken to parallel lines. *(8.G.1c)*	D	1 point
16	Equation Item	Work with radicals and integer exponents.	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. (8.EE.3)*	---	1 point
17	Multiple Choice	Investigate patterns of association in bivariate data.	Understand that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. *(8.SP.2)*	D	1 point

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Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
18	Equation Item	Understand and apply the Pythagorean Theorem.	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. *(8.G.8)*	---	1 point
19	Multi-Select Item	Work with radicals and integer exponents.	Understand, explain, and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$. *(8.EE.1)*	C, D	1 point
20	Equation Item	Define, evaluate, and compare functions.	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. (8.F.2)*	---	1 point
21	Multiple Choice	Understand congruence and similarity using physical models, transparencies, or geometry software.	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. (Include examples both with and without coordinates.) *(8.G.4)*	B	1 point

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Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
22	Graphic Response	Understand the connections between proportional relationships, lines, and linear equations.	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. (8.EE.5)*	---	1 point
23	Equation Item	Use functions to model relationships between quantities.	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. *(8.F.4)*	---	1 point
24	Multi-Select Item	Understand congruence and similarity using physical models, transparencies, or geometry software.	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. (Include examples both with and without coordinates.) *(8.G.2)*	C, E, F	1 point

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Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
25	Editing Task Choice Item	Work with radicals and integer exponents.	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. (8.EE.3)*	---	2 points
26	Hot Text Item	Understand congruence and similarity using physical models, transparencies, or geometry software.	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. (Include examples both with and without coordinates.) *(8.G.2)*	---	1 point

Grade 8
Math
Practice Test

Question 1

Question and Scoring Guidelines

Question 1

Triangle ABC has vertices A (0, 1), B (2, 5), and C (6, 3). Triangle A′B′C′ is created by reflecting triangle ABC over the *y*-axis.

What is the *x*-coordinate of vertex C′ ?

Points Possible: 1

Content Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Content Standard: Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. *(8.G.3)*

Scoring Guidelines

Exemplar Response

- –6

Other Correct Responses

- Any equivalent value

For this item, a full-credit response includes:

- A correct coordinate (1 point).

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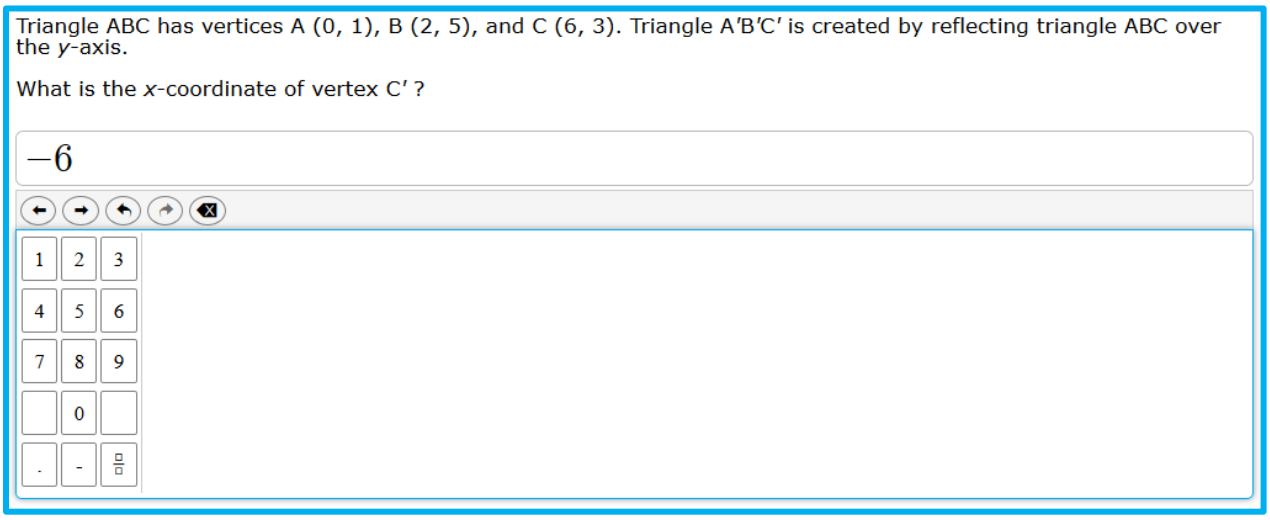
Math
Practice Test

Question 1

Sample Responses

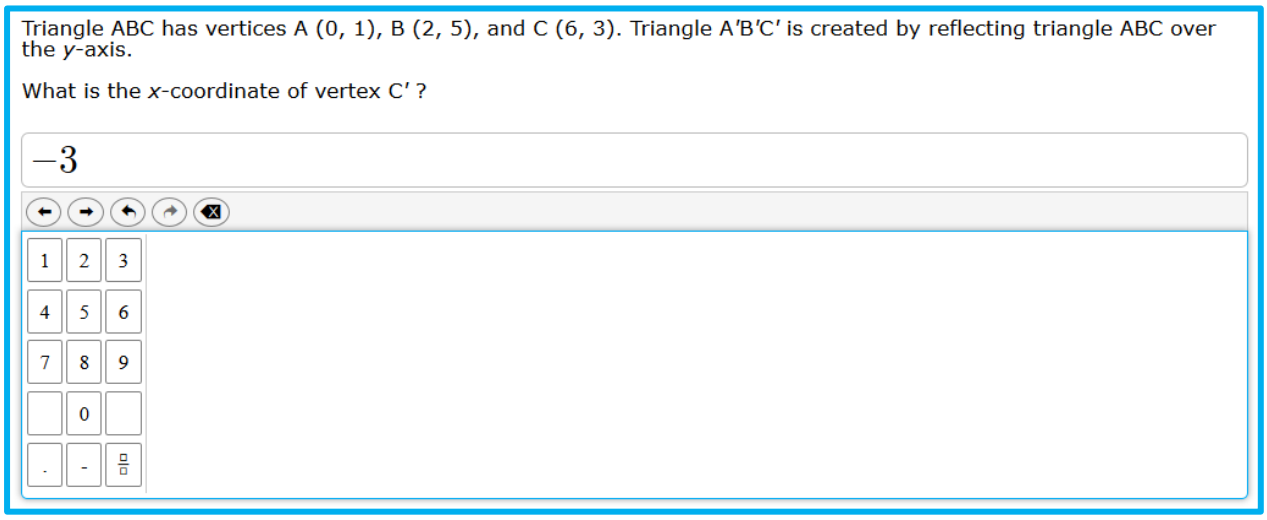
Sample Response: 1 point



Notes on Scoring

This response earns full credit (1 point) because the student correctly identified the *x*-coordinate of C′; a reflection over the *y*-axis changes the sign of the *x*-coordinate.

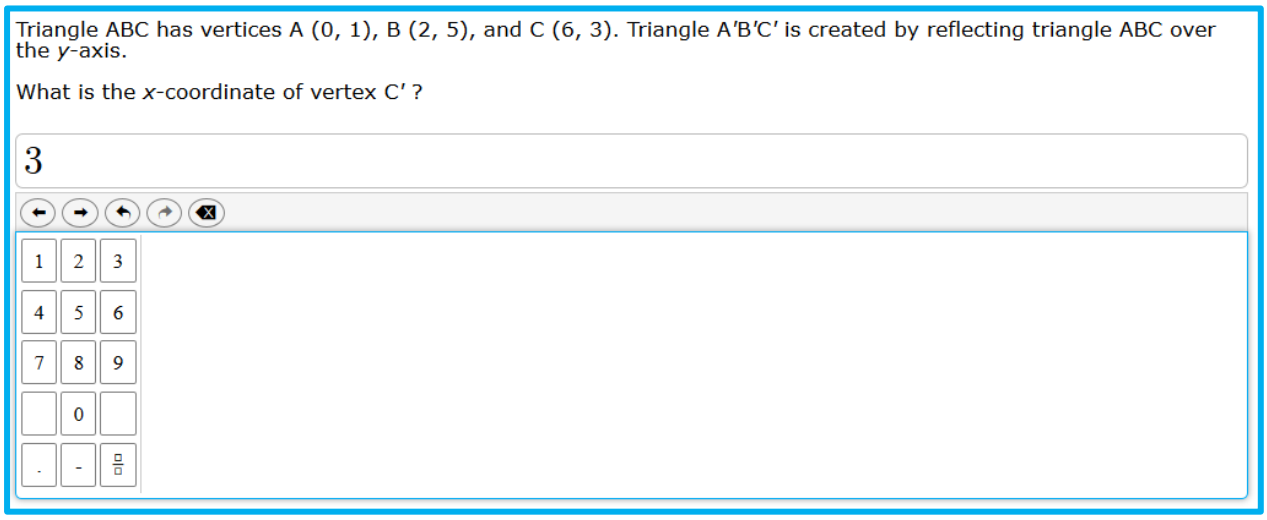
Sample Response: 0 points



Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify the *x*-coordinate of C′. The student may have confused the *x*- and *y*-coordinates of vertex C.

Sample Response: 0 points



Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify the *x*-coordinate of C′. The student may have identified the *y*-coordinate of C′ instead.

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Practice Test

Question 2

Question and Scoring Guidelines

Question 2

Which table represents a nonlinear function?

Ⓐ

x	y
−1	3
1	5
4	8
10	14

Ⓒ

x	y
2	−3
5	−9
7	−13
11	−21

Ⓑ

x	y
0	0
4	12
6	18
9	27

Ⓓ

x	y
2	5
4	17
8	65
10	101

Points Possible: 1

Content Cluster: Define, evaluate, and compare functions.

Content Standard: 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. (8.F.3)*

Scoring Guidelines

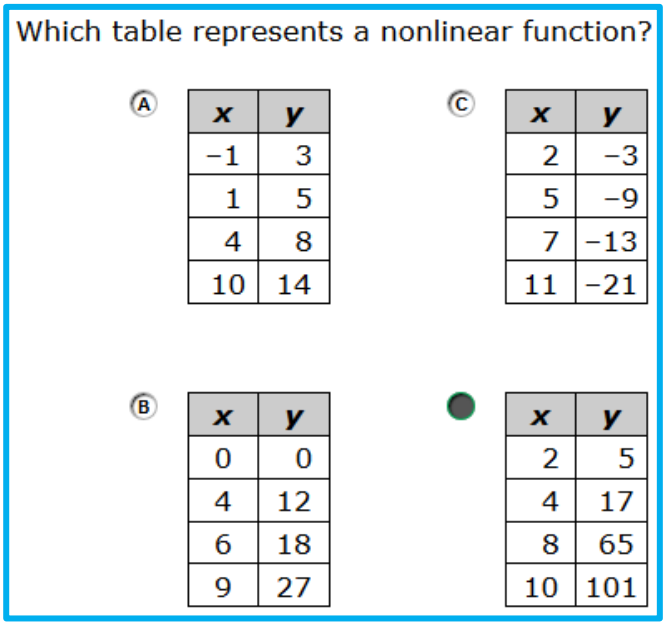
Rationale for Option A: This is incorrect. The student may not have identified the linear function as having the same rate of change.

Rationale for Option B: This is incorrect. The student may have incorrectly divided one of the rows, resulting in an inconsistent slope.

Rationale for Option C: This is incorrect. The student may have incorrectly handled the negative numbers in the *y*-column, resulting in an inconsistent slope.

Rationale for Option D: **Key** – The student correctly identified the nonlinear function as one having a different rate of change over equally sized intervals.

Sample Response: 1 point



Which table represents a nonlinear function?

Ⓐ

x	y
−1	3
1	5
4	8
10	14

Ⓒ

x	y
2	−3
5	−9
7	−13
11	−21

Ⓑ

x	y
0	0
4	12
6	18
9	27

●

x	y
2	5
4	17
8	65
10	101

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Question 3

Question and Scoring Guidelines

Question 3

The value of $\sqrt{k}$ lies between 2.2 and 2.3.

Select all possible values of k.

- [ ] 1.49
- [ ] 4.8
- [ ] 5
- [ ] 5.04
- [ ] 5.3
- [ ] 6

Points Possible: 1

Content Cluster: Know that there are numbers that are not rational, and approximate them by rational numbers.

Content Standard: Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions, e.g., π^2. *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. (8.NS.2)*

Scoring Guidelines

Rationale for First Option: This is incorrect. The student may choose a number that is between the square roots of 2.2 and 2.3.

Rationale for Second Option: This is incorrect. The student may choose a number whose square root is slightly outside of the range 2.2 – 2.3.

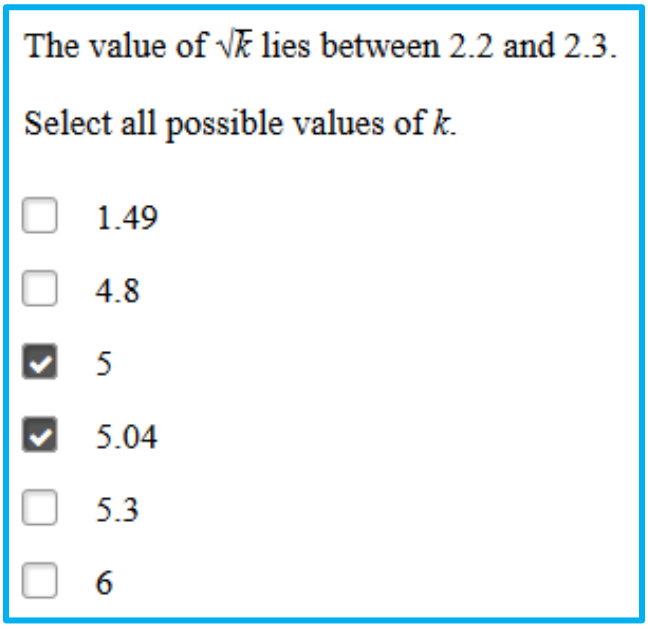
Rationale for Third Option: **Key** – The student correctly identifies that the square root of 5 is between 2.2 and 2.3.

Rationale for Fourth Option: **Key** – The student correctly identifies that the square root of 5.04 is between 2.2 and 2.3.

Rationale for Fifth Option: This is incorrect. The student may choose a number whose square root is slightly outside of the range 2.2 – 2.3.

Rationale for Sixth Option: This is incorrect. The student may think that the square root of 6 is in the range 2.2 – 2.3.

Sample Response: 1 point



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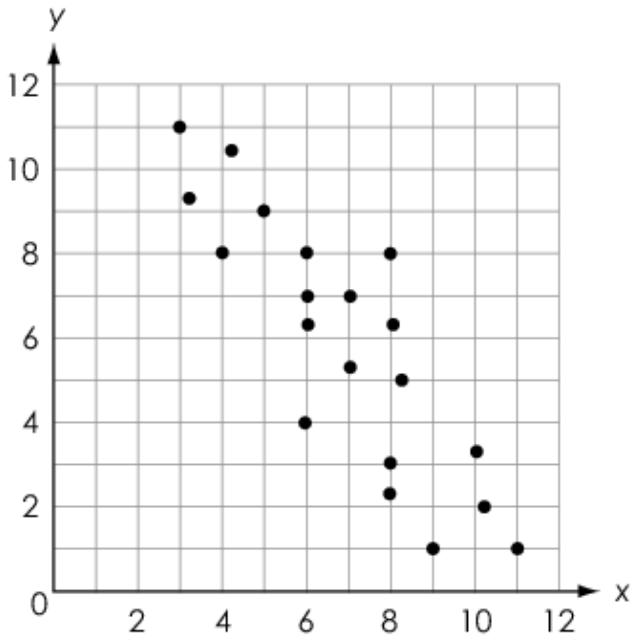
Question 4

Question and Scoring Guidelines

Question 4

A scatterplot is shown.



Which statement about the scatterplot is true?

Ⓐ There is no association between x and y.

Ⓑ There is a positive, linear association between x and y.

Ⓒ There is a negative, linear association between x and y.

Ⓓ There is a nonlinear association between x and y.

Points Possible: 1

Content Cluster: Investigate patterns of association in bivariate data.

Content Standard: Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering; outliers; positive, negative, or no association; and linear association, and nonlinear association. *(8.SP.1)*

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have thought that there is no association since the data points are not in a straight line.

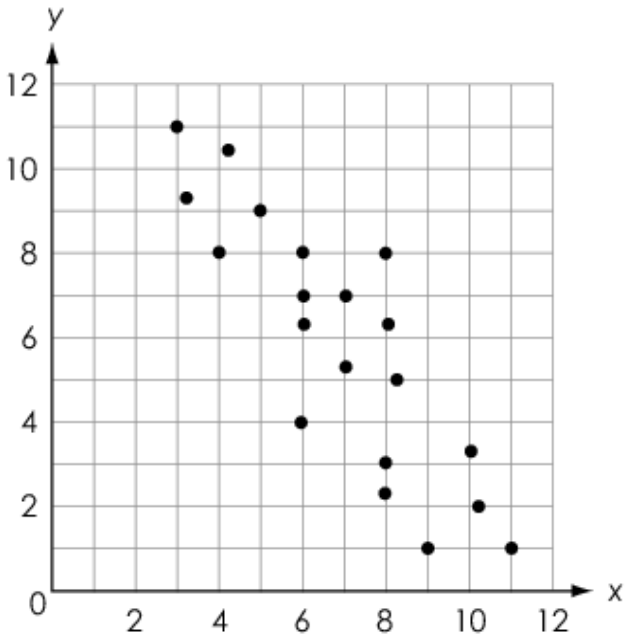
Rationale for Option B: This is incorrect. The student may have thought that since the data trend looks linear, there is a positive correlation.

Rationale for Option C: **Key** – The student selected the correct statement.

Rationale for Option D: This is incorrect. The student may have thought that the data follows a pattern that is not linear.

Sample Response: 1 point

A scatterplot is shown.



Which statement about the scatterplot is true?

Ⓐ There is no association between x and y.

Ⓑ There is a positive, linear association between x and y.

● There is a negative, linear association between x and y.

Ⓓ There is a nonlinear association between x and y.

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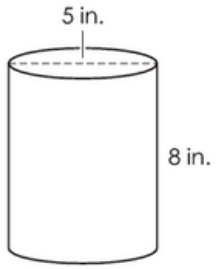
Question 5

Question and Scoring Guidelines

Question 5

A candle in the shape of a cylinder has the dimensions shown, in inches (in.).



What is the volume, in cubic inches $(in.^3)$, of the candle? Round your answer to the nearest hundredth.

$in.^3$

1	2	3
4	5	6
7	8	9
	0	
.	-	$\frac{\square}{\square}$

Points Possible: 1

Content Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Content Standard: Solve real-world and mathematical problems involving volumes of cones, cylinders, and spheres. *(8.G.9)*

Scoring Guidelines

Exemplar Response

- 157.08

Other Correct Responses

- Any value between 157 and 157.143

For this item, a full-credit response includes:

- A correct volume (1 point).

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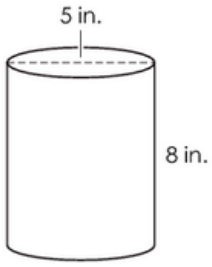
Math
Practice Test

Question 5

Sample Responses

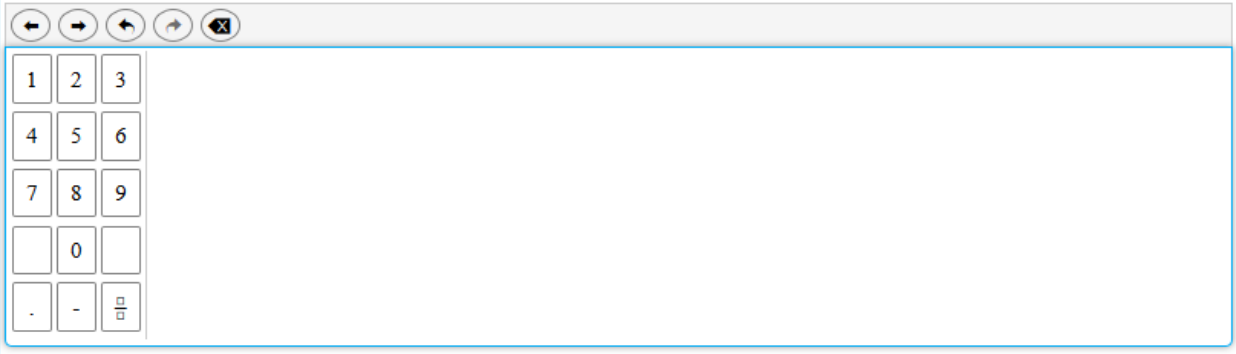
Sample Response: 1 point

A candle in the shape of a cylinder has the dimensions shown, in inches (in.).



What is the volume, in cubic inches $(in.^3)$, of the candle? Round your answer to the nearest hundredth.

157.08 $in.^3$



Notes on Scoring

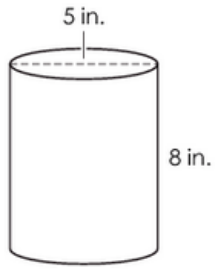
This response earns full credit (1 point) because the student correctly calculated the volume of the cylinder, probably using π, and rounded to the nearest hundredth.

$\pi \cdot 2.5^2 \cdot 8 = 50\pi$

≈ 157.08.

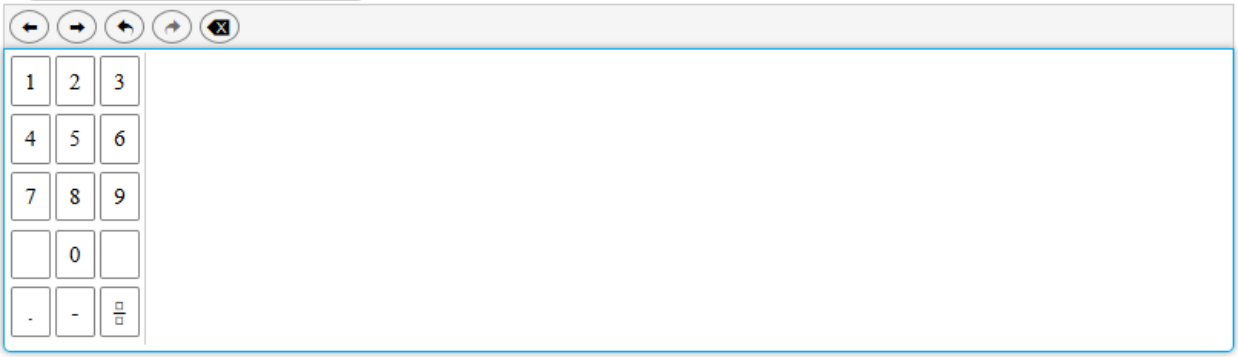
Sample Response: 1 point

A candle in the shape of a cylinder has the dimensions shown, in inches (in.).



What is the volume, in cubic inches $(in.^3)$, of the candle? Round your answer to the nearest hundredth.

157.14286 $in.^3$



Notes on Scoring

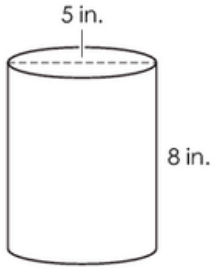
This response earns full credit (1 point) because the student correctly calculated the volume of the cylinder, probably using $\frac{22}{7}$ for pi.

$$\frac{22}{7} \cdot 2.5^2 \cdot 8 = \frac{1100}{7}$$
$$\approx 157.14286$$

Because standards at grade 6 and above assess content other than rounding, a range of values will be accepted as correct. Answers that are more precise than the rounding instructions will be accepted. Answers that are truncated can be less precise than the rounding instructions and therefore may fall outside the range of acceptable values.

Sample Response: 0 points

A candle in the shape of a cylinder has the dimensions shown, in inches (in.).



What is the volume, in cubic inches $(in.^3)$, of the candle? Round your answer to the nearest hundredth.

125.66 $in.^3$

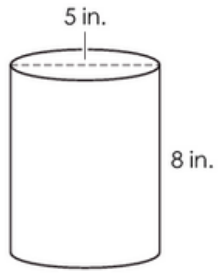
1 2 3
4 5 6
7 8 9
0
. -

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly calculate the volume of the cylinder. The student may have incorrectly calculated the circumference instead of the area of the base ($2 \cdot \pi \cdot 2.5$) and then multiplied by the height (8).

Sample Response: 0 points

A candle in the shape of a cylinder has the dimensions shown, in inches (in.).



What is the volume, in cubic inches $(in.^3)$, of the candle? Round your answer to the nearest hundredth.

628.32 $in.^3$

1 2 3
4 5 6
7 8 9
0
. - $\frac{\square}{\square}$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly calculate the volume of the cylinder. The student may have incorrectly used the diameter (5) instead of the radius (2.5) in the calculation of the area of the base and then multiplied by the height.

Grade 8
Math
Practice Test

Question 6

Question and Scoring Guidelines

Question 6

Select all of the equations that represent a nonlinear function.

- [ ] $y = 3x^2 + 9x + 6$
- [ ] $y = 3x - 10$
- [ ] $y = 2x + 9 + x$
- [ ] $y = x(3x + 10)$
- [ ] $y = \frac{x}{3} + 10$

Points Possible: 1

Content Cluster: Define, evaluate, and compare functions.

Content Standard: 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. (8.F.3)*

Scoring Guidelines

Rationale for First Option: **Key** – The student correctly identified that an equation that contains the term x^2 represents a nonlinear function.

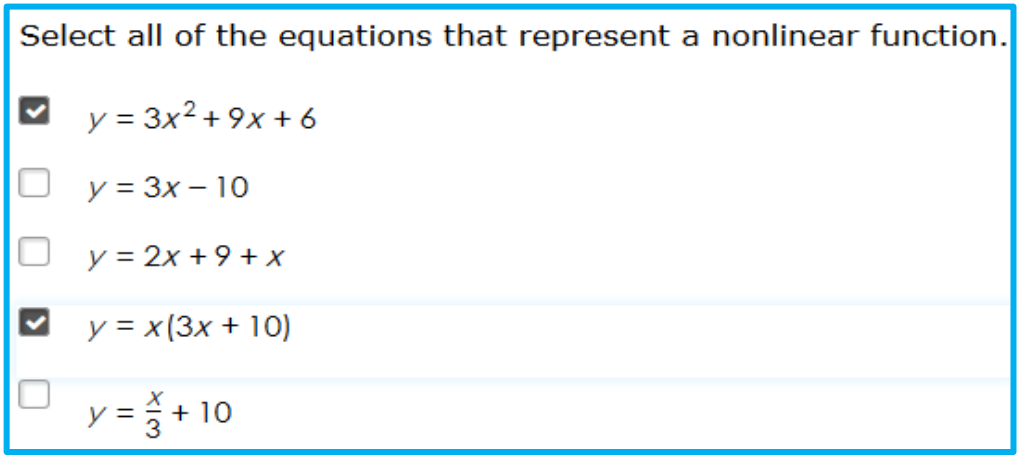
Rationale for Second Option: This is incorrect. The student may have identified the equation of a linear function instead of a nonlinear function.

Rationale for Third Option: This is incorrect. The student may have incorrectly combined like terms and believed the equation represented a nonlinear quadratic function.

Rationale for Fourth Option: **Key** – The student correctly identified an equation that, when the distributive property is applied, contains the term $3x^2$, and represents a nonlinear function.

Rationale for Fifth Option: This is incorrect. The student may have identified the equation of a linear function instead of a nonlinear function.

Sample Response: 1 point



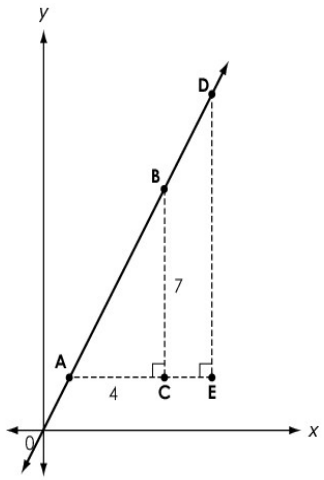
Grade 8
Math
Practice Test

Question 7

Question and Scoring Guidelines

Question 7

A figure is shown, where triangle ABC is similar to triangle ADE. The location of point A is (1.2, 2.1). The line connecting points A, B, and D passes through the origin.



What is a possible ordered pair for point D?

(,)

Points Possible: 1

Content Cluster: Understand the connections between proportional relationships, lines, and linear equations.

Content Standard: 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*. *(8.EE.6)*

Scoring Guidelines

Exemplar Response

- (8, 14)

Other Correct Responses

- Any correct ordered pair that satisfies the equation $y = \frac{7}{4}x$, where $x > 5.2$

For this item, a full-credit response includes:

- A correct set of coordinates (1 point).

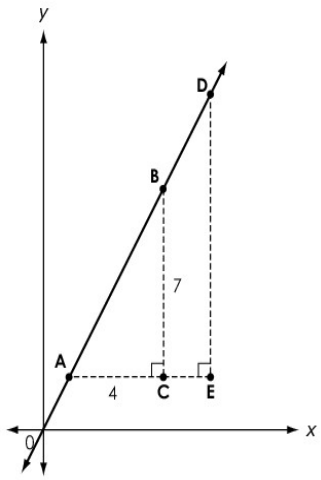
Grade 8
Math
Practice Test

Question 7

Sample Responses

Sample Response: 1 point

A figure is shown, where triangle ABC is similar to triangle ADE. The location of point A is (1.2, 2.1). The line connecting points A, B, and D passes through the origin.



What is a possible ordered pair for point D?

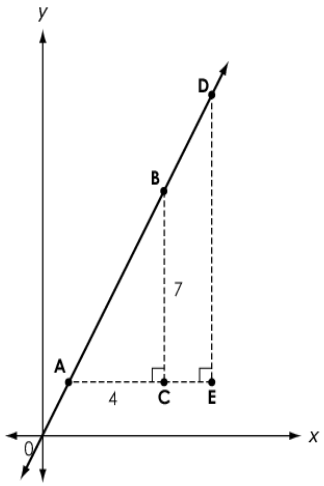
(8 , 14)

Notes on Scoring

This response earns full credit (1 point) because the student correctly identified an ordered pair that satisfies the equation $y = \frac{7}{4}x$ where $x > 5.2$.

Sample Response: 1 point

A figure is shown, where triangle ABC is similar to triangle ADE. The location of point A is (1.2, 2.1). The line connecting points A, B, and D passes through the origin.



What is a possible ordered pair for point D?

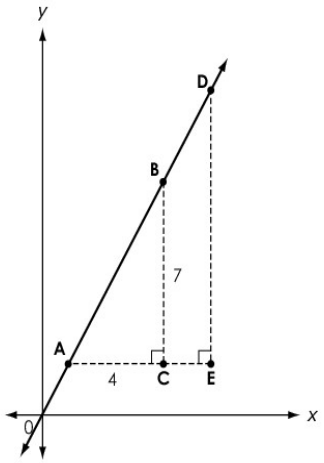
(6 , 10.5)

Notes on Scoring

This response earns full credit (1 point) because the student correctly identified an ordered pair that satisfies the equation $y = \frac{7}{4}x$ where $x > 5.2$.

Sample Response: 0 points

A figure is shown, where triangle ABC is similar to triangle ADE. The location of point A is (1.2, 2.1). The line connecting points A, B, and D passes through the origin.



What is a possible ordered pair for point D?

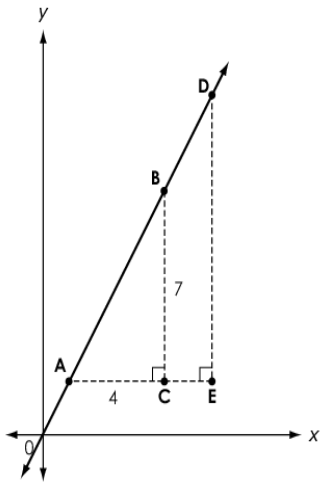
(4 , 7)

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify an ordered pair that satisfies the equation $y = \frac{7}{4}x$ where $x > 5.2$. Instead, the student identified a point between points A and B.

Sample Response: 0 points

A figure is shown, where triangle ABC is similar to triangle ADE. The location of point A is (1.2, 2.1). The line connecting points A, B, and D passes through the origin.



What is a possible ordered pair for point D?

(1 , 1.75)

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify an ordered pair that satisfies the equation $y = \frac{7}{4}x$, where $x > 5.2$. Instead, the student identified a point between the origin and point A.

Grade 8
Math
Practice Test

Question 8

Question and Scoring Guidelines

Question 8

An expression is shown.

$2.1 \times 10^5 + 4.3 \times 10^4$

Which expression is equivalent?

(A) 2.53×10^4

(B) 2.53×10^5

(C) 6.4×10^5

(D) 6.4×10^9

Points Possible: 1

Content Cluster: Work with radicals and integer exponents.

Content Standard: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities, e.g., use millimeters per year for seafloor spreading. Interpret scientific notation that has been generated by technology. *(8.EE.4)*

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have added to obtain the correct coefficient but made a mistake on the power of 10.

Rationale for Option B: **Key** – The student correctly added the two numbers expressed in scientific notation.

Rationale for Option C: This is incorrect. The student may have added the coefficients together without looking at the place value of the numbers.

Rationale for Option D: This is incorrect. The student may have added the coefficients together without looking at the place value of the numbers, and then added the powers of 10 together.

Sample Response: 1 point

An expression is shown.

$2.1 \times 10^5 + 4.3 \times 10^4$

Which expression is equivalent?

Ⓐ 2.53×10^4

● 2.53×10^5

Ⓒ 6.4×10^5

Ⓓ 6.4×10^9

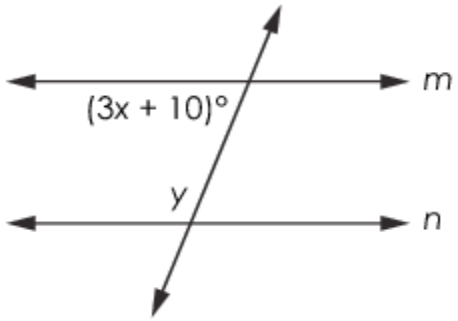
Grade 8
Math
Practice Test

Question 9

Question and Scoring Guidelines

Question 9

A diagram with line *m* parallel to line *n* is shown.



Express the value of *y* in terms of *x*.

$y =$

1	2	3	x							
4	5	6	+	-	•	÷				
7	8	9	<	≤	=	≥	>			
	0		$\square^{\square}$	( )	| |	$\sqrt{\square}$	$\sqrt[\square]{\square}$	π		
.	-	$\frac{\square}{\square}$								

Points Possible: 1

Content Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Content Standard: 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. (8.G.5)*

Scoring Guidelines

Exemplar Response

- $y = 170 - 3x$

Other Correct Responses

- Any equivalent equation

For this item, a full-credit response includes:

- A correct equation (1 point).

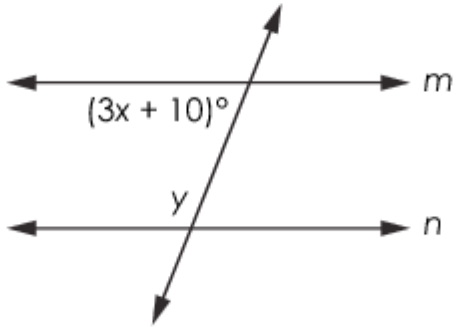
Grade 8
Math
Practice Test

Question 9

Sample Responses

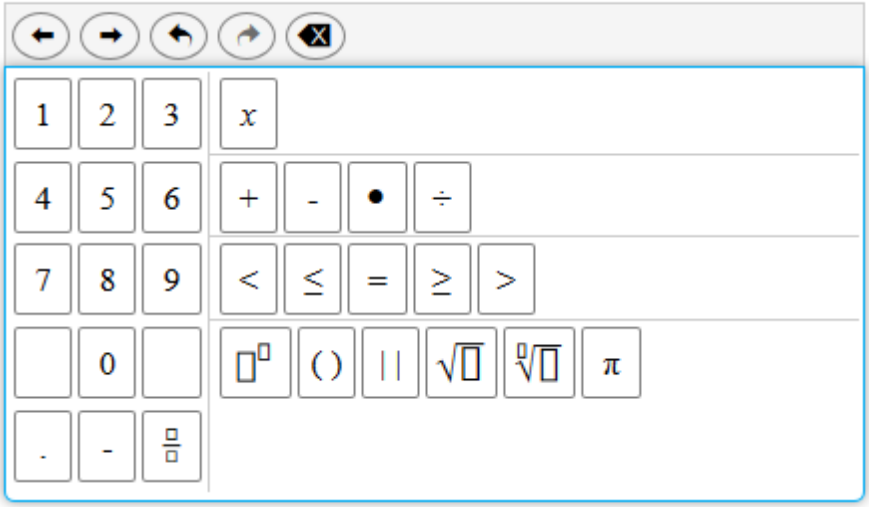
Sample Response: 1 point

A diagram with line *m* parallel to line *n* is shown.



Express the value of *y* in terms of *x*.

$y = 170 - 3x$



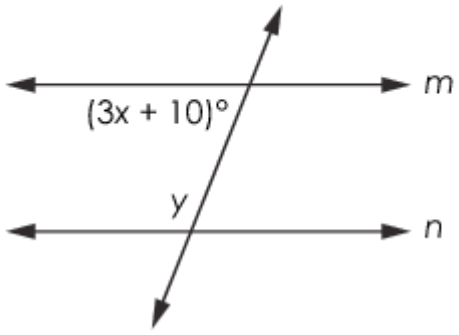
Notes on Scoring

This response earns full credit (1 point) because the student correctly expressed the value of *y* in terms of *x*.

y = 180 – (3*x* + 10), using the distributive property gives
y = 180 – 3*x* – 10, combining like terms gives
y = 170 – 3*x*

Sample Response: 1 point

A diagram with line *m* parallel to line *n* is shown.



Express the value of *y* in terms of *x*.

$y = 180-(3x+10)$

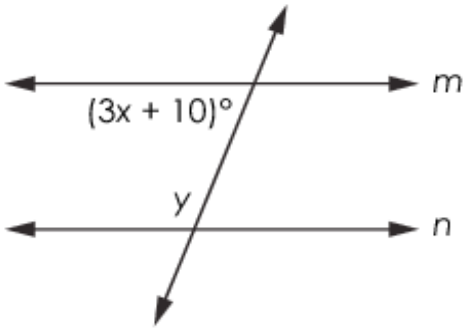
1	2	3	x							
4	5	6	+	-	•	÷				
7	8	9	<	≤	=	≥	>			
	0		$\square^{\square}$	( )	| |	$\sqrt{\square}$	$\sqrt[\square]{\square}$	π		
.	-	$\frac{\square}{\square}$								

Notes on Scoring

This response earns full credit (1 point) because the student correctly expressed the value of *y* in terms of *x*, without combining like terms.

Sample Response: 0 points

A diagram with line *m* parallel to line *n* is shown.



Express the value of *y* in terms of *x*.

$y =$ $3x+10$

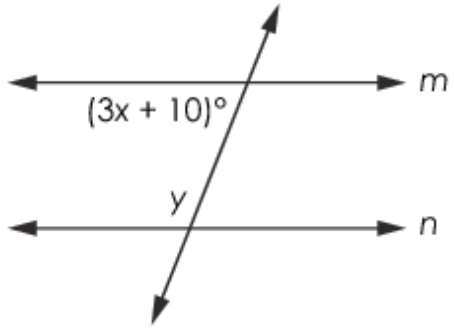
1	2	3	x						
4	5	6	+	-	•	÷			
7	8	9	<	≤	=	≥	>		
	0		$\square^{\square}$	( )	| |	$\sqrt{\square}$	$\sqrt[\square]{\square}$	π	
.	-	$\frac{\square}{\square}$							

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly express the value of *y* in terms of *x*. The student may have thought that angle *y* is equal to the given angle measurement.

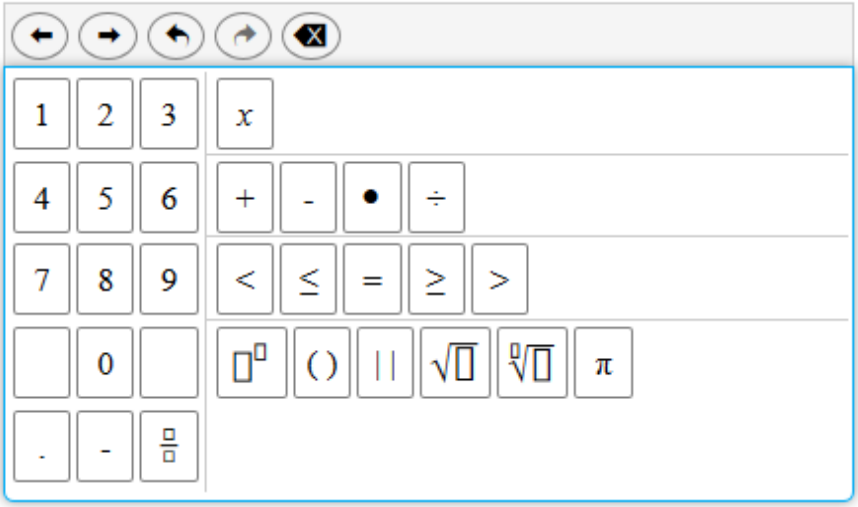
Sample Response: 0 points

A diagram with line *m* parallel to line *n* is shown.



Express the value of *y* in terms of *x*.

$y = 180-3x+10$



Notes on Scoring

This response earns no credit (0 points) because the student did not correctly express the value of *y* in terms of *x*. The student may have deleted the parentheses without distributing –1 to the terms in the parentheses.

Grade 8
Math
Practice Test

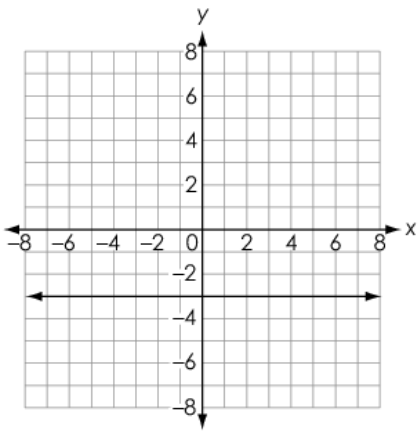
Question 10

Question and Scoring Guidelines

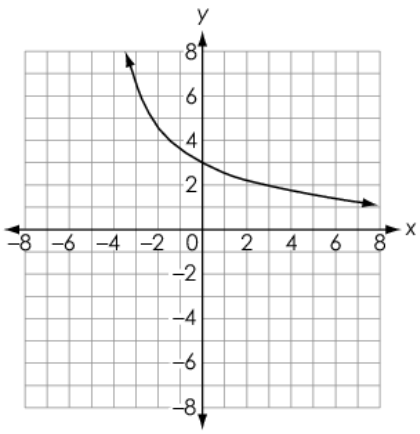
Question 10

Which graph represents a function that is decreasing at a nonconstant rate?

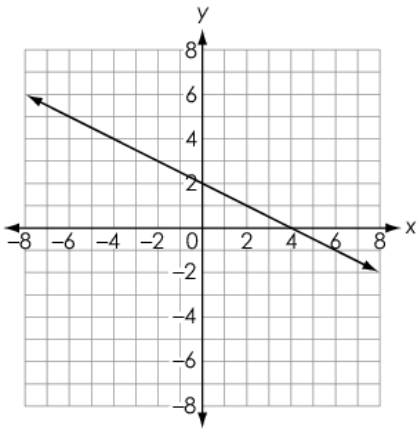
Ⓐ



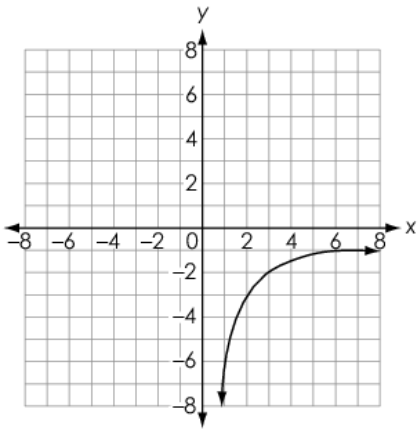
Ⓒ



Ⓑ



Ⓓ



Points Possible: 1

Content Cluster: Use functions to model relationships between quantities.

Content Standard: 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. *(8.F.5)*

Scoring Guidelines

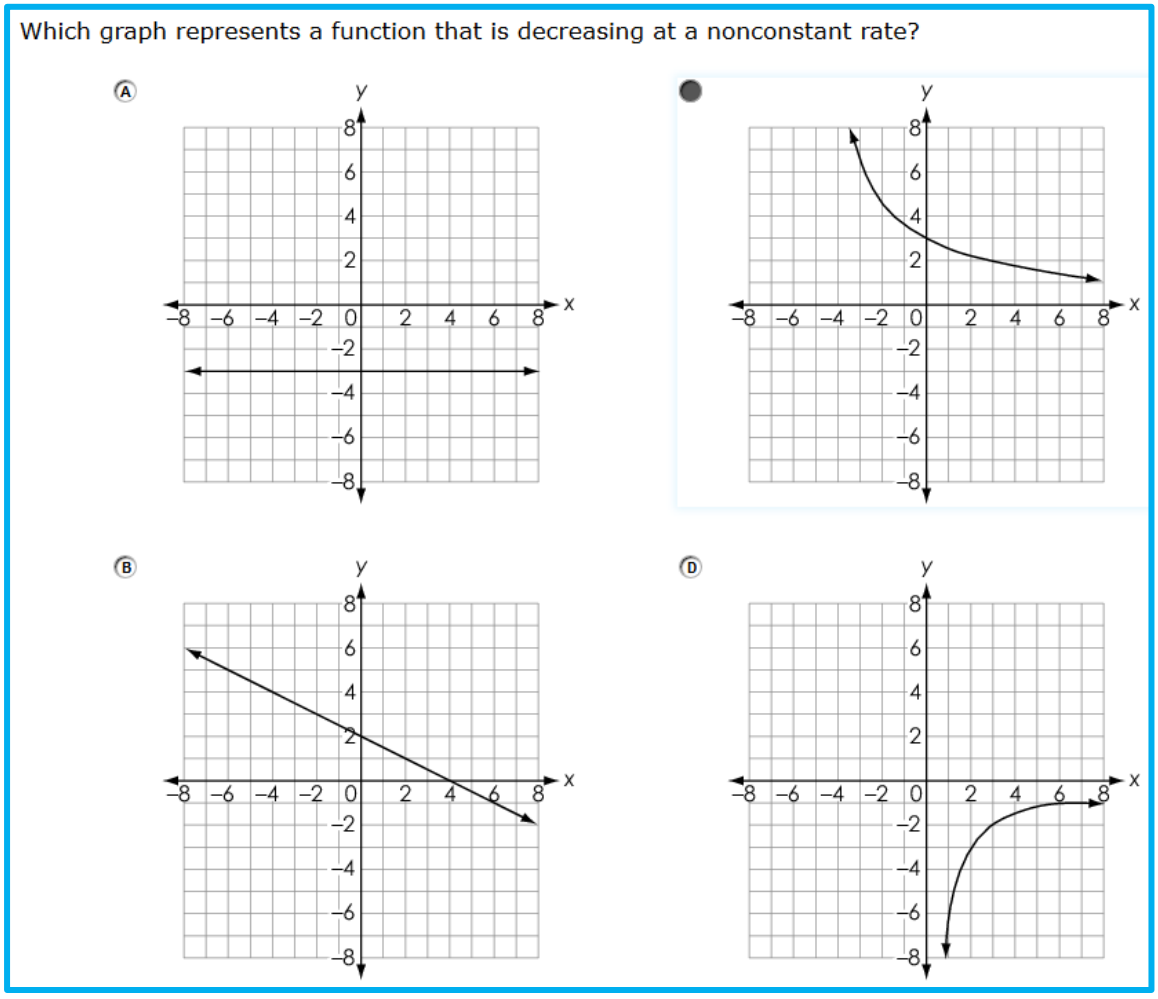
Rationale for Option A: This is incorrect. The student may have thought that a graph showing only negative *y*-values is decreasing and overlooked that it is linear.

Rationale for Option B: This is incorrect. The student correctly noted that the function is decreasing but overlooked that it is linear.

Rationale for Option C: **Key** – The student correctly noted that the function is decreasing and nonlinear.

Rationale for Option D: This is incorrect. The student correctly noted that the function is nonlinear, but may have thought that it is decreasing because the range is negative values.

Sample Response: 1 point



Grade 8
Math
Practice Test

Question 11

Question and Scoring Guidelines

Question 11

Select a box to identify whether each equation has no solution, one solution, or infinitely many solutions.

	No Solution	One Solution	Infinitely Many Solutions
$-2x+3=-3x+2$	☐	☐	☐
$-2x+3=-2x+3$	☐	☐	☐
$-2x+3=2x+3$	☐	☐	☐

Points Possible: 1

Content Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations.

Content Standard: Solve linear equations in one variable.
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). *(8.EE.7a)*

Scoring Guidelines

For this item, a full-credit response includes:

- "One Solution" selected for "$-2x + 3 = -3x + 2$";
  AND
- "Infinitely Many Solutions" selected for "$-2x + 3 = -2x + 3$";
  AND
- "One Solution" selected for "$-2x + 3 = 2x + 3$" (1 point).

Sample Response: 1 point

Select a box to identify whether each equation has no solution, one solution, or infinitely many solutions.

	No Solution	One Solution	Infinitely Many Solutions
$-2x+3=-3x+2$	☐	☑	☐
$-2x+3=-2x+3$	☐	☐	☑
$-2x+3=2x+3$	☐	☑	☐

Notes on Scoring

In this item students can only select one option per row.

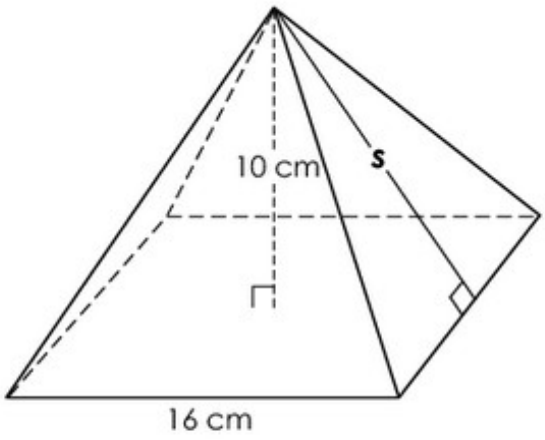
Grade 8
Math
Practice Test

Question 12

Question and Scoring Guidelines

Question 12

A right square pyramid is shown.



The height is 10 centimeters and the side length of the base is 16 centimeters.

What is the length, in centimeters (cm), of s?

$s =$ cm

Points Possible: 1

Content Cluster: Understand and apply the Pythagorean Theorem.

Content Standard: Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. *(8.G.7)*

Scoring Guidelines

Exemplar Response

- $\sqrt{164}\ cm$

Other Correct Responses

- Any value between 12.8 and 12.81, inclusive

For this item, a full-credit response includes:

- The correct value (1 point).

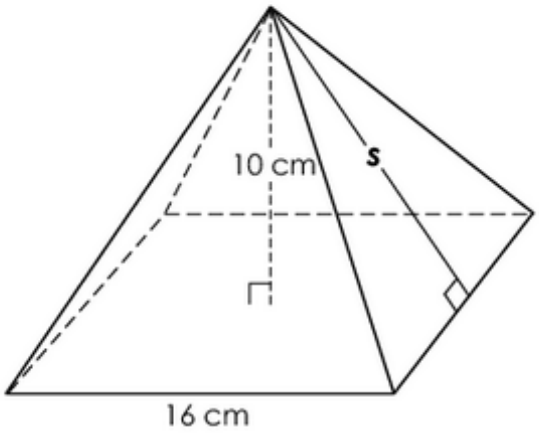
Grade 8
Math
Practice Test

Question 12

Sample Responses

Sample Response: 1 point

A right square pyramid is shown.



The height is 10 centimeters and the side length of the base is 16 centimeters.

What is the length, in centimeters (cm), of s?

$s =$ $\sqrt{164}$ cm

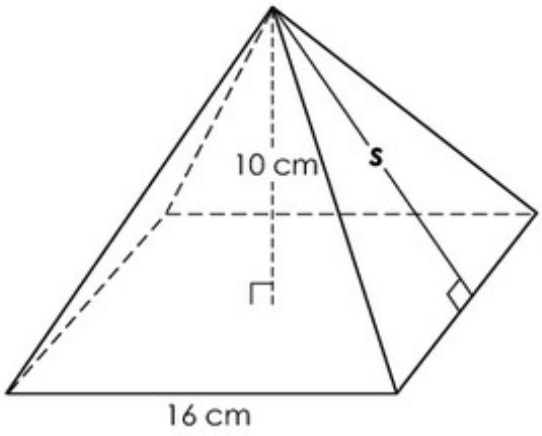
Notes on Scoring

This response earns full credit (1 point) because the student correctly applied the Pythagorean Theorem to determine the unknown side length, *s*, in the right triangle inside the right square pyramid.

$a^2 + b^2 = c^2$
$10^2 + 8^2 = c^2$
$100 + 64 = c^2$
$\sqrt{164} = c$

Sample Response: 1 point

A right square pyramid is shown.



The height is 10 centimeters and the side length of the base is 16 centimeters.

What is the length, in centimeters (cm), of s?

$s =$ 12.81 *cm*

Notes on Scoring

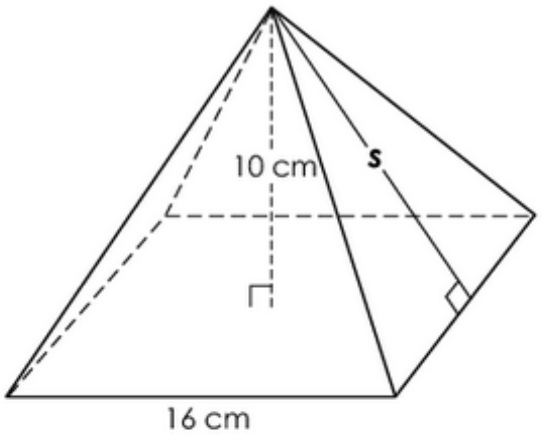
This response earns full credit (1 point) because the student correctly applied the Pythagorean Theorem to determine the unknown side length, *s*, in the right triangle inside the right square pyramid.

$a^2 + b^2 = c^2$
$10^2 + 8^2 = c^2$
$100 + 64 = c^2$
$\sqrt{164} = c$

$\sqrt{164} \approx 12.8062$
≈ 12.81

Sample Response: 0 points

A right square pyramid is shown.



The height is 10 centimeters and the side length of the base is 16 centimeters.

What is the length, in centimeters (cm), of s?

$s =$ $\sqrt{356}$ cm

Notes on Scoring

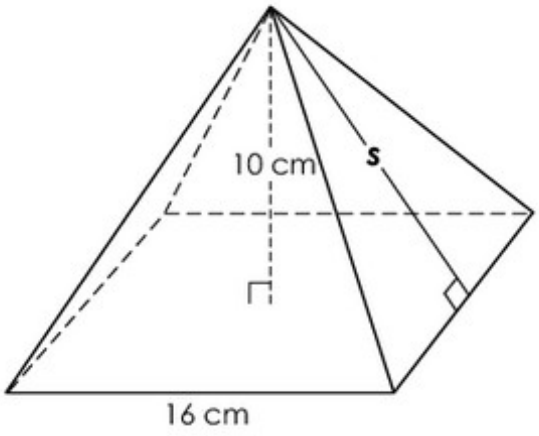
This response earns no credit (0 points) because the student did not correctly apply the Pythagorean Theorem to determine the unknown side length, s, in the right triangle inside the right square pyramid.

The student may have used the full side length of the pyramid, 16 cm, instead of dividing it by 2 when using the Pythagorean Theorem.

$$a^2 + b^2 = c^2$$
$$16^2 + 10^2 = c^2$$
$$256 + 100 = c^2$$
$$356 = c^2$$
$$\sqrt{356} = c$$

Sample Response: 0 points

A right square pyramid is shown.



The height is 10 centimeters and the side length of the base is 16 centimeters.

What is the length, in centimeters (cm), of s?

$s =$ 6 cm

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly apply the Pythagorean Theorem to determine the unknown side length, s, in the right triangle inside the right square pyramid.

The student may have subtracted 10 from 16 to get 6.

Grade 8
Math
Practice Test

Question 13

Question and Scoring Guidelines

Question 13

The density of an object is given by the equation shown.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

A scientist has evidence that a newly discovered planet has a mass of 7.0×10^{24} kilograms (kg) and a volume of 3.5×10^{12} cubic kilometers (km^3).

What is the planet's density?

(A) $2.0 \times 10^{2} \frac{kg}{km^3}$

(B) $2.0 \times 10^{12} \frac{kg}{km^3}$

(C) $2.0 \times 10^{36} \frac{kg}{km^3}$

(D) $3.5 \times 10^{2} \frac{kg}{km^3}$

Points Possible: 1

Content Cluster: Work with radicals and integer exponents.

Content Standard: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities, e.g., use millimeters per year for seafloor spreading. Interpret scientific notation that has been generated by technology. *(8.EE.4)*

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have divided the exponents in addition to the coefficients.

Rationale for Option B: **Key** – The student identified the correct density.

Rationale for Option C: This is incorrect. The student may have divided the coefficients but added the exponents.

Rationale for Option D: This is incorrect. The student may have subtracted the coefficients and divided the exponents.

Sample Response: 1 point

The density of an object is given by the equation shown.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

A scientist has evidence that a newly discovered planet has a mass of 7.0×10^{24} kilograms (kg) and a volume of 3.5×10^{12} cubic kilometers (km^3).

What is the planet's density?

Ⓐ $2.0 \times 10^{2} \frac{kg}{km^3}$

● $2.0 \times 10^{12} \frac{kg}{km^3}$

Ⓒ $2.0 \times 10^{36} \frac{kg}{km^3}$

Ⓓ $3.5 \times 10^{2} \frac{kg}{km^3}$

Grade 8
Math
Practice Test

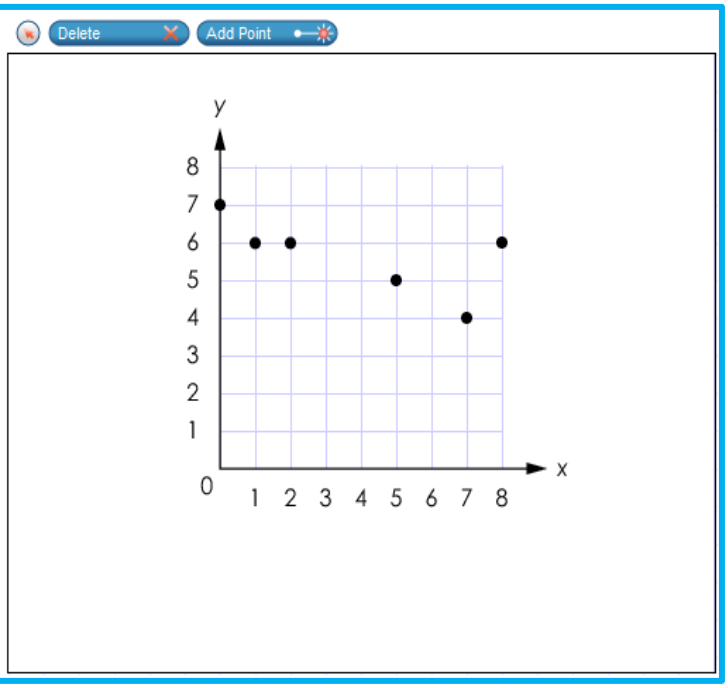
Question 14

Question and Scoring Guidelines

Question 14

Brett creates a function of x with seven points, each in a different location on the grid. He graphs six of the points as shown.

Use the Add Point tool to show the location of a point that could be the seventh point of Brett's function.



Points Possible: 1

Content Cluster: Define, evaluate, and compare functions.

Content Standard: 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. Function notation is not required in Grade 8. *(8.F.1)*

Scoring Guidelines

Exemplar Response

- A point at (3, 2)

Other Correct Responses

- Any point with an *x*-coordinate of 3, 4 or 6
- Multiple correct points can be plotted

For this item, a full-credit response includes:

- A correct point (1 point).

Grade 8
Math
Practice Test

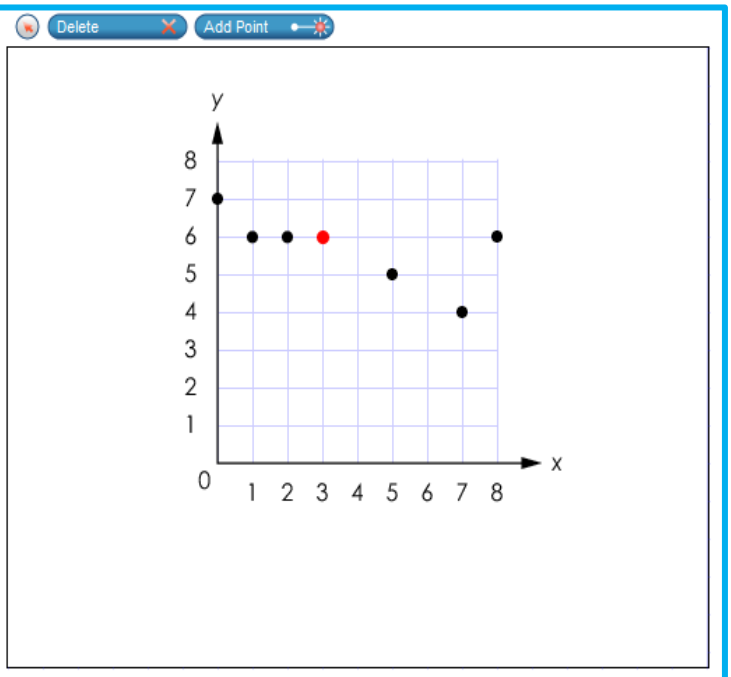
Question 14

Sample Responses

Sample Response: 1 point

Brett creates a function of x with seven points, each in a different location on the grid. He graphs six of the points as shown.

Use the Add Point tool to show the location of a point that could be the seventh point of Brett's function.



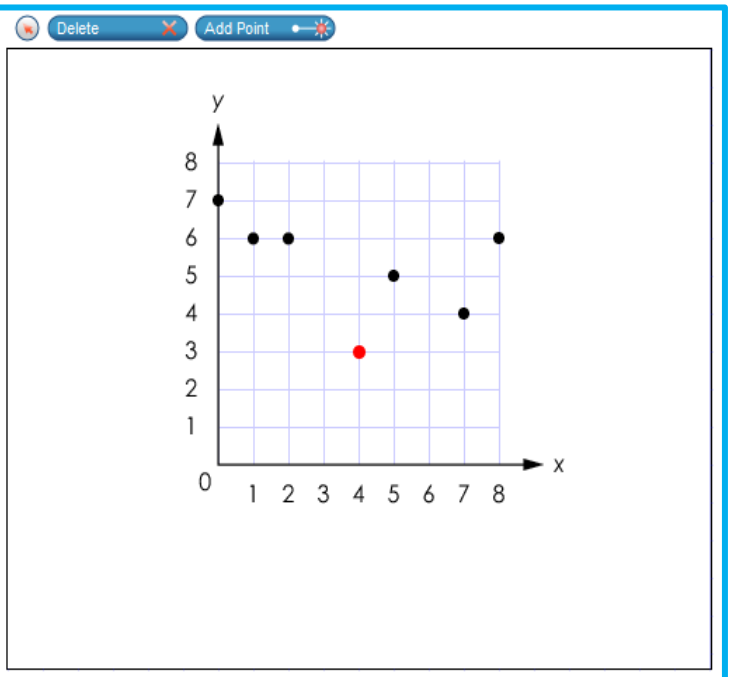
Notes on Scoring

This response earns full credit (1 point) because the student correctly placed a possible seventh point. Each input (x-value) has exactly one output (y-value).

Sample Response: 1 point

Brett creates a function of x with seven points, each in a different location on the grid. He graphs six of the points as shown.

Use the Add Point tool to show the location of a point that could be the seventh point of Brett's function.



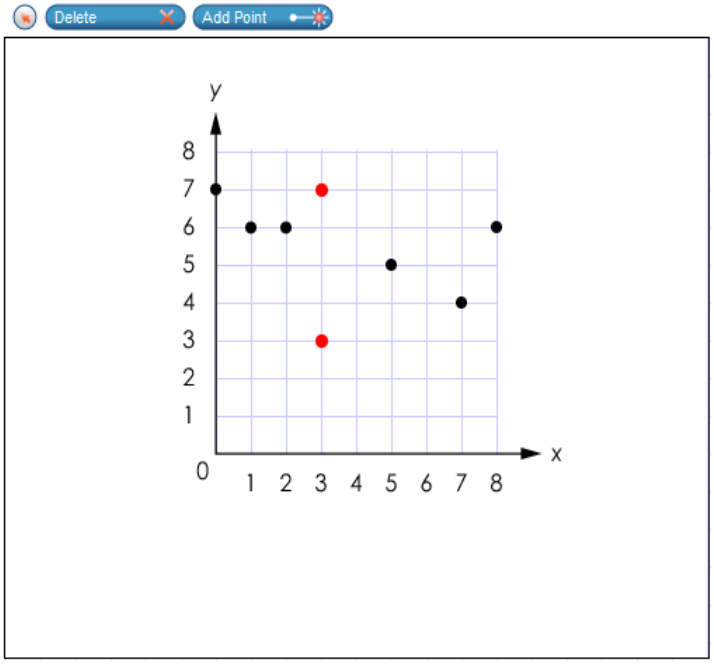
Notes on Scoring

This response earns full credit (1 point) because the student correctly placed a possible seventh point. Each input (x-value) has exactly one output (y-value).

Sample Response: 0 points

Brett creates a function of x with seven points, each in a different location on the grid. He graphs six of the points as shown.

Use the Add Point tool to show the location of a point that could be the seventh point of Brett's function.



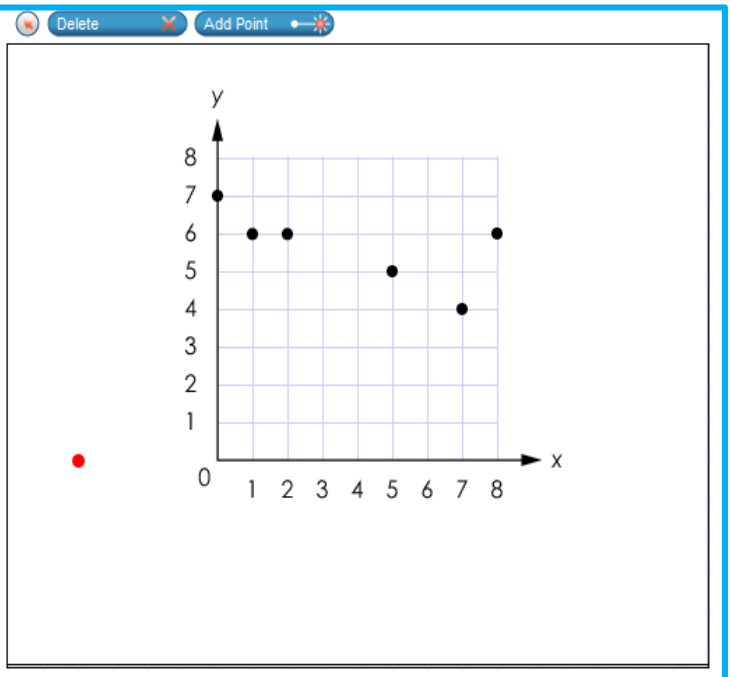
Notes on Scoring

This response earns no credit (0 points) because the student placed two points with the same input (x-value) but with different outputs (y-value). In a function each input needs to have exactly one output.

Sample Response: 0 points

Brett creates a function of x with seven points, each in a different location on the grid. He graphs six of the points as shown.

Use the Add Point tool to show the location of a point that could be the seventh point of Brett's function.



Notes on Scoring

This response earns no credit (0 points) because the student did not add a possible seventh point to the grid. The computer scoring cannot score points outside of the grid.

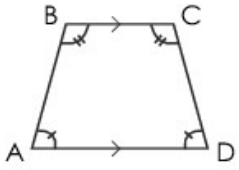
Grade 8
Math
Practice Test

Question 15

Question and Scoring Guidelines

Question 15

Isosceles trapezoid ABCD is shown. It is rotated to create trapezoid EFGH.



Which statement is true?

Ⓐ $\overline{EF} \parallel \overline{HG}$

Ⓑ $\angle A \cong \angle F$

Ⓒ $\angle B \cong \angle H$

Ⓓ $\overline{FG} \parallel \overline{EH}$

Points Possible: 1

Content Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Content Standard: Verify experimentally the properties of rotations, reflections, and translations (include examples both with and without coordinates).
c. Parallel lines are taken to parallel lines. *(8.G.1c)*

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have rotated the labels on the vertices, making angle E correspond to the original angle B.

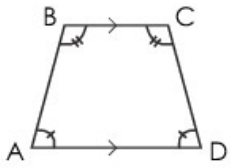
Rationale for Option B: This is incorrect. The student may have thought that since the trapezoid was rotated, the corresponding angles change.

Rationale for Option C: This is incorrect. The student may have thought that since the trapezoid was rotated, opposite angle measures could be congruent.

Rationale for Option D: **Key** – The student correctly determined the parallel sides of the rotated trapezoid.

Sample Response: 1 point

Isosceles trapezoid ABCD is shown. It is rotated to create trapezoid EFGH.



Which statement is true?

Ⓐ $\overline{EF} \parallel \overline{HG}$

Ⓑ $\angle A \cong \angle F$

Ⓒ $\angle B \cong \angle H$

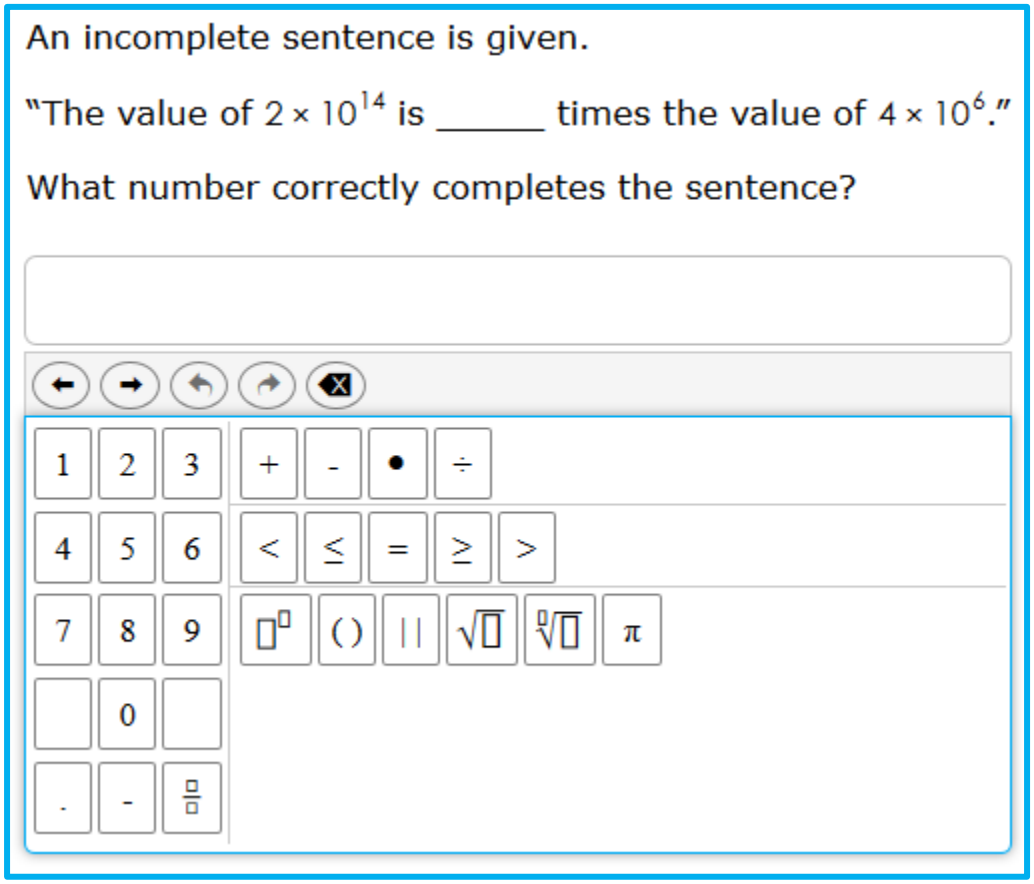
● $\overline{FG} \parallel \overline{EH}$

Grade 8
Math
Practice Test

Question 16

Question and Scoring Guidelines

Question 16



Points Possible: 1

Content Cluster: Work with radicals and integer exponents.

Content Standard: 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. (8.EE.3)*

Scoring Guidelines

Exemplar Response

- $5 \bullet 10^7$

Other Correct Responses

- Any equivalent value

For this item, a full-credit response includes:

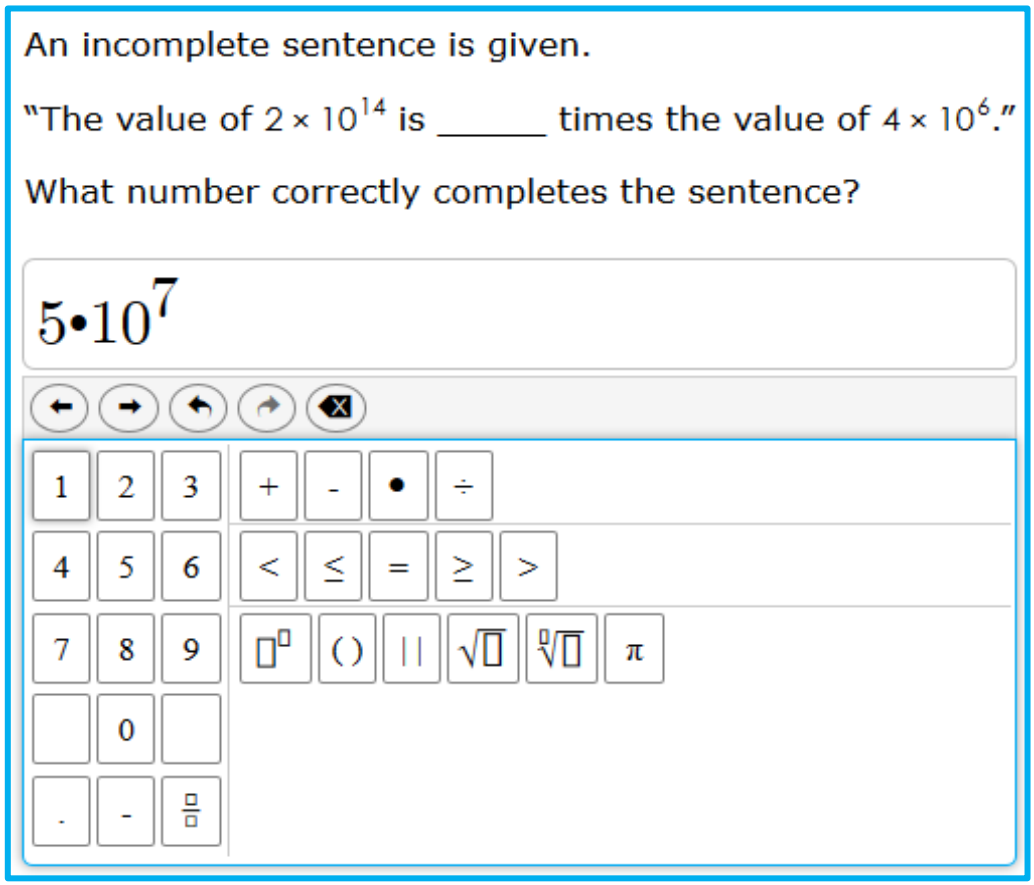
- A correct value (1 point).

Grade 8
Math
Practice Test

Question 16

Sample Responses

Sample Response: 1 point



Notes on Scoring

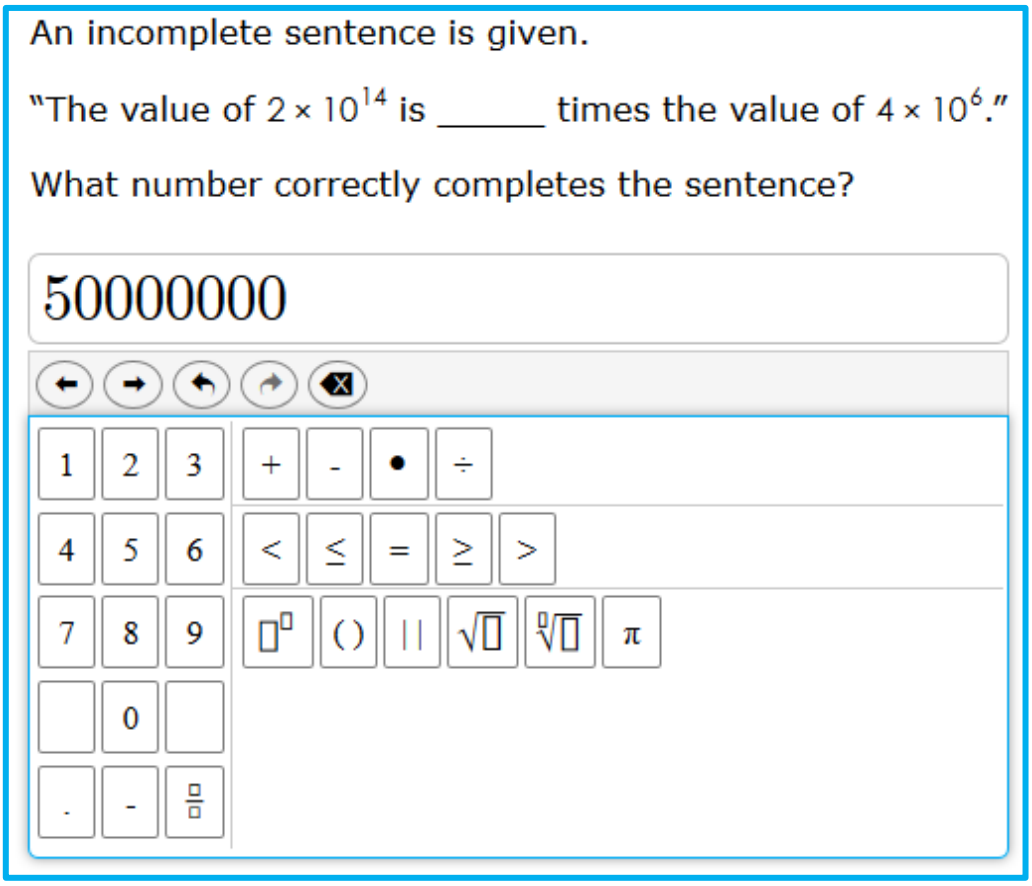
This response earns full credit (1 point) because the student correctly expressed how many times as much one value is than the other.

$$\frac{2 \cdot 10^{14}}{4 \cdot 10^{6}} = \frac{2 \cdot 10^{8}}{4}$$

$$= \frac{20 \cdot 10^{7}}{4}$$

$$= 5 \cdot 10^{7}$$

Sample Response: 1 point



Notes on Scoring

This response earns full credit (1 point) because the student correctly expressed how many times as much one value is than the other.

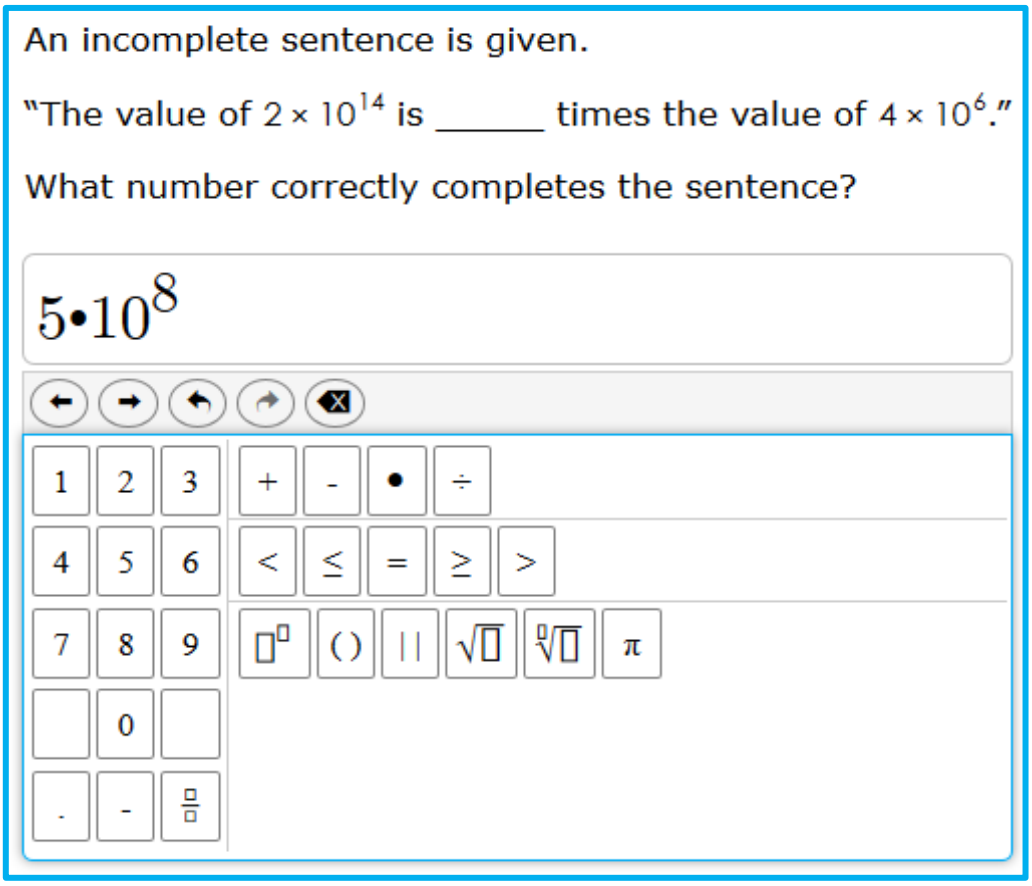
$$\frac{2 \cdot 10^{14}}{4 \cdot 10^{6}} = \frac{200{,}000{,}000{,}000{,}000}{4{,}000{,}000}$$

$$= \frac{200{,}000{,}000}{4}$$

$$= 50{,}000{,}000$$

$$= 5 \cdot 10^{7}$$

Sample Response: 0 points



Notes on Scoring

This response earns no credit (0 points) because the student did not correctly express how many times as much one value is than the other.

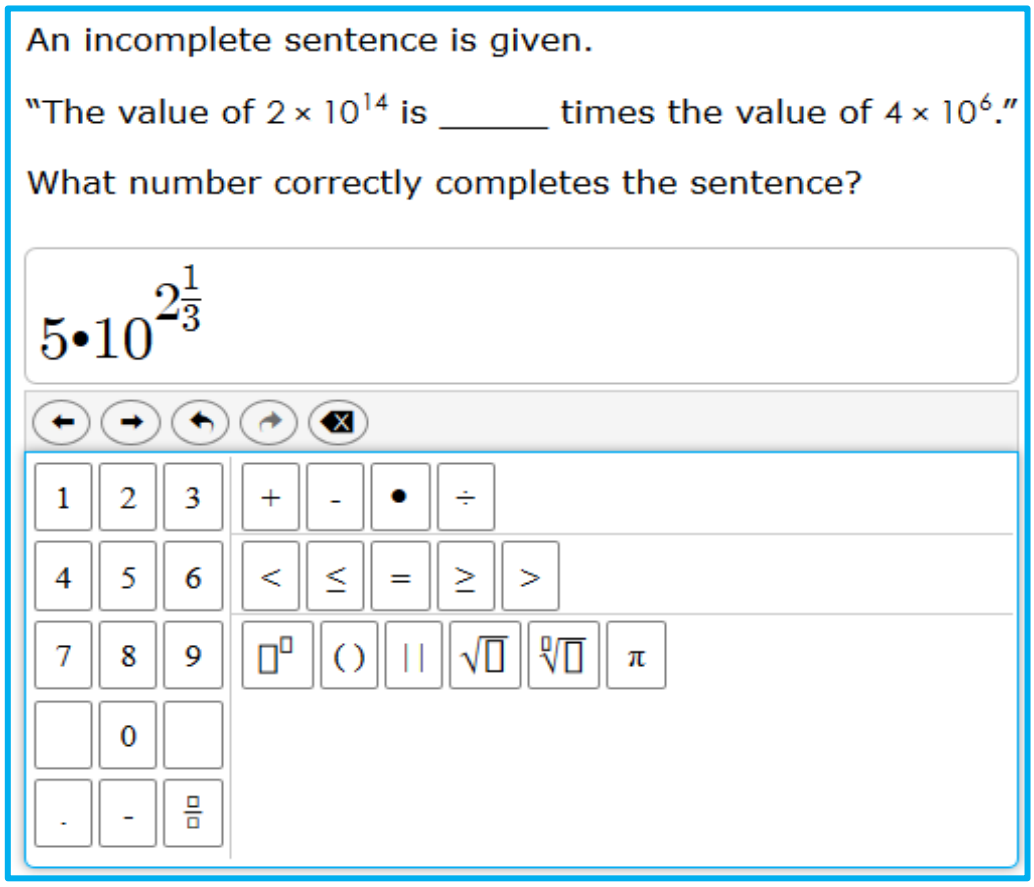
$$\frac{2 \cdot 10^{14}}{4 \cdot 10^{6}} = \frac{200{,}000{,}000{,}000{,}000}{4{,}000{,}000}$$

$$= \frac{200{,}000{,}000}{4}$$

$$= 50{,}000{,}000$$

The student may have counted the number of digits in the number to determine the exponent on the 10.

Sample Response: 0 points



Notes on Scoring

This response earns no credit (0 points) because the student did not correctly express how many times as much one value is than the other.

$\frac{2 \cdot 10^{14}}{4 \cdot 10^{6}}$

The student may have divided the two numbers correctly to get the 5, then incorrectly divided the exponents $\frac{14}{6}$ to get $2\frac{1}{3}$ as an exponent.

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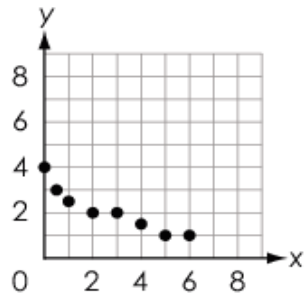
Math
Practice Test

Question 17

Question and Scoring Guidelines

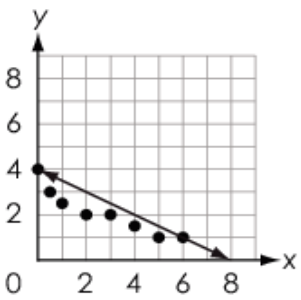
Question 17

A scatterplot of some data is shown.

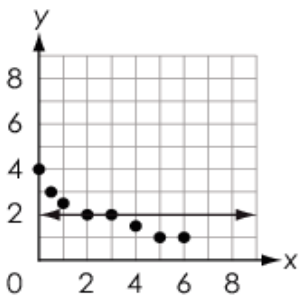


Which model **best** represents the data?

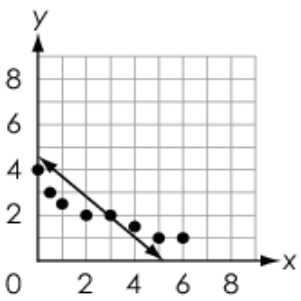
Ⓐ



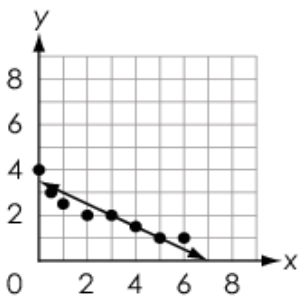
Ⓒ



Ⓑ



Ⓓ



Points Possible: 1

Content Cluster: Investigate patterns of association in bivariate data.

Content Standard: Understand that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. *(8.SP.2)*

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have thought that the line that goes through the first and last point was the line of best fit.

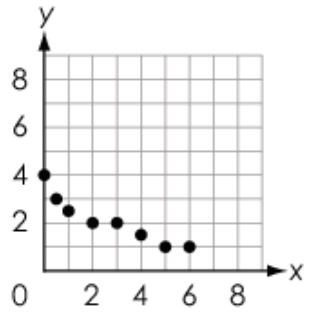
Rationale for Option B: This is incorrect. The student may have thought that the line of best fit needed to go through the middle point with close to the same number of points above and below.

Rationale for Option C: This is incorrect. The student may have thought that the line of best fit should be a horizontal line that divides the points in half so there is an equal number above and below the line.

Rationale for Option D: **Key** – The student correctly identified the model that best fits the data.

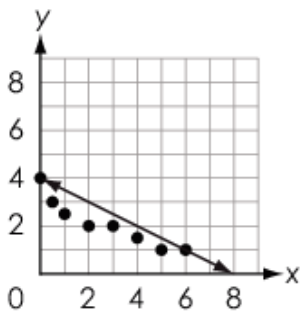
Sample Response: 1 point

A scatterplot of some data is shown.

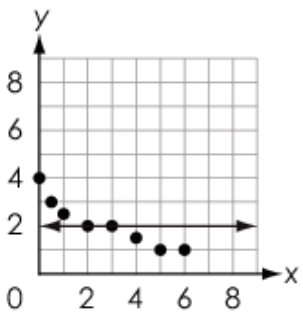


Which model **best** represents the data?

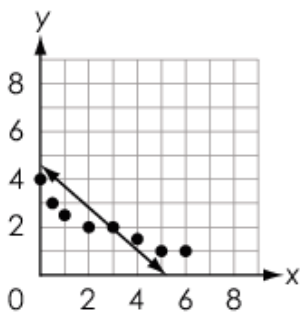
Ⓐ



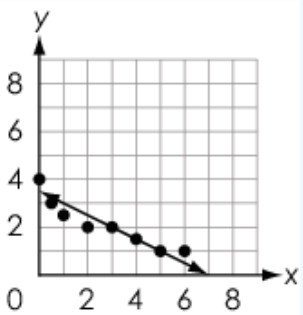
Ⓒ



Ⓑ



●



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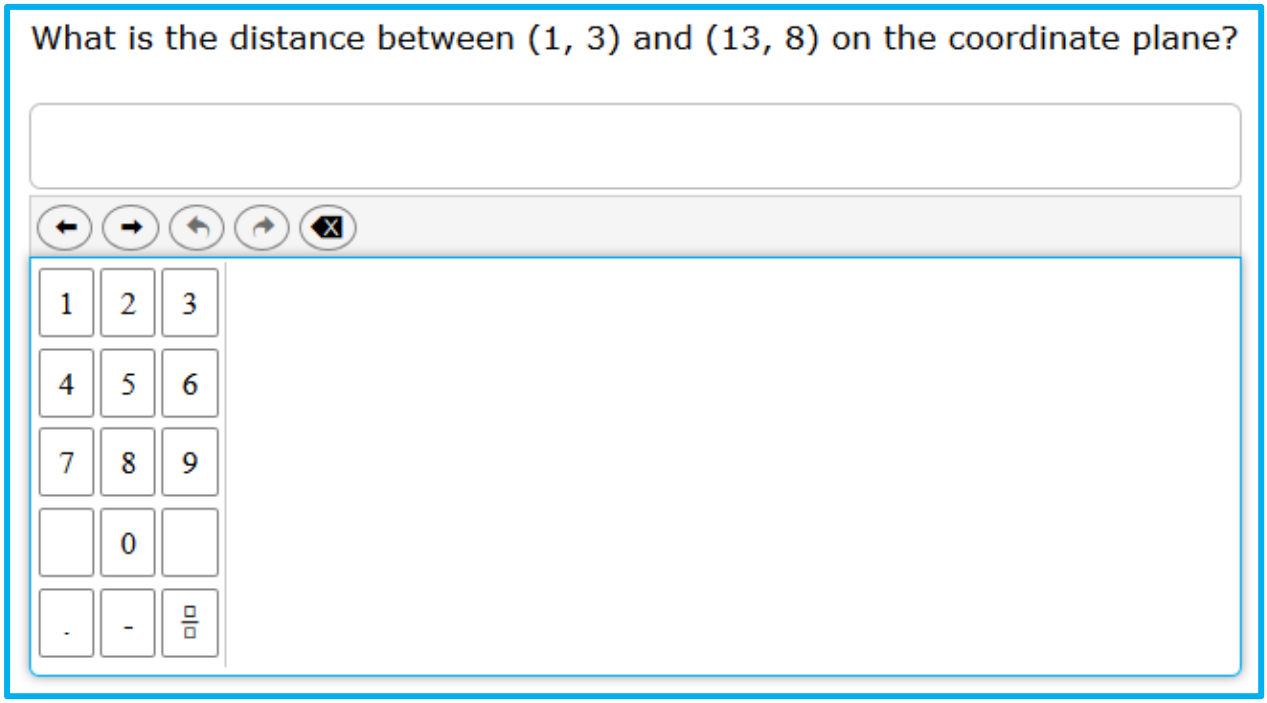
Math
Practice Test

Question 18

Question and Scoring Guidelines

Question 18



Points Possible: 1

Content Cluster: Understand and apply the Pythagorean Theorem.

Content Standard: Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. *(8.G.8)*

Scoring Guidelines

Exemplar Response

- 13

Other Correct Responses

- Any equivalent value

For this item, a full-credit response includes:

- The correct value (1 point).

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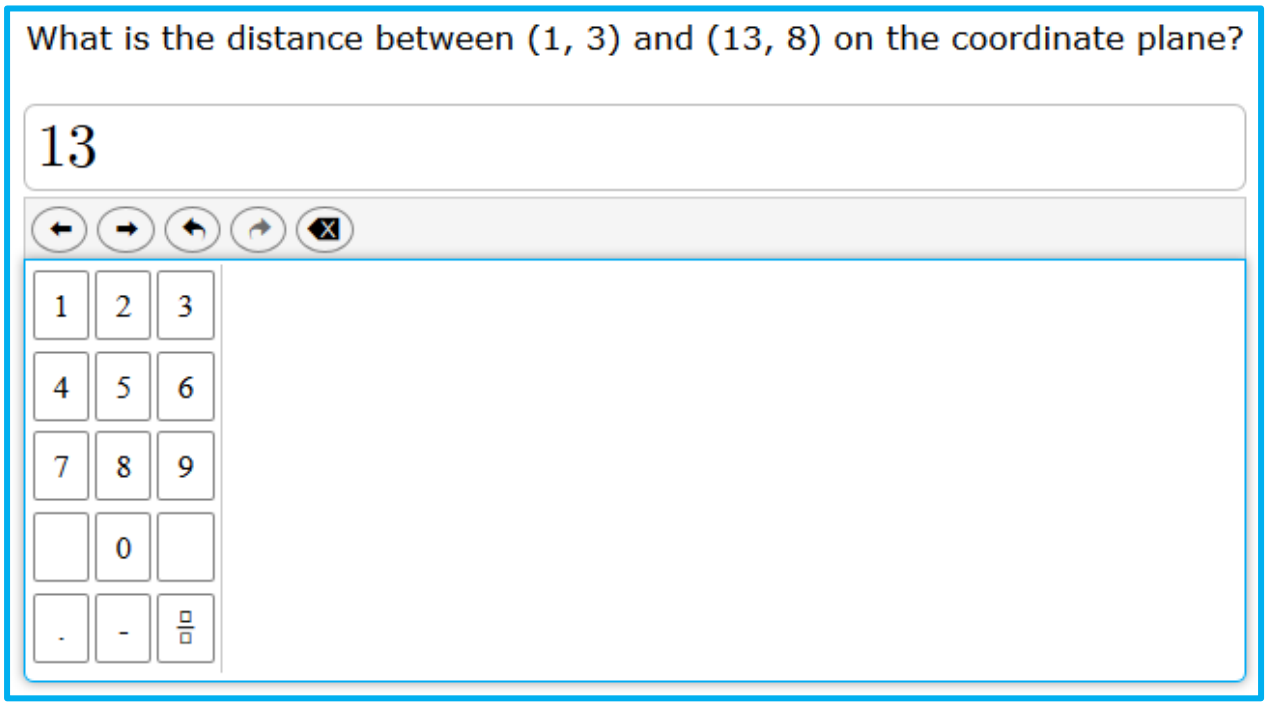
Math
Practice Test

Question 18

Sample Responses

Sample Response: 1 point



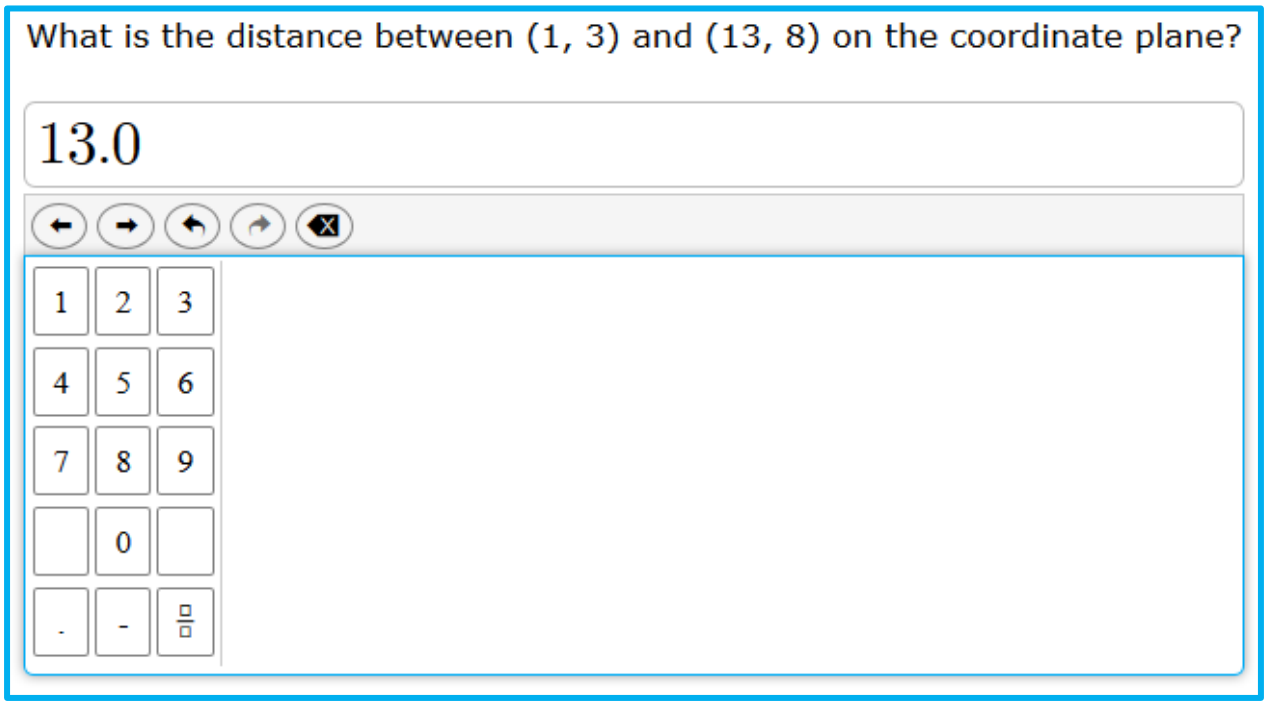
Notes on Scoring

This response earns full credit (1 point) because the student correctly applied the Pythagorean Theorem to find the distance between the two points in the coordinate plane.

Distance between *x*-coordinates: 13 – 1 = 12
Distance between *y*-coordinates: 8 – 3 = 5

$12^2 + 5^2 = c^2$
$144 + 25 = c^2$
$\sqrt{169} = c$
$13 = c$

Sample Response: 1 point



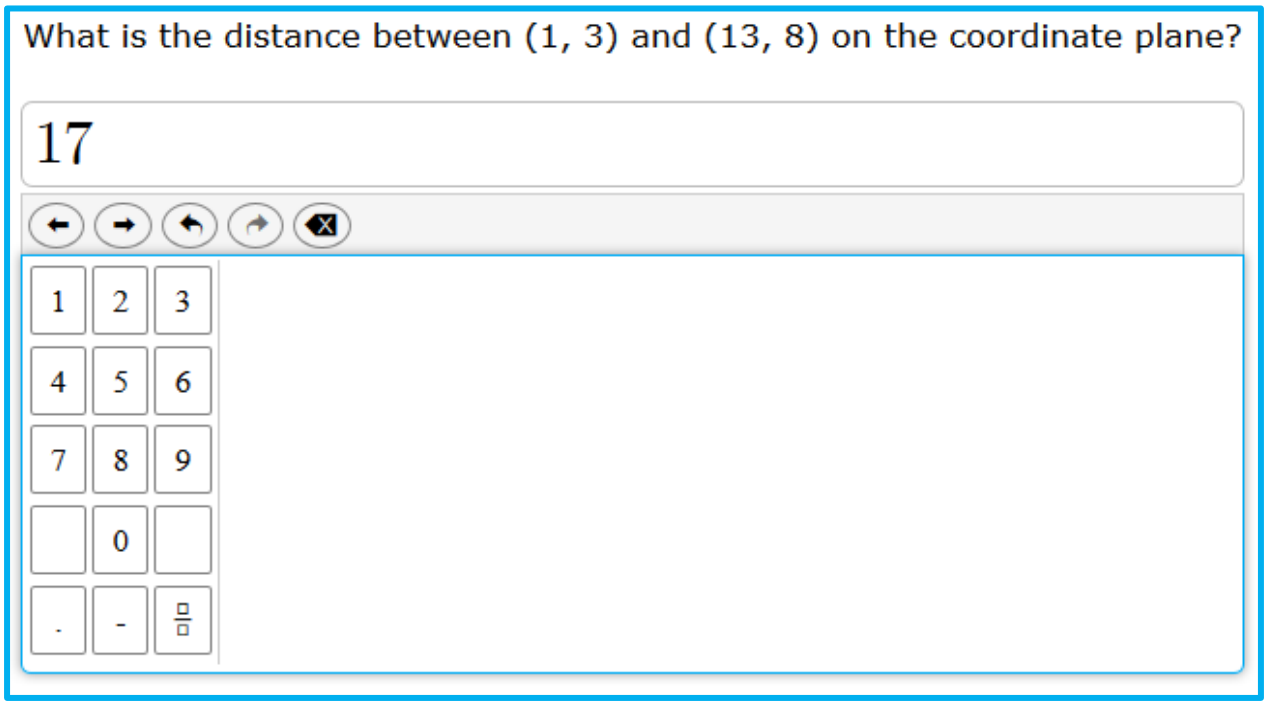
Notes on Scoring

This response earns full credit (1 point) because the student correctly applied the Pythagorean Theorem to find the distance between the two points in the coordinate plane.

Distance between *x*-coordinates: 13 – 1 = 12
Distance between *y*-coordinates: 8 – 3 = 5

$12^2 + 5^2 = c^2$
$144 + 25 = c^2$
$\sqrt{169} = c$
$13.0 = c$

Sample Response: 0 points



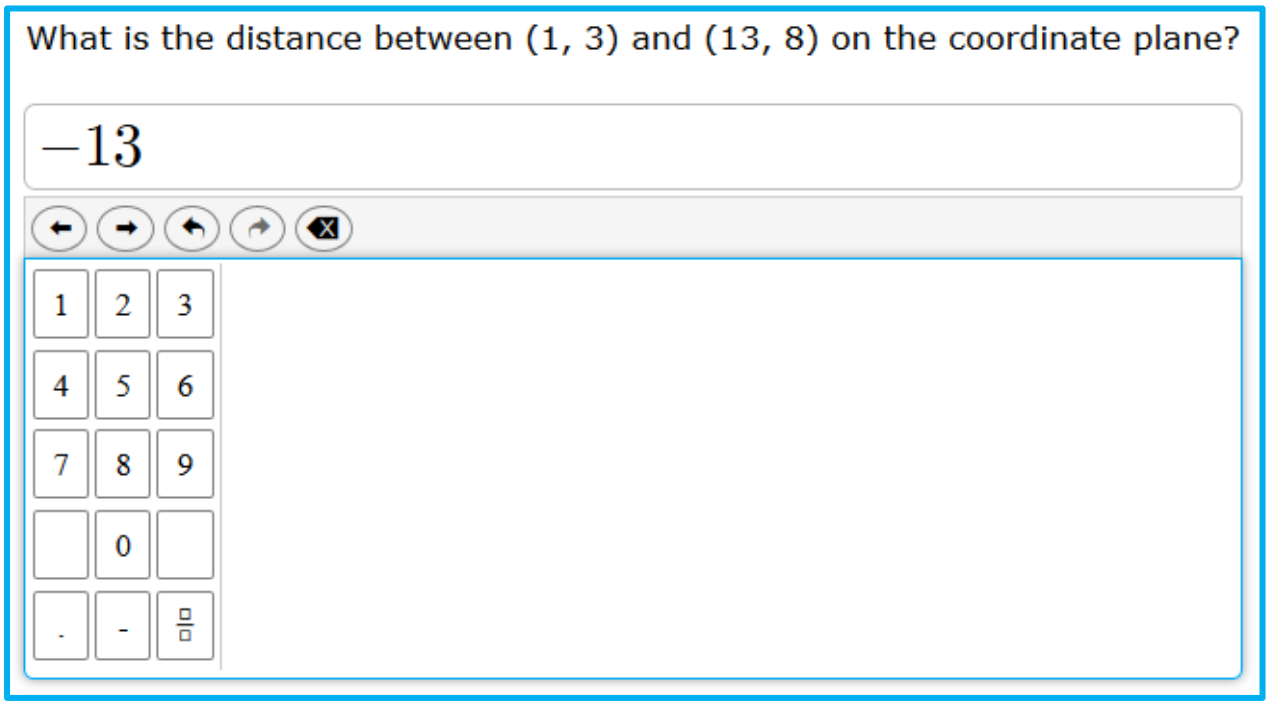
Notes on Scoring

This response earns no credit (0 points) because the student did not correctly find the distance between the *x*- and *y*-coordinates to apply to the Pythagorean Theorem to find the distance between the two points in the coordinate plane.

The student may have added the *x*-coordinates and the *y*-coordinates to get

$14^2 + 11^2 = c^2$
$196 + 121 = c^2$
$\sqrt{317} = c$
$17.8 \approx c$
$17 \approx c$ (truncated to a whole number)

Sample Response: 0 points



Notes on Scoring

This response earns no credit (0 points) because even though the student may have correctly applied the Pythagorean Theorem to find the distance between the two points in the coordinate plane, the distance is written as a negative number. The student may have incorrectly thought that the line had a negative slope and therefore responded with a negative number:

$12^2 + 5^2 = c^2$
$144 + 25 = c^2$
$\sqrt{169} = c$
$13 = c$

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Math
Practice Test

Question 19

Question and Scoring Guidelines

Question 19

An expression is given.

$$\frac{(3^2)^3 \bullet 3^6}{3^4}$$

Select all of the expressions that are equivalent to the given expression.

- [ ] 3^3
- [ ] 3^7
- [ ] 3^8
- [ ] $\frac{3^{12}}{3^4}$
- [ ] $\frac{3^{11}}{3^4}$

Points Possible: 1

Content Cluster: Work with radicals and integer exponents.

Content Standard: Understand, explain, and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$. *(8.EE.1)*

Scoring Guidelines

Rationale for First Option: This is incorrect. The student may have correctly found that the numerator was 3^{12} but then divided the exponent 12 by 4, rather than subtracting 4 from 12.

Rationale for Second Option: This is incorrect. The student may have added the exponents when computing a power to a power rather than multiplying, which would have given $3^5 \cdot 3^6$ in the numerator.

Rationale for Third Option: **Key** – The student correctly multiplied the exponents of the first factor in the numerator, added the exponents of the two factors in the numerator, and then subtracted the exponent of the divisor.

Rationale for Fourth Option: **Key** – The student correctly multiplied the exponents of the first factor in the numerator and then added the exponents of the two factors in the numerator.

Rationale for Fifth Option: This is incorrect. The student may have added the exponents in the first factor in the numerator to get $3^5 \cdot 3^6$, and then added those exponents to get 3^{11} in the numerator.

Sample Response: 1 point

An expression is given.

$$\frac{(3^2)^3 \bullet 3^6}{3^4}$$

Select all of the expressions that are equivalent to the given expression.

- [ ] 3^3
- [ ] 3^7
- [x] 3^8
- [x] $\frac{3^{12}}{3^4}$
- [ ] $\frac{3^{11}}{3^4}$

Notes on Scoring

In multi-select items where the student is asked to "select all" there will always be two or more correct responses. All choices may be correct.

Grade 8
Math
Practice Test

Question 20

Question and Scoring Guidelines

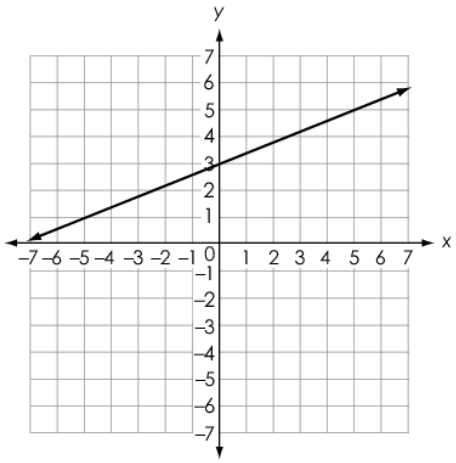
Question 20

A table of values for Function A and the graph of Function B are shown.

Function A:

x	y
−4	−2
2	2.5
4	4

Function B:



Create an equation for a third linear function with a rate of change that is between the rates of change for Function A and Function B.

Points Possible: 1

Content Cluster: Define, evaluate, and compare functions.

Content Standard: 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. (8.F.2)*

Scoring Guidelines

Exemplar Response

- $y = 0.5x$

Other Correct Responses

- Any linear equation where the slope, m, is $0.4 < m < 0.75$

For this item, a full-credit response includes:

- A correct equation (1 point).

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Math
Practice Test

Question 20

Sample Responses

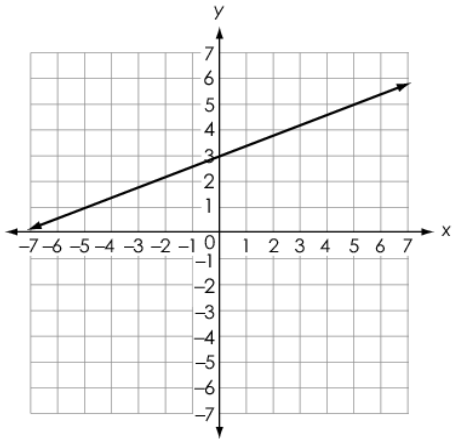
Sample Response: 1 point

A table of values for Function A and the graph of Function B are shown.

Function A:

x	y
−4	−2
2	2.5
4	4

Function B:



Create an equation for a third linear function with a rate of change that is between the rates of change for Function A and Function B.

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

1 2 3 x y
4 5 6 + - • ÷
7 8 9 < ≤ = ≥ >
0 . - π

Notes on Scoring

This response earns full credit (1 point) because the student correctly created a linear equation of the form $y = mx + b$, where $0.4 < m < 0.75$. In this equation $m = \frac{1}{2} = 0.5$.

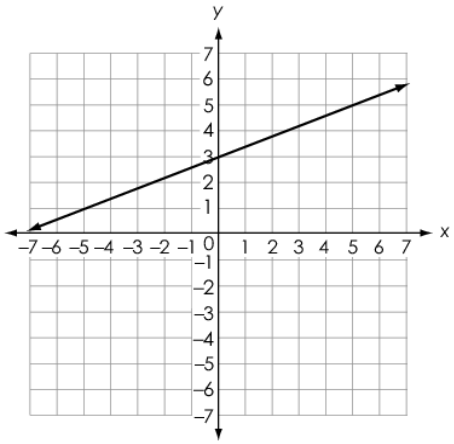
Sample Response: 1 point

A table of values for Function A and the graph of Function B are shown.

Function A:

x	y
−4	−2
2	2.5
4	4

Function B:



Create an equation for a third linear function with a rate of change that is between the rates of change for Function A and Function B.

$y=\frac{3}{5}x$

1 2 3 x y
4 5 6 + - • ÷
7 8 9 < ≤ = ≥ >
0 . - π

Notes on Scoring

This response earns full credit (1 point) because the student correctly created a linear equation of the form $y = mx + b$, where $0.4 < m < 0.75$ and b = 0. In this equation m = $\frac{3}{5}$ = 0.6.

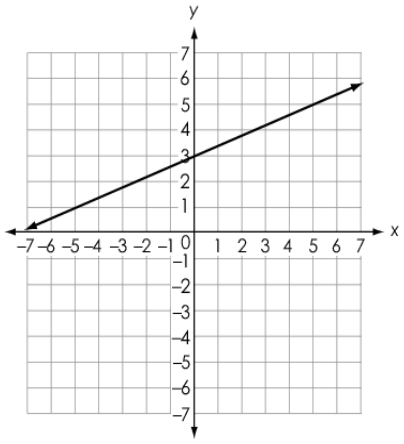
Sample Response: 0 points

A table of values for Function A and the graph of Function B are shown.

Function A:

x	y
−4	−2
2	2.5
4	4

Function B:



Create an equation for a third linear function with a rate of change that is between the rates of change for Function A and Function B.

$y=x^2$

1 2 3 x y
4 5 6 + - • ÷
7 8 9 < ≤ = ≥ >
0 . - ( ) | | π

Notes on Scoring

This response earns no credit (0 points) because the student did not create a linear equation. Instead, the student created a quadratic equation.

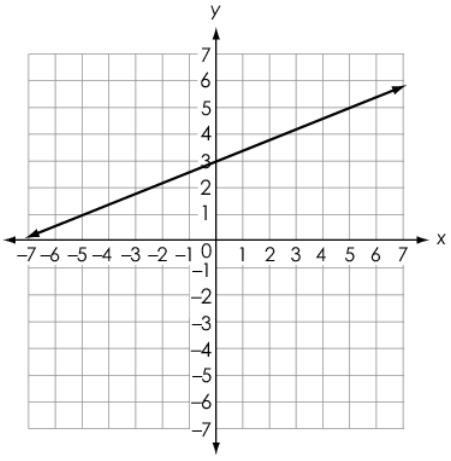
Sample Response: 0 points

A table of values for Function A and the graph of Function B are shown.

Function A:

x	y
−4	−2
2	2.5
4	4

Function B:



Create an equation for a third linear function with a rate of change that is between the rates of change for Function A and Function B.

$y=x+7$

1 2 3 x y
4 5 6 + - • ÷
7 8 9 < ≤ = ≥ >
0 . - ( ) | | π

Notes on Scoring

This response earns no credit (0 points) because the student did not create a linear equation where $0.4 < m < 0.75$. The slope, m, is 1, which is greater than 0.75.

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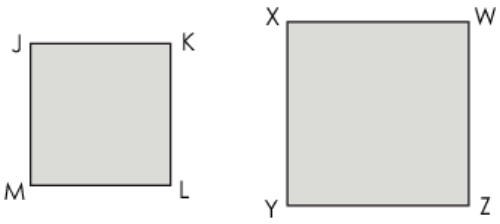
Question 21

Question and Scoring Guidelines

Question 21

Two quadrilaterals are shown.



Brian uses two transformations to show that quadrilateral JKLM is similar to quadrilateral WXYZ.

Which transformations did Brian use?

Ⓐ rotation and dilation

Ⓑ dilation and reflection

Ⓒ dilation and translation

Ⓓ reflection and translation

Points Possible: 1

Content Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Content Standard: 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. (Include examples both with and without coordinates.) *(8.G.4)*

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have realized that a dilation was required, but thought that a rotation would match JKLM to WXYZ.

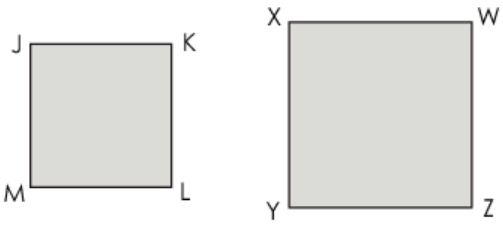
Rationale for Option B: **Key** – The student correctly identified that a dilation and reflection would match JKLM to WXYZ.

Rationale for Option C: This is incorrect. The student may have realized that a dilation was required, but thought that a translation would match JKLM to WXYZ.

Rationale for Option D: This is incorrect. The student may have noticed that a reflection and translation would give the squares the same position, but did not identify that a dilation is needed.

Sample Response: 1 point

Two quadrilaterals are shown.



Brian uses two transformations to show that quadrilateral JKLM is similar to quadrilateral WXYZ.

Which transformations did Brian use?

Ⓐ rotation and dilation

● dilation and reflection

Ⓒ dilation and translation

Ⓓ reflection and translation

Grade 8
Math
Practice Test

Question 22

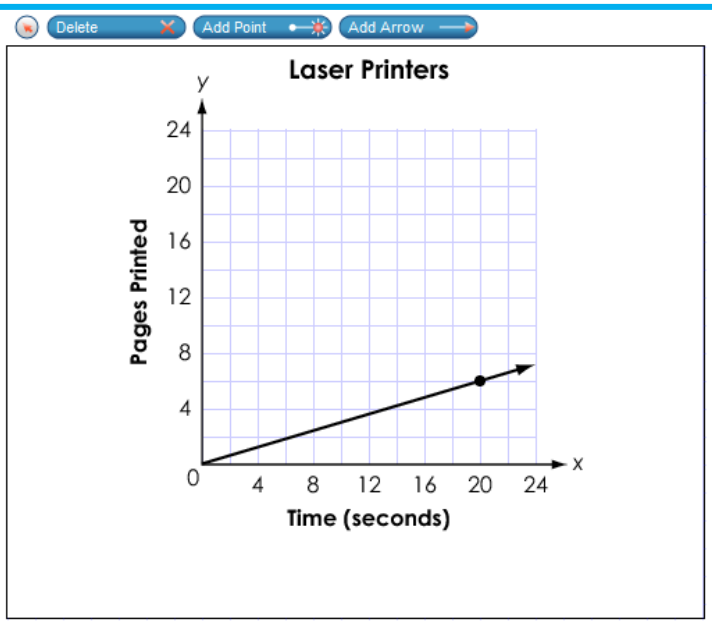
Question and Scoring Guidelines

Question 22

A company has an old laser printer that prints pages at a constant rate, as shown on the graph.

The company buys a new laser printer that prints the same number of pages in $\frac{1}{3}$ as much time as its old printer.

Use the Add Arrow tool to graph the relationship between the number of pages printed and time for the new printer.



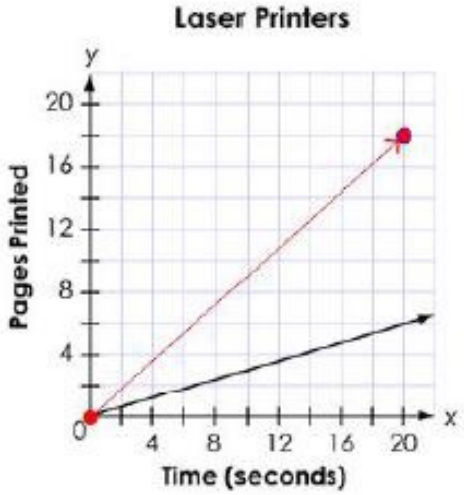
Points Possible: 1

Content Cluster: Understand the connections between proportional relationships, lines, and linear equations.

Content Standard: 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. (8.EE.5)*

Scoring Guidelines

Exemplar Response



Other Correct Responses

- N/A

For this item, a full-credit response includes:

- The correct graph—a line that would pass through (0, 0) and (20, 18) (1 point).

Grade 8
Math
Practice Test

Question 22

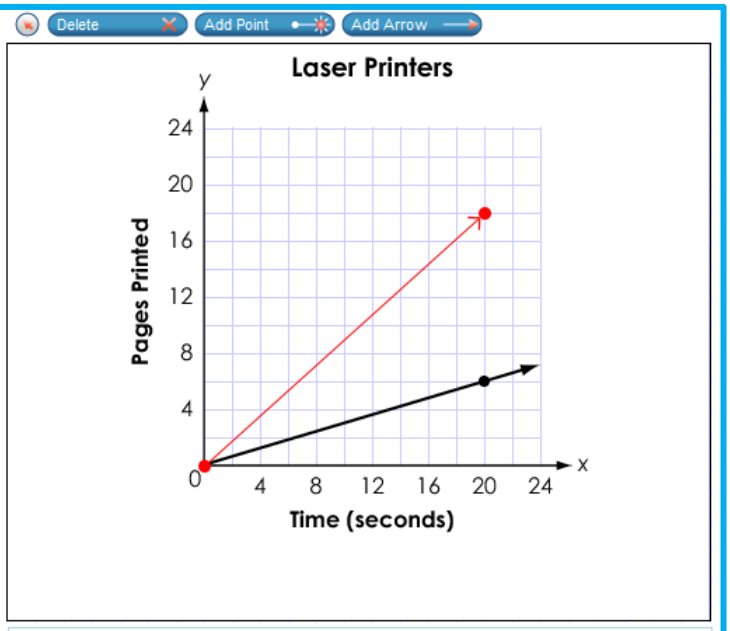
Sample Responses

Sample Response: 1 point

A company has an old laser printer that prints pages at a constant rate, as shown on the graph.

The company buys a new laser printer that prints the same number of pages in $\frac{1}{3}$ as much time as its old printer.

Use the Add Arrow tool to graph the relationship between the number of pages printed and time for the new printer.



Notes on Scoring

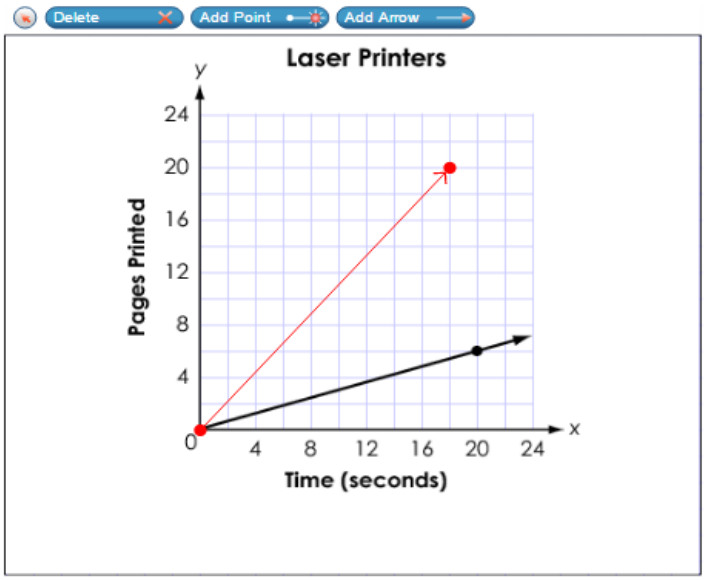
This response earns full credit (1 point) because the student correctly created a line that goes through (0, 0) and (20, 18). The old laser printer prints 6 pages in 20 seconds and the new laser printer now prints 18 pages in 20 seconds; three times as many pages in the same amount of time (i.e., the same number of pages in $\frac{1}{3}$ of the time).

Sample Response: 0 points

A company has an old laser printer that prints pages at a constant rate, as shown on the graph.

The company buys a new laser printer that prints the same number of pages in $\frac{1}{3}$ as much time as its old printer.

Use the Add Arrow tool to graph the relationship between the number of pages printed and time for the new printer.



Notes on Scoring

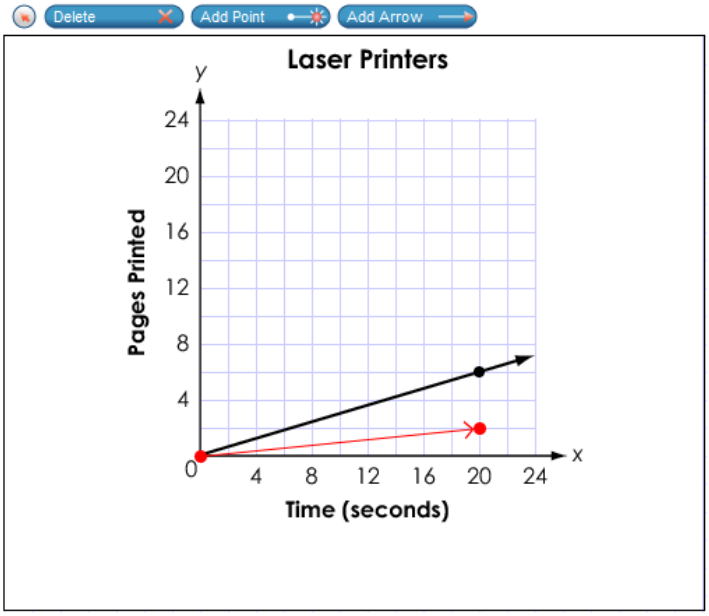
This response earns no credit (0 points) because the student did not correctly create a line that would go through (0, 0) and (20, 18). This response shows a printing rate of 20 pages in 18 seconds instead of the correct rate of 18 pages in 20 seconds.

Sample Response: 0 points

A company has an old laser printer that prints pages at a constant rate, as shown on the graph.

The company buys a new laser printer that prints the same number of pages in $\frac{1}{3}$ as much time as its old printer.

Use the Add Arrow tool to graph the relationship between the number of pages printed and time for the new printer.



Notes on Scoring

This response earns no credit (0 points) because the student did not correctly create a line that would go through (0, 0) and (20, 18). This line shows a speed $\frac{1}{3}$ of the old printer when the new printer actually prints 3 times the speed of the old printer. In this response, the new printer prints 2 pages in 20 seconds and the old printer prints 6 pages in 20 seconds.

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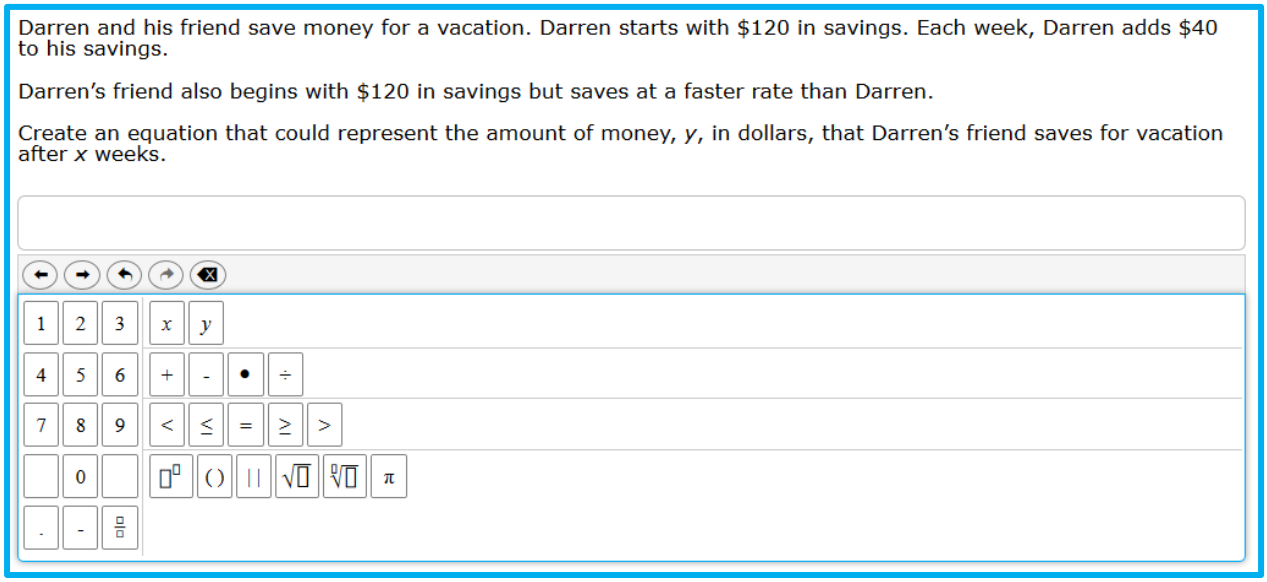
Question 23

Question and Scoring Guidelines

Question 23



Points Possible: 1

Content Cluster: Use functions to model relationships between quantities.

Content Standard: 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. *(8.F.4)*

Scoring Guidelines

Exemplar Response

- $y = 120 + 45x$

Other Correct Responses

- $y = 120 + mx$ where $m > 40$

For this item, a full-credit response includes:

- A correct equation (1 point).

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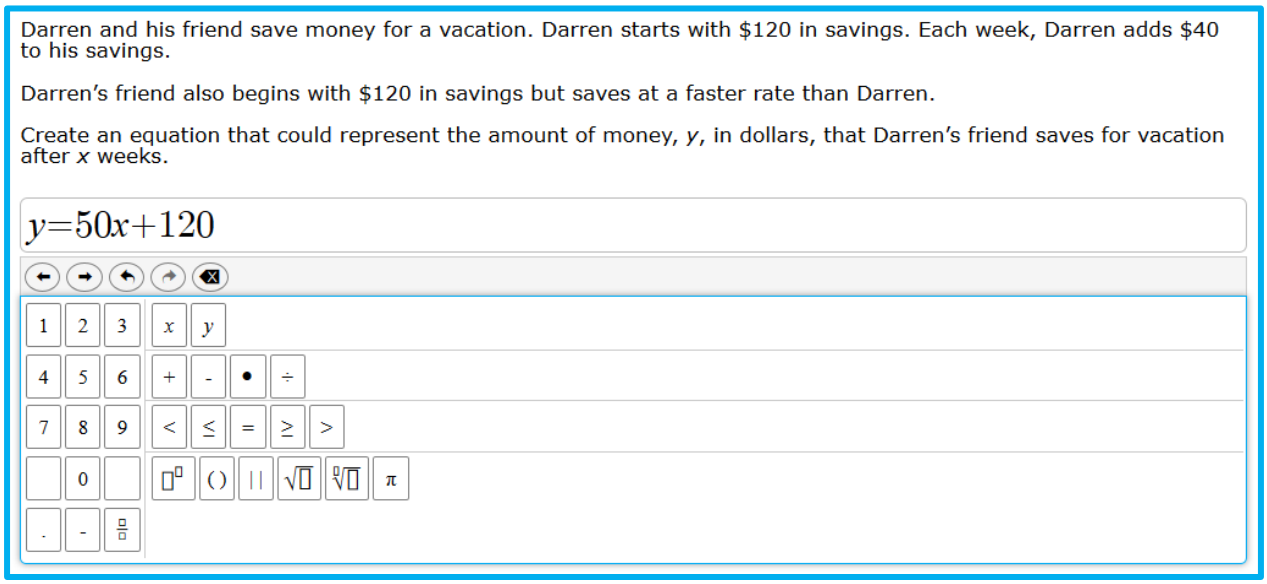
Math
Practice Test

Question 23

Sample Responses

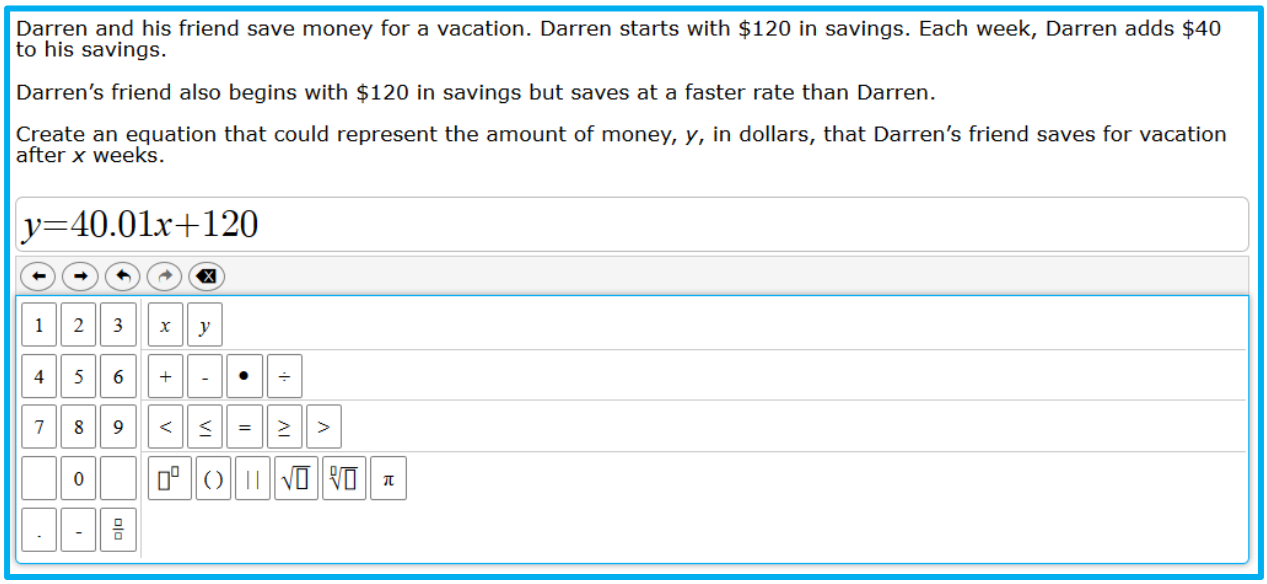
Sample Response: 1 point



Notes on Scoring

This response earns full credit (1 point) because the student correctly created an equation that represents the situation where Darren's friend has $120 in the account and saves $50 each week (x) (i.e., more than what Darren saves each week).

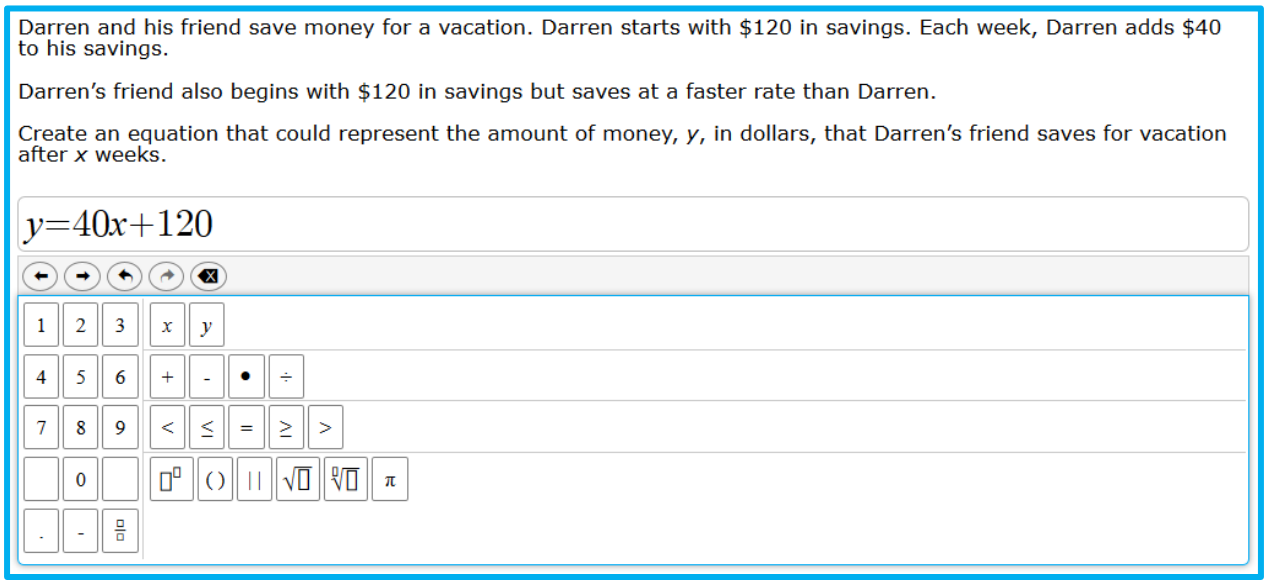
Sample Response: 1 point



Notes on Scoring

This response earns full credit (1 point) because the student correctly created an equation that represents the situation where Darren's friend has $120 in the account and saves $40.01 each week ($x$) (i.e., ever so slightly more than what Darren saves each week).

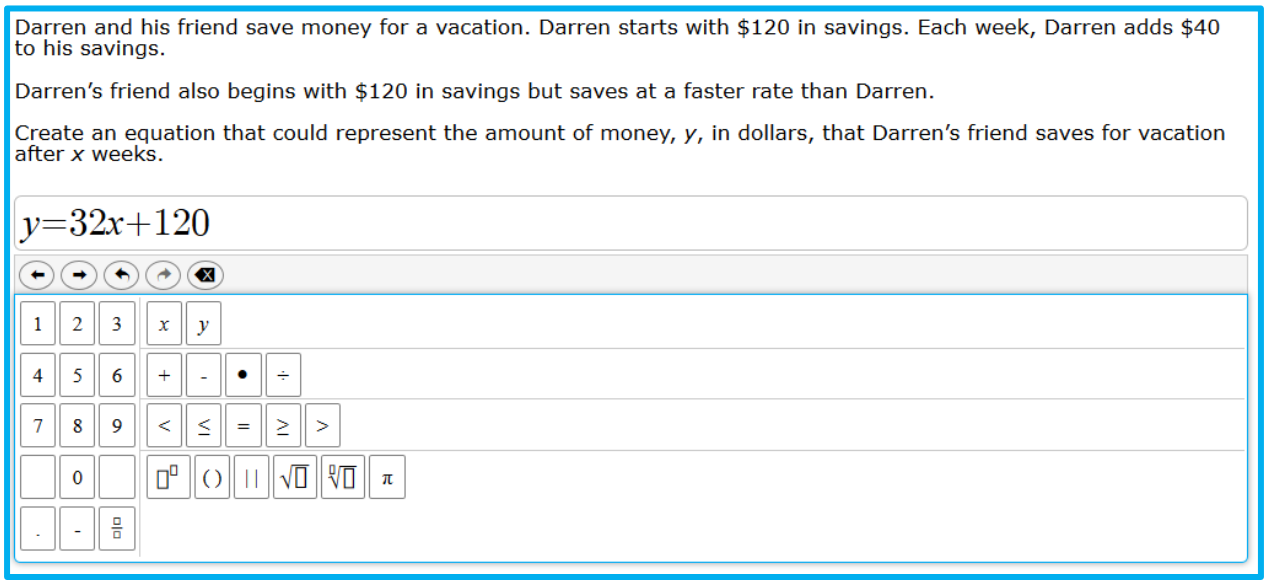
Sample Response: 0 points



Notes on Scoring

This response earns no credit (0 points) because the student did not correctly create an equation that represents the situation. The student may have thought that the equation should represent Darren's savings.

Sample Response: 0 points



Notes on Scoring

This response earns no credit (0 points) because the student did not correctly create an equation that represents the situation. This equation shows that Darren's friend saves $32 each week, which is less than what Darren saves.

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Math
Practice Test

Question 24

Question and Scoring Guidelines

Question 24

A sequence of transformations is applied to $\triangle CDE$ to create $\triangle C'D'E'$.

Select all the sequences of transformations that could be applied to $\triangle CDE$ so that $\triangle CDE \cong \triangle C'D'E'$.

- [ ] a clockwise rotation of 90 degrees and then a dilation by a scale factor of 2
- [ ] a dilation by a scale factor of 2 and then a reflection across the *y*-axis
- [ ] a clockwise rotation of 90 degrees and then a reflection across the *y*-axis
- [ ] a translation 5 units down and then a dilation by a scale factor of 2
- [ ] a translation 5 units down and then a clockwise rotation of 90 degrees
- [ ] a reflection across the *y*-axis and then a translation 5 units down

Points Possible: 1

Content Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Content Standard: 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. (Include examples both with and without coordinates.) *(8.G.2)*

Scoring Guidelines

Rationale for First Option: This is incorrect. The student may not have realized that a dilation by a scale factor of 2 leads to similar but not congruent triangles.

Rationale for Second Option: This is incorrect. The student may not have realized that a dilation by a scale factor of 2 leads to similar but not congruent triangles.

Rationale for Third Option: **Key** – The student identified a correct sequence of transformations.

Rationale for Fourth Option: This is incorrect. The student may not have realized that a dilation by a scale factor of 2 leads to similar but not congruent triangles.

Rationale for Fifth Option: **Key** – The student identified a correct sequence of transformations.

Rationale for Sixth Option: **Key** – The student identified a correct sequence of transformations.

Sample Response: 1 point

A sequence of transformations is applied to $\triangle CDE$ to create $\triangle C'D'E'$.

Select all the sequences of transformations that could be applied to $\triangle CDE$ so that $\triangle CDE \cong \triangle C'D'E'$.

- [ ] a clockwise rotation of 90 degrees and then a dilation by a scale factor of 2
- [ ] a dilation by a scale factor of 2 and then a reflection across the y-axis
- [x] a clockwise rotation of 90 degrees and then a reflection across the y-axis
- [ ] a translation 5 units down and then a dilation by a scale factor of 2
- [x] a translation 5 units down and then a clockwise rotation of 90 degrees
- [x] a reflection across the y-axis and then a translation 5 units down

Grade 8
Math
Practice Test

Question 25

Question and Scoring Guidelines

Question 25

A table showing the number of annual exports from three regions is shown.

Region	Number of Exports
Japan	$3A \times 10^{11}$
Ecuador	$A \times 10^{10}$
Guam	$2A \times 10^{7}$

Complete the statements comparing the number of exports from the regions.

Ecuador exports [ ] [ ] Japan annually.

Ecuador exports [ ] [ ] Guam annually.

Points Possible: 2

Content Cluster: Work with radicals and integer exponents.

Content Standard: 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. (8.EE.3)*

Scoring Guidelines

Exemplar Response

- Ecuador exports 30 times fewer products than Japan annually.
- Ecuador exports 500 times as many products as Guam annually.

Other Correct Responses

- N/A

For this item, a full-credit response includes:

- A correctly completed statement regarding Ecuador and Japan (1 point);

  AND

- A correctly completed statement regarding Ecuador and Guam (1 point).

Grade 8
Math
Practice Test

Question 25

Sample Responses

Sample Response: 2 points

A table showing the number of annual exports from three regions is shown.

Region	Number of Exports
Japan	$3A \times 10^{11}$
Ecuador	$A \times 10^{10}$
Guam	$2A \times 10^{7}$

Complete the statements comparing the number of exports from the regions.

Ecuador exports [30 times] [fewer products than] Japan annually.

Ecuador exports [500 times] [as many products as] Guam annually.

Notes on Scoring

This response earns full credit (2 points) because the student correctly compares Ecuador's exports to both Japan's and Guam's exports.

Sample Response: 1 point

A table showing the number of annual exports from three regions is shown.

Region	Number of Exports
Japan	$3A \times 10^{11}$
Ecuador	$A \times 10^{10}$
Guam	$2A \times 10^{7}$

Complete the statements comparing the number of exports from the regions.

Ecuador exports [30 times] [fewer products than] Japan annually.

Ecuador exports [2 times] [as many products as] Guam annually.

Notes on Scoring

This response earns partial credit (1 point) because the student correctly compares Ecuador's exports to Japan's exports. When comparing Ecuador and Guam, the student may have seen that Guam has two times *A* when Ecuador has only *A*, but did not consider that the powers of 10 differ by three.

Sample Response: 1 point

A table showing the number of annual exports from three regions is shown.

Region	Number of Exports
Japan	$3A \times 10^{11}$
Ecuador	$A \times 10^{10}$
Guam	$2A \times 10^{7}$

Complete the statements comparing the number of exports from the regions.

Ecuador exports [3 times] [fewer products than] Japan annually.

Ecuador exports [500 times] [as many products as] Guam annually.

Notes on Scoring

This response earns partial credit (1 point) because the student correctly compares Ecuador's exports to Guam's exports. When comparing Ecuador and Japan, the student may have seen that Japan has three times *A* when Ecuador has only *A*, but did not consider that the powers of 10 differ by one.

Sample Response: 1 point

A table showing the number of annual exports from three regions is shown.

Region	Number of Exports
Japan	$3A \times 10^{11}$
Ecuador	$A \times 10^{10}$
Guam	$2A \times 10^{7}$

Complete the statements comparing the number of exports from the regions.

Ecuador exports [30 times] [as many products as] Japan annually.

Ecuador exports [500 times] [as many products as] Guam annually.

Notes on Scoring

This response earns partial credit (1 point) because the student correctly compares Ecuador's exports to Guam's exports. When comparing Ecuador and Japan, the student may have mixed the two countries up and switched which has more exports.

Sample Response: 0 points

A table showing the number of annual exports from three regions is shown.

Region	Number of Exports
Japan	$3A \times 10^{11}$
Ecuador	$A \times 10^{10}$
Guam	$2A \times 10^{7}$

Complete the statements comparing the number of exports from the regions.

Ecuador exports [3 times] [fewer products than] Japan annually.

Ecuador exports [2 times] [as many products as] Guam annually.

Notes on Scoring

This response earns no credit (0 points) because the student does not correctly compare Ecuador's exports. The student may have compared the leading digits and not considered the powers of 10.

Sample Response: 0 points

A table showing the number of annual exports from three regions is shown.

Region	Number of Exports
Japan	$3A \times 10^{11}$
Ecuador	$A \times 10^{10}$
Guam	$2A \times 10^{7}$

Complete the statements comparing the number of exports from the regions.

Ecuador exports [30 times] [as many products as] Japan annually.

Ecuador exports [500 times] [fewer products than] Guam annually.

Notes on Scoring

This response earns no credit (0 points) because the student does not correctly compare Ecuador's exports. The student may have calculated correctly but then switched the countries and may have confused which number is the greater of the two.

Sample Response: 0 points

A table showing the number of annual exports from three regions is shown.

Region	Number of Exports
Japan	$3A \times 10^{11}$
Ecuador	$A \times 10^{10}$
Guam	$2A \times 10^{7}$

Complete the statements comparing the number of exports from the regions.

Ecuador exports [300 times] [fewer products than] Japan annually.

Ecuador exports [50 times] [as many products as] Guam annually.

Notes on Scoring

This response earns no credit (0 points) because the student does not correctly compare Ecuador's exports. The student may have made a mistake when dividing the powers of ten, causing the response to be off by one zero in both calculations.

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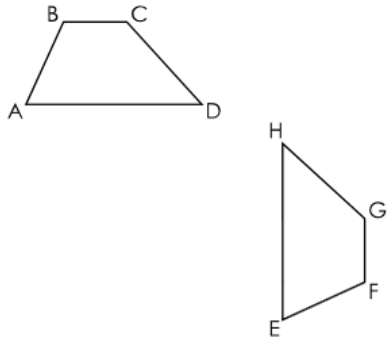
Math
Practice Test

Question 26

Question and Scoring Guidelines

Question 26

Similar quadrilaterals ABCD and EFGH are shown.



Chloe performs two transformations on trapezoid ABCD to prove that it is congruent to trapezoid EFGH.

Move phrases to the table to show two transformations that Chloe could perform.

reflection across a vertical line | reflection across a diagonal line | clockwise rotation of 90 degrees | reflection across a horizontal line | clockwise rotation of 180 degrees

Sequence of Transformations	
1.	
2.	

Points Possible: 1

Content Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Content Standard: 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. (Include examples both with and without coordinates.) *(8.G.2)*

Scoring Guidelines

For this item, a full-credit response includes:

- The student determined a sequence of transformations, providing evidence of the ability to describe a sequence that exhibits the congruency between two similar two-dimensional figures.
    - reflection across a vertical line
    - clockwise rotation of 90 degrees
      OR
    - clockwise rotation of 90 degrees
    - reflection across a horizontal line
      OR
    - reflection across a diagonal line
    - clockwise rotation of 180 degrees
      OR
    - clockwise rotation of 180 degrees
    - reflection across a diagonal line (1 point).

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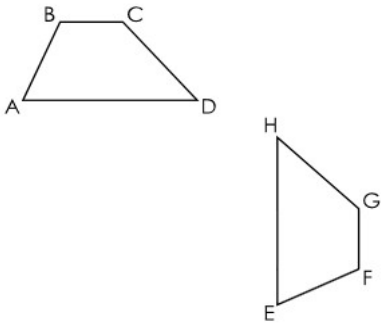
Math
Practice Test

Question 26

Sample Responses

Sample Response: 1 point

Similar quadrilaterals ABCD and EFGH are shown.



Chloe performs two transformations on trapezoid ABCD to prove that it is congruent to trapezoid EFGH.

Move phrases to the table to show two transformations that Chloe could perform.

reflection across a vertical line | reflection across a diagonal line | clockwise rotation of 90 degrees | reflection across a horizontal line | clockwise rotation of 180 degrees

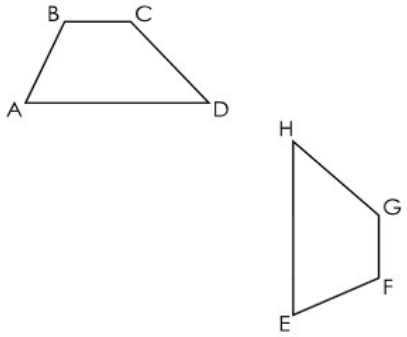
Sequence of Transformations	
1.	reflection across a vertical line
2.	clockwise rotation of 90 degrees

Notes on Scoring

This response earns full credit (1 point) because the student correctly chooses two transformations that map one trapezoid onto the other to prove that the trapezoids are congruent.

Sample Response: 1 point

Similar quadrilaterals ABCD and EFGH are shown.



Chloe performs two transformations on trapezoid ABCD to prove that it is congruent to trapezoid EFGH.

Move phrases to the table to show two transformations that Chloe could perform.

reflection across a vertical line | reflection across a diagonal line | clockwise rotation of 90 degrees | reflection across a horizontal line | clockwise rotation of 180 degrees

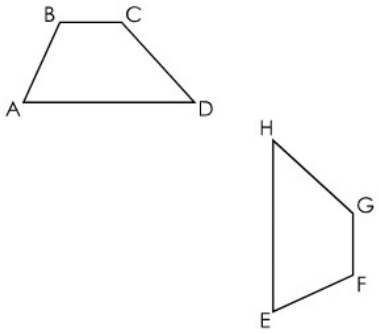
Sequence of Transformations	
1.	clockwise rotation of 180 degrees
2.	reflection across a diagonal line

Notes on Scoring

This response earns full credit (1 point) because the student correctly chooses two transformations that map one trapezoid onto the other to prove that the trapezoids are congruent.

Sample Response: 1 point

Similar quadrilaterals ABCD and EFGH are shown.



Chloe performs two transformations on trapezoid ABCD to prove that it is congruent to trapezoid EFGH.

Move phrases to the table to show two transformations that Chloe could perform.

reflection across a vertical line | reflection across a diagonal line | clockwise rotation of 90 degrees | reflection across a horizontal line | clockwise rotation of 180 degrees

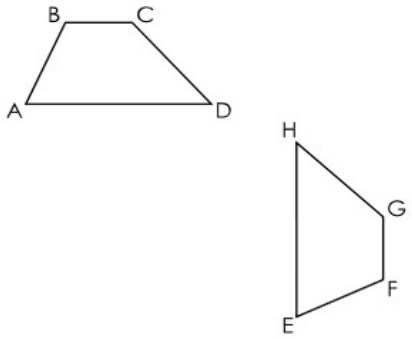
Sequence of Transformations	
1.	clockwise rotation of 90 degrees
2.	reflection across a horizontal line

Notes on Scoring

This response earns full credit (1 point) because the student correctly chooses two transformations that map one trapezoid onto the other to prove that the trapezoids are congruent.

Sample Response: 0 points

Similar quadrilaterals ABCD and EFGH are shown.



Chloe performs two transformations on trapezoid ABCD to prove that it is congruent to trapezoid EFGH.

Move phrases to the table to show two transformations that Chloe could perform.

reflection across a vertical line | reflection across a diagonal line | clockwise rotation of 90 degrees | reflection across a horizontal line | clockwise rotation of 180 degrees

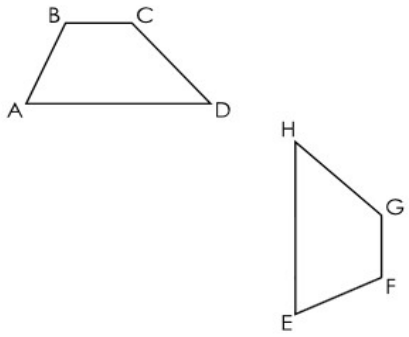
Sequence of Transformations	
1.	clockwise rotation of 180 degrees
2.	reflection across a vertical line

Notes on Scoring

This response earns no credit (0 points) because the student does not correctly choose two transformations. This sequence of transformations will not map one trapezoid onto the other to prove that the trapezoids are congruent.

Sample Response: 0 points

Similar quadrilaterals ABCD and EFGH are shown.



Chloe performs two transformations on trapezoid ABCD to prove that it is congruent to trapezoid EFGH.

Move phrases to the table to show two transformations that Chloe could perform.

reflection across a vertical line | reflection across a diagonal line | clockwise rotation of 90 degrees | reflection across a horizontal line | clockwise rotation of 180 degrees

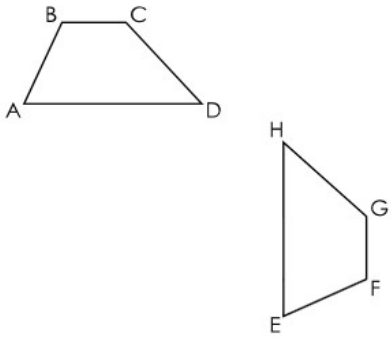
Sequence of Transformations	
1.	reflection across a horizontal line
2.	clockwise rotation of 90 degrees

Notes on Scoring

This response earns no credit (0 points) because the student does not correctly choose two transformations. This sequence of transformations will result in sides AD and HE "facing" each other and will not map one trapezoid onto the other to prove that the trapezoids are congruent.

Sample Response: 0 points

Similar quadrilaterals ABCD and EFGH are shown.



Chloe performs two transformations on trapezoid ABCD to prove that it is congruent to trapezoid EFGH.

Move phrases to the table to show two transformations that Chloe could perform.

reflection across a vertical line | reflection across a diagonal line | clockwise rotation of 90 degrees | reflection across a horizontal line | clockwise rotation of 180 degrees

Sequence of Transformations	
1.	clockwise rotation of 90 degrees
2.	reflection across a vertical line

Notes on Scoring

This response earns no credit (0 points) because the student does not correctly choose two transformations. This sequence of transformations will result in sides AD and HE "facing" each other and will not map one trapezoid onto the other to prove that the trapezoids are congruent.