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New York State Testing Program
Grade 8 Common Core
Mathematics Test

Released Questions with Annotations

August 2014

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

New York State Testing Program
Grade 8 Common Core
Mathematics Test

Released Questions with Annotations

With the adoption of the New York P–12 Common Core Learning Standards (CCLS) in ELA/Literacy and Mathematics, the Board of Regents signaled a shift in both instruction and assessment. Starting in Spring 2013, New York State began administering tests designed to assess student performance in accordance with the instructional shifts and the rigor demanded by the Common Core State Standards (CCSS). To aid in the transition to new assessments, New York State has released a number of resources, including test blueprints and specifications, sample questions, and criteria for writing assessment questions. These resources can be found at http://www.engageny.org/common-core-assessments.

New York State administered the ELA/Literacy and Mathematics Common Core tests in April 2014 and is now making a portion of the questions from those tests available for review and use. These released questions will help students, families, educators, and the public better understand how tests have changed to assess the instructional shifts demanded by the Common Core and to assess the rigor required to ensure that all students are on track to college and career readiness.

Annotated Questions Are Teaching Tools

The released questions are intended to help educators, students, families, and the public understand how the Common Core is different. The annotated questions demonstrate the way the Common Core should drive instruction and how tests have changed to better assess student performance in accordance with the instructional shifts demanded by the Common Core. They are also intended to help educators identify how the rigor of the State tests can inform classroom instruction and local assessment. The annotations will indicate common student misunderstandings related to content standards; educators should use these to help inform unit and lesson planning. In some cases, the annotations may offer insight into particular instructional elements (conceptual thinking, visual models) that align to the Common Core that may be used in curricular design. It should not be assumed, however, that a particular standard will be measured with an identical question in future assessments.

The annotated questions will include both multiple-choice and constructed-response questions. With each multiple-choice question released, a rationale will be available to demonstrate why the question measures the intended standards; why the correct answer is correct; and why each wrong answer is plausible but incorrect. The rationales describe why the wrong answer choices are plausible but incorrect and are based on common errors in computation. While these rationales will speak to a possible and likely reason for selection of the incorrect option by the student, these rationales do not contain definitive statements as to why the student chose the incorrect option or what we can infer about knowledge and skills of the student based on the student's selection of an incorrect response. These multiple-choice questions are designed to assess student proficiency, not to diagnose specific misconceptions/errors with each and every incorrect option.

Additionally, for each constructed-response question, there will be an explanation for why the question measures the intended standards and sample student responses representing each possible score point.

Questions from the upper grades may feature more detailed annotations, as the questions tend to be more complex.

Understanding Math Annotated Questions

Multiple Choice

Multiple-choice questions are designed to assess CCLS for Mathematics. Mathematics multiple-choice questions will mainly be used to assess standard algorithms and conceptual standards. Multiple-choice questions incorporate both Standards and Standards for Mathematical Practices, some in real-world applications. Many multiple-choice questions require students to complete multiple steps. Likewise, many of these questions are linked to more than one standard, drawing on the simultaneous application of multiple skills and concepts. Within answer choices, distractors will all be based on plausible missteps.

Short- and extended- constructed-response questions may refer to the scoring rubric, which can be found in the Educator Guide to the 2014 Grade 8 Common Core Mathematics Test at www.engageny.org/resource/test-guides-for-english-language-arts-and-mathematics.

Short Response

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

Extended Response

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

Released Questions Do Not Comprise a "Mini" Test

This document is NOT intended to show how operational tests look or to provide information about how teachers should administer the test; rather, the purpose of the released questions is to provide an overview of how the new test reflects the demands of the Common Core.

The released questions do not represent the full spectrum of standards assessed on the State test, nor do they represent the full spectrum of how the Common Core should be taught and assessed in the classroom. Specific criteria for writing test questions as well as additional instruction and assessment information is available at www.engageny.org/common-core-assessments.

134080011_2

Which number is equivalent to $\frac{3^4}{3^2}$?

A 2

B 9

C 81

D 729

Key: B
Measured CCLS: 8.EE.1

Commentary: This question measures 8.EE.1 because it assesses the student's ability to know and apply the properties of integer exponents to generate an equivalent numerical expression.

Extended Rationale

Answer Choice A: "2"; This response is incorrect and may occur if a student subtracts the exponents in the expression and then uses this value as the value of the expression.

$$\frac{3^4}{3^2} = 3^{(4-2)} = 3^2 \rightarrow 2$$

A student who selects this response may have limited understanding of how to know and apply the properties of integer exponents to generate equivalent numerical expressions.

Answer Choice B: "9"; This response correctly shows the number that is equivalent to $\frac{3^4}{3^2}$. The student may have subtracted the exponents to find the value of the given expression.

$$\frac{3^4}{3^2} = 3^{(4-2)} = 3^2 = 9$$

A student who selects this response understands how to know and apply the properties of integer exponents to generate equivalent numerical expressions.

Answer Choice C: "81"; This response is incorrect and may occur if a student uses only the expression in the numerator to determine the value of the whole expression.

$$\frac{3^4}{3^2} \rightarrow 3^4 = 81$$

A student who selects this response may have limited understanding of how to know and apply the properties of integer exponents to generate equivalent numerical expressions.

Answer Choice D: "729"; This response is incorrect and may occur if a student adds the exponents in the expression.

$$\frac{3^4}{3^2} \rightarrow 3^{(4+2)} = 3^6 = 729$$

A student who selects this response may have limited understanding of how to know and apply the properties of integer exponents to generate equivalent numerical expressions.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when knowing and applying the properties of integer exponents to generate equivalent numerical expressions.

134080064_1

A sequence of transformations was applied to an equilateral triangle in a coordinate plane. The transformations used were rotations, reflections, and translations. Which statement about the resulting figure is true?

A It must be an equilateral triangle with the same side lengths as the original triangle.

B It must be an equilateral triangle, but the side lengths may differ from the original triangle.

C It may be a scalene triangle, and all the side lengths may differ from the original triangle.

D It may be an obtuse triangle with at least one side the same length as the original triangle.

Key: A
Measured CCLS: 8.G.2

Commentary: This question measures 8.G.2 because it assesses the student's ability to understand that a two-dimensional figure, in this case, an equilateral triangle, is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations.

Extended Rationale

Answer Choice A: "It must be an equilateral triangle with the same side lengths as the original triangle." This statement correctly describes the figure that results from a series of rotations, reflections, and translations on an equilateral triangle. The student may have recognized that the two triangles must be congruent since the second was obtained from the first by a sequence of rotations, reflections, and translations. A student who selects this response understands 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.

Answer Choice B: "It must be an equilateral triangle, but the side lengths may differ from the original triangle." This response is incorrect and may occur if a student thinks that a triangle obtained from a sequence of rotations, reflections, and translations will be similar, but not necessarily congruent, to the first triangle. A student who selects this response may have limited understanding of the concept 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.

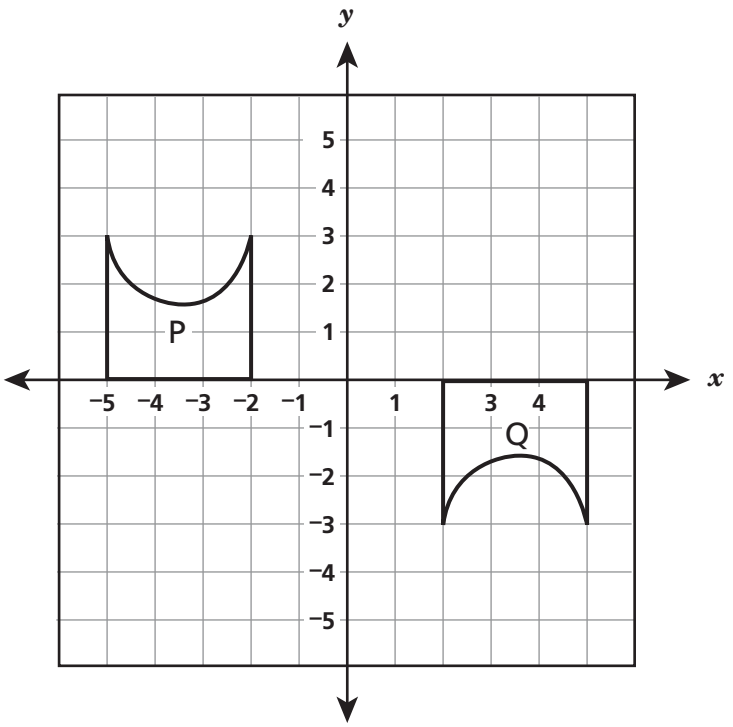
Answer Choice C: "It may be a scalene triangle, and all the side lengths may differ from the original triangle." This response is incorrect and may occur if a student does not recognize that the lengths of line segments and the measures of angles in the two triangles will be the same given that the second triangle was obtained from the first by a sequence of rotations, reflections, and translations. A student who selects this response may not understand the concept 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.

Answer Choice D: "It may be an obtuse triangle with at least one side the same length as the original triangle." This response is incorrect and may occur if a student does not recognize that the lengths of line segments and the measures of angles in the two triangles will be the same given that the second triangle was obtained from the first by a sequence of rotations, reflections, and translations. A student who selects this response may have limited understanding of the concept 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.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when understanding 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.

134080067_1

Figure Q was the result of a sequence of transformations on figure P, both shown below.



Which sequence of transformations could take figure P to figure Q?

A reflection over the *x*-axis and translation 7 units right

B reflection over the *y*-axis and translation 3 units down

C translation 1 unit right and 180° rotation about the origin

D translation 4 units right and 180° rotation about the origin

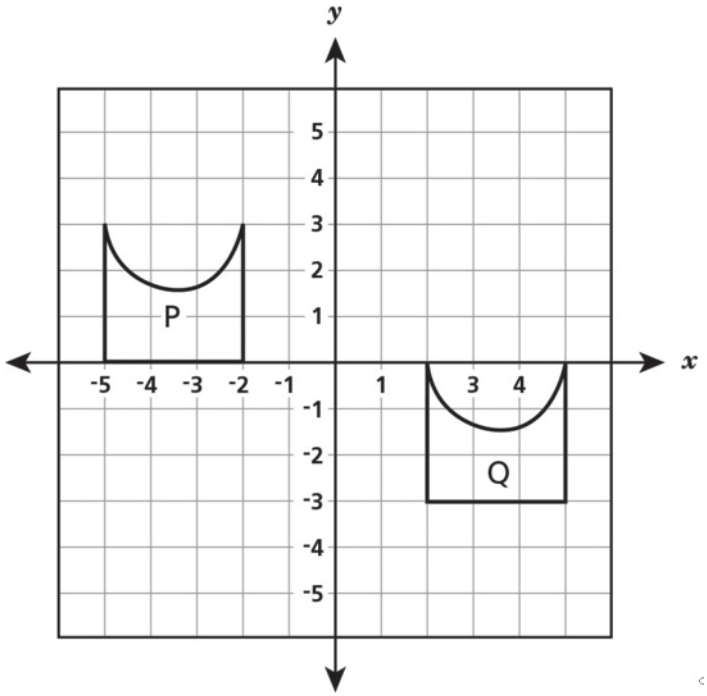
Key: A
Measured CCLS: 8.G.2

Commentary: This question measures 8.G.2 because it assesses the student's ability to describe a sequence of transformations that exhibits the congruence between two given congruent figures.

Extended Rationale

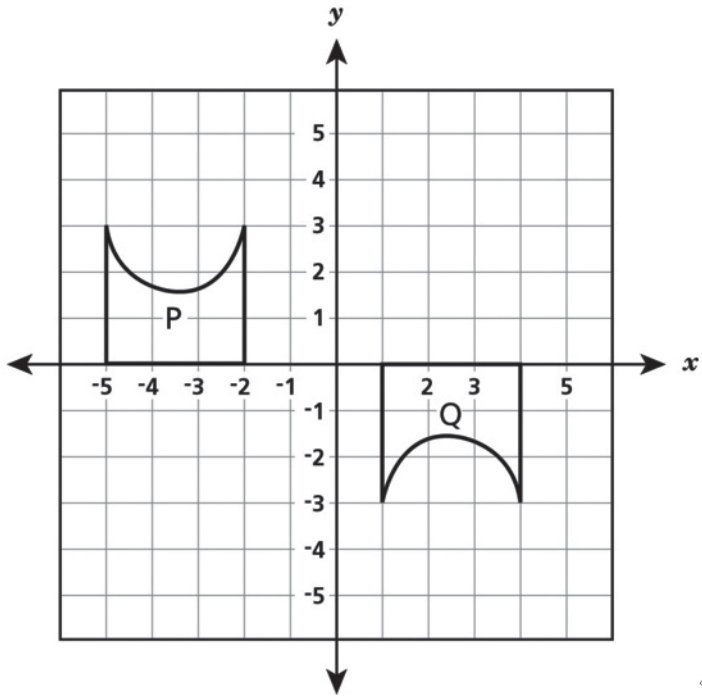
Answer Choice A: "reflection over the *x*-axis and translation 7 units right"; This statement correctly describes a series of transformations that takes Figure P to Figure Q. A student who selects this response understands how to describe a sequence of transformations that exhibits the congruence between two given congruent figures.

Answer Choice B: "reflection over the *y*-axis and translation 3 units down"; This response is incorrect and may occur if a student does not recognize that these two transformations will not transform Figure P to Figure Q.



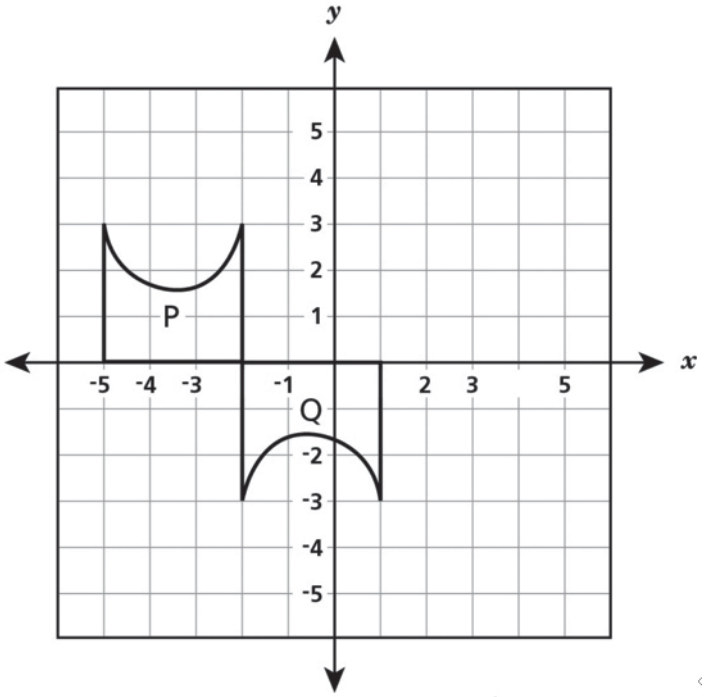
The student may have confused the *x*- and *y*-axes and misinterpreted the meaning of a translation by 3 units down. A student who selects this response may have limited understanding of how to describe a sequence of transformations that exhibits the congruence between two given congruent figures.

Answer Choice C: "translation 1 unit right and 180° rotation about the origin"; This response is incorrect and may occur if a student does not recognize that these two transformations will not transform Figure P to Figure Q.



The student may have assumed that a rotation of 180° degrees would map figure P onto Figure Q without considering the translation by one unit right. A student who selects this response may have limited understanding of how to describe a sequence of transformations that exhibits the congruence between two given congruent figures.

Answer Choice D: "translation 4 units right and 180° rotation about the origin"; This response is incorrect and may occur if a student does not recognize that these two transformations will not transform Figure P to Figure Q.



The student may have assumed that a rotation of 180° degrees would map figure P onto Figure Q without considering the translation by four units right. A student who selects this response may have limited understanding of how to describe a sequence of transformations that exhibits the congruence between two given congruent figures.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when describing a sequence that exhibits the congruence between two given congruent figures.

134080404_4

Determine the product.

$$800.5 \times (2 \times 10^6)$$

A 1.7×10^7

B 1.601×10^7

C 1.7×10^9

D 1.601×10^9

Key: D
Measured CCLS: 8.EE.4

Commentary: This question measures 8.EE.4 because it assesses the student's ability to perform operations with numbers expressed in scientific notation in a problem where both decimal and scientific notation are used.

Extended Rationale

Answer Choice A: "1.7×10^7"; This response is incorrect and may occur if a student incorrectly converts 800.5 to scientific notation, then makes an error when determining the exponent on the power of ten for the product of the two expressions.

$800.5 \rightarrow (8.5 \times 10^2)$ $\qquad$ $(8.5 \times 10^2) \times (2 \times 10^6) \rightarrow 1.7 \times 10^7$

A student who selects this response may have limited understanding of how to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Answer Choice B: "1.601×10^7"; This response is incorrect and may occur if a student makes an error when determining the exponent on the power of ten.

$800.5 \times (2 \times 10^6) \rightarrow 1.601 \times 10^7$

A student who selects this response may have limited understanding of how to perform operations with numbers expressed in scientific notation including problems where both decimal and scientific notation are used.

Answer Choice C: "1.7×10^9"; This response is incorrect and may occur if a student incorrectly converts 800.5 to scientific notation.

$800.5 \rightarrow (8.5 \times 10^2)$

A student who selects this response may have limited understanding of how to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Answer Choice D: "1.601×10^9"; This response represents the correct product of the two given numbers. The student may have used a method such as the one below.

$800.5 \times (2 \times 10^6) = 1{,}601 \times 10^6 = 1.601 \times 10^9$

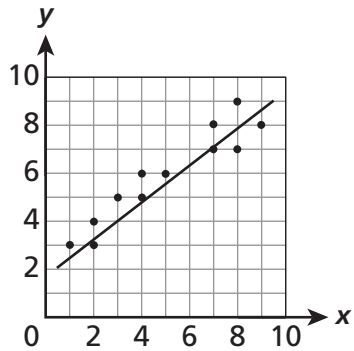
A student who selects this response understands how to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors and misconceptions made when performing operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

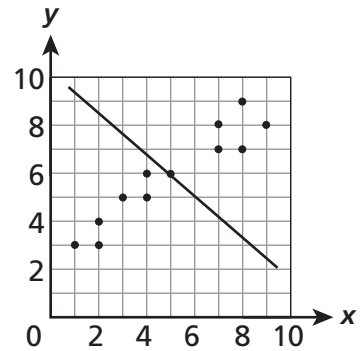
124080054_1

Which line represents the best fit for the scatter plot data?

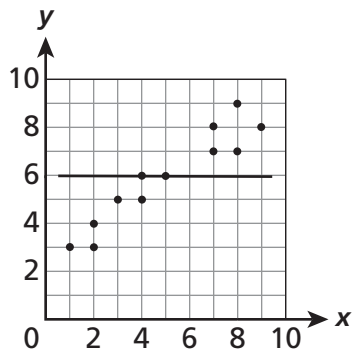
A



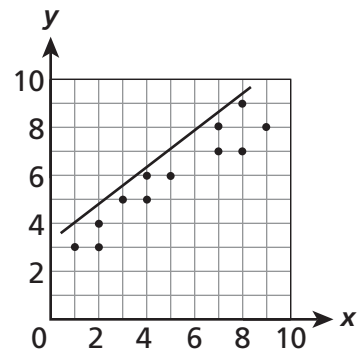
C



B



D



Key: A
Measured CCLS: 8.SP.2

Commentary: This question measures 8.SP.2 because it assesses the student's ability to informally assess the fit of a linear model by judging the closeness of the data points to the line.

Extended Rationale

Answer Choice A: This response shows the line that best fits the data on the scatter plot based on the closeness of the data points to the line. A student who selects this response understands how to informally assess the fit of a linear model by judging the closeness of the data points to the line.

Answer Choice B: This response is incorrect and may reflect a lack of understanding of how to informally assess the fit of a linear model. The student may select this scatter plot incorrectly because it evenly divides the number of points above and below the line.

Answer Choice C: This response is incorrect and may reflect a lack of understanding of how to informally assess the fit of a linear model. The student selected a scatter plot that shows a straight line, however the line does not model the relationship shown by the data points.

Answer Choice D: This response is incorrect and may reflect a lack of understanding of how to informally assess the fit of a linear model. The student selected a scatter plot that shows a linear model that represents a similar relationship to the data points; however, all of the points on the graph fall below the line. The line is not a good model for the data points on the scatter plot.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when informally assessing the fit of a linear model by judging the closeness of the data points to the line.

124080604_4

At a given time, Saturn was 9.1×10^8 miles from the Sun and Earth was 9.3×10^7 miles from the Sun. By what distance is one planet closer to the Sun than the other planet?

A 2×10^1

B 2×10^{15}

C 8.17×10^7

D 8.17×10^8

Key: D
Measured CCLS: 8.EE.4

Commentary: This question measures 8.EE.4 because it involves performing operations with numbers expressed in scientific notation. This question specifically assesses student understanding of the subtraction numbers expressed in scientific notation.

Extended Rationale

Answer Choice A: "2×10^1"; This response is incorrect and may occur when a student subtracts 9.1 from 9.3, without regard for place value, and then subtracts the two exponents, 7 from 8.

$(9.3 - 9.1) \times 10^{8-7} = 2 \times 10^1$

A student who selects this response may have limited understanding of how to subtract expressions represented in scientific notation.

Answer Choice B: "2×10^{15}"; This response is incorrect and may occur when a student subtracts 9.1 from 9.3, without regard for place value, and then adds the exponents, 7 and 8.

$(9.3 - 9.1) \times 10^{7+8} = 2 \times 10^{15}$

A student who selects this response may have limited understanding of how to subtract expressions represented in scientific notation.

Answer Choice C: "8.17×10^7"; This response is incorrect and may occur when a student rewrites 9.1×10^8 as 91×10^7 so that the two expressions have the same power of ten. The student may have obtained 8.17 by subtracting 9.3 from 91, incorrectly interpreting this result as 8.17×10^7.

$(91 - 9.3) \times 10^7 = 8.17 \times 10^7$

A student who selects this response may have some understanding of how to subtract expressions represented in scientific notation, but may have made an error when obtaining the final result.

Answer Choice D: "8.17×10^8"; This response represents the correct subtraction of the two numbers expressed in scientific notation. The student may have first rewritten 9.1×10^8 as 91×10^7 so that the two numbers have the same power of ten. The student may have then went on to subtract 9.3 from 91 to get 81.7×10^7, which is equal to 8.17×10^8.

$(91 - 9.3) \times 10^7 = 81.7 \times 10^7 = 8.17 \times 10^8$

Answer Choices A, B, and C are plausible but incorrect. They represent common student errors made when subtracting numbers expressed in scientific notation.

134080405_3

The combined volume of all the tanks at an aquarium is 1.25×10^6 gallons. The aquarium plans to install a new dolphin tank with a volume of 250,000 gallons. What will be the total volume of all of the tanks at the aquarium after the new dolphin tank is installed?

A 1.5×10^5

B 3.75×10^5

C 1.5×10^6

D 3.75×10^6

Key: C
Measured CCLS: 8.EE.4

Commentary: This question measures 8.EE.4 because it assesses the student's ability to perform operations with numbers expressed in scientific notation in a problem where both decimal and scientific notation are used.

Extended Rationale

Answer Choice A: "1.5×10^5"; This response is incorrect and may occur if a student makes an error determining the exponent on the power of ten for the sum of 1.25×10^6 and 250,000.

$$\left(1.25 \times 10^6\right) + 250{,}000 =$$

$$1{,}250{,}000 + 250{,}000 = 1{,}500{,}000$$

$$1{,}500{,}000 \rightarrow 1.5 \times 10^5$$

A student who selects this response may have limited understanding of how to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Answer Choice B: "3.75×10^5"; This response is incorrect and may occur if a student attempts to add the two values without correctly expressing them in terms of a common power of 10.

$$\left(1.25 \times 10^6\right) + 250{,}000 \rightarrow \left(1.25 \times 10^6\right) + \left(2.5 \times 10^5\right) \rightarrow 3.75 \times 10^5$$

A student who selects this response may have limited understanding of how to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Answer Choice C: "1.5×10^6"; This represents the correct total volume of the tanks at the aquarium. The student may have added the values using a method similar to these below.

Method 1:

$$\left(1.25 \times 10^6\right) + 250{,}000 =$$

$$1{,}250{,}000 + 250{,}000 =$$

$$1{,}500{,}000 = 1.5 \times 10^6$$

Method 2:

$$\left(1.25 \times 10^6\right) + 250{,}000 =$$

$$\left(1.25 \times 10^6\right) + \left(0.25 \times 10^6\right) = 1.5 \times 10^6$$

A student who selects this response understands how to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Answer Choice D: "3.75×10^6"; This response is incorrect and may occur if a student does not properly convert the value in decimal notation into scientific notation before adding the two values.

$$\left(1.25 \times 10^6\right) + 250{,}000 \rightarrow \left(1.25 \times 10^6\right) + \left(2.5 \times 10^6\right) = 3.75 \times 10^6$$

A student who selects this response may have limited understanding of how to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors and misconceptions made when performing operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

124080041_2

Rectangle *R* undergoes a dilation with scale factor 0.5 and then a reflection over the *y*-axis. The resulting image is Rectangle *S*. Which statement about Rectangles *R* and *S* is true?

A They are congruent and similar.

B They are similar but not congruent.

C They are congruent but not similar.

D They are neither congruent nor similar.

Key: B
Measured CCLS: 8.G.4

Commentary: This question measures 8.G.4 because the student must demonstrate understanding 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. Specifically, the student must recognize that a rectangle obtained from a dilation (with scale factor other than 1) and a reflection is similar, but not congruent, to the original rectangle.

Extended Rationale

Answer Choice A: "They are congruent and similar." This response is incorrect and may reflect a limited understanding of the effect on a two-dimensional figure of a sequence of transformations. A student who selects this response may lack an understanding that when a rectangle undergoes a dilation with a scale factor other than 1, the resulting image will not be congruent to the original image.

Answer Choice B: "They are similar but not congruent." This response represents the correct description of the resulting figure when a rectangle undergoes a dilation with a scale factor other than 1, followed by a reflection. The student also demonstrates an understanding 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.

Answer Choice C: "They are congruent but not similar." This response is incorrect and may reflect a limited understanding of the effect on a two-dimensional figure of a sequence of transformations. A student who selects this response may lack an understanding that when a rectangle undergoes a dilation with a scale factor other than 1, the resulting image will not be congruent to the original image.

Answer Choice D: "They are neither congruent nor similar." This response is incorrect and may reflect a limited understanding of the effect on a two-dimensional figure of a sequence of transformations. Since the rectangle is described as being dilated and reflected, the student may lack understanding 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.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when students are asked to demonstrate understanding 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.

124080031_1

The table below shows the cost of different numbers of goldfish at a pet store.

COST OF GOLDFISH

Number of Goldfish	Cost
5	$1.50
10	$3.00
15	$4.50
20	$6.00

The cost is a linear function of the number of goldfish. Which statement describes the rate of change of this function?

A The cost increases $0.30 each time 1 goldfish is added.

B The cost increases $1.50 each time 1 goldfish is added.

C The cost increases $3.00 each time 5 goldfish are added.

D The cost increases $6.00 each time 5 goldfish are added.

Key: A
Measured CCLS: 8.F.4

Commentary: This question measures 8.F.4 because it assesses the student's ability to determine the rate of change of a function from a table and interpret the rate of change in terms of the situation it models.

Extended Rationale

Answer Choice A: "The cost increases $0.30 each time 1 goldfish is added." This statement describes the rate of change of the function given in the table. The student may have used a method such as the one shown below to determine the rate of change.

$$m = \frac{(\$3.00 - \$1.50)}{(10 - 5)\text{ goldfish}} = \frac{\$1.50}{5\text{ goldfish}} = \$0.30/\text{goldfish}$$

A student who selects this response understands how to determine the rate of change of a function from a table and interpret the rate of change in terms of the situation it models.

Answer Choice B: "The cost increases $1.50 each time 1 goldfish is added." This response is incorrect and may occur if a student subtracts the adjacent costs in the table without dividing by the corresponding change in the number of goldfish.

$\$3.00 - \$1.50 = \$1.50$

A student who selects this response may have a limited understanding of how to determine the rate of change of a function from a table of values.

Answer Choice C: "The cost increases \$3.00 each time 5 goldfish are added." This response is incorrect and may occur if a student misinterprets the table of values and determines that the increase from 5 to 10 goldfish corresponds to an increase in price of \$3.00. As a result, the student subtracts the adjacent number of goldfish in the table and uses \$3.00 as the numerator of the rate of change.

$$m = \frac{\$3.00}{(10 - 5)\text{ goldfish}} = \frac{\$3.00}{5\text{ goldfish}}$$

A student who selects this response may have a limited understanding of how to determine the rate of change of a function from a table and interpret the rate of change in terms of the situation it models.

Answer Choice D: "The cost increases \$6.00 each time 5 goldfish are added." This response is incorrect and may occur if a student uses the increase in the number of goldfish from one row to the next as the denominator, and uses the greatest cost in the table (\$6.00) as the numerator in calculating the rate of change.

$$m = \frac{\$6.00}{(10 - 5)\text{ goldfish}} = \frac{\$6.00}{5\text{ goldfish}}$$

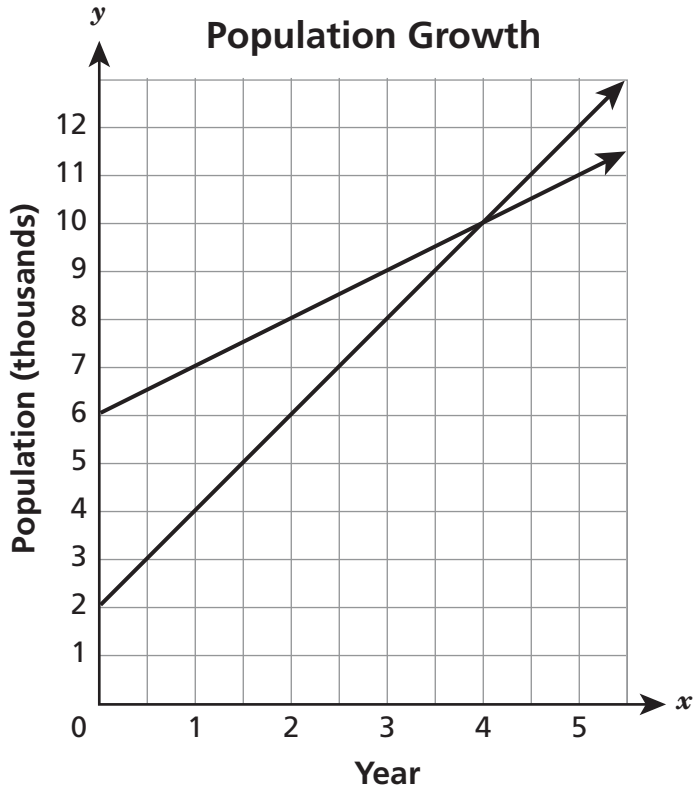
A student who selects this response may have a limited understanding of how to determine the rate of change of a function from a table and interpret the rate of change in terms of the situation it models.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when determining the rate of change of a function from a table and interpreting the rate of change in terms of the situation it models.

134080028_2

The population growth of two towns over a period of five years is represented by the system of equations below, both algebraically and graphically.

$$y = x + 6$$
$$y = 2x + 2$$



Which ordered pair is the solution to the system of equations?

A (2, 6)

B (4, 10)

C (6, 2)

D (10, 4)

Key: B
Measured CCLS: 8.EE.8a

Commentary: This question measures 8.EE.8a because it assesses the student's ability to understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection indicate values that satisfy both equations simultaneously.

Extended Rationale

Answer Choice A: "(2, 6)"; This response is incorrect and may occur if a student chooses a point with values from the *y*-intercepts of both lines.

$$\begin{array}{l} y = 2x + 2 \rightarrow 2 \\ y = x + 6 \rightarrow 6 \end{array} \rightarrow (2,\ 6)$$

A student who selects this response may have limited understanding of how to use the graph or equations of a system of two linear equations in two variables to determine the solution to a system.

Answer Choice B: "(4, 10)"; This represents the correct solution to the given system of equations. The student may have used the graph to find the solution to the system of equations, which is the point of intersection of the two lines, or the student may have used a method such as the one below.

$$\begin{aligned} x + 6 &= 2x + 2 \\ x + 4 &= 2x \\ 4 &= x \end{aligned} \quad \rightarrow \quad \begin{aligned} y &= (4) + 6 \\ y &= 10 \end{aligned}$$

A student who selects this response understands how to use the graph or equations of a system of two linear equations in two variables to determine the solution to a system.

Answer Choice C: "(6, 2)"; This response is incorrect and may occur if a student chooses a point with values from the *y*-intercepts of both lines.

$$\begin{array}{l} y = x + 6 \rightarrow 6 \\ y = 2x + 2 \rightarrow 2 \end{array} \rightarrow (6,\ 2)$$

A student who selects this response may have limited understanding of how to use the graph or equations of a system of two linear equations in two variables to determine the solution to a system.

Answer Choice D: "(10, 4)"; This response is incorrect and may occur if a student reverses the coordinates in the solution. A student who selects this response may have limited understanding how to use the graph or equations of a system of two linear equations in two variables to determine the solution to a system.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when determining the solutions to a system of two linear equations in two variables.

124080609_4

The four tables below show relationships in which the *x* values represent inputs and the *y* values represent the corresponding outputs.

Q

x	y
–2	–3
1	3
3	–3
5	3

R

x	y
–1	–5
2	4
3	7
4	10

S

x	y
–2	3
1	3
3	3
5	3

T

x	y
3	4
4	5
3	–4
4	–5

Which table represents a relationship that is **not** a function?

A Q

B R

C S

D T

Key: D
Measured CCLS: 8.F.1

Commentary: This question measures 8.F.1 because it involves assessing the student's understanding that a function is a rule that assigns to each input exactly one output.

Extended Rationale

Answer Choice A: "Q"; This response shows a table that represents a function, since each input, *x*, has exactly one output, *y*. A student who selects this response may not understand that a function is a rule that assigns to each input exactly one output.

Answer Choice B: "R"; This response shows a table that represents a function, since each input, *x*, has exactly one output, *y*. A student who selects this response may not understand that a function is a rule that assigns to each input exactly one output.

Answer Choice C: "S"; This response shows a table that represents a function, since each input, *x*, has exactly one output, *y*. A student who selects this response may not understand that a function is a rule that assigns to each input exactly one output.

Answer Choice D: "T"; This response represents the table that does not represent a function. The student who selects this response understands that the table of a function is the set of ordered pairs consisting of an input and exactly one corresponding output. The ordered pairs (3, 4) and (3, –4) are examples where an input, *x*, has more than one corresponding output, *y*.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors or misconceptions made in understanding that a function is a rule that assigns to each input exactly one output.

124080026_2

Madison created two functions.
For Function A, the value of y is two less than four times the value of x.
The table below represents Function B.

Function B

x	y
–3	–9
–1	–5
1	–1
3	3

In comparing the rates of change, which statement about Function A and Function B is true?

A Function A and Function B have the same rate of change.

B Function A has a greater rate of change than Function B has.

C Function A and Function B both have negative rates of change.

D Function A has a negative rate of change and Function B has a positive rate of change.

Key: B
Measured CCLS: 8.F.2

Commentary: This question measures 8.F.2 because the student must compare properties of two functions, each represented in a different way. The student must compare the rate of change of Function A, represented by a verbal description, with the rate of change of Function B, represented numerically in a table. The rate of change of Function A is 4, while the rate of change of Function B is 2.

Extended Rationale

Answer Choice A: "Function A and Function B have the same rate of change." This response is incorrect and may occur when a student lacks understanding of "rate of change." The student may have identified the rate of change of Function A as 4, and then assumed incorrectly that the rate of change of Function B is also 4 because y-values increase by 4 in each subsequent table entry. A student who selects this response may be unable to compare properties of two functions, each represented in a different way.

Answer Choice B: "Function A has a greater rate of change than Function B has." This response represents the correct comparison of the rates of change of the two given functions. A student may have arrived at this answer by using the given equation to create a table for the x and y values of Function A and then comparing the two tables to determine the rate of change for both functions.

Function A:

$y = 4x - 2$

$y = 4(-3) - 2 = -14$

$y = 4(-1) - 2 = -6$

$y = 4(1) - 2 = 2$

$y = 4(3) - 2 = 10$

x	***y***
–3	–14
–1	–6
1	2
3	10

Rate of change: Function A = $\frac{10 - 2}{3 - 1} = \frac{8}{2} = 4$

Rate of change: Function B= $\frac{3 - (-1)}{3 - 1} = \frac{4}{2} = 2$

A student who selects this response has an understanding of how to compare the properties of two functions when each are represented in a different way.

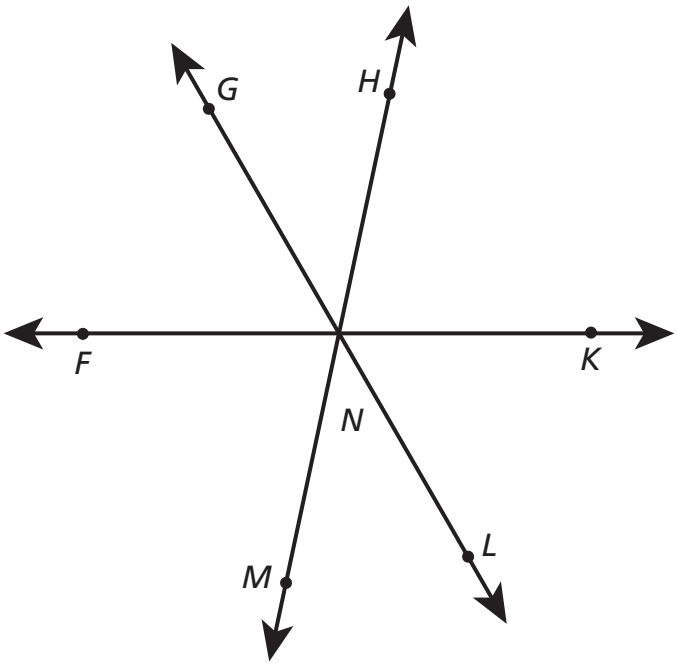
Answer Choice C: "Function A and Function B both have negative rates of change." This response is incorrect and may occur when a student lacks understanding of "rate of change." The student may incorrectly interpret negative values in the table for Function B and the fact that, for Function A, the value of *y* is two less than four times the value of *x*, as evidence that both functions have a negative rate of change. A student who selects this response may be unable to compare properties of two functions, each represented in a different way.

Answer Choice D: "Function A has a negative rate of change and Function B has a positive rate of change." This response is incorrect and may occur when a student lacks understanding of "rate of change." The student may incorrectly interpret the fact that, for Function A, the value of *y* is two less than four times the value of *x*, as evidence that the function has a negative rate of change. A student who selects this response may be unable to compare properties of two functions, each represented in a different way.

Answer choices A, C, and D are plausible but incorrect. They represent common student misconceptions or errors made when comparing the properties of two functions, each represented in a different way.

124070047_3

In the diagram below, three lines intersect at N. The measure of $\angle GNF$ is 60°, and the measure of $\angle MNL$ is 47°.



What is the measure of $\angle HNK$?

A 47°

B 60°

C 73°

D 107°

Key: C
Measured CCLS: 7.G.5

Commentary: This question measures 7.G.5 because it assesses the student's ability to use facts about supplementary, vertical, and adjacent angles in a multi-step problem to find an unknown angle in a figure. Standard 7.G.5 is designated as May-to-June in Grade 7. As indicated in the educator guide, test questions may assess standards from previous grades.

Extended Rationale

Answer Choice A: "47°"; This response is incorrect and may occur if a student assumes that $\angle HNK$ and $\angle MNL$ are equal in measure. A student who selects this response may have limited understanding of how to use facts about supplementary, vertical, and adjacent angles in a multi-step problem to find an unknown angle in a figure.

Answer Choice B: "60°"; This response is incorrect and may occur if a student assumes that $\angle HNK$ and $\angle GNF$ are equal in measure. A student who selects this response may have limited understanding of how to use facts about supplementary, vertical, and adjacent angles in a multi-step problem to find an unknown angle in a figure.

Answer Choice C: "73°"; This response shows the correct measure of $\angle HNK$. The student may have first determined that the measure of $\angle FNM$ is equal to 73° based on the fact that $\angle FNM$ is supplementary to $\angle GNF$ and $\angle MNL$.

$180 - (60 + 47) = 73$

The student may then have used the fact that the measures of $\angle HNK$ and $\angle FNM$ are equal, since these two angles are vertical angles to determine that the measure of $\angle HNK$ is equal to 73°. A student who selects this response understands how to use facts about supplementary, vertical, and adjacent angles in a multi-step problem to find an unknown angle in a figure.

Answer Choice D: "107°"; This response is incorrect and may occur if a student assumes that the measure of $\angle HNK$ is equal to the sum of the measures of $\angle GNF$ and $\angle MNL$.

$60 + 47 = 107$

A student who selects this response may have limited understanding of how to use facts about supplementary, vertical, and adjacent angles in a multi-step problem to find an unknown angle in a figure.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors and misconceptions made when using facts about supplementary, vertical, and adjacent angles in a multi-step problem to find an unknown angle in a figure.

134080001_2

Which expression is equivalent to $4^7 \times 4^{-5}$?

A 4^{12}

B 4^2

C 4^{-2}

D 4^{-35}

Key: B
Measured CCLS: 8.EE.1

Commentary: This question measures 8.EE.1 because it assesses the student's ability to know and apply the properties of integer exponents to generate an equivalent numerical expression.

Extended Rationale

Answer Choice A: "4^{12}"; This response is incorrect and may occur if a student subtracts the exponents to create an equivalent expression.

$$4^7 \times 4^{-5} \rightarrow 4^{(7-(-5))} = 4^{12}$$

A student who selects this response may have a limited understanding of the properties of integer exponents and how to apply them to generate equivalent numerical expressions.

Answer Choice B: "4^2"; This response shows an expression that is equivalent to the given expression. The student may have correctly added the exponents to create an equivalent expression.

$$4^7 \times 4^{-5} = 4^{(7+(-5))} = 4^2$$

A student who selects this response understands the properties of integer exponents and how to apply them to generate equivalent numerical expressions.

Answer Choice C: "4^{-2}"; This response is incorrect and may occur if a student adds the exponents in the expression, but either reverses the signs on both exponents or makes a calculation error when adding integer exponents.

$$4^7 \times 4^{-5} \rightarrow 4^{(-7+5)} = 4^{-2}$$

A student who selects this response may have limited understanding of how to know and apply the properties of integer exponents to generate equivalent numerical expressions.

Answer Choice D: "4^{-35}"; This response is incorrect and may occur if a student multiplies the exponents in the expression.

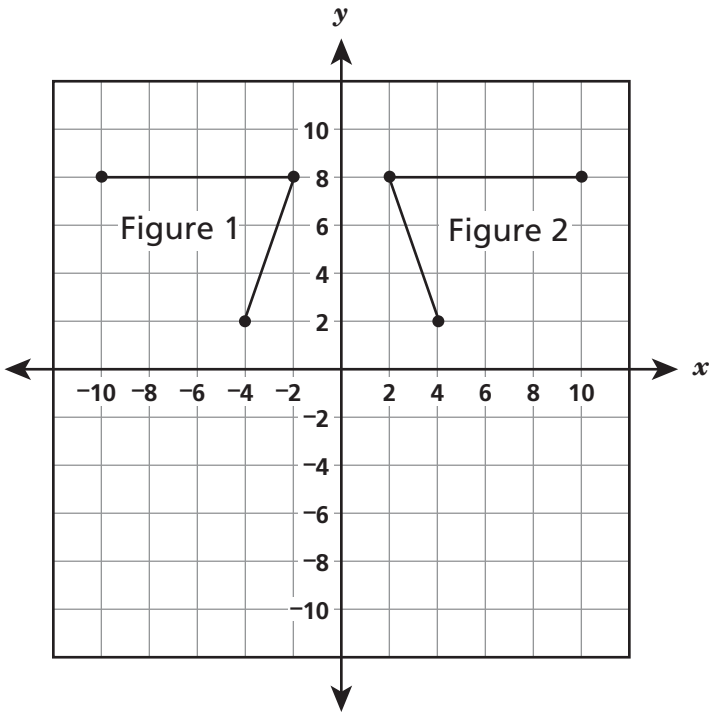
$$4^7 \times 4^{-5} \rightarrow 4^{(7\times(-5))} = 4^{-35}$$

A student who selects this response may have limited understanding of the properties of integer exponents and how to apply them to generate equivalent numerical expressions.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions concerning the properties of integer exponents or applying the properties of integer exponents to generate equivalent numerical expressions.

134080418_3

Figure 1 can be transformed to create Figure 2 using a single transformation.



Which transformation can be used to accomplish this?

A dilation

B rotation

C reflection

D translation

Key: C
Measured CCLS: 8.G.1

Commentary: This question measures 8.G.1 because it assesses the student's ability to verify the properties of rotations, reflections, and translations, where line segments are taken to line segments of the same length and angles are taken to angles of the same measure.

Extended Rationale

Answer Choice A: "dilation"; This response is incorrect and may occur if a student does not recognize that the lengths of the line segments in Figures 1 and 2 are the same and that the figures do not have the same orientation. A student who selects this response may have limited understanding of the properties of rotations, reflections, and translations.

Answer Choice B: "rotation"; This response is incorrect and may occur if a student confuses the concept of rotation about a point with the concept of reflection across an axis. A student who selects this response may

have limited understanding of how to verify the properties of rotations, reflections, and translations, where line segments are taken to line segments of the same length and angles are taken to angles of the same measure.

Answer Choice C: "reflection"; This statement correctly describes the single transformation that takes Figure 1 to Figure 2. The student may have recognized that Figure 2 is a reflection of Figure 1 over the *y*-axis. A student who selects this response understands the properties of rotations, reflections, and translations.

Answer Choice D: "translation"; This response is incorrect and may occur if a student thinks that moving the figure horizontally will result in Figure 1 being transformed to Figure 2. A student who selects this response may have limited understanding of the properties of rotations, reflections, and translations.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors and misconceptions made when verifying the properties of rotations, reflections, and translations, where line segments are taken to line segments of the same length and angles are taken to angles of the same measure.

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124080607_4

What is the solution to the system of equations below?

$$\begin{cases} 3x + 4y = -2 \\ 2x - 4y = -8 \end{cases}$$

A $x = 2,\ y = -2$

B $x = 6,\ y = -5$

C $x = 4,\ y = 4$

D $x = -2,\ y = 1$

Key: D
Measured CCLS: 8.EE.8b

Commentary: This question measures 8.EE.8b because it assesses the student's ability to solve a system of two linear equations with two variables algebraically.

Extended Rationale

Answer Choice A: "$x = 2,\ y = -2$"; This response is incorrect and may occur when a student determines values of x and y that are consistent only with the first equation shown. The values of $x = 2$ and $y = -2$, however, do not result in a true second equation.

$3(2) + 4(-2) = -2$ $\qquad$ $2(2) - 4(-2) \neq -8$

$6 + (-8) = -2$ $\qquad$ $4 - (-8) \neq -8$

The student who selects this response may lack an understanding of how to solve a system of two linear equations with two variables algebraically.

Answer Choice B: "$x = 6,\ y = -5$"; This response is incorrect and may occur when a student determines values of x and y that are consistent only with the first equation shown. The values of $x = 6$ and $y = -5$, however, do not result in a true second equation.

$3(6) + 4(-5) = -2$ $\qquad$ $2(6) - 4(-5) \neq -8$

$18 + (-20) = -2$ $\qquad$ $12 - (-20) \neq -8$

The student who selects this response may lack an understanding of how to solve a system of two linear equations with two variables algebraically.

Answer Choice C: "$x = 4,\ y = 4$"; This response is incorrect and may occur when a student determines values of x and y that are consistent only with the second equation shown. The values of $x = 4$ and $y = 4$, however, do not result in a true first equation.

$3(4) + 4(4) \neq -2$ $\qquad$ $2(4) - 4(4) = -8$

$12 + 16 \neq -2$ $\qquad$ $8 - (16) = -8$

The student who selects this response may lack an understanding of how to solve a system of two linear equations with two variables algebraically.

Answer Choice D: "$x = -2,\ y = 1$"; This response represents the correct solution to the given system of equations. The student may have added the two equations in order to solve for x, then inserted the value of x in one of the equations in order to determine the value of y.

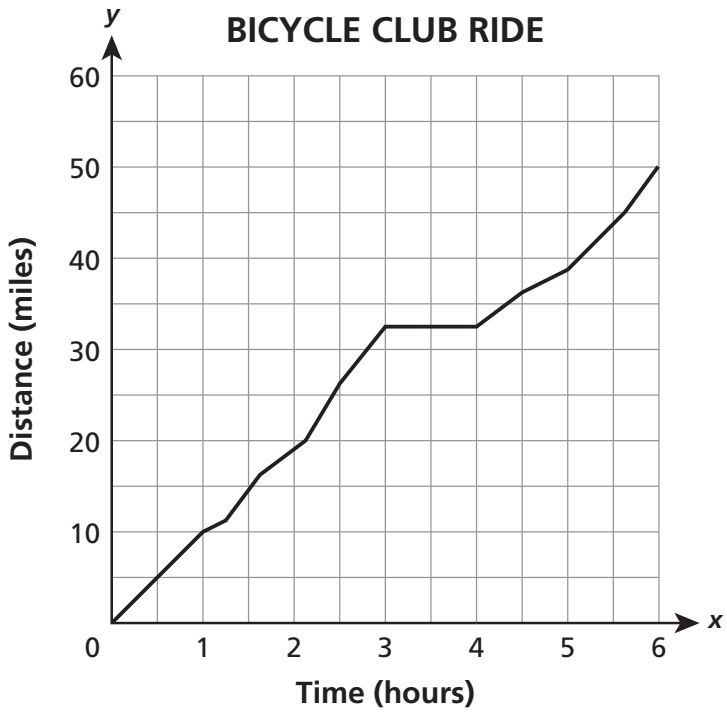
$3x + 4y = -2$	$3(-2) + 4y = -2$
$2x - 4y = -8$	$-6 + 4y = -2$
$5x = -10$	$4y = 4$
$x = -2$	$y = 1$

The student who selects this response understands how to solve a system of two linear equations with two variables algebraically.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors made when solving systems of two linear equations with two variables algebraically.

124080033_2

A bicycle club went on a six-hour ride. The graph below shows the relationship between the number of hours spent on the trails and the number of miles traveled.



Which statement best interprets information provided by the graph?

A The club members rode at a constant speed for the entire ride.

B The club members stopped for a rest during their ride.

C The number of miles traveled increased continuously throughout the ride.

D The number of miles traveled increased some of the time and decreased some of the time.

Key: B
Measured CCLS: 8.F.5

Commentary: This question measures 8.F.5 because it assesses the student's ability to describe qualitatively the functional relationship between two quantities when analyzing a graph. In this case, the graph shows the functional relationship between time and distance for the bicycle club's ride.

Extended Rationale

Answer Choice A: "The club members rode at a constant speed for the entire ride." This response is incorrect and may occur when the student is unable to recognize that increasing at a constant speed would be represented by a straight line with constant slope. A student who selects this response may have limited understanding of how to describe qualitatively the functional relationship between two quantities when analyzing a graph.

Answer Choice B: "The club members stopped for a rest during their ride." This response represents the correct interpretation of the information presented in the graph. A student who selects this response is able to describe qualitatively the functional relationship between distance and time by analyzing the given graph.

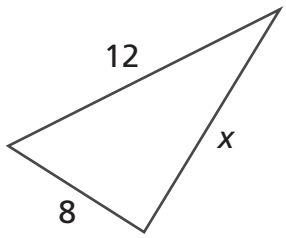
Answer Choice C: "The number of miles traveled increased continuously throughout the ride." This response is incorrect and may occur when the student is unable to recognize that between the third and the fourth hour the distance remained the same, approximately 35 miles. A student who selects this response may have limited understanding of how to describe qualitatively the functional relationship between two quantities when analyzing a graph.

Answer Choice D: "The number of miles traveled increased some of the time and decreased some of the time." This response is incorrect and may occur when the student erroneously interprets the measurement between the third and the fourth hour as decreasing in distance rather than the distance remaining the same, approximately 35 miles. A student who selects this response may have limited understanding of how to describe qualitatively the functional relationship between two quantities when analyzing a graph.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors or misconceptions made when describing qualitatively the functional relationship between two quantities when analyzing a graph.

134070025_4

Which number could **not** be a value of x?



[not drawn to scale]

A 8

B 9

C 12

D 21

Key: D
Measured CCLS: 7.G.2

Commentary: This question measures 7.G.2 because it assesses the student's ability to notice when conditions determine a unique triangle, more than one triangle, or no triangle. In this case, the student is required to recognize that a particular side length for a triangle is not possible, based on the given lengths of the other two sides. Standard 7.G.2 is designated as May-to-June in Grade 7. As indicated in the educator guide, test questions may assess standards from previous grades.

Extended Rationale

Answer Choice A: "8"; This response is incorrect and may occur if a student does not recognize that $x = 8$ is a possible value for the length of this side of the triangle, since each side is shorter than the sum of the other two side lengths. The student may have incorrectly assumed that because the sum of two sides 8 + 8, is greater than the third, 12, that the triangle could not exist. A student who selects this response may have limited ability to notice when the conditions determine a unique triangle, more than one triangle, or no triangle.

Answer Choice B: "9"; This response is incorrect and may occur if a student does not recognize that $x = 9$ is a possible value for the length of this side of the triangle, since each side is shorter than the sum of the other two sides. The student may have incorrectly assumed that because the sum of two sides 8 + 9, is greater than the third, 12, that the triangle could not exist. A student who selects this response may have limited ability to notice when the conditions determine a unique triangle, more than one triangle, or no triangle.

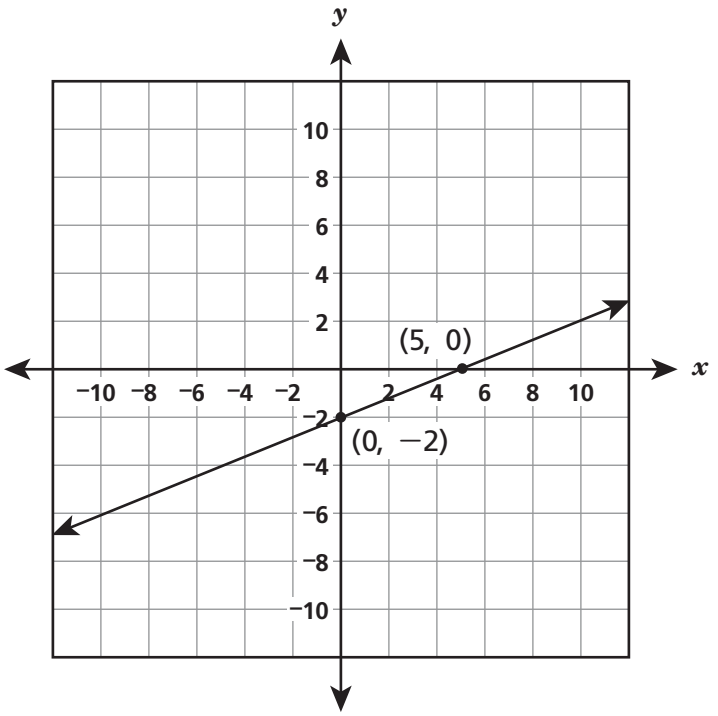
Answer Choice C: "12"; This response is incorrect and may occur if a student does not recognize that $x = 12$ is a possible value for the length of this side of the triangle, since each side is shorter than the sum of the other two sides. The student may have incorrectly assumed that because the sum of two sides 8 + 12, is greater than the third, 12, that the triangle could not exist. A student who selects this response may have limited ability to notice when the conditions determine a unique triangle, more than one triangle, or no triangle.

Answer Choice D: "21"; This is the correct response and represents a value that could not represent the measure of *x*, the length of the third side of the triangle. Based on the triangle inequality, any side of a triangle must be shorter than the sum of the other two sides. If $x = 21$, this side would have a length greater than the sum of the two given sides, $8 + 12$. A student who selects this response understands when the conditions determine a unique triangle, more than one triangle, or no triangle.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors and misconceptions made when noticing when conditions determine a unique triangle, more than one triangle, or no triangle.

134080010_1

Which equation represents the line shown on the coordinate grid below?



A $y = \frac{2}{5}x - 2$

B $y = \frac{2}{5}x + 5$

C $y = -\frac{2}{5}x - 2$

D $y = -\frac{2}{5}x + 5$

Key: A
Measured CCLS: 8.EE.6

Commentary: This question measures 8.EE.6 because it assesses the student's understanding of the derivation of the equation $y = mx + b$ for a line intercepting the vertical axis at b. The student must call upon understanding that m represents the slope of the line and b represents the y-intercept in order to identify the equation in $y = mx + b$ form that represents the line shown.

Extended Rationale

Answer Choice A: "$y = \frac{2}{5}x - 2$"; This response represents the correct equation for the graph shown. The student may have correctly determined the slope, possibly by using the slope formula:

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 0}{0 - 5} = \frac{-2}{-5} = \frac{2}{5}$$

The student may then have determined the *y*-intercept to be –2 by examining the graph. The student who selects this response understands the derivation of the equation $y = mx + b$ for a line intercepting the vertical axis at *b*.

Answer Choice B: "$y = \frac{2}{5}x + 5$"; This response is incorrect and may occur when the student correctly calculates the slope but then confuses the *x*- and *y* -intercepts. The student who selects this response may have some understanding of the derivation of the equation $y = mx + b$ for a line intercepting the vertical axis at *b*.

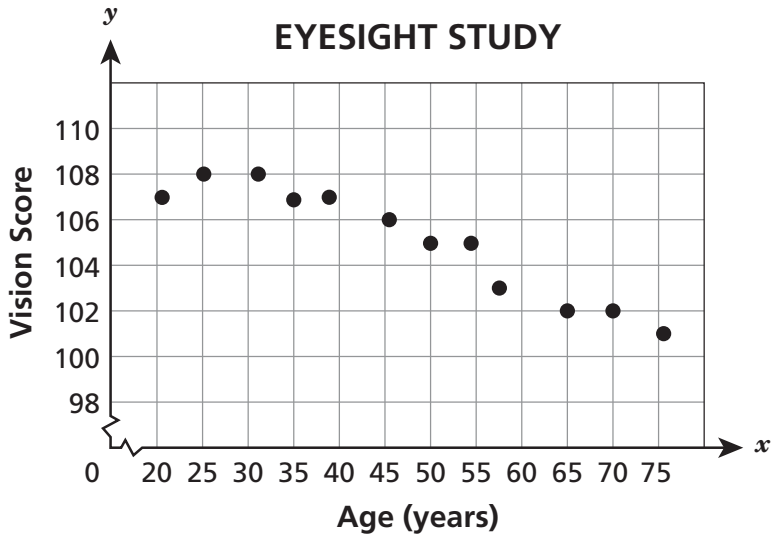
Answer Choice C: "$y = -\frac{2}{5}x - 2$"; This response is incorrect and may occur when the student erroneously calculates the slope as $\frac{0-2}{5-0}$, but the *y*-intercept was correctly determined to be –2. The student who selects this response may have limited understanding of the derivation of the equation $y = mx + b$ for a line intercepting the vertical axis at *b*.

Answer Choice D: "$y = -\frac{2}{5}x + 5$"; This response is incorrect and may occur when the student erroneously calculates the slope as $\frac{0-2}{5-0}$ and also then confuses the *x*- and *y* -intercepts. The student who selects this response may lack an understanding of the derivation of the equation $y = mx + b$ for a line intercepting the vertical axis at *b*.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when deriving the equation $y = mx + b$ for a line intercepting the vertical axis at *b*.

134080300_2

A researcher studied the eyesight of people at different ages. She calculated a vision score for each person in the study and plotted the data on the graph below.



The researcher used the line $y = -0.1x + 110$ to model the data. When she substituted the value $x = 65$ into this equation, what did the result tell her?

A the exact value for the vision score of a 65-year-old

B the predicted value for the vision score of a 65-year-old

C the minimum possible value for the vision score of a 65-year-old

D the maximum possible value for the vision score of a 65-year-old

Key: B
Measured CCLS: 8.SP.3

Commentary: This question measures 8.SP.3 because it assesses the student's ability to use the equation of a linear model to solve a problem in the context of bivariate measurement data.

Extended Rationale

Answer Choice A: "the exact value for the vision score of a 65-year-old"; This response is incorrect and may occur if a student does not understand that the linear function models a linear association, and does not determine exact values for a given input. A student who selects this response may have limited understanding of how to use the equation of a linear model to solve problems in the context of bivariate measurement data.

Answer Choice B: "the predicted value for the vision score of a 65-year-old"; This answer correctly describes the meaning of the value that results from substituting $x = 65$ into the given equation. The student may have understood that a linear model can be used for determining a prediction based on a linear association, and that the input value, $x = 65$, would represent the age of the participant. The student who selects this response understands how to use the equation of a linear model to solve problems in the context of bivariate measurement data.

Answer Choice C: "the minimum possible value for the vision score of a 65-year-old"; This response is incorrect and may occur if a student does not understand that the linear function models a linear association, and does not determine the minimum possible value. A student who selects this response may have limited understanding of how to use the equation of a linear model to solve problems in the context of bivariate measurement data.

Answer Choice D: "the maximum possible value for the vision score of a 65-year-old"; This response is incorrect and may occur if a student does not understand that the linear function models a linear association, and does not determine the maximum possible value. A student who selects this response may have limited understanding of how to use the equation of a linear model to solve problems in the context of bivariate measurement data.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when using the equation of a linear model to solve problems in the context of bivariate measurement data.

134080411_2

The table below represents a linear function.

x	y
–1	5
1	9
3	13
5	17

Which function has a greater slope and a greater y-intercept than the linear function represented in the table?

A $y = 2x + 8.5$

B $y = 3x + 7.5$

C $y = 5x + 6.5$

D $y = 10x + 5.5$

Key: B
Measured CCLS: 8.F.2

Commentary: This question measures 8.F.2 because it assesses the student's ability to compare properties of two functions, each represented in a different way. In this case, one function is represented by a table of values and the other is represented by an equation.

Extended Rationale

Answer Choice A: "$y = 2x + 8.5$"; This response is incorrect and may occur if a student makes a calculation error while determining the slope and/or y-intercept of the function represented in the table. One possible error is shown below.

$$m = \frac{(y_2 - x_2)}{(y_1 - x_1)} = \frac{(9 - 1))}{(5 - (-1))} = \frac{8}{6} = \frac{4}{3}$$

$$5 = \frac{4}{3}(-1) + b$$
$$5 = -\frac{4}{3} + b$$
$$6\frac{1}{3} = b$$

A student who selects this response may have limited understanding of how to compare the properties of two functions when each is represented in a different way.

Answer Choice B: "$y = 3x + 7.5$"; This represents a correct function with a greater slope and y-intercept than the function represented in the table. The student may have used a method such as the one shown below to determine the slope and y-intercept of the function represented in the table.

$$m = \frac{(9 - 5)}{(1 - (-1))} = \frac{4}{2} = 2$$

$$5 = 2(-1) + b$$
$$5 = -2 + b$$
$$7 = b$$

A student who selects this response understands how to compare properties of two functions when each is represented in a different way.

Answer Choice C: " $y = 5x + 6.5$ "; This response is incorrect and may occur if a student makes a calculation error while determining the slope and/or *y*-intercept of the function represented in the table. One possible error is shown below.

$$m = \frac{(x_2 - x_1)}{(y_2 - y_1)} = \frac{(1-(-1))}{(9-5)} = \frac{2}{4} = \frac{1}{2}$$

$$\begin{aligned} 5 &= \frac{1}{2}(-1) + b \\ 5 &= -\frac{1}{2} + b \\ 5\frac{1}{2} &= b \end{aligned}$$

A student who selects this response may have limited understanding of how to compare properties of two functions when each is represented in a different way.

Answer Choice D: " $y = 10x + 5.5$ "; This response is incorrect and may occur if a student makes a calculation error while determining the slope and/or y-intercept of the function represented in the table. One possible error is shown below.

$$m = \frac{(9-5)}{(1-(-1))} = \frac{4}{2} = 2$$

$$\begin{aligned} x &= my + b \\ -1 &= 2(5) + b \\ -1 &= 10 + b \\ -11 &= b \end{aligned}$$

A student who selects this response may have limited understanding of how to compare properties of two functions when each is represented in a different way.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when comparing properties of two functions when each is represented in different ways.

134080413_1

Which phrase describes a nonlinear function?

A the area of a circle as a function of the radius

B the perimeter of a square as a function of the side length

C the cost of gasoline as a function of the number of gallons purchased

D the distance traveled by a car moving at constant speed as a function of time

Key: A
Measured CCLS: 8.F.3

Commentary: This question measures 8.F.3 because it assesses the student's ability to recognize examples of functions that are not linear.

Extended Rationale

Answer Choice A: "the area of a circle as a function of the radius"; This statement correctly describes a nonlinear function. The student may have understood that the function described in this answer choice can be written as $A = \pi r^2$, where A is the area and r is the radius, and recognized that the exponent on the variable r is greater than 1.

$A = \pi r^2$

A student who selects this response recognizes that the equation for the area of a circle is an example of a function that is not linear.

Answer Choice B: "the perimeter of a square as a function of the side length"; This response is incorrect and may occur if a student does not recognize that the function described in this option can be represented by a linear equation such as the one below.

$P = 4s$, where P is the perimeter and s is the side length.

A student who selects this response may have limited understanding of how to determine if a given example can be modeled by a linear function.

Answer Choice C: "the cost of gasoline as a function of the number of gallons purchased"; This response is incorrect and may occur if a student does not recognize that the function described in this option can be represented by a linear equation such as the one below.

$c = mg$, where c is the cost, m is the price per gallon, and g is the number of gallons.

A student who selects this response may have limited understanding of how to determine if a given example can be modeled by a linear function.

Answer Choice D: "the distance traveled by a car moving at a constant speed as a function of time"; This response is incorrect and may occur if a student does not recognize that the function described in this option can be represented by a linear equation such as the one below.

$d = mt$, where d is distance, m is the constant speed of the car, and t is time.

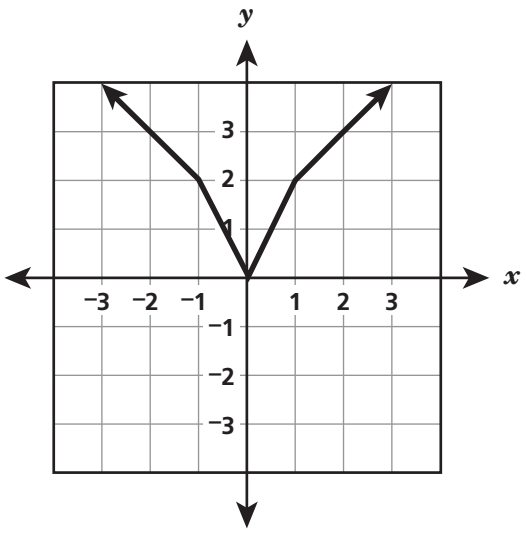
A student who selects this response may have limited understanding of how to determine if a given example can be modeled by a linear function.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when interpreting if an example of a relationship between two quantities can be modeled with a linear function.

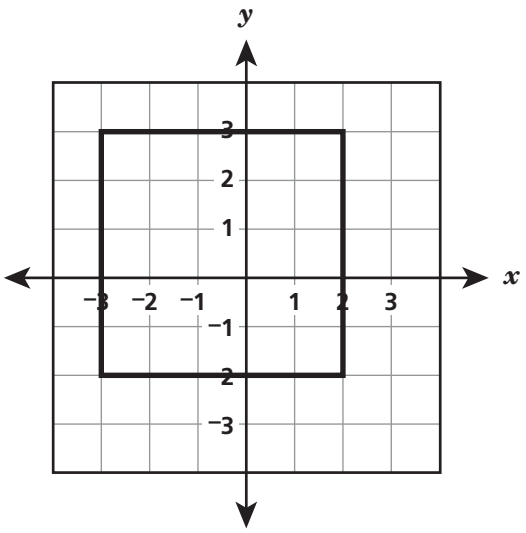
134080043_1

Which graph represents a function?

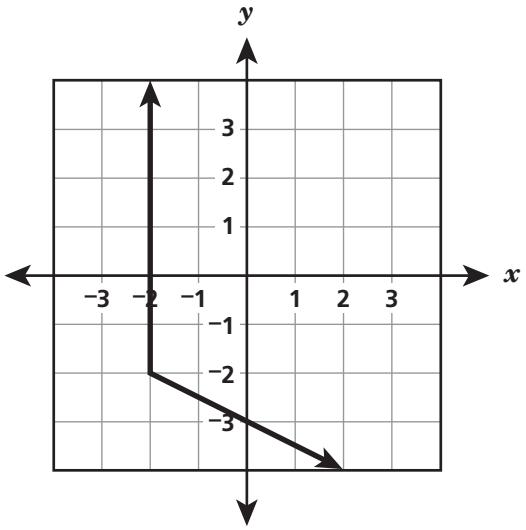
A



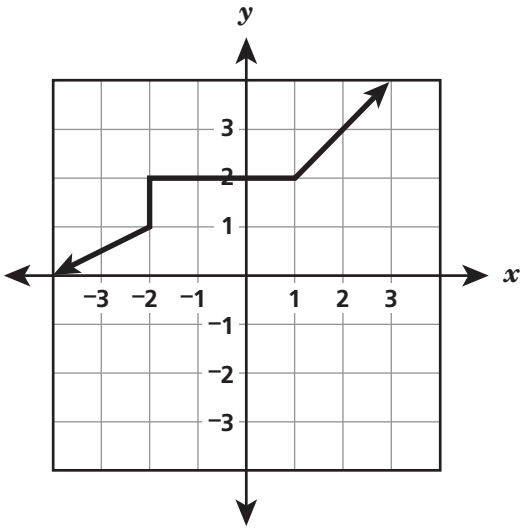
C



B



D



Key: A
Measured CCLS: 8.F.1

Commentary: This question measures 8.F.1 because it assesses the student's understanding of a function as a rule that assigns to each input exactly one output, and that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

Extended Rationale

Answer Choice A: This is the correct graph that represents a function. The student may have recognized that there is exactly one output for each input on the graph. A student who selects this response understands that a function is a rule that assigns to each input exactly one output, and that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

Answer Choice B: This response is incorrect and may occur if a student does not recognize that there are multiple outputs for the input value of $x = -2$. A student who selects this response may have a limited understanding of how to determine if a rule is a function from a graph of the function.

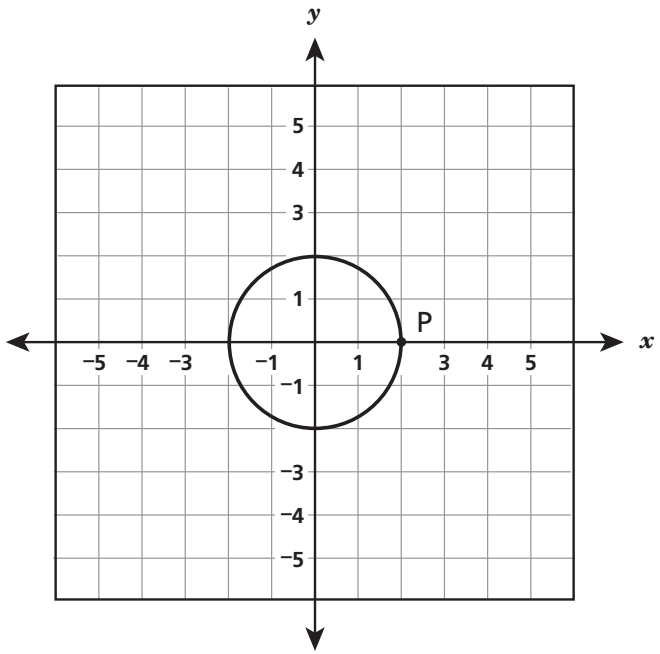
Answer Choice C: This response is incorrect and may occur if a student does not recognize that there are multiple outputs for input values of $x = -3$ and $x = 2$. A student who selects this response may have a limited understanding of how to determine if a rule is a function from a graph of the function.

Answer Choice D: This response is incorrect and may occur if a student does not recognize that there are multiple outputs for the input value of $x = -2$. A student who selects this response may have limited understanding of how to determine if a rule is a function from a graph of the function.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when understanding that a function is a rule that assigns to each input exactly one output, and that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

134080072_2

The circle shown below is centered at (0, 0) and passes through point P located at (2, 0).



The circle is dilated with the center of dilation at the origin and a scale factor of 0.5 and then translated up 3 units. What are the coordinates of the image of point P after this transformation?

A (4, 3)

B (1, 3)

C (1, 1.5)

D (0.5, 3)

Key: B
Measured CCLS: 8.G.3

Commentary: This question measures 8.G.3 because it assesses the student's ability to describe the effect of dilations, translations, rotations, and reflections on a two-dimensional figure using coordinates. In this case, the student is required to locate the image of a point on a circle after the circle is dilated and then translated.

Extended Rationale

Answer Choice A: "(4, 3)"; This response is incorrect and may occur if a student mistakenly dilates the circle by a factor of 2 instead of 0.5, and then correctly translates the circle up 3 units. A student who selects this response may have a limited understanding of how to apply the effect of dilations and translations on two-dimensional figures using coordinates.

Answer Choice B: "(1, 3)"; This answer describes the correct coordinates of the image of point P after the given transformation. The student may have arrived at this point after correctly performing the given transformation on point P. After the dilation, the image of point P will be located at (1, 0); after the translation, the image of point P will be located at (1, 3). A student who selects this response understands how to apply the effect of dilations and translations on two-dimensional figures using coordinates.

Answer Choice C: "(1, 1.5)"; This response is incorrect and may occur if a student correctly dilates the circle, but then mistakenly translates it up half of the units, 1.5, instead of up 3 units. A student who selects this response may have limited understanding of how to apply the effect of dilations and translations on two-dimensional figures using coordinates.

Answer Choice D: "(0.5, 3)"; This response is incorrect and may occur if a student mistakenly interprets 0.5 as the *x*-coordinate of point P after the dilation, instead of dilating the circle by a factor of 0.5, and then correctly translates the circle up 3 units. A student who selects this response may have limited understanding of how to apply the effect of dilations and translations on two-dimensional figures using coordinates.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when applying the effect of dilations and translations on two-dimensional figures using coordinates.

134080414_4

Which equation represents a linear function?

A $y = \frac{4}{x} + 1$

B $y = x^2 + 2$

C $y = \sqrt[3]{x + 1}$

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

Key: D
Measured CCLS: 8.F.3

Commentary: This question measures 8.F.3 because it assesses the student's ability to interpret the equation $y = mx + b$ as defining a linear function.

Extended Rationale

Answer Choice A: "$y = \frac{4}{x} + 1$"; This response is incorrect and may occur if a student does not understand that this function cannot be represented by an equation in the form of $y = mx + b$. A student who selects this response may have limited understanding of how to determine if a function is linear by recognizing that the equation $y = mx + b$ defines a linear function.

Answer Choice B: "$y = x^2 + 2$"; This response is incorrect and may occur if a student does not understand that this function cannot be represented by an equation in the form of $y = mx + b$, as x is raised to the power of 2. A student who selects this response may have limited understanding of how to determine if a function is linear by recognizing that the equation $y = mx + b$ defines a linear function.

Answer Choice C: "$y = \sqrt[3]{x + 1}$"; This response is incorrect and may occur if a student does not understand that this function cannot be represented by an equation in the form of $y = mx + b$, as x is part of an expression involving a cube root. A student who selects this response may have limited understanding of how to determine if a function is linear by recognizing that the equation $y = mx + b$ defines a linear function.

Answer Choice D: "$y = -\frac{2}{3}x - \frac{1}{2}$"; This equation represents a linear function. The student may recognize that this equation is in the form of $y = mx + b$. A student who selects this response understands how to interpret the equation $y = mx + b$ as defining a linear function.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors and misconceptions made when interpreting the equation $y = mx + b$ as defining a linear function.

134080096_2

Annette plans to visit an amusement park where she must pay for admission and purchase tickets to go on the rides. Annette wants to find the total cost for a day at the amusement park. She wrote the equation $c = 1.50x + 12$ to predict c, the total cost for a day at the amusement park. What could the number 12 represent in Annette's equation?

A the number of rides

B the cost of admission

C the cost of each ticket

D the number of tickets

Key: B
Measured CCLS: 8.SP.3

Commentary: This question measures 8.SP.3 because it assesses the student's ability to interpret the intercept of the equation of a linear model.

Extended Rationale

Answer Choice A: "the number of rides"; This response is incorrect and may occur if a student does not understand that the number 12 represents the intercept in the given equation and therefore would not represent the number of rides in the situation. A student who selects this response may have limited understanding of how to interpret the intercept of the equation of a linear model in the context of bivariate measurement data.

Answer Choice B: "the cost of admission"; This answer describes the correct meaning of the number 12 in the given equation. The student may have understood that the number 12 represents the intercept in the given equation and therefore would represent the cost of admission in the situation. The student who selects this response understands how to interpret the intercept of the equation of a linear model in the context of bivariate measurement data.

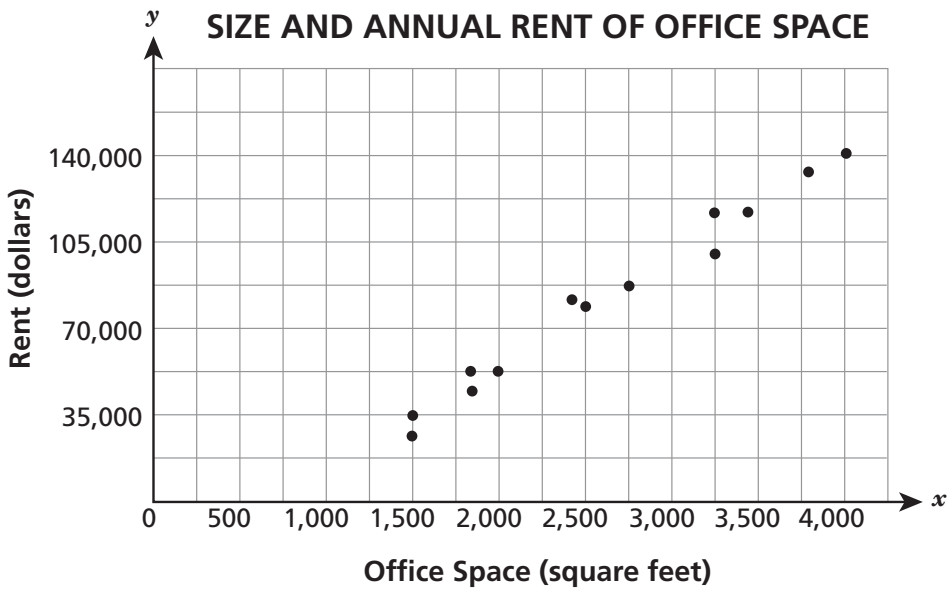
Answer Choice C: "the cost of each ticket"; This response is incorrect and may occur if a student does not understand that the number 12 is the intercept in the given equation and therefore would not represent the cost of each ticket in the situation. The student may have confused the intercept with the rate of change in the equation. A student who selects this response may have limited understanding of how to interpret the intercept of the equation of a linear model in the context of bivariate measurement data.

Answer Choice D: "the number of tickets"; This response is incorrect and may occur if a student does not understand that the number 12 is the intercept in the given equation and therefore would not represent the number of tickets in the situation. The student may have confused the intercept with the independent variable in the equation. A student who selects this response may have limited understanding of how to interpret the intercept of the equation of a linear model in the context of bivariate measurement data.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when interpreting the intercept of the equation of a linear model in the context of bivariate measurement data.

134080420_2

The scatter plot shows the sizes and annual rents of some office spaces in the downtown area of a city.



What would the line of best fit reveal about these data?

A There is a strong negative relationship between the cost of rent and the size of the office space.

B There is a strong positive relationship between the cost of rent and the size of the office space.

C There is a weak positive relationship between the cost of rent and the size of the office space.

D There is a weak negative relationship between the cost of rent and the size of the office space.

Key: B
Measured CCLS: 8.SP.2

Commentary: This question measures 8.SP.2 because it assesses the student's ability to informally fit a straight line, for a scatter plot that suggests a linear association, and informally assess the model fit by judging the closeness of the data points to the line.

Extended Rationale

Answer Choice A: "There is a strong negative relationship between the cost of rent and the size of the office space." This response is incorrect and may occur if a student misinterprets the linear association that the data suggests, possibly by confusing the meanings of "positive" and "negative" in this context. A student who selects this response may have limited understanding of how to informally fit a straight line, for scatter plots that suggest a linear association, and informally assess the model fit by judging the closeness of the data points to the line.

Answer Choice B: "There is a strong positive relationship between the cost of rent and the size of the office space." This answer correctly describes the relationship that would be conveyed about the given data by the line of best of fit. The student may have informally fit a straight line to the data and then observed that this line had a strong positive relationship between the variables. The student who selects this response understands how to informally fit a straight line, for scatter plots that suggest a linear association, and informally assess the model fit by judging the closeness of the data points to the line.

Answer Choice C: "There is a weak positive relationship between the cost of rent and the size of the office space." This response is incorrect and may occur if a student makes an error when informally fitting a straight line to the data, possibly by confusing the description of the strength of the relationship with a description of the steepness of the linear function that would fit these data. A student who selects this response may have a limited understanding of how to informally fit a straight line or informally assess the model fit by judging the closeness of the data points to the line.

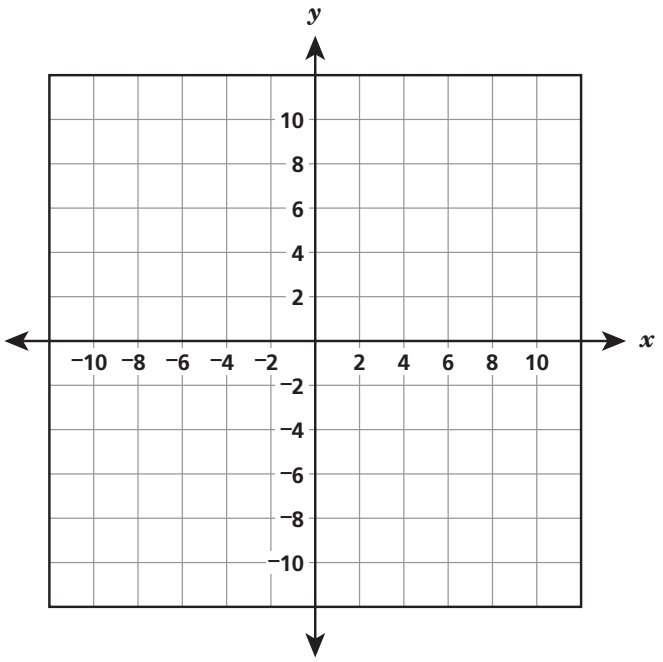
Answer Choice D: "There is a weak negative relationship between the cost of rent and the size of the office space." This response is incorrect and may occur if a student makes an error when informally fitting a straight line to the data and interpreting the linear association that the data suggests, possibly by confusing the meanings of "positive" and "negative" in this context. A student who selects this response may have limited understanding of how to informally fit a straight line, for scatter plots that suggest a linear association, and informally assess the model fit by judging the closeness of the data points to the line.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when informally fitting a straight line, for scatter plots that suggest a linear association, and informally assessing the model fit by judging the closeness of the data points to the line.

134080105

Graph and label the given system of equations on the coordinate grid shown below.

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



What is the solution to the system of equations?

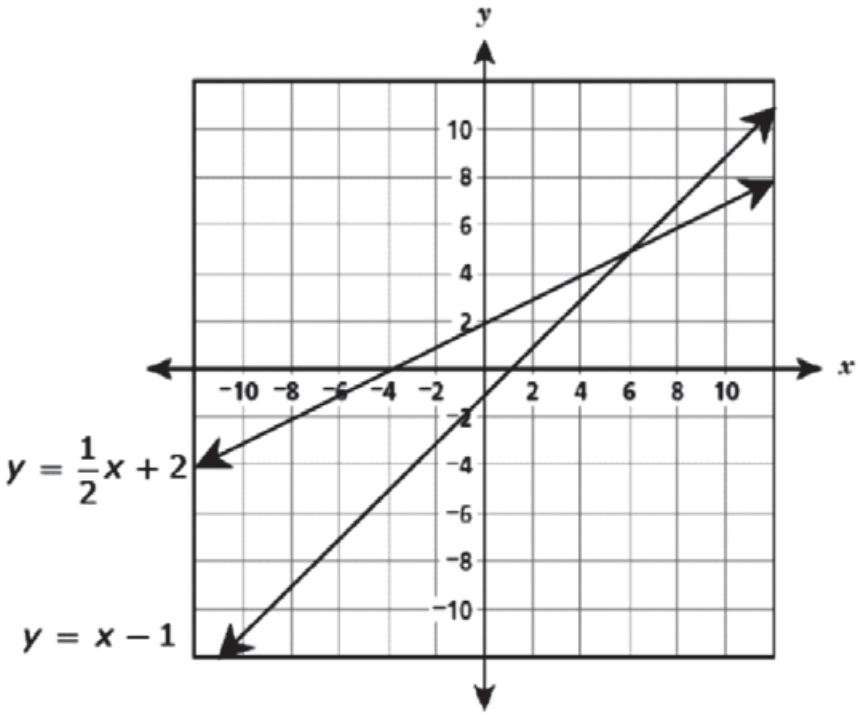
Answer _____

Measured CCLS: 8.EE.8a

Commentary: This question measures 8.EE.8a because it assesses a student's ability to understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

Extended Rationale: This question asks students to graph and label a given system of linear equations. Then, students must determine the solution to the system of linear equations. Students must correctly graph and label both linear equations and correctly identify the solution. As indicated in the rubric, student responses will be rated on whether they demonstrate a thorough understanding of how to solve systems of linear equations in two variables by graphing, indicating the solution as the intersection of their graphs. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

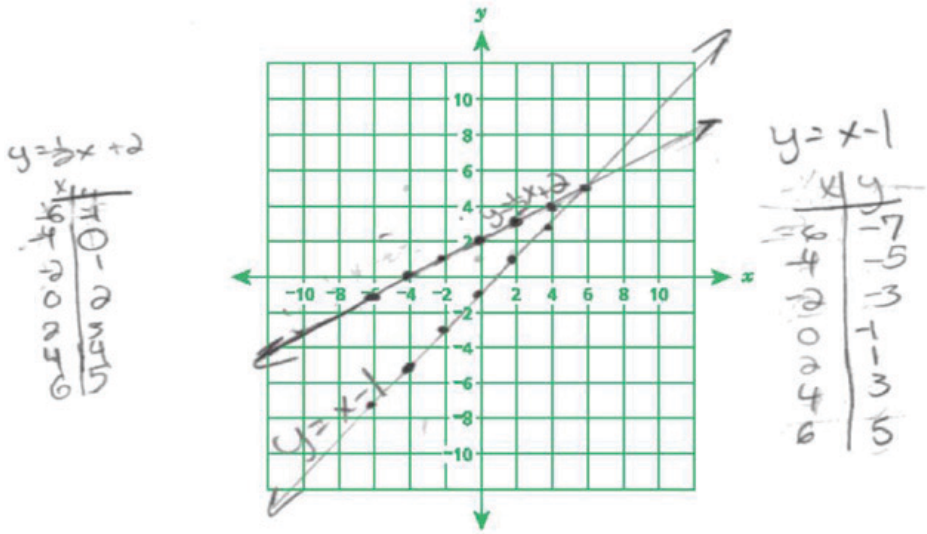
The correct graphs of the system of linear equations, with labels, is shown below:



Students must then indicate the correct solution to the system of linear equations, $(6, 5)$.

Graph and label the given system of equations on the coordinate grid shown below.

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



What is the solution to the system of equations?

Answer (6, 5)

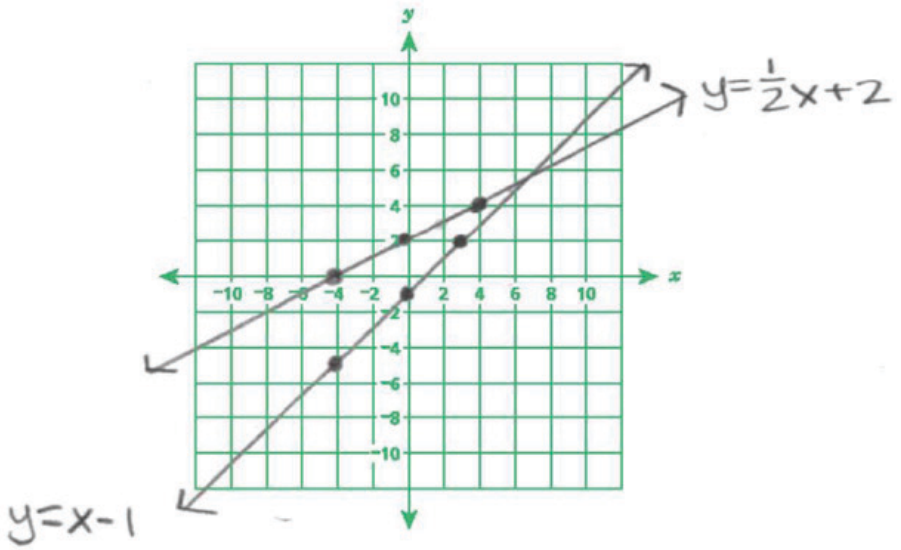
Score Point 2 (out of 2 points)

This response includes the correct solution (6, 5) and demonstrates a thorough understanding of the mathematical concepts in the task. The response contains the correct graphs and labels for each line.

Graph and label the given system of equations on the coordinate grid shown below.

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

$y = x - 1$



What is the solution to the system of equations?

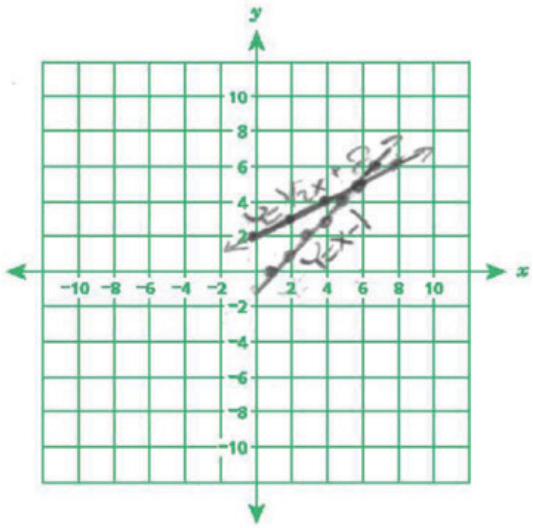
Answer (6,5)

Score Point 2 (out of 2 points)

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. The response contains reasonably accurate graphs and correct labels for each line.

Graph and label the given system of equations on the coordinate grid shown below.

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



What is the solution to the system of equations?

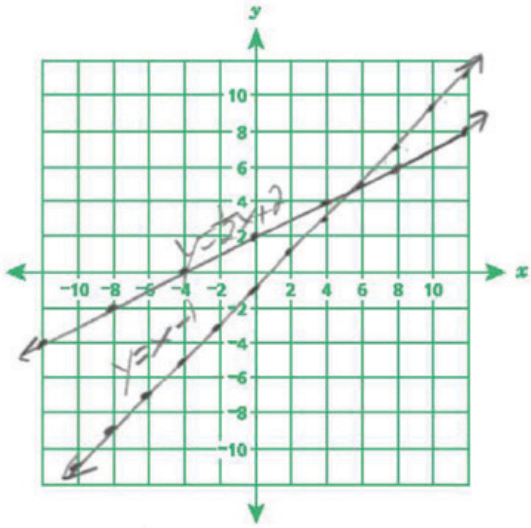
Answer (6,5)

Score Point 2 (out of 2 points)

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. The response contains the reasonably accurate graphs and correct labels for each line. The ray drawn for $y = x - 1$ does not detract from the demonstration of a thorough understanding.

Graph and label the given system of equations on the coordinate grid shown below.

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



What is the solution to the system of equations?

Answer (5,5)

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains an incorrect solution (5, 5) but demonstrates a mathematically appropriate process. The response contains the graphs and labels for the given system of equations; however, $y = x - 1$ has the correct y-intercept but a slope that is a little greater than 1, resulting in the incorrect solution.

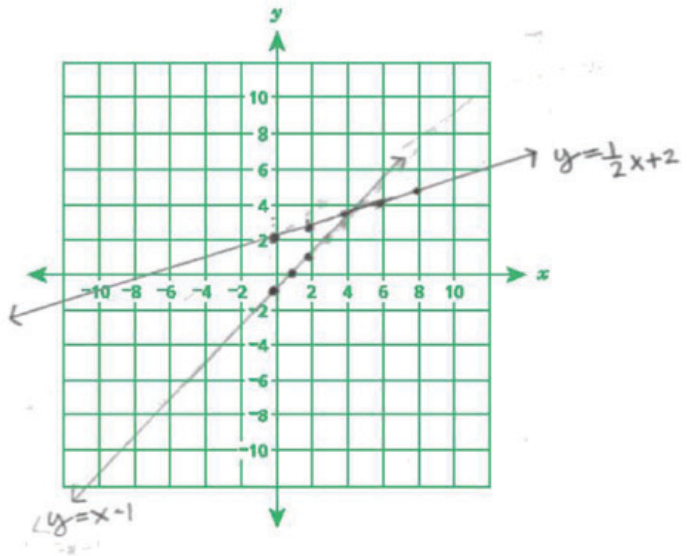
Graph and label the given system of equations on the coordinate grid shown below.

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

$y = x - 1$

$y = \frac{1}{2}x + 2$
$m = \frac{1}{2}$
$b = 2\ (0, 2)$

$y = x - 1$
$m = 1$
$b = -1\ (0, -1)$



What is the solution to the system of equations?

$y = \frac{1}{2}x + 2$
$y - 1 = \frac{1}{2}x + 2$
$-x \quad -x$
$-1 = \frac{-1}{2}x + 2$
$-2 \quad -2$
$-\frac{2}{1}(-3) = (-\frac{1}{2}x)\cdot\frac{2}{1}$
$x = 6$

$y = x - 1$
$y = 6 - 1$
$y = 5$

Answer (6, 5)

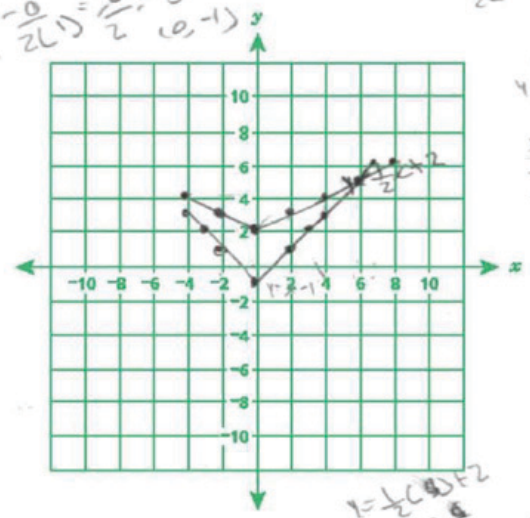
Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains the correct solution (6, 5). The response also contains the correct graph and label for $y = x - 1$, and has the correct y-intercept for $y = \frac{1}{2}x + 2$; however, the graphed slope for $y = \frac{1}{2}x + 2$ is not $\frac{1}{2}$ and results in an incorrect point of intersection.

Graph and label the given system of equations on the coordinate grid shown below.

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

$y = x - 1$



What is the solution to the system of equations?

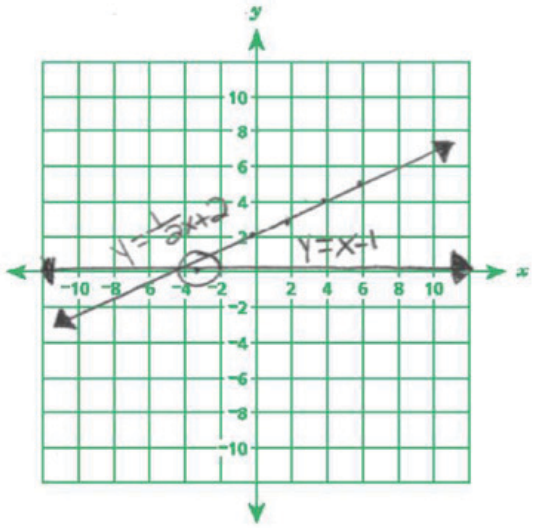
Answer (6,5)

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains the correct solution (6, 5). The response also contains the correct graphs of the equations for all values of x greater than 0 and $x = 0$, but all values of x less than 0 are graphed incorrectly.

Graph and label the given system of equations on the coordinate grid shown below.

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



What is the solution to the system of equations?

Answer (-3,0)

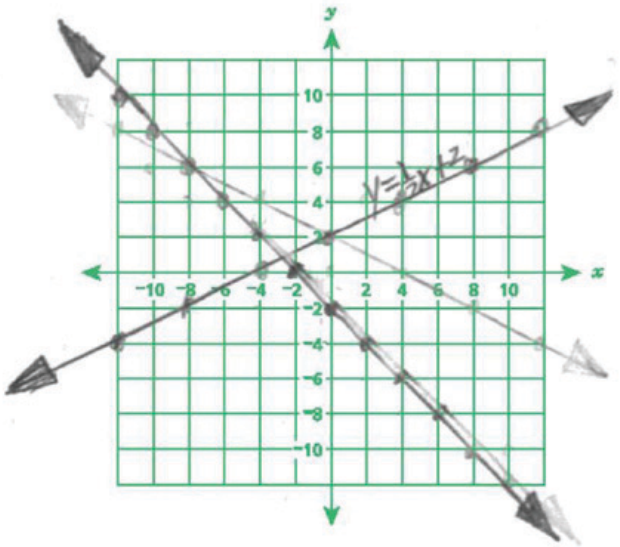
Score Point 0 (out of 2 points)

This response is incorrect. Although the response contains the correct graph of $y = \frac{1}{2}x + 2$, holistically this is not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task. The point of intersection is not identified as the solution to the system.

Graph and label the given system of equations on the coordinate grid shown below.

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

$y = x - 1$



What is the solution to the system of equations?

Answer (−3,0)

Score Point 0 (out of 2 points)

This response is incorrect. Although the response contains the correct graph of $y = \frac{1}{2}x + 2$, holistically it is not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task. The point of intersection is not identified as the solution to the system.

134080507

Does the equation below define a linear function?

$$y = \frac{3}{x}, \text{ when } x \neq 0$$

Explain how you got your answer.

Answer

Measured CCLS: 8.F.3

Commentary: This question measures 8.F.3 because it assesses a student's ability to recognize and explain if a function is linear by showing that it cannot be defined by an equation in the form $y = mx + b$ or by determining if its graph is a straight line.

Extended Rationale: This question asks students to determine whether the given equation defines a linear function, when $x \neq 0$. Students must explain whether the equation does or does not define a linear function. Students must include sound mathematical reasoning that leads to a correct classification of the given equation. As indicated in the rubric, student responses will be rated on whether they include sufficient mathematical reasoning to indicate a thorough understanding of interpreting whether or not the given equation can be defined by a linear function of the form $y = mx + b$ or if it defines a linear function because its graph is a straight line. The determining factor in demonstrating a thorough understanding is using mathematically sound reasoning to lead to a correct response.

The student should determine that the given equation does not define a linear function and must include an explanation similar to one of the following:

Explanation 1: I determined that $y = \frac{3}{x}, x \neq 0$ does not define a linear function because this equation will not yield a straight line when graphed. I determined that the graph of this equation would not be a straight line by substituting 1, 2, and 3 in for the *x*-value. I found that these points would make a line on the graph of this equation: (1,3), (2,1.5), and (3,1). So, the graph of this equation would be a curve, and therefore would not define a linear function whose graph is a straight line.

Explanation 2: I determined that $y = \frac{3}{x}, x \neq 0$ does not define a linear function because this equation will not yield a graph with a constant rate of change. I determined that the graph of this equation would not have a constant rate of change by substituting 1, 2, and 3 in for the x-value. I found that these points would make a line on the graph of this equation: (1, 3), (2,1.5), and (3,1). The slope of the graph between points (1, 3) and (2,1.5) is –1.5, and the slope of the graph between the points (2,1.5) and (3,1) is –0.5. So, the graph of this equation would not have a constant rate of change and therefore would not define a function whose graph is a straight line.

Does the equation below define a linear function?

$$y = \frac{3}{x}, \text{ when } x \neq 0$$

Explain how you got your answer.

Answer

No, because it doesn't have a y intercept.

Score Point 2 (out of 2 points)

This response includes the correct solution (No) and demonstrates a thorough understanding of the mathematical concepts in the task. The response provides a sound explanation for why the equation does not define a linear function (because it doesn't have a y intercept). Stating that the denominator cannot be zero would also indicate the absence of a y-intercept.

Does the equation below define a linear function?

$$y = \frac{3}{x}, \text{ when } x \neq 0$$

Explain how you got your answer.

Answer

No because there are 2 curved lines in the 1st quadrant and in the 3 quadrant + in a linear function their is only 1 line and it is not curved

Score Point 2 (out of 2 points)

This response includes the correct solution (No) and demonstrates a thorough understanding of the mathematical concepts in the task. The response provides a sound explanation (there are 2 curved lines in the 1st quadrant and in the 3 quadrant & in a linear function their is only 1 line).

Does the equation below define a linear function?

$$y = \frac{3}{x}, \text{ when } x \neq 0$$

Explain how you got your answer.

X	Y
1	3
2	1.5
3	1
4	.75

Answer

No, it does not define a linear function. I got my answer by making a chart of X and Y values and by drawing a graph.

Score Point 2 (out of 2 points)

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. The response contains a correct chart of x and y values and plots the points to show a nonlinear relationship.

Does the equation below define a linear function?

$$y = \frac{3}{x}, \text{ when } x \neq 0$$

Explain how you got your answer.

Answer

No, because a linear function requires the following formula which is y=mx+b.

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains the correct solution (No) and an incomplete explanation (requires the following formula which is y = mx + b). A thorough understanding requires an explanation or demonstration that the given equation cannot be written in slope-intercept form.

Does the equation below define a linear function?

$$y = \frac{3}{x}, \text{ when } x \neq 0$$

Explain how you got your answer.

Answer

No because there is no y-intercept.
The equation gives the slope.

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains the correct solution (No) but the explanation includes correct information (there is no y-intercept) and incorrect information (The equation gives the slope). The incorrect information detracts from the demonstrated level of understanding.

Does the equation below define a linear function?

$$y = \frac{3}{x}, \text{ when } x \neq 0$$

Explain how you got your answer.

Answer

Yes it would just be a negative linear function because the x does not equal 0.

Score Point 0 (out of 2 points)

This response is incorrect. The response contains an incorrect solution (Yes) and incorrect explanation.

Does the equation below define a linear function?

$$y = \frac{3}{x}, \text{ when } x \neq 0$$

Explain how you got your answer.

Answer

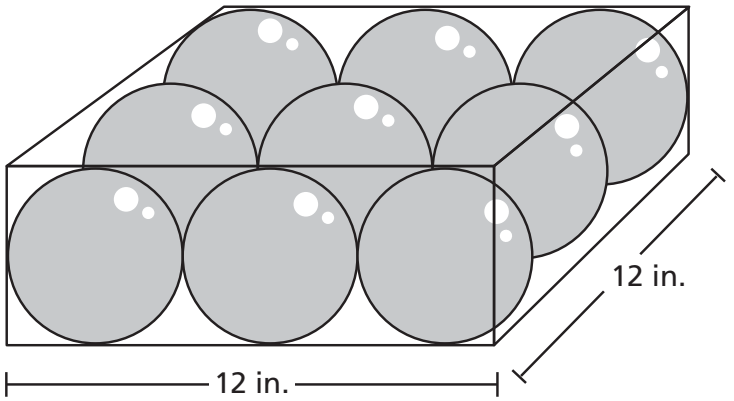
Yes because the x is equal to one.

Score Point 0 (out of 2 points)

This response is incorrect. The response contains an incorrect solution (Yes) and an incorrect explanation (x is equal to one).

134080110

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

Show your work.

Answer _____ cubic inches

Measured CCLS: 8.G.9

Commentary: This question measures 8.G.9 because it assesses a student's ability to apply the formula for the volume of a sphere to solve real-world problems.

Extended Rationale: This question asks students to determine the total volume, in cubic inches, of nine identical spheres packed in a box. Students must include a set of computations that will lead to a correct response, where work is provided to defend each step in the process. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of how to apply the formula for the volume of a sphere to solve real-world problems. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

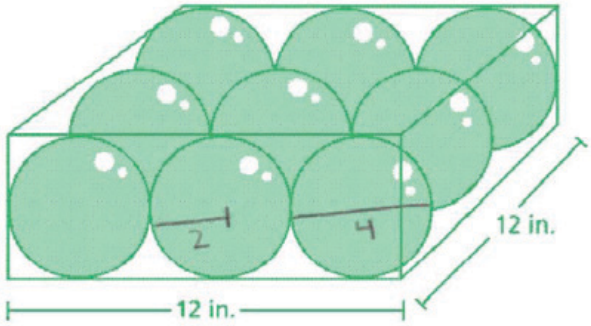
The correct total volume, in cubic inches, of the nine identical spheres may be arrived at by applying the formula for the volume of a sphere:

$$3(2r) = 12$$
$$6r = 12$$
$$r = 2$$

$$V = \frac{4}{3}\pi r^3$$
$$V = \frac{4}{3}\pi(2)^3$$
$$V = \frac{4}{3}\pi(8)$$
$$V = \frac{32}{3}\pi$$

$$\frac{32}{3}\pi \times 9 = 96\pi \approx 301.6$$

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

Volume of sphere $= \frac{4}{3}\pi r^3$

Show your work.

$V = 9(\frac{4}{3}\pi r^3)$

$V = 9(\frac{4}{3}\pi 2^3)$

$V = 9(\frac{4}{3}\pi 8)$

$V = 9(10\frac{2}{3}\pi)$

$V = 96\pi$

$V = 301.592894\ldots$

$V \approx 301.6 \text{ in}^3$

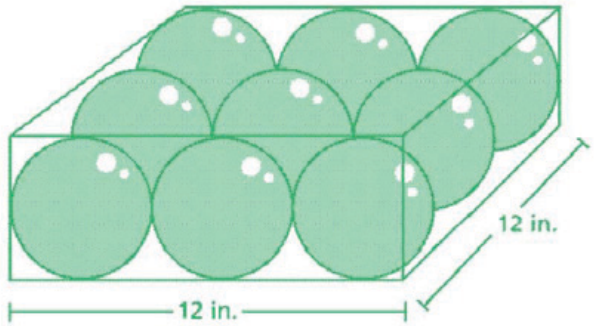
$\frac{12}{3} = 4$

Answer 301.6 cubic inches

Score Point 2 (out of 2 points)

This response includes the correct solution (301.6) and demonstrates a thorough understanding of the mathematical concepts in the task. The volume of each sphere is correctly calculated ($V = {}^4/_3\ \pi 2^3 = 10^2/_3\pi$) and then multiplied by 9 to determine the total volume of the 9 spheres (301.6).

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

Volume of sphere = $\frac{4}{3}\pi r^3$

$\frac{12}{3} = 4$ in

Show your work.

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

$V = \frac{4}{3}\pi(2)^3$

$V = \frac{4}{3}\pi(8)$

$V = 10.\overline{6}\pi$

$10.\overline{6}\pi \cdot 9 =$

301.592894

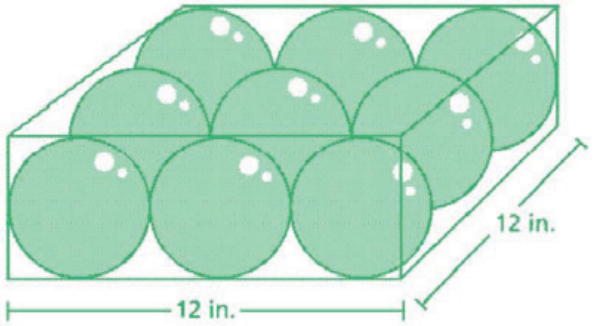
$\approx 301.6 \text{ in}^3$

Answer 301.6 cubic inches

Score Point 2 (out of 2 points)

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. The volume of one sphere is correctly calculated ($V = 4/3\ \pi(2)^3$, $V = 10.\bar{6}\pi$) and then multiplied by 9 to determine the total volume (301.6).

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

Volume of sphere $= \frac{4}{3}\pi r^3$

Show your work.

sphere = 4 in diameter
2 in radius

$\frac{4}{3}\pi r^3$

$\frac{4}{3}\pi 2^3$

$= \frac{4}{3}\pi 8$

$= 10.\overline{6}\pi$

33.5103216...

≈ 33.5

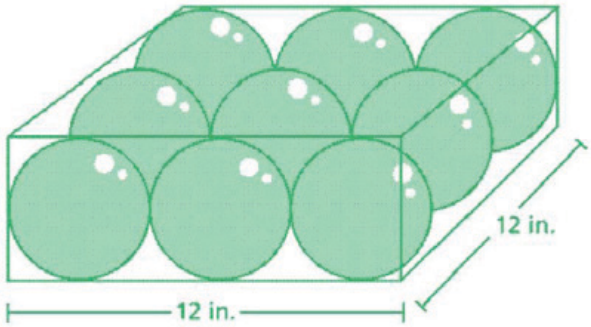
$33.5 \times 9 = 301.5 \text{ in}^3$

Answer 301.5 cubic inches

Score Point 2 (out of 2 points)

This response includes the correct solution (301.5) and demonstrates a thorough understanding of the mathematical concepts in the task. The volume of one sphere is correctly determined and then multiplied by 9 to determine the final volume. Rounding the volume of one sphere to the nearest tenth and then multiplying by 9 is an acceptable procedure.

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

Volume of sphere $= \frac{4}{3}\pi r^3$

Show your work.

$\frac{4}{3}\pi r^3$

$\frac{4}{3}\pi 12^3 \cdot 9$

$12^3 = 1728$

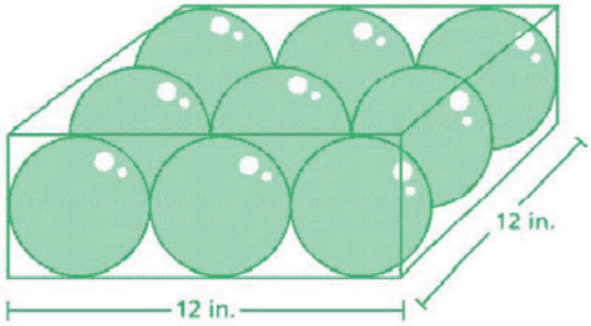
$\frac{4}{3}\pi 1728 \cdot 9 = 65{,}144.1$ cubic inches

Answer 65,144.1 cubic inches

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response correctly addresses some elements of the task; the volume of a sphere is determined and multiplied by 9 to determine the final volume ($^4/_3\,\pi 12^3 \cdot 9$). However, the solution (65,144.1) is incorrect and instead of 2, the length of the box (12) is used as the radius.

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

Volume of sphere $= \frac{4}{3}\pi r^3$

Show your work.

$\frac{4}{3}\pi 2^3$

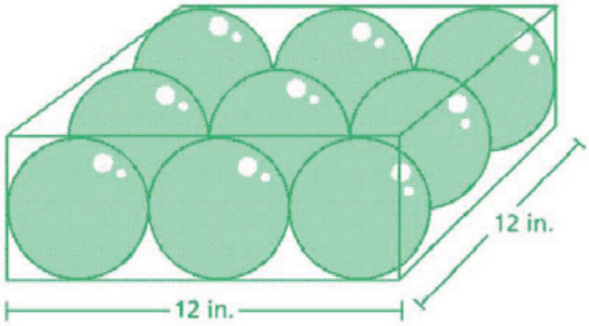
$\frac{4}{3}\pi 8$

Answer 33.5 cubic inches

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The volume of a single sphere (33.5) is correctly determined by using the appropriate formula and substituting the correct radius value (2). The final volume of the 9 spheres is not determined.

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

Volume of sphere $= \frac{4}{3}\pi r^3$

Show your work.

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

$V = \frac{4}{3}\pi 2^2$

$V = \frac{4}{3}\pi(4)$

$V = 5\frac{1}{3}\pi$

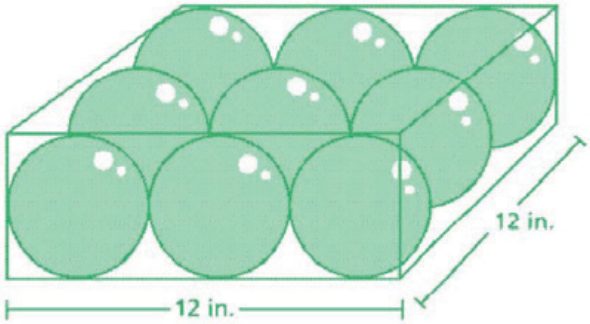
$V \approx 16.75516082\ldots$

Answer ≈ 16.8 cubic inches

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains an incorrect solution (16.8) but demonstrates a mathematically appropriate process for determining the volume of a single sphere. The response correctly shows the radius (2) substituted into the formula, but the radius is squared instead of cubed. The response does not include the final volume calculation, 9 times the volume of a single sphere.

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

Volume of sphere $= \frac{4}{3}\pi r^3$

Show your work.

$V = \frac{4}{3}\pi 6^3$

$V = \frac{4}{3} \cdot 2\cancel{6}^{72}\pi$

$V = 288\pi$

$V = 904.778684\ldots$

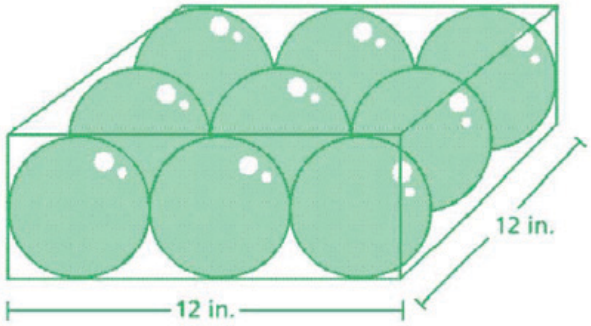
$V \approx 905 \text{ in}^3$

Answer 905 cubic inches

Score Point 0 (out of 2 points)

Although this response uses the given formula, holistically this is not sufficient to demonstrate even a limited understanding of the mathematical concepts. An incorrect value for the radius (6) is substituted into the formula, the resultant volume is inappropriately rounded to the nearest whole number, not the nearest tenth, and there is no determination of the final volume, 9 times the volume of a single sphere.

A box contains 9 identical glass spheres that are used to make snow globes. The spheres are tightly packed, as shown below.



What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

Volume of sphere $= \frac{4}{3}\pi r^3$

Show your work.

$4\pi r^3$

$4\pi(12)^3$

21714.68842

Answer 21714.7 cubic inches

Score Point 0 (out of 2 points)

This response is incorrect. An incorrect value for the radius (12) is substituted into the formula, the formula used is incorrect ($4\pi r^3$), and there is no attempt to determine the final volume, 9 times the volume of a single sphere.

134080504

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

Answer $x =$ _____

Measured CCLS: 8.EE.7b

Commentary: This question measures 8.EE.7b because it assesses a student's ability to solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

This question asks students to solve a given linear equation in one variable. Students must include a set of computations that will lead to a correct response where work is provided to defend each step in the process. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of solving linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct solution may be obtained by successively applying properties, such as the distributive property and properties of equality, to transform the equation:

$$\begin{aligned}
0.4\left(2x + \frac{1}{2}\right) &= 3[0.2x + (-2)] - 4 \\
0.8x + 0.2 &= 0.6x - 6 - 4 \\
0.8x + 0.2 &= 0.6x - 10 \\
0.8x - 0.6x + 0.2 &= 0.6x - 0.6x - 10 \\
0.2x + 0.2 &= -10 \\
0.2x + 0.2 - 0.2 &= -10 - 0.2 \\
0.2x &= -10.2 \\
\frac{0.2x}{0.2} &= \frac{-10.2}{0.2} \\
x &= -51
\end{aligned}$$

The solution of -51 can be verified by substituting into the original equation:

$$\begin{aligned}
0.4\left(2(-51) + \frac{1}{2}\right) &= 3[0.2(-51) + (-2)] - 4 \\
0.4\left(-102 + \frac{1}{2}\right) &= 3[-10.2 + (-2)] - 4 \\
0.4(-101.5) &= 3[-12.2] - 4 \\
-40.6 &= -36.6 - 4 \\
-40.6 &= -40.6
\end{aligned}$$

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

$0.4(2x + \frac{1}{2}) = 3[0.2x + (-2)] - 4$

$.8x + .2 = .6x - 6 - 4$

$.2x + .2 = -10$

$.2x = -10.2$

$x = -51$

$0.4(2(-51) + \frac{1}{2}) = 3[0.2(-51) + (-2)] - 4$

$.4(-102 + .5) = 3(-10.2 - 2) - 4$

$.4(-101.5) = 3(-12.2) - 4$

$-40.6 = -40.6$ ✓

Answer $x =$ -51

Score Point 2 (out of 2 points)

This response includes the correct solution (-51) and demonstrates a thorough understanding of the mathematical concepts in the task. The correct order of operations is used and all calculations are accurate.

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

$.8x + .2 = .6x - 6 - 4$

$.8x + .2 = .6x - 10$

$-.2 \qquad -.2$

$.8x = .6x - 10.2$

$-.6x \qquad -.6x$

$\frac{.2x}{.2} = \frac{-10.2}{.2}$

$\boxed{x = -51}$

Answer $x =$ -51

Score Point 2 (out of 2 points)

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. The correct order of operations is used and all calculations are accurate.

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

$0.4(2x + \frac{1}{2}) = 3[0.2x + (-2)] - 4$

$= 0.8x + 0.2 = 0.6x - 6 - 4$

$= 0.8x + 0.2 = 0.6x - 10$

$-0.2 \qquad -0.2$

$0.8x = 0.6x - 10.2$

$-0.6x \qquad -0.6x$

$\frac{0.2x}{0.2} = \frac{-10.2}{0.2}$

$x = -5.1$

Check

$0.4(-102 + \frac{1}{2}) = 3(-10.2 + (-2)] - 4$

$-40.8 + 0.2 = -30.6 + -6 - 4$

$= -40.6 = -30.6 + -10$

$-40.6 = -40.6$ ✓

Answer $x =$ -51

Score Point 2 (out of 2 points)

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. The correct order of operations is used. Although the value for x shown in the work area has an incorrect decimal placement, all other calculations are accurate and the decimal point is corrected in the answer space, making this an error that does not detract from the demonstration of a thorough understanding.

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

$8x + .2 = .6x + 6 - 4$

$.8x + .2 = .6x + 2$

$-.6x \quad -.6x$

$.2x + .2 = 2$

$-.2 \quad -.2$

$\frac{.2x}{.2} = \frac{1.8}{.2}$

$x = 9$

Check

$.4(2(9) + \frac{1}{2}) = 3(.2(9) + (-2)) - 4$

$.4(18 + \frac{1}{2}) = 3(1.8 - 2) - 4$

$7.2 + .2 = 5.4 + 6 - 4$

$7.4 = 7.4$

Answer $x =$ 9

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains an incorrect solution (9) but demonstrates a mathematically appropriate process. The response shows the correct order of operations, but includes a multiplication error when 3 is distributed on the right side of the equation, 3 × (-2) = 6, resulting in an incorrect solution.

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

$0.4(2x+\frac{1}{2}) = 3(0.2x + (-2)) - 4$

$0.8 + 0.2x = 0.6x - 6 - 4$

$0.8 + 0.2x = 0.6x - 10$

$-0.2x \quad -0.2x$

$0.8 = 0.4x - 10$

$+10 \qquad +10$

$\frac{10.8}{0.4} = \frac{0.4x}{0.4}$

$\boxed{27 = x}$

Answer $x =$ 27

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains an incorrect solution (27) but demonstrates a mathematically appropriate process. The response shows the correct order of operations. However, an error in the second step results in an incorrect answer; the variable is shifted from first term to the second term on the left side of the equation. ($0.8 + 0.2x$) should read $0.8x + 0.2$.

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

$0.8x + 0.2 = [.6x + -6] - 4$

$1x = -51$

$= 1.4x$

$.2x = 0.8$

$0.8 + x0.2 = .6x + -6 - 4$

-10

$0.2x = -10.2$

Answer $x =$ -51

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response includes the correct solution, but the work is incomplete and does not sufficiently demonstrate how that solution was obtained.

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

$0.4\left(2x+\frac{1}{2}\right) = 3[0.2x+(-2)]-4$

$0.8x+0.2 = 3\ 1.8x - 4$

$0.8x+0.2 = 3(-2.2x)$

$\frac{0.8x+0.2}{0.8}$ $\frac{-6.6x}{0.8}$

$0.2 = -8.25x$

$-41.25 = x$

Answer $x =$ -41.25

Score Point 0 (out of 2 points)

This response is incorrect. Although the distributive property is correctly applied on the left side of the equation ($0.8x + 0.2$), holistically this is not sufficient to demonstrate even a limited understanding. On the right side of the equation, unlike terms are combined and the order of operations is not correctly followed ($0.2x + (-2) = 1.8x$ and $1.8x - 4 = -2.2x$). Additionally, the properties of equality, are incorrectly applied ($^{0.8x}/_{0.8} + 0.2 = {}^{-6.6x}/_{0.8}$, $0.2 = -8.25x$).

Solve the equation below.

$$0.4\left(2x + \frac{1}{2}\right) = 3[0.2x + (-2)] - 4$$

Show your work.

$.8 + .2 = 3[.2x + (-2)] - 4$

$.8 + .2 = [.6x - 6] - 4$

$1.0 = .6x - 10$
$+10 \quad +10$

$\frac{11 = .6x}{.6 \quad .6}$

$x = 18.3$

Answer $x =$ 18.3

Score Point 0 (out of 2 points)

This response is incorrect. Although the distributive property is correctly applied on the right side of the equation and the properties of equality are correctly applied, holistically these are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task. The response incorrectly drops x from the left side of the equation.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

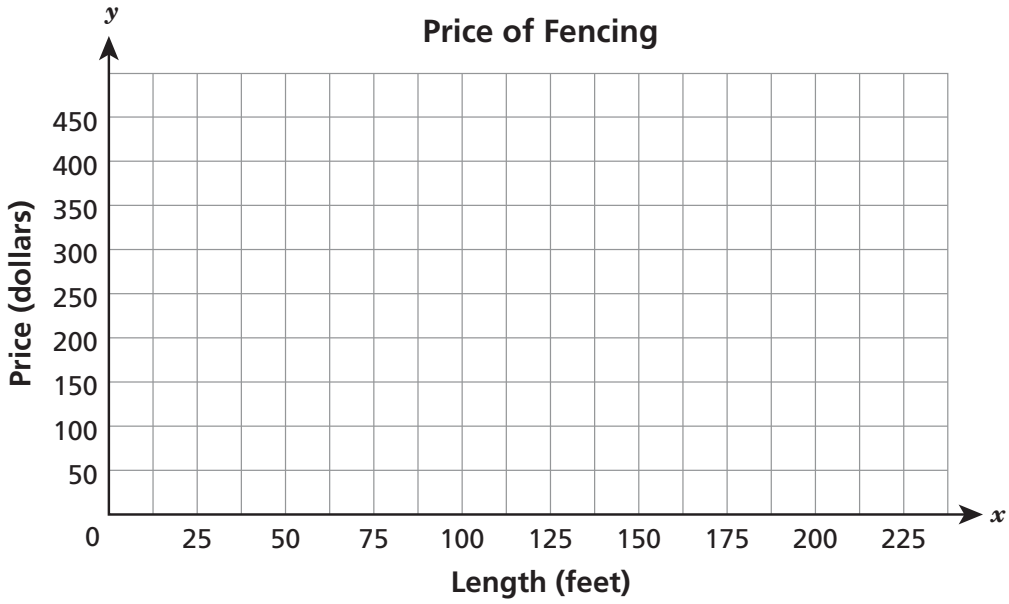
Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

Answers Andy's Hardware $_____ per foot

Bargain Hardware $_____ per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Measured CCLS: 8.EE.5

Commentary: This question measures 8.EE.5 because it assesses a student's ability to graph proportional relationships, interpret the unit rate as the slope of the graph, and compare two different proportional relationships represented in different ways.

Extended Rationale: The question has two different, but related questions. The first question asks students to determine the unit price of a certain type of fencing at two stores when given the prices of different lengths of the fencing in a table for one store and the equation to determine the total price of a given length of fencing at the other store. Students must include a set of computations that will lead to a correct response, where work is provided to defend each step in the process. The student is then required to graph the relationship between the length of the fencing and the price for both stores to verify the answers to the first question. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of comparing two different proportional relationships represented in different ways. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

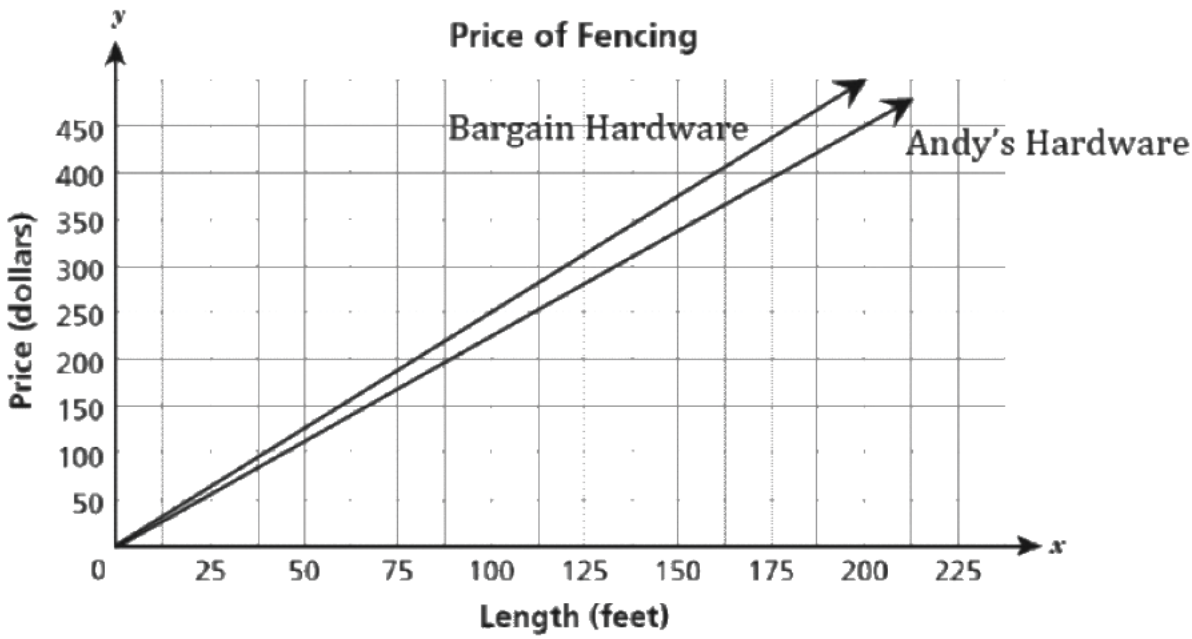
The correct unit price, in dollars per foot, for Andy's Hardware may be determined by calculating the rate of change from the table:

$$\frac{(\$281.25 - \$168.75)}{(125 \text{ ft} - 75 \text{ ft})} = \frac{\$112.50}{50 \text{ ft}} = \$2.25 \text{ / ft}$$

The correct unit price, in dollars per foot, for Bargain Hardware may be determined by identifying that the unit price of the fencing is the slope in the given equation, $y = 2.50x$:

2.50 is the slope in the given equation, so the unit price of the fencing is $\$2.50 \text{ / ft}$.

For the second part, the graph should show the correct relationship between the length of the fencing and the price for both stores:



The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

$y = 2.50x$

$y = 2.50$

$\frac{168.75}{75} = 2.25$

$\frac{281.25}{125} = 2.25$

Answers Andy's Hardware $ 2.25 per foot

Bargain Hardware $ 2.50 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.

$y = 2.50x$

x	y
25	62.50
50	125
75	187.5
100	250

$y = 2.25x$

x	y
25	56.25
50	112.50
75	168.75
100	225

Score Point 3 (out of 3 points)

This response includes the correct solutions (2.25 and 2.50) and demonstrates a thorough understanding of the mathematical concepts in the task. A mathematically sound procedure ($^{168.75}/_{75} = 2.25$) is used to determine the price per foot of Andy's Hardware. The price per foot at Bargain Hardware can be taken directly from the equation $y = 2.50x$. The graphs are correctly drawn and labeled.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work. $\frac{168.75}{75}$ $y = 2.50x$ y = length (feet) x = Price

75 : 168.75 one foot for $2.50 two feet for $5.00

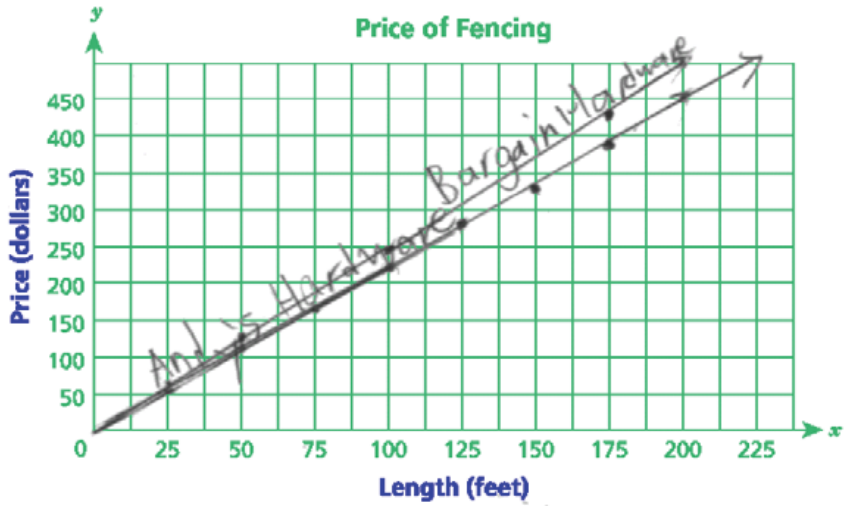
length (feet) = $\boxed{1.2.25}$

price

Answers Andy's Hardware $ 2.25 per foot

Bargain Hardware $ 2.50 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Score Point 3 (out of 3 points)

This response includes the correct solutions and demonstrates a thorough understanding of the mathematical concepts in the task. A mathematically sound procedure ($^{168.75}/_{75}$; 75:168.75; 1:2.25) is used to determine the price per foot at Andy's Hardware. The graphs are correctly drawn and labeled.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

Bargan

168.75 ÷ 75 = 2.25

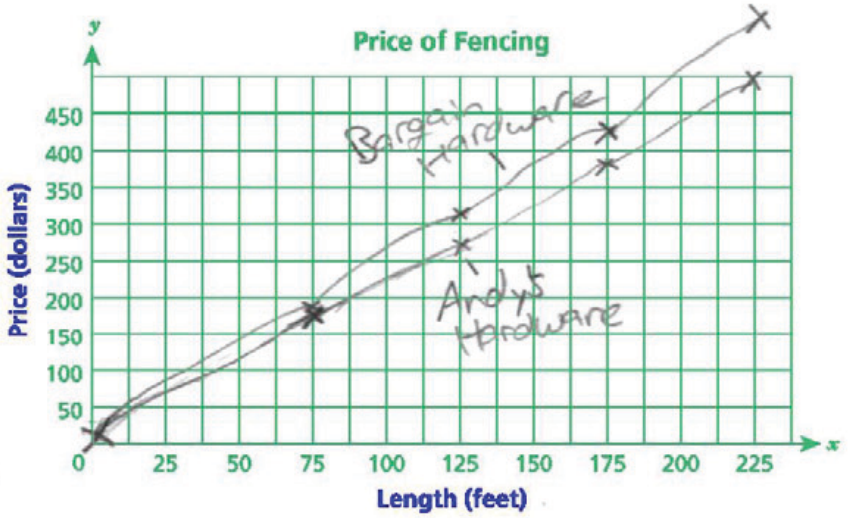
2.50 each x x.

75 × 2.50 = 187.50

Answers Andy's Hardware $ 2.25 per foot

Bargain Hardware $ 2.50 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Bargain

Feet	Price
75	187.50
125	312.50
175	437.50
225	562.50

Score Point 3 (out of 3 points)

This response includes the correct solutions and demonstrates a thorough understanding of the mathematical concepts in the task. A sound mathematical procedure (168.75 ÷ 75 = 2.25) is used to determine the price per foot at Andy's Hardware. The graphs are reasonably accurate and labeled.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet) X	Price Y
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

75)168.75

$y = 2.50x$

$168.75 = 2.50 \cdot 75$

168.75

187.50

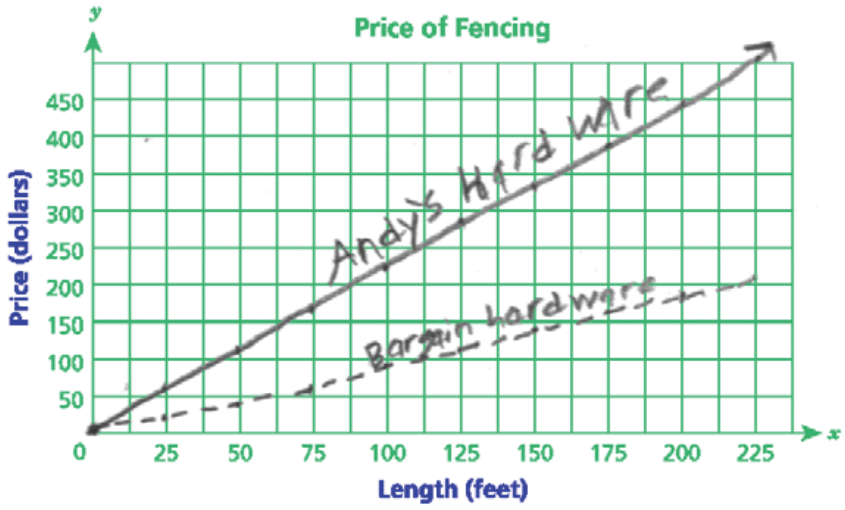
187.50

187.50

Answers Andy's Hardware $ 2.25 per foot

Bargain Hardware $ 0.90 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. This response includes the correct solution for Andy's hardware with appropriate work (75)168.75). The solution for Bargain Hardware is incorrect. Andy's graph is correctly drawn and labeled, and the graph for Bargain Hardware is correctly drawn and labeled based on the incorrect solution for price per foot.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

	Length (feet)	Price
50	75	$168.75
50	125	$281.25
50	175	$393.75
50	225	$506.25

Y = 50x

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

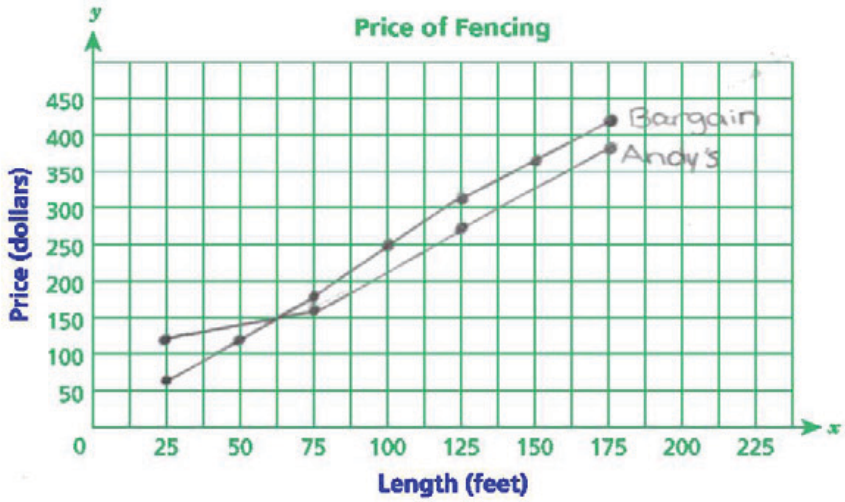
168.75 ÷ 75 = 2.25

2.50

Answers Andy's Hardware $ 2.25 per foot

Bargain Hardware $ 2.50 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Bargain

2.50 × 25 = 63.50

2.50 × 75 = 187.50

2.50 × 125 = 312.50

2.50 × 175 = 437.50

Andy's

2.25 × 25 = 125

2.25 × 75 = 168.75

2.25 × 125 = 281.25

2.25 × 175 = 393.75

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. This response includes the correct solutions with appropriate work (168.25 ÷ 75 = 2.25). Except for the segment from 25 feet to 75 feet on Andy's graph, the lines are accurately plotted and correctly labeled.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

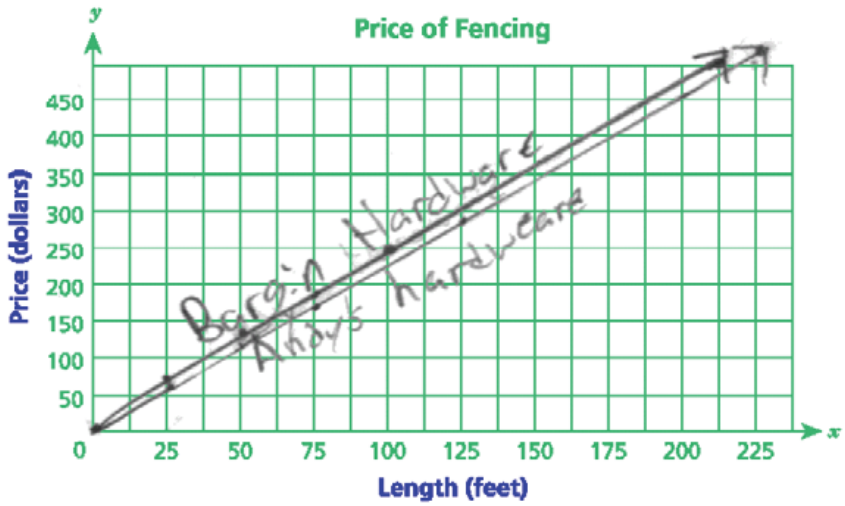
2.25
75)168.75
-150
18.75
-150
375
-375
0

$y = 2.25x$

Answers Andy's Hardware $2.25 per foot

Bargain Hardware $2.50 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. This response includes the correct solutions with appropriate work ($\begin{array}{r} 2.25 \\ 75\overline{)168.75} \end{array}$.) The graph for Andy's Hardware is correctly drawn and labeled. The graph for Bargain Hardware is correctly labeled, but the line is not accurately drawn (note that the price is below 500 at 200 feet).

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

$y = 2.25x$

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

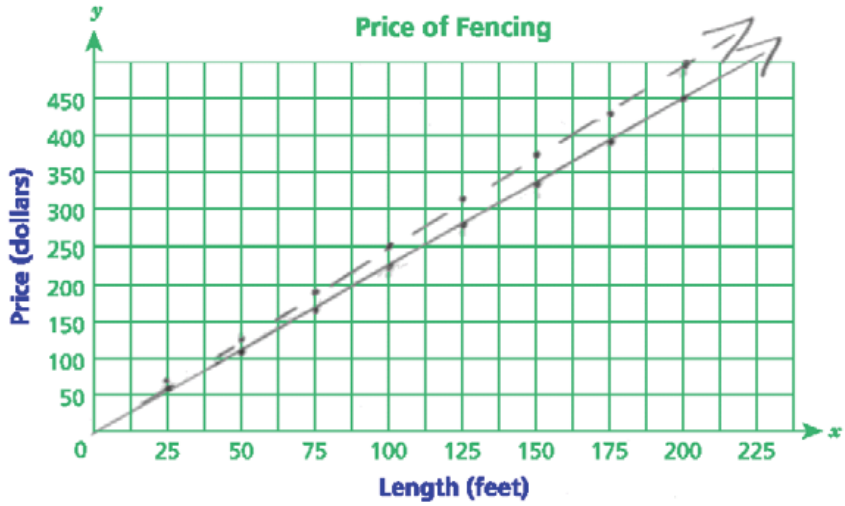
Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

Answers Andy's Hardware $ 2.25 per foot

Bargain Hardware $ 2.50 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Key:
—— = Andy's Hardware
- - - = Bargain Hardware

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. This response includes the correct solutions, but no work is shown. The graphs are correctly drawn and labeled. Holistically, the response demonstrates only limited understanding.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

168.75 ÷ 75 = 2.25

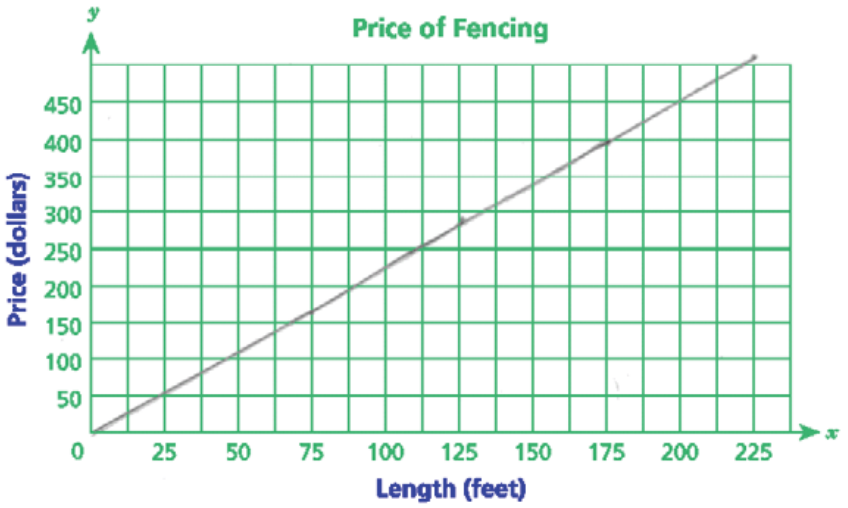
506.25 ÷ 225 = 2.25

2.50

Answers Andy's Hardware $ 2.25 per foot

Bargain Hardware $_____ per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. This response includes the correct solution for Andy's Hardware with appropriate work (168.75 ÷ 75 = 2.25), but no solution is included for Bargain Hardware (the value of 2.50 shown in the work area is not referenced to the equation $y = 2.50x$). There is only one line graphed and it does not include a label.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

$y = 2.50$

$2.50 \cdot 25 = 62.5$

$2.50 \cdot 50 = 125$

$2.50 \cdot 75 = 187.5$

$2.50 \cdot 125 = 312.5$

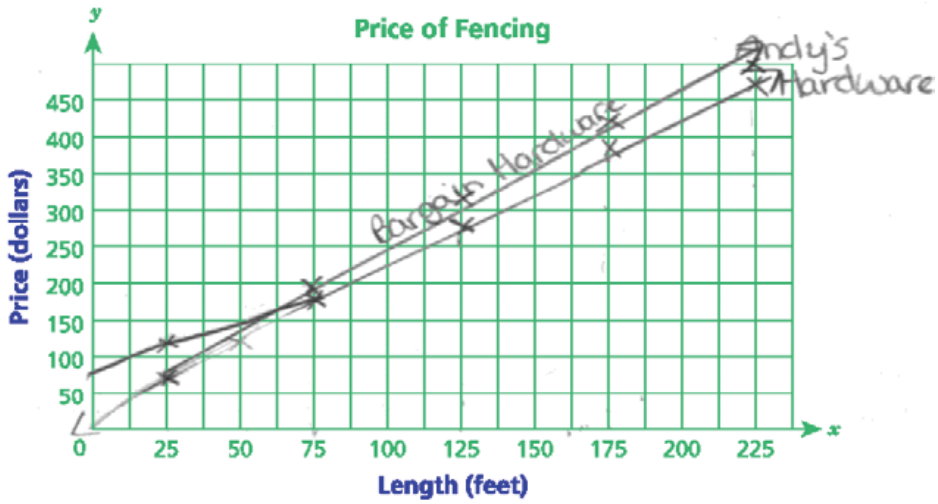
$2.50 \cdot 175 = 437.5$

$2.50 \cdot 225 = 562.5$

Answers Andy's Hardware $ 2.50 per foot

Bargain Hardware $ 2.25 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. This response includes the correct solutions reversed (Andy's: 2.50 and Bargain: 2.25) and does not include work for determining the unit price for Andy's fencing. The graphs are partially correct with labels (the value at 25 feet for Andy's is plotted incorrectly).

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet)	Price
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

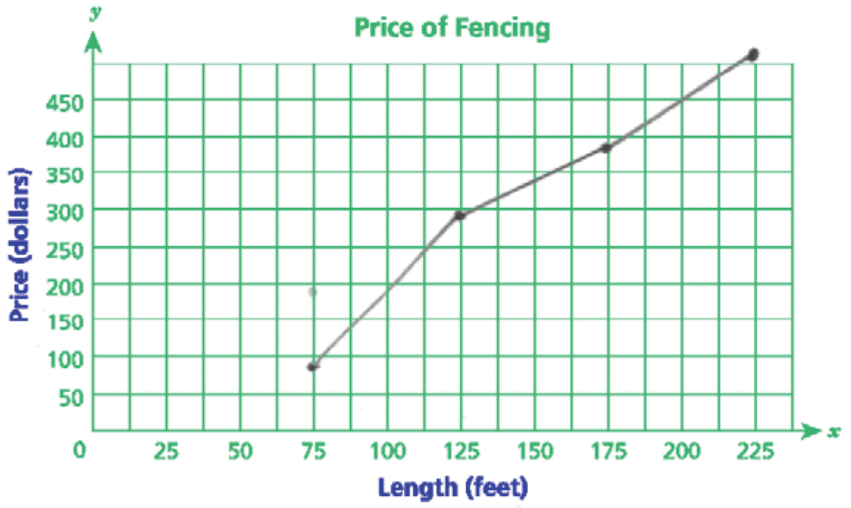
Show your work.

2.50x

Answers Andy's Hardware $ 2.25 per foot

Bargain Hardware $ 2.50 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



Score Point 0 (out of 3 points)

This response does not demonstrate even a limited understanding of the mathematical concepts embodied in the task. Although the correct solutions are shown, the required work is omitted. There is only one graph and it is neither correct nor labeled.

The table shown below was posted on the wall at Andy's Hardware to show the price of varying lengths of chain-link fencing.

PRICE OF FENCING

Length (feet) x	Price y
75	$168.75
125	$281.25
175	$393.75
225	$506.25

The price of the same fencing at Bargain Hardware can be determined by the equation $y = 2.50x$, where y is the price, in dollars, for x feet of fencing.

Determine the unit price for fencing, in dollars per foot, for each store.

Show your work.

A

$y = 2.50x$

$y = 2.50(75)$

$168.75 < 187.5$

$\frac{75}{125} = \frac{168.75}{x}$

$\frac{75x}{75} = \frac{125}{75}$

$x \approx 1.6$

B

$y = 2.50x$

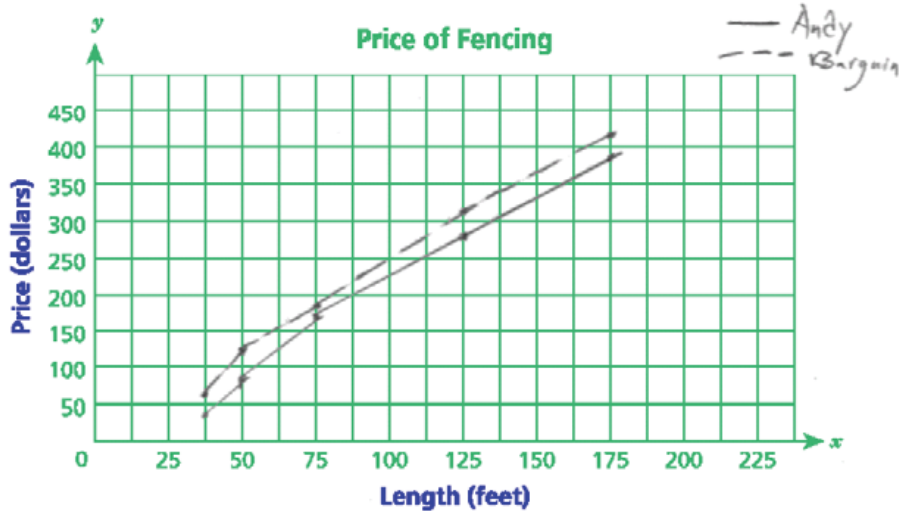
$y = 2.50(1)$

$y = 2.50$

Answers Andy's Hardware $ 1.60 per foot

Bargain Hardware $ 2.50 per foot

On the grid below, graph for each store the relationship between the length of the fencing and the price to verify your answers. Be sure to label each line.



$y = 2.50x$

Score Point 0 (out of 3 points)

This response does not demonstrate even a limited understanding of the mathematical concepts embodied in the task. The solution for Bargain is correct, but the solution for Andy's is incorrect (1.60) and is determined by an incorrect procedure ($^{75}/_{125} = {}^{1}/_{x}$, $x = 1.6$). The graphs are incomplete and incorrect.

124080207

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride. Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride. Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's _____

Madeline's _____

At what distance, in miles, will the cost be the same for both companies?

Show your work.

Answer _____ miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer _____

Use words and numbers to explain how you determined your answer.

_____

_____

Measured CCLS: 8.EE.8c

Commentary: This question measures 8.EE.8c because it assesses a student's ability to solve real-world problems using a system of linear equations.

Extended Rationale: This question asks students to write a system of linear equations in order to determine at what distance, in miles, the cost of a cab ride will be the same from two different cab companies. The student is then required to solve the system of linear equations. Students must include a set of computations that will lead to a correct response, where work is provided to defend each step in the process. The student is then required to determine which cab company will charge less for a ride that is 10 miles long. Students must explain the process that they used to determine their answer. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of using two linear equations in two variables to solve real-world problems. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

In the first part, a correct system of linear equations could be determined by recognizing that *y*, the cost, in dollars, of the cab ride, is the sum of the cost per *x* miles and the initial fee.

Equation for Bert's cab company: $y = 3.00x + 1.00$

Equation for Madeline's cab company: $y = 2.00x + 3.00$

In the second part, finding the distance, in miles, *x*, for which the cost for both companies will be the same can be obtained by setting the expressions on the right side of each equation equal to each other, and then solving for *x*:

$$\begin{aligned}
3.00x + 1.00 &= 2.00x + 3.00 \\
3.00x - 2.00x + 1.00 &= 2.00x - 2.00x + 3.00 \\
1.00x + 1.00 &= 3.00 \\
1.00x + 1.00 - 1.00 &= 3.00 - 1.00 \\
1.00x &= 2.00 \\
\frac{1.00x}{1.00} &= \frac{2.00}{1.00} \\
x &= 2
\end{aligned}$$

For the last part, which cab company will charge less for a ride that is 10 miles long can be determined by substituting a value of 10 for x in each equation:

For Bert's cab company:
$$\begin{aligned}
y &= 3.00(10) + 1.00 \\
y &= 30.00 + 1.00 \\
y &= 31.00
\end{aligned}$$

For Madeline's cab company:
$$\begin{aligned}
y &= 2.00(10) + 3.00 \\
y &= 20.00 + 3.00 \\
y &= 23.00
\end{aligned}$$

The student can explain the method used in a manner similar to the following:

I determined that Madeline's cab company will charge less for a cab ride that is 10 miles long by substituting 10 (miles) into each equation as the x-value and solving both equations. For Bert's cab company, when $x = 10$, $y = \$31.00$, and for Madeline's cab company, when $x = 10$, $y = \$23.00$. So, Madeline's cab company will charge less for a cab ride that is 10 miles long.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's $y = 1 + 3x$

Madeline's $y = 3 + 2x$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

$$1 + 3x = 3 + 2x$$
$$-2x \qquad -2x$$
$$1 + x = 3$$
$$-1 \qquad -1$$
$$\boxed{x = 2}$$

Answer 2 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Madelines

$y = 1 + 3(10)$
$y = 1 + 30$
$y = 31$

$y = 3 + 2x$
$y = 3 + 2(10)$
$y = 3 + 20$
$y = 23$

Use words and numbers to explain how you determined your answer.

If each cab driver drives 10 miles in distance, Bert's would charge $31 and Madelines would charge $23.

Score Point 3 (out of 3 points)

This response includes the correct solutions ($y = 1 + 3x$; $y = 3 + 2x$; 2; Madeline's) and demonstrates a thorough understanding of the mathematical concepts in the task. The response shows a sound mathematical procedure, setting the two equations equal to each other ($1 + 3x = 3 + 2x$) and solving for x. The response also contains a sound explanation for how the "Madeline's" answer was determined ($y = 1 + 3(10)\ldots\ y = 31$; $y = 3 + 2(10)\ldots\ y = 23$) and (10 miles in distance, Bert's would charge $31 and Madeline's would charge $23).

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's $y = 3x + 1$

Madeline's $y = 2x + 3$

At what distance, in miles, will the cost be the same for both companies?

Show your work. Let $x =$ miles

$$3x + 1 = 2x + 3$$
$$-2x \qquad -2x$$
$$x + 1 = 3$$
$$-1 \quad -1$$
$$x = 2$$

check:
$3x + 1 = 2x + 3$
$7 = 4 + 3$
$7 \stackrel{\checkmark}{=} 7$

Answer 2 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Madeline's

Use words and numbers to explain how you determined your answer.

I multiplied 10 by 3, and added 1, and got 31 for Bert's. Then, I multiplied 10 by 2, and added 1, and got 23 for Madeline's.

Score Point 3 (out of 3 points)

This response includes the correct solutions ($y = 3x + 1$; $y = 2x + 3$; 2; Madeline's) and demonstrates a thorough understanding of the mathematical concepts in the task. The response shows correct work by setting the two equations equal to each other ($3x + 1 = 2x + 3$) and solving for x (miles). The response also contains a sound explanation for how the solution, "Madeline's," was derived.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's $y = 3x + 1$

Madeline's $y = 2x + 3$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

$3x + 1 = 2x + 3$
$-2x \quad -2x$
$1x + 1 = 3$
$-1 \quad -1$
$\frac{1x}{1} = \frac{2}{1}$
$x = 2$

$3 \cdot 10 + 1$
$30 + 1$
$\boxed{31}$

$2 \cdot 10 + 3$
$20 + 3$
$\boxed{23}$

Answer 2 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Madeline

Use words and numbers to explain how you determined your answer.

I determined My Answer by Substituting the Given (10) into the System of linear equations that I Wrote. Finaly Got My Answer.

Score Point 3 (out of 3 points)

This response includes the correct solutions ($y = 3x + 1$; $y = 2x + 3$; 2; Madeline) and demonstrates a thorough understanding of the mathematical concepts in the task. The response shows correct work by setting the two equations equal to each other ($3x + 1 = 2x + 3$) and solving for x (miles). The response also contains a sound explanation for how the solution, "Madeline," was derived.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's $y = 3.00x + 1.00$

Madeline's $y = 2.00x + 3.00$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

3.00$ × 2 + 1.00 = 7.00$
2.00$ × 2 + 3.00 = 7.00$

Answer 2 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Bert's

23

Use words and numbers to explain how you determined your answer.

First I did: 3.00$ × 10 + 1.00$, and got=23.00$ Then I did 2.00$ ×10 +3.00 and got 32. So berts Taxis cheaper

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response includes correct equations and the correct mileage; however, the solution for the cab charging less for a 10 mile ride is incorrect (Bert's). The work shown to support the mileage (2) is correct. The explanation of how to determine which cab driver will charge less is correct, but a transcription error and a computational error lead to an incorrect solution.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's $y = 3x + 1$

Madeline's $y = 2x + 3$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

$y = 3(2) + 1 \rightarrow 7 \leftarrow$ Bert (6)

$y = 2(2) + 3 \rightarrow 7 \leftarrow$ Madelines (4)

Answer 7 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Madelines $3(10) + 1 = 37$

$2(10) + 3 \rightarrow 23$

Use words and numbers to explain how you determined your answer.

I plugged in the x for each equation with 10 and then I solved it. Bert's cost $37 while Madeline's was $23.

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response includes correct equations and the correct solution for which cab will charge less for a 10 mile ride. Although the correct procedure was used for determining the miles where the cost will be the same, the cost was given as the solution (7) instead of the mileage. The explanation of how to determine which cab driver will charge less is correct but contains a computational error which did not affect the solution.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's _____

Madeline's _____

At what distance, in miles, will the cost be the same for both companies?

Show your work.

1+3+3 = $7.00 = $7.00
2 miles

3+2+2 = $7.00
2 miles

1+3+3+3+3+3+3+3+3+3
$31.00

3+2+2+2+2+2+2+2+2+2
$23.00

Answer 2 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Madelines

Use words and numbers to explain how you determined your answer.

To find my answer, I added 1+ten 3's to get $31.00. then I added 3+ten 2's to get $23.00.

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response includes the correct solutions for the mileage and for which cab will charge less for a 10 mile ride. The work shown to support the mileage (2) is correct. The explanation of how to determine which cab driver will charge less is correct. However, no system of linear equations is written.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, *y*, for a cab ride of *x* miles for each cab driver.

Bert's $1.00 + 3.00x$

Madeline's $3.00 + 2.00x$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

$$\frac{3.00x}{3.00x} = \frac{1.00}{3.00} = 0.\overline{3}$$

$$\frac{2.00x}{2.00x} = \frac{3.00}{2.00} = 1.5$$

$$1.5 - 0.3 = 1.2$$
$$1.5 \div 0.3 = 5$$

Answer 5 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Madeline's.

Use words and numbers to explain how you determined your answer.

I determined my answer by multiplying Bert's $3.00 per mile by 10, and got $30.00 Then I multiplied Madeline's $2.00 per mile by 10, and got $20.00.

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response includes the correct solution for which cab will charge less for a 10 mile ride. The solutions provided for the equations are incomplete descriptions of the relationship between the two cab companies when it comes to the cost of a cab ride (they are expressions not equations), and this would detract from a demonstration of thorough understanding. The solution and work provided for the mileage is incorrect. While the solution for which cab driver will charge less is correct, the explanation is incomplete; it does not account for the initial charges, $3 and $1.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's $y=1+3x$

Madeline's $y=3+2x$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

$1+3=4+2x$

$3x+2x=4$

$\frac{5x}{5}=\frac{4}{5}$

$4\overline{)5}$ = 1.2

Answer 1.2 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Bert's

$1+3x=10$

$\frac{3x}{3}=\frac{9}{3}$ $x=3$

Use words and numbers to explain how you determined your answer.

I set up the equation $3+2x=10$, then I used the balanced method and got 3. Finially I divided 3 from 9 and got 3.

Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The response includes correct equations; however, the other solutions and the work/explanations shown are incorrect.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's $y = 1 + 3p$

Madeline's $y = 3 + 2p$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

$$\begin{cases} y = 1 + 3x \\ y = 3 + 2x \end{cases}$$

$$1 + 3x = 3 + 2x$$
$$-3x \qquad -2x$$
$$-1 + 1x = 3$$
$$-1$$
$$1x = 2 \qquad \boxed{x = 2}$$

$y = 1 + 3 \cdot 2$

$y = 7$

S.S. $(2, 7)$

Answer 7 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Bert's

Use words and numbers to explain how you determined your answer.

Because Bert's was cheaper until 7 miles this means it will be cheaper past 7 miles.

Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The response includes correct equations. Using p instead of x in the equations is acceptable. Although the correct procedure was used for determining the miles where the cost will be the same, the cost was given as the solution (7) instead of the mileage. The solution to which cab driver will charge less is incorrect and so is the explanation of how that solution was determined.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's $4y = x$

Madeline's $5y = x$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

Bert $4 every mile
Madeline $5 every mile

Answer 14 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Bert

Use words and numbers to explain how you determined your answer.

Bert would charge $40 for 10 miles and Madeline would charge $50 for 10 miles. Bert charges less

Score Point 0 (out of 3 points)

This response does not demonstrate even a limited understanding of the mathematical concepts embodied in the task. The response includes incorrect solutions ($4y = x$; $5y = x$; 14; Bert) and the work/explanations provided are incorrect.

Bert's cab company charges $1.00 plus an additional $3.00 per mile for a ride.
Madeline's cab company charges $3.00 plus an additional $2.00 per mile for a ride.
Write a system of linear equations that shows the cost in dollars, y, for a cab ride of x miles for each cab driver.

Bert's 4.00

Madeline's 5.00

$$\begin{array}{r} 1.00 \\ +3.00 \\ \hline \$4.00 \end{array} \qquad \begin{array}{r} 3.00 \\ +2.00 \\ \hline \$5.00 \end{array}$$

At what distance, in miles, will the cost be the same for both companies?

Show your work.

$9.00

Answer 10 miles

Which cab driver's charge will be less for a ride that is 10 miles in distance?

Answer Bert cab

Use words and numbers to explain how you determined your answer.

the answer is bert cab because it is $ 3.00 per mile plus $ 1.00 and madeline's cab company charges $ 3.00 plus $2.00

Score Point 0 (out of 3 points)

This response does not demonstrate even a limited understanding of the mathematical concepts embodied in the task. The response includes incorrect solutions (4.00; 5.00; 10; Bert) and the work/explanations provided are incorrect.

2-Point Holistic Rubric

Score Points:

2 Points	A two-point response includes the correct solution to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task. This response • indicates that the student has completed the task correctly, using mathematically sound procedures • contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures • may contain inconsequential errors that do not detract from the correct solution and the demonstration of a thorough understanding
1 Point	A one-point response demonstrates only a partial understanding of the mathematical concepts and/or procedures in the task. This response • correctly addresses only some elements of the task • may contain an incorrect solution but applies a mathematically appropriate process • may contain the correct solution but required work is incomplete
0 Points*	A zero-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.

* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

3-Point Holistic Rubric

Score Points:

3 Points	A three-point response includes the correct solution(s) to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task. This response • indicates that the student has completed the task correctly, using mathematically sound procedures • contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures • may contain inconsequential errors that do not detract from the correct solution(s) and the demonstration of a thorough understanding
2 Points	A two-point response demonstrates a partial understanding of the mathematical concepts and/or procedures in the task. This response • appropriately addresses most, but not all aspects of the task using mathematically sound procedures • may contain an incorrect solution but provides sound procedures, reasoning, and/or explanations • may reflect some minor misunderstanding of the underlying mathematical concepts and/or procedures
1 Point	A one-point response demonstrates only a limited understanding of the mathematical concepts and/or procedures in the task. This response • may address some elements of the task correctly but reaches an inadequate solution and/or provides reasoning that is faulty or incomplete • exhibits multiple flaws related to misunderstanding of important aspects of the task, misuse of mathematical procedures, or faulty mathematical reasoning • reflects a lack of essential understanding of the underlying mathematical concepts • may contain the correct solution(s) but required work is limited
0 Points*	A zero-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.

* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted).

2014 2- and 3-Point Mathematics Scoring Policies

Below are the policies to be followed while scoring the mathematics tests for all grades:

1. If a student does the work in other than a designated "Show your work" area, that work should still be scored. (Additional paper is an allowable accommodation for a student with disabilities if indicated on the student's Individual Education Program or Section 504 Accommodation Plan.)
2. If the question requires students to show their work, and the student shows appropriate work and clearly identifies a correct answer but fails to write that answer in the answer blank, the student should still receive full credit.
3. In questions that provide ruled lines for students to write an explanation of their work, mathematical work shown elsewhere on the page should be considered and scored.
4. If the student provides one legible response (and one response only), teachers should score the response, even if it has been crossed out.
5. If the student has written more than one response but has crossed some out, teachers should score only the response that has **not** been crossed out.
6. Trial-and-error responses are **not** subject to Scoring Policy #5 above, since crossing out is part of the trial-and-error process.
7. If a response shows repeated occurrences of the same conceptual error within a question, the student should **not** be penalized more than once.
8. In questions that require students to provide bar graphs,
    - in Grades 3 and 4 only, touching bars are acceptable
    - in Grades 3 and 4 only, space between bars does **not** need to be uniform
    - in all grades, widths of the bars must be consistent
    - in all grades, bars must be aligned with their labels
    - in all grades, scales must begin at 0, but the 0 does **not** need to be written
9. In questions requiring number sentences, the number sentences must be written horizontally.
10. In pictographs, the student is permitted to use a symbol other than the one in the key, provided that the symbol is used consistently in the pictograph; the student does not need to change the symbol in the key. The student may **not**, however, use multiple symbols within the chart, nor may the student change the value of the symbol in the key.
11. If students are not directed to show work, any work shown will not be scored. This applies to items that do not ask for any work and items that ask for work for one part and do not ask for work in another part.
12. Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session completely blank (no response attempted). This is not to be confused with a score of zero wherein the student does respond to part or all of the question but that work results in a score of zero.