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**New York State Testing Program
Grade 6 Common Core
Mathematics Test**

Released Questions with Annotations

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THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK /
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New York State Testing Program Grade 6 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 in 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 their 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 6 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.

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What is the value of the expression below?

$$3^4 + 9$$

- A** 21
- B** 39
- C** 43
- D** 90

Key: D

Measured CCLS: 6.EE.1

Commentary: This question measures 6.EE.1 because it assesses the student's ability to evaluate a numerical expression involving whole-number exponents.

Extended Rationale

Answer Choice A: "21"; This response is incorrect and may occur when a student incorrectly evaluates 3^4 as the product of 3 and 4 while determining the value of the expression.

$$3^4 + 9 \rightarrow (3 \times 4) + 9 = 21$$

A student who selects this response may have limited understanding of how to evaluate numerical expressions involving whole-number exponents.

Answer Choice B: "39"; This response is incorrect and may occur when a student misinterprets the exponent and incorrectly applies the distributive property, evaluating 3^4 as three times the sum of 4 and 9.

$$3^4 + 9 \rightarrow 3(4 + 9) = 39$$

A student who selects this response may have limited understanding of how to evaluate numerical expressions involving whole-number exponents.

Answer Choice C: "43"; This response is incorrect and may occur when a student interprets 3^4 as being equivalent to 34.

$$3^4 + 9 \rightarrow 34 + 9 = 43$$

A student who selects this response may have limited understanding of how to evaluate numerical expressions involving whole-number exponents.

Answer Choice D: "90"; This response is the correct value of the given expression. The student may have used a method such as the one below.

$$3^4 + 9 = (3 \times 3 \times 3 \times 3) + 9 = 90$$

A student who selects this response understands how to evaluate numerical expressions involving whole-number exponents.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors and misconceptions made when evaluating numerical expressions involving whole-number exponents.

Paul bought a package of 6 spiral notebooks for a total cost of \$13.50. Which equation represents p , the cost, in dollars, of each notebook?

A $p = 13.50 - 6$

B $p = 13.50 \times 6$

C $p = 13.50 + 6$

D $p = 13.50 \div 6$

Key: D

Measured CCLS: 6.EE.7

Commentary: The question measures 6.EE.7 because it asks the student to solve a real-world problem by writing an equation of the form $px = q$ for a case in which p, q , and x are all nonnegative rational numbers. In this case the equation includes a division expression and shows the total cost of \$13.50 divided by 6, the number of spiral notebooks.

Extended Rationale

Answer Choice A: " $p = 13.50 - 6$ "; This response is incorrect and may reflect a lack of understanding of the relationship between an equation and the real-world problem it solves. The student may have mistakenly thought 6 should be subtracted from the total cost rather than dividing the total cost by 6.

Answer Choice B: " $p = 13.50 \times 6$ "; This response is incorrect and may reflect a lack of understanding of the relationship between an equation and the real-world problem it solves. The student may have mistakenly thought the total cost should be multiplied by 6 rather than divided by 6.

Answer Choice C: " $p = 13.50 + 6$ "; This response is incorrect and may reflect a lack of understanding of the relationship between an equation and the real-world problem it solves. The student may have mistakenly thought 6 should be added to the total cost rather than dividing the total cost by 6.

Answer Choice D: " $p = 13.50 \div 6$ "; This response shows the correct equation that represents the situation; the total cost, \$13.50, divided by the number of notebooks, 6, will yield the cost of each notebook, p . A student who selects this response understands how to solve real-world problems by writing equations of the form $px = q$ for cases in which p, q , and x are all nonnegative rational numbers.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors made when solving real-world problems by writing equations of the form $px = q$ for cases in which p, q , and x are all nonnegative rational numbers.

The set of numbers 1, 7, 11, and 36 contains values for m . What value of m makes the equation below true?

$$4m + 8 = 36$$

- A** 1
- B** 7
- C** 11
- D** 36

Key: B

Measured CCLS: 6.EE.5

Commentary: This question measures 6.EE.5 because it assesses the student's ability to use substitution to determine whether a given number in a specified set makes an equation true.

Extended Rationale

Answer Choice A: "1"; This response is incorrect and may occur if a student makes an error when substituting the value of m into the equation.

$$\begin{aligned} 4(1 + 8) &= 36 \\ 4(9) &= 36 \\ 36 &= 36 \end{aligned}$$

A student who selects this response may not be able to use substitution to judge if a value from a set of numbers is a solution to a given equation.

Answer Choice B: "7"; This answer represents the value of m that makes the given equation true. The student may have used a method such as the one below.

$$\begin{aligned} 4(7) + 8 &= 36 \\ 28 + 8 &= 36 \\ 36 &= 36 \end{aligned}$$

A student who selects this response understands how to use substitution to determine whether a given number in a specified set makes an equation or inequality true.

Answer Choice C: "11"; This response is incorrect and may occur if a student makes an error when substituting the value of m into the equation.

$$\begin{aligned} 4(11) &= 36 + 8 \\ 44 &= 44 \end{aligned}$$

A student who selects this response may not be able to use substitution to judge if a value from a set of numbers is a solution to a given equation.

Answer Choice D: "36"; This response is incorrect and may occur when a student mistakenly selects the value on the right-hand side of the equation as the value of m that makes the equation true. A student who selects this response demonstrates a limited understanding of how to use substitution to judge if a value from a set of numbers is a solution to a given equation.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when using substitution to determine whether a given number in a specified set makes an equation true.

What is the value of the expression below when $c = 5$ and $d = 4$?

$$6c^2 - 5d + 8$$

- A** 48
- B** 79
- C** 138
- D** 888

Key: C

Measured CCLS: 6.EE.2.c

Commentary: The question measures 6.EE.2.c because it asks the student to evaluate an expression at specific values of its variables.

Extended Rationale

Answer Choice A: "48"; This response is incorrect and may reflect an error in understanding of exponents. The student may have multiplied 5 by 2 instead of squaring 5. A student who selects this response may not understand how to use exponents or evaluate expressions at specific values of their variable.

$$6(5 \times 2) - 5(4) + 8 = 48$$

Answer Choice B: "79"; This response is incorrect and may reflect an error in understanding how to evaluate an expression at specific values of its variables. The student most likely switched the positions of the variables when making the calculations, substituting 4 for c and 5 for d . A student who selects this response may not understand how to use variables or evaluate expressions at specific values of their variable.

$$6(4^2) - 5(5) + 8 = 79$$

Answer Choice C: "138"; This response shows the correct value of the expression when evaluated for $c = 5$ and $d = 4$. A student who selects this response understands how to evaluate expressions at specific values of their variable.

$$6(5^2) - 5(4) + 8 = 138$$

Answer Choice D: "888"; This response is incorrect and may reflect an error in understanding of exponents and the order of operations. The student may have squared the product of 6 and 5 instead of squaring the 5 and then multiplying that value by 6. A student who selects this response may not understand how to use exponents or evaluate expressions at specific values of their variable.

$$(6 \times 5)^2 - 5(4) + 8 = 888$$

Answer choices A, B, and D are plausible but incorrect. They represent common student errors made when evaluating an expression at specific values of their variables.

Which expression is equivalent to $16a + 24b$?

- A** $4(4a + 20b)$
- B** $8(2a + 3b)$
- C** $4a(4 + 6b)$
- D** $8ab(2 + 3)$

Key: B

Measured CCLS: 6.EE.3

Commentary: This question measures 6.EE.3 because it assesses the student's ability to apply the distributive property to generate an equivalent expression.

Extended Rationale

Answer Choice A: " $4(4a + 20b)$ "; This response is incorrect and may occur if a student applies the distributive property incorrectly.

A student may have started with the given expression and performed the following incorrect set of operations, $16a + 24b \rightarrow 4(4a) + (24 - 4)b \rightarrow 4(4a + 20b)$, or may have started with option A and performed the following incorrect set of operations, $4(4a + 20b) \rightarrow 4(4a) + (4 + 20b) \rightarrow 16a + 24b$.

A student who selects this response may have limited understanding of how to apply the distributive property to generate equivalent expressions.

Answer Choice B: " $8(2a + 3b)$ "; This answer represents an expression that is equivalent to the given expression. The student may have used a method such as the one below.

$$16a + 24b = 8(2a) + 8(3b) = 8(2a + 3b)$$

A student who selects this response understands how to apply the distributive property to generate equivalent expressions.

Answer Choice C: " $4a(4 + 6b)$ "; This response is incorrect and may occur if a student does not understand how to apply the distributive property with expressions that contain variables.

$$16a + 24b \rightarrow 4a(4) + 4(6b) \rightarrow 4a(4 + 6b)$$

A student who selects this response may have limited understanding of how to apply the distributive property to generate equivalent expressions.

Answer Choice D: " $8ab(2 + 3)$ "; This response is incorrect and may occur if a student does not understand how to apply the distributive property with expressions that contain variables.

$$16a + 24b \rightarrow 8a(2) + 8b(3) \rightarrow 8ab(2 + 3)$$

A student who selects this response may have limited understanding of how to apply the distributive property to generate equivalent expressions.

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

Felicity babysat 2 hours each night for 10 nights. She earned a total of \$180 babysitting. Felicity wants to calculate her hourly rate. How much did Felicity earn per hour babysitting?

- A \$9
- B \$15
- C \$18
- D \$20

Key: A

Measured CCLS: 6.RP.2

Commentary: This question measures 6.RP.2 because it assesses the student's ability to understand the concept of a unit rate presented in a context that uses rate language.

Extended Rationale

Answer Choice A: "\$9"; This answer represents the amount Felicity earned per hour babysitting. The student may have used a method such as the one below.

Total number of hours Felicity babysat: $2 \times 10 = 20$

Felicity's hourly rate: $180 \div 20 = 9$

A student who selects this response understands the concept of a unit rate presented in a context that uses rate language.

Answer Choice B: "\$15"; This response is incorrect and may occur if the student adds the number of hours per night and the number of nights and then divides 180 by this sum.

$$2 + 10 = 12$$

$$180 \div 12 = 15$$

A student who selects this response may have limited ability to understand the concept of a unit rate presented in a context that uses rate language.

Answer Choice C: "\$18"; This response is incorrect and may occur if the student divides Felicity's total earnings by the number of nights.

$$180 \div 10 = 18$$

A student who selects this response may have limited ability to understand the concept of a unit rate presented in a context that uses rate language.

Answer Choice D: "\$20"; This response is incorrect and may occur if the student calculates the total number of hours.

$$2 \times 10 = 20$$

A student who selects this response may have limited ability to understand the concept of a unit rate presented in a context that uses rate language.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when understanding the concept of a unit rate presented in a context that uses rate language.

Which expression is equivalent to $3(6m) + m$?

- A** $19m$
- B** $21m$
- C** $7m + 3$
- D** $18m + 6m^2$

Key: A

Measured CCLS: 6.EE.3

Commentary: This question measures 6.EE.3 because it assesses the student's ability to apply the properties of operations to generate an equivalent expression.

Extended Rationale

Answer Choice A: " $19m$ "; This response correctly shows an expression that is equivalent to the given expression. The student may have used a method such as the one below.

$$3(6m) + m = 18m + m = 19m$$

A student who selects this response understands how to apply the properties of operations to generate equivalent expressions.

Answer Choice B: " $21m$ "; This response is incorrect and may occur if the student adds before multiplying while determining an equivalent expression.

$$3(6m + m) = 3(7m) = 21m$$

A student who selects this response may have limited understanding of how to apply the properties of operations to generate equivalent expressions.

Answer Choice C: " $7m + 3$ "; This response is incorrect and may occur if the student does not understand how to interpret the expression, using addition only instead of multiplying when appropriate.

$$3 + 6m + m = 7m + 3$$

A student who selects this response may have limited understanding of how to apply the properties of operations to generate equivalent expressions.

Answer Choice D: " $18m + 6m^2$ "; This response is incorrect and may occur if the student does not understand how to interpret the expression and incorrectly applies the distributive property.

$$6m(3 + m) = 18m + 6m^2$$

A student who selects this response may have limited understanding of how to apply the properties of operations to generate equivalent expressions.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when applying the properties of operations to generate equivalent expressions.

Machines S and T were both cleaned this week.

- Machine S is cleaned every 12 weeks.
- Machine T is cleaned every 8 weeks.

What is the **fewest** number of weeks that will pass before both machines are cleaned again in the same week?

- A** 16
- B** 24
- C** 36
- D** 48

Key: B

Measured CCLS: 6.NS.4

Commentary: This question measures 6.NS.4 because it assesses the student's ability to find the least common multiple of two whole numbers less than or equal to 12. Given that Machine S is cleaned every 12 weeks and Machine T is cleaned every 8 weeks, the least common multiple of 12 and 8 is the fewest number of weeks that will pass before both machines are cleaned again in the same week.

Extended Rationale

Answer Choice A: "16"; This response is incorrect and may occur if a student finds a multiple of 8, but not a multiple of 12. A student who selects this response may have limited understanding of how to find the least common multiple of two whole numbers less than or equal to 12.

Answer Choice B: "24"; This response correctly shows the fewest number of weeks that will pass before both machines are cleaned again. The student may have used a method such as the one below.

Machine S: 12, 24, 36, ...

Machine T: 8, 16, 24, 32, ...

$$12 \times 2 = 24$$

Least number of weeks/least common multiple:

$$8 \times 3 = 24$$

A student who selects this response understands how to find the least common multiple of two whole numbers less than or equal to 12.

Answer Choice C: "36"; This response is incorrect and may occur if a student finds a number that is a multiple of 12, but not a multiple of 8. A student who selects this response may have limited understanding of how to find the least common multiple of two whole numbers less than or equal to 12.

Answer Choice D: "48"; This response is incorrect and may occur if a student finds a common multiple of 8 and 12, but not the least common multiple. A student who selects this response may have limited understanding of how to find the least common multiple of two whole numbers less than or equal to 12.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when finding the least common multiple of two whole numbers less than or equal to 12.

Nadia bought 5 tickets to attend a spaghetti supper fundraiser at her school. The equation $5x = 32.50$ can be used to find x , the cost of each ticket in dollars. Which equation represents the cost of each ticket?

A $x = \frac{32.50}{5}$

B $x = 32.50(5)$

C $x = 32.50 - 5$

D $x = 32.50 + 5$

Key: A

Measured CCLS: 6.EE.7

Commentary: This question measures 6.EE.7 because it assesses the student's ability to solve a real-world problem by solving an equation of the form $px = q$ for a case in which p , q , and x are all nonnegative rational numbers.

Extended Rationale

Answer Choice A: " $x = \frac{32.50}{5}$ "; This equation correctly shows the cost of each ticket. The student may have used a method such as the one below.

$$5x = 32.50$$

$$\frac{5x}{5} = \frac{32.50}{5}$$

$$x = \frac{32.50}{5}$$

A student who selects this response understands how to solve real-world problems by solving equations of the form $px = q$.

Answer Choice B: " $x = 32.50(5)$ "; This response is incorrect and may occur if a student multiplies 32.50 by 5 while transforming the equation, instead of using division. A student who selects this response may have limited understanding of how to solve real-world problems by solving equations of the form $px = q$.

Answer Choice C: " $x = 32.50 - 5$ "; This response is incorrect and may occur if a student subtracts 5 from 32.50 while transforming the equation, instead of using division. A student who selects this response may have limited understanding of how to solve real-world problems by solving equations of the form $px = q$.

Answer Choice D: " $x = 32.50 + 5$ "; This response is incorrect and may occur if a student adds 5 to 32.50 while transforming the equation, instead of using division. A student who selects this response may have limited understanding of how to solve real-world problems by solving equations of the form $px = q$.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when solving real-world problems by solving equations of the form $px = q$ for cases in which p , q , and x are all nonnegative rational numbers.

The area of a rectangular city park is $\frac{25}{54}$ square miles. The length of the park is $\frac{5}{9}$ mile. What is the width, in miles, of the park?

A $\frac{4}{9}$

B $\frac{5}{6}$

C $1\frac{1}{54}$

D $1\frac{1}{5}$

Key: B

Measured CCLS: 6.NS.1

Commentary: This question measures 6.NS.1 because it assesses the student's ability to solve a word problem involving division of fractions by fractions.

Extended Rationale

Answer Choice A: " $\frac{4}{9}$ "; This response is incorrect and may occur if a student makes a series of computational errors when attempting to divide the fractional area by the fractional length. One possible error is shown below.

$$\frac{25}{54} \div \frac{5}{9} \rightarrow \frac{25}{54} - \frac{5}{9} \rightarrow \frac{(25 - 5)}{(54 - 9)}$$

$$\frac{(25 - 5)}{(54 - 9)} = \frac{20}{45} = \frac{4}{9}$$

A student who selects this response may have limited understanding of how to solve word problems involving operations with fractions, specifically division of fractions by fractions.

Answer Choice B: " $\frac{5}{6}$ "; This answer represents the correct width, in miles, of the park. The student may have used a method such as the one below.

$$A = lw$$

$$\frac{25}{54} = \frac{5}{9}w$$

$$\frac{25}{54} \div \frac{5}{9} = \frac{5}{9}w \div \frac{5}{9}$$

$$\frac{25}{54} \times \frac{9}{5} = \frac{5}{9}w \times \frac{9}{5}$$

$$\frac{5}{6} = 1w$$

A student who selects this response understands how to solve word problems involving division of fractions by fractions.

Answer Choice C: " $1\frac{1}{54}$ "; This response is incorrect and may occur if a student makes an error when attempting to divide the fractional area by the fractional length. One possible error is shown below.

$$\frac{25}{54} \div \frac{5}{9} \rightarrow \frac{25}{54} + \frac{5}{9}$$

$$\frac{25}{54} + \frac{5}{9} = \frac{25}{54} + \frac{30}{54} = \frac{55}{54} = 1\frac{1}{54}$$

A student who selects this response may have limited understanding of how to solve word problems involving division of fractions by fractions.

Answer Choice D: " $1\frac{1}{5}$ "; This response is incorrect and may occur if a student makes an error when attempting to divide the fractional area by the fractional length. One possible error is shown below.

$$\frac{25}{54} \div \frac{5}{9} \rightarrow \frac{54}{25} \times \frac{5}{9}$$

$$\frac{54}{25} \times \frac{5}{9} = 1\frac{1}{5}$$

A student who selects this response may have limited understanding of how to solve word problems involving division of fractions by fractions.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when solving word problems involving division of fractions by fractions.

The table below shows how much money a grocery store receives for selling different amounts of asparagus.

ASPARAGUS SALES

Number of Pounds	Total Sales
4	\$10
6	\$15
8	\$20
10	?
12	?

If the unit rate is constant, what are the total sales for 12 pounds of asparagus?

- A \$22.50
- B \$25.00
- C \$30.00
- D \$32.50

Key: C

Measured CCLS: 6.RP.3a

Commentary: This question measures 6.RP.3a because it assesses the student's ability to apply an understanding of unit rate and ratios to find missing values in a table of equivalent ratios relating quantities with whole-number measurements.

Extended Rationale

Answer Choice A: "\$22.50"; This response is incorrect and may occur if a student determines the cost per pound of asparagus and adds that to the total cost for 8 pounds of asparagus.

$$\frac{\$10}{4 \text{ lbs}} = \$2.50/\text{lb}$$

$$\$2.50 + \$20 = \$22.50$$

A student who selects this response may have limited understanding of how to apply the unit rate to find missing values in the tables of equivalent ratios relating quantities with whole-number measurements.

Answer Choice B: "\$25.00"; This response is incorrect and may occur if a student determines the cost for 10 pounds of asparagus.

$$10 \text{ lbs} \times \frac{\$5}{2 \text{ lbs}} = \$25$$

A student who selects this response may not have carefully examined the question being asked and provided the solution for 10 pounds rather than 12.

Answer Choice C: "\$30.00"; This response represents the total sales for 12 pounds of asparagus. The student may have used a method such as the one below.

$$\text{Unit rate: } \frac{\$10}{4 \text{ lbs}} = \frac{\$15}{6 \text{ lbs}} = \frac{\$20}{8 \text{ lbs}} = \$5 / 2 \text{ lbs}$$

$$\text{Total sales for 12 pounds of asparagus: } 12 \text{ lbs} \times \frac{\$5}{2 \text{ lbs}} = \$30$$

A student who selects this response understands how to find missing values in the tables of equivalent ratios relating quantities with whole-number measurements.

Answer Choice D: "\$32.50"; This response is incorrect and may occur if a student adds the total cost for 6 pounds and 8 pounds of asparagus to determine the total cost for 14 pounds of asparagus, and then subtracts the cost per pound of asparagus.

$$\frac{\$10}{4 \text{ lbs}} = \$2.50/\text{lb}$$

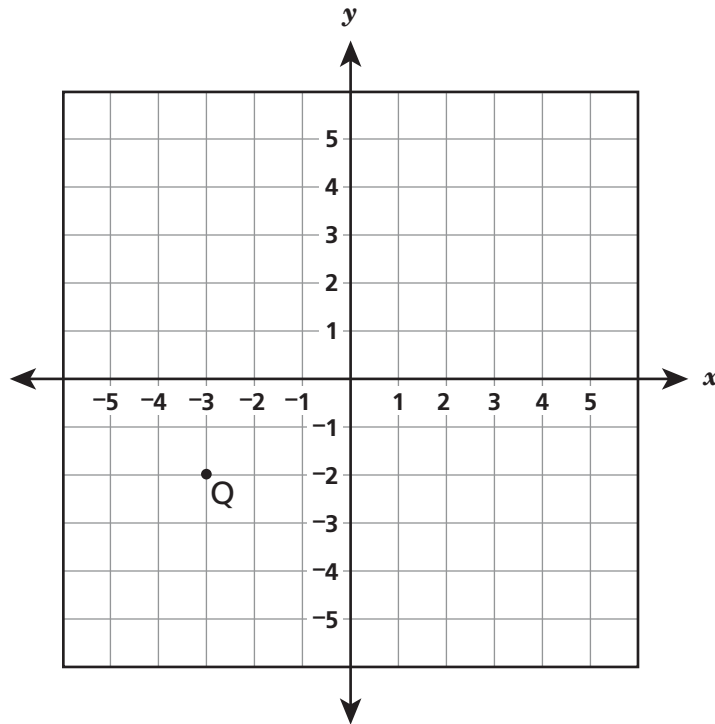
$$\$15 + \$20 = \$35$$

$$\$35 - \$2.50 = \$32.50$$

A student who selects this response may have limited understanding of how to find missing values in the tables of equivalent ratios relating quantities with whole-number measurements.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors and misconceptions made when finding missing values in the tables of equivalent ratios relating quantities with whole-number measurements.

Point Q is shown on the coordinate grid below.



Which statement correctly describes the relationship between the point $(-3, 2)$ and point Q?

- A It is a reflection across the x -axis.
- B It is a reflection across the y -axis.
- C They are 6 units apart.
- D They are 2 units apart.

Key: A

Measured CCLS: 6.NS.6b

Commentary: This question measures 6.NS.6b because it assesses the student's ability to understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane, and recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

Extended Rationale

Answer Choice A: "It is a reflection across the x -axis." This statement correctly describes the relationship between the point $(-3, 2)$ and point Q. The student may have recognized that the x -coordinates of the points are the same, but the y -coordinates are opposites, and then determined that these points would be reflections of each other across the x -axis. A student who selects this response understands signs of numbers in ordered

pairs as indicating locations in quadrants of the coordinate plane, and recognizes that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

Answer Choice B: "It is a reflection across the y -axis." This response is incorrect and may occur if a student makes an error plotting the given point, plotting it at $(3, -2)$, which would make the points reflections across the y -axis. A student who selects this response may have limited ability to understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane, and recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

Answer Choice C: "They are 6 units apart." This response is incorrect and may occur if a student makes an error plotting the given point, plotting it at $(3, -2)$, which would make the points 6 units apart. A student who selects this response may have limited ability to understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane.

Answer Choice D: "They are 2 units apart." This response is incorrect and may occur if a student selects the distance each of the points is from the x -axis. A student who selects this response may have limited ability to understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when understanding signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane, and recognizing that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

What is the value of the expression below when $z = 7$?

$$3z - 3$$

- A** 12
- B** 18
- C** 21
- D** 34

Key: B

Measured CCLS: 6.EE.2c

Commentary: This question measures 6.EE.2c because it assesses the student's ability to evaluate expressions at specific values of their variables, using the correct order of operations.

Extended Rationale

Answer Choice A: "12"; This response is incorrect and may occur if a student subtracts before multiplying when determining the value of the expression.

$$3(7 - 3) = 12$$

A student who selects this response may have limited understanding of how to evaluate expressions at specific values of their variables, using the correct order of operations.

Answer Choice B: "18"; This response represents the correct value of the given expression when $z = 7$. The student may have used a method such as the one below.

$$3(7) - 3 = 18$$

A student who selects this response understands how to evaluate expressions at specific values of their variables, using the correct order of operations.

Answer Choice C: "21"; This response is incorrect and may occur if a student finds the product $3(7)$ but neglects the other term while determining the value of the expression.

$$3(7) = 21$$

A student who selects this response may have limited understanding of how to evaluate expressions at specific values of their variables.

Answer Choice D: "34"; This response is incorrect and may occur if a student does not recognize that $3z$ represents the product of 3 and z , and writes 37 instead of $3(7)$.

$$37 - 3 = 34$$

A student who selects this response may have limited understanding of how to evaluate expressions at specific values of their variables.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when evaluating expressions at specific values of their variables, using the correct order of operations.

Which equation is true when $n = 4$?

A $2n = 6$

B $n + 3 = 7$

C $9 - n = 13$

D $\frac{n}{12} = 3$

Key: B

Measured CCLS: 6.EE.5

Commentary: The question measures 6.EE.5 because it asks the student to use substitution to determine whether a given number makes an equation true.

Extended Rationale

Answer Choice A: " $2n = 6$ "; This response is incorrect and may reflect a lack of understanding that multiplication is implied when a variable is positioned directly next to a number. The student may have added 2 to the value of the variable, 4, to get a result of 6.

$$2 + 4 = 6$$

Answer Choice B: " $n + 3 = 7$ "; This response represents the correct equation that is true when $n = 4$; when replacing the variable n with 4, the result is a true statement, $4 + 3 = 7$. A student who selects this response understands how to use substitution to determine whether a given number makes an equation true.

$$4 + 3 = 7$$

Answer Choice C: " $9 - n = 13$ "; This response is incorrect and may reflect an error in computation after substituting the given number into the equation. The student may have neglected to account for the subtraction sign, adding $9 + 4$ instead.

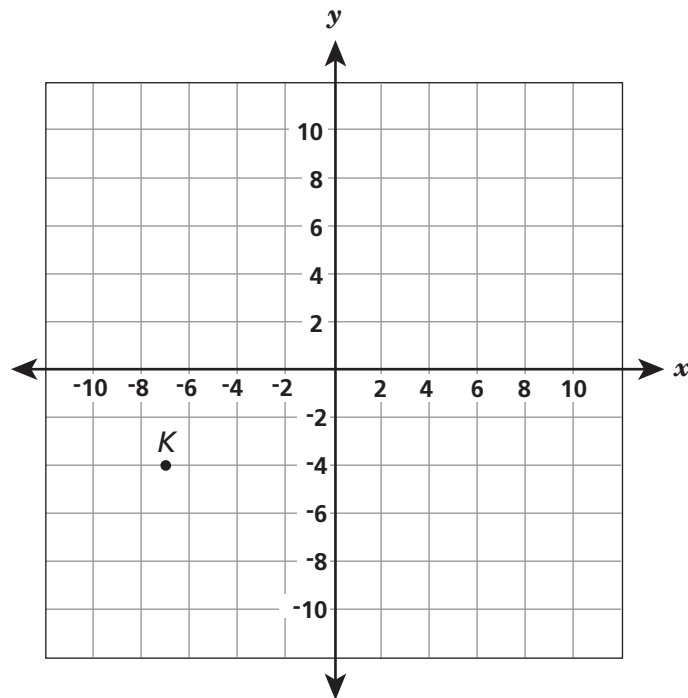
$$13 - 9 = 4 \text{ or } 9 + 4 = 13$$

Answer Choice D: " $\frac{n}{12} = 3$ "; This response is incorrect and may reflect a lack of understanding of how division is represented by fractions. The student may have thought that $\frac{n}{12}$ was equivalent to $\frac{12}{n}$, concluding incorrectly that 4 would make the equation true.

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

Answer choices A, C, and D are plausible but incorrect. They represent common student errors made when using substitution to determine whether a given number makes an equation true.

What coordinates best represent the location of point K on the coordinate plane below?



- A** $(-7, -4)$
- B** $(-7, 4)$
- C** $(-4, -7)$
- D** $(-4, 7)$

Key: A

Measured CCLS: 6.NS.6c

Commentary: The question measures 6.NS.6c because it asks the student to find and position a pair of integers on a coordinate plane.

Extended Rationale

Answer Choice A: " $(-7, -4)$ "; This response correctly identifies the x - and y -coordinates for the given point on the coordinate plane. A student who selects this response understands how to find and position a pair of integers on a coordinate plane.

Answer Choice B: " $(-7, 4)$ "; This response is incorrect and may reflect an incomplete understanding of the number line on the y -axis. The student may have understood how to use the number line on the x -axis, but may have neglected to recognize that point K has a negative y -coordinate. A student who selects this response may not understand how to find and position a pair of integers on a coordinate plane.

Answer Choice C: " $(-4, -7)$ "; This response is incorrect and may reflect an incomplete understanding of the representation of x - and y -coordinates in an ordered pair. The student most likely interpreted the coordinates

as (y, x) instead of (x, y) . A student who selects this response may not understand how to find and position a pair of integers on a coordinate plane.

Answer Choice D: " $(-4, 7)$ "; This response is incorrect and may reflect multiple errors, both in using the number line on the y -axis and in interpreting the order of the coordinates as (x, y) . A student who selects this response may not understand how to find and position a pair of integers on a coordinate plane.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when finding and positioning a pair of integers on a coordinate plane.

124060009_3

In Ms. Perron's class, 75% of the students are boys. There are 18 boys in the class. What is the total number of students in Ms. Perron's class?

- A** 6
- B** 14
- C** 24
- D** 57

Key: C

Measured CCLS: 6.RP.3c

Commentary: The question measures 6.RP.3c because it asks the student to solve a problem involving finding the whole, given a part and the percent. In this case, the student must determine the number of students in the whole class, if it is known that 18 students comprise 75% of the class.

Extended Rationale

Answer Choice A: "6"; This response is incorrect and may reflect an error in interpreting the problem situation. The student may have calculated a total of 24 students, but then found the number of girls in the class.

$$\frac{18}{n} = \frac{75}{100}$$

$$n = 24$$

$$24 - 18 = 6$$

Answer Choice B: "14"; This response is incorrect and may reflect a lack of understanding of how the part, percent, and whole relate to one another. Instead of recognizing 18 as 75% of the whole, the student may have found 75% of 18 and rounded to the nearest whole number.

$$18 \times 0.75 = 13.5$$

13.5 rounds up to 14

Answer Choice C: "24"; This response represents the correct determination that there are 24 students in the class. A student who selects this response understands how to solve problems involving finding the whole, given a part and the percent.

$$\frac{18}{n} = \frac{75}{100}$$

$$n = 24$$

Answer Choice D: "57"; This response is incorrect and may reflect a lack of understanding of how the part, percent, and whole relate to one another. The student may have subtracted 18, the number of boys in the class, from 75.

$$75 - 18 = 57$$

Answer choices A, B, and D are plausible but incorrect. They represent common student errors made when solving problems involving finding the whole, given a part and the percent.

134060011_1

Which expression is equivalent to $5(d + 1)$?

A $5d + 5$

B $5d + 1$

C $d + 5$

D $d + 6$

Key: A

Measured CCLS: 6.EE.3

Commentary: This question measures 6.EE.3 because it assesses the student's ability to apply the distributive property to generate an equivalent expression.

Extended Rationale

Answer Choice A: " $5d + 5$ "; This answer represents an expression that is equivalent to the given expression. The student may have made this determination using the distributive property, as shown below:

$$5(d + 1) = 5d + 5$$

A student who selects this response understands how to apply the distributive property to generate equivalent expressions.

Answer Choice B: " $5d + 1$ "; This response is incorrect and may occur if a student does not distribute the factor 5 to both terms while attempting to create the equivalent expression.

$$5(d + 1) \rightarrow 5d + 1$$

A student who selects this response may have limited understanding of how to apply the properties of operations to generate equivalent expressions.

Answer Choice C: " $d + 5$ "; This response is incorrect and may occur if a student does not distribute the factor 5 to both terms while attempting to create the equivalent expression.

$$5(d + 1) \rightarrow d + 5$$

A student who selects this response may have limited understanding of how to apply the distributive property to generate equivalent expressions.

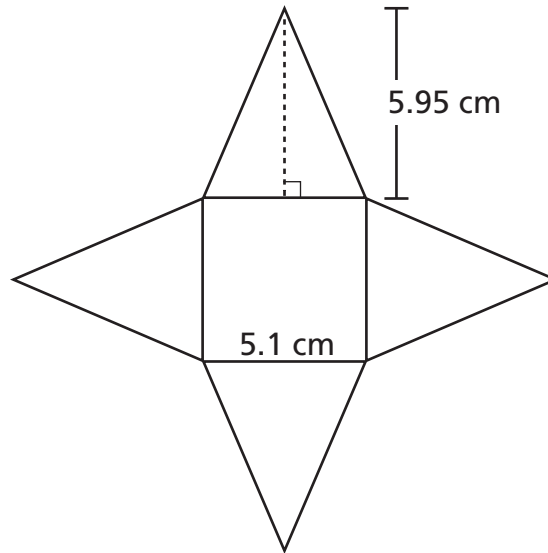
Answer Choice D: " $d + 6$ "; This response is incorrect and may occur if a student does not recognize that the expression $5(d + 1)$ represents the product of 5 and $(d + 1)$ and, consequently, does not use the distributive property to create an equivalent expression.

$$5(d + 1) \rightarrow 5 + d + 1 = d + 6$$

A student who selects this response may have limited understanding of how to apply the distributive property to generate equivalent expressions.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when applying the distributive property to generate equivalent expressions.

A net of a square pyramid is shown below.



What is the surface area, in square centimeters, of the pyramid?

- A 60.7
- B 86.7
- C 121.4
- D 147.4

Key: B

Measured CCLS: 6.G.4

Commentary: This question measures 6.G.4 because it assesses the student's ability to use the nets of a three-dimensional figure, made up of rectangles and triangles, to find the surface area of the figure.

Extended Rationale

Answer Choice A: "60.7"; This response is incorrect and may occur if a student does not include the area of the square base in the total surface area.

$$\frac{1}{2} \times 5.95 \times 5.1 = 15.1725$$

$$4 \times 15.1725 = 60.69 \approx 60.7$$

A student who selects this response may not understand that the surface area of these figures includes all sides of the figures including their bases.

Answer Choice B: "86.7"; This response represents the correct surface area, in square centimeters, of the net of the given square pyramid. The student may have used a method such as the one below.

$$\text{Area of each triangular face: } \frac{1}{2} \times 5.95 \times 5.1 = 15.1725$$

$$\text{Area of square base: } 5.1 \times 5.1 = 26.01$$

$$\text{Total surface area: } 15.1725 + 15.1725 + 15.1725 + 15.1725 + 26.01 = 86.7$$

A student who selects this response understands how to use the nets of a three-dimensional figure, made up of rectangles and triangles, to find the surface area of these figures.

Answer Choice C: "121.4"; This response is incorrect and may occur if a student does not include $\frac{1}{2}$ when calculating the area of each triangular face and does not include the area of the square base in the total surface area.

$$5.95 \times 5.1 = 30.345$$

$$4 \times 30.345 = 121.38 \approx 121.4$$

A student who selects this response may have limited understanding of how to use the nets of a three-dimensional figure, made up of rectangles and triangles, to find the surface area of these three-dimensional figures.

Answer Choice D: "147.4"; This response is incorrect and may occur if a student does not include $\frac{1}{2}$ when calculating the area of each triangular face.

$$5.95 \times 5.1 =$$

$$5.1 \times 5.1 = 26.01$$

$$30.345 + 30.345 + 30.345 + 30.345 + 26.01 = 147.39 \approx 147.4$$

A student who selects this response may have limited understanding of how to calculate the area of triangles that comprise the nets that represent three-dimensional figures.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when representing three-dimensional figures, using nets made up of rectangles and triangles, and using the nets to find the surface area of these figures, applying these techniques in the context of solving mathematical problems.

134060012_4

Which expression is equivalent to $8x - 2y + x + x$?

- A $4x$
- B $8x$
- C $6x - 2y$
- D $10x - 2y$

Key: D

Measured CCLS: 6.EE.3

Commentary: This question measures 6.EE.3 because it assesses the student's ability to apply the properties of operations to generate an equivalent expression.

Extended Rationale

Answer Choice A: " $4x$ "; This response is incorrect and may occur if a student does not understand which term the subtraction sign applies to and does not recognize that the expression is comprised of two different variables, interpreting " $2y$ " as " $2x$ ".

$$8x - (2x + x + x) = 8x - (4x) = 4x$$

A student who selects this response may have limited understanding of how to apply the properties of operations to generate equivalent expressions.

Answer Choice B: " $8x$ "; This response is incorrect and may occur if a student does not recognize that the expression is comprised of two different variables, interpreting " $2y$ " as " $2x$ ".

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

A student who selects this response may have limited understanding of how to apply the properties of operations to generate equivalent expressions.

Answer Choice C: " $6x - 2y$ "; This response is incorrect and may occur if a student does not understand how to appropriately apply the subtraction sign in an expression of this type:

$$8x - (2y + x + x) = 8x - 2y - x - x = 6x - 2y$$

A student who selects this response may have limited understanding of how to apply the properties of operations to generate equivalent expressions.

Answer Choice D: " $10x - 2y$ "; This response represents an expression that is equivalent to the given expression. The student may have used a method such as the one below.

$$8x - 2y + x + x = (8x + x + x) - 2y = 10x - 2y$$

A student who selects this response understands how to apply the properties of operations to generate equivalent expressions.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors and misconceptions made when applying the properties of operations to generate equivalent expressions.

Which situation can be represented by the expression $1.3x$?

- A** the total cost of an item that is x dollars more than \$1.30
- B** the area of a rectangle with side lengths 1.3 and x
- C** the amount of change when \$1.30 is used to pay for an item costing x dollars
- D** the number of square feet in each lot when 1.3 acres is partitioned into x equal sections

Key: B

Measured CCLS: 6.EE.6

Commentary: This question measures 6.EE.6 because it assesses the student's ability to use variables to represent numbers and write expressions in the context of a real-world problem.

Extended Rationale

Answer Choice A: "the total cost of an item that is x dollars more than \$1.30"; This response is incorrect and may occur if a student does not realize that this phrase implies addition and is best represented by the expression $x + 1.30$. A student who selects this response may have limited understanding of how to represent numbers and write expressions in the context of a real-world problem.

Answer Choice B: "the area of a rectangle with side lengths 1.3 and x "; This phrase is best represented by the given expression. The student may have observed that the area of a rectangle is the product of the side lengths, which are 1.3 and x , leading to the expression $1.3x$. A student who selects this response understands how to represent numbers and write expressions in the context of a real-world problem.

Answer Choice C: "the amount of change when \$1.30 is used to pay for an item costing x dollars"; This response is incorrect and may occur if a student does not realize that this phrase implies subtraction is best represented by the expression $1.30 - x$. A student who selects this response may have limited understanding of how to represent numbers and write expressions in the context of a real-world problem.

Answer Choice D: "the number of square feet in each lot when 1.3 acres is partitioned into x equal sections"; This response is incorrect and may occur if a student does not realize that this phrase implies division is best represented by the expression $13/x$. A student who selects this response may have limited understanding of how to represent numbers and write expressions in the context of a real-world problem.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when using variables to represent numbers and write expressions in the context of a real-world problem.

124060002_3

Last year the girls' basketball team had 8 fifth-grade students and 7 sixth-grade students. What was the ratio of sixth-grade students to fifth-grade students on the team?

- A** 8 : 15
- B** 8 : 7
- C** 7 : 8
- D** 15 : 8

Key: C

Measured CCLS: 6.RP.1

Commentary: The question measures 6.RP.1 because it asks the student to understand the concept of a ratio and ratio language used to describe a ratio relationship between two quantities. The student must identify the ratio of sixth-grade students to fifth-grade students, based on a description.

Extended Rationale

Answer Choice A: "8 : 15"; This response is incorrect and may reflect an error in understanding the concept of a ratio. The student may have used 8 to represent the number of fifth-grade students but then incorrectly used 15 to represent the number of sixth-grade students after adding the number of fifth-grade students to the number of sixth-grade students. A student who selects this response may not understand the concept of a ratio and how to use ratio language to describe a ratio relationship between two quantities.

8 (fifth-grade students) : 15 (8 fifth-grade students + 7 sixth-grade students)

Answer Choice B: "8 : 7"; This response is incorrect and may reflect an error in understanding the concept of a ratio. The student may have confused the order in which the numbers should be presented in the ratio. The student who selects this response may not understand the concept of a ratio and how to use ratio language to describe a ratio relationship between two quantities.

Answer Choice C: "7 : 8"; This response represents the correct ratio of sixth-grade students to fifth-grade students on the team. A student who selects this response understands the concept of a ratio and how to use ratio language to describe a ratio relationship between two quantities.

Answer Choice D: "15 : 8"; This response is incorrect and may reflect an error in understanding the concept of a ratio. The student may have used 8 to represent the number of fifth-grade students but then incorrectly used 15 to represent the number of sixth grade students and also reversed the order of the quantities in the ratio. A student who selects this response may not understand the concept of a ratio and how to use ratio language to describe a ratio relationship between two quantities.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors made in understanding the concept of a ratio and how to use ratio language to describe a ratio relationship between two quantities.

Peter wants to plot the point $(2, 3)$ on a coordinate plane. Which statement describes how to plot this point starting from the origin?

- A** Move 2 units to the left and then 3 units down.
- B** Move 3 units to the left and then 2 units down.
- C** Move 2 units to the right and then 3 units up.
- D** Move 3 units to the right and then 2 units up.

Key: C

Measured CCLS: 5.G.1

Commentary: This question measures 5.G.1 because it assesses the student's ability to use axes and coordinates. Standard 5.G.1 is designated as May-to-June in Grade 5. As indicated in the test guide, test questions may assess standards from previous grades.

Extended Rationale

Answer Choice A: "Move 2 units to the left and then 3 units down." This response is incorrect and may occur if a student does not understand the direction in which positive coordinate values are measured from the origin. A student who selects this response may have limited understanding of how to use axes and coordinates.

Answer Choice B: "Move 3 units to the left and then 2 units down." This response is incorrect and may occur if a student does not understand the order in which x - and y -coordinates are presented in an ordered pair and also does not understand the direction in which positive coordinate values are measured from the origin. A student who selects this response may have limited understanding of how to use axes and coordinates.

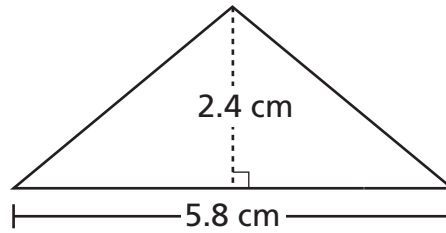
Answer Choice C: "Move 2 units to the right and then 3 units up." This statement describes how to plot the point $(2, 3)$ starting from the origin. The student may have observed that the x -coordinate, 2, would be reached by moving 2 units right, or in the positive direction, and that the y -coordinate, 3, would be reached by moving 3 units up, or in the positive direction. A student who selects this response understands how to use axes and coordinates.

Answer Choice D: "Move 3 units to the right and then 2 units up." This response is incorrect and may occur if a student does not understand the order in which x - and y -coordinates are presented in an ordered pair. A student who selects this response may have limited understanding of how to use axes and coordinates.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors and misconceptions made when using axes and coordinates.

134060409_1

What is the area, in square centimeters, of the figure below?



- A** 6.96
- B** 10.6
- C** 13.92
- D** 17.4

Key: A

Measured CCLS: 6.G.1

Commentary: This question measures 6.G.1 because it assesses the student's ability to find the area of a triangle.

Extended Rationale

Answer Choice A: "6.96"; This answer represents the area, in square centimeters, of the given triangle. The student may have used a method such as the one below.

$$\frac{1}{2} \times 5.8 \times 2.4 = 6.96$$

A student who selects this response understands how to find the area of triangles.

Answer Choice B: "10.6"; This response is incorrect and may occur if a student finds the perimeter, using 2.4 centimeters as the length of the two unmarked sides.

$$5.8 + 2.4 + 2.4 = 10.6$$

A student who selects this response may have limited understanding of the difference between perimeter and area as well as how to calculate the area of a triangle.

Answer Choice C: "13.92"; This response is incorrect and may occur if a student does not multiply by $\frac{1}{2}$ while determining the area of the triangle.

$$5.8 \times 2.4 = 13.92$$

A student who selects this response may have limited understanding of how to find the area of a triangle.

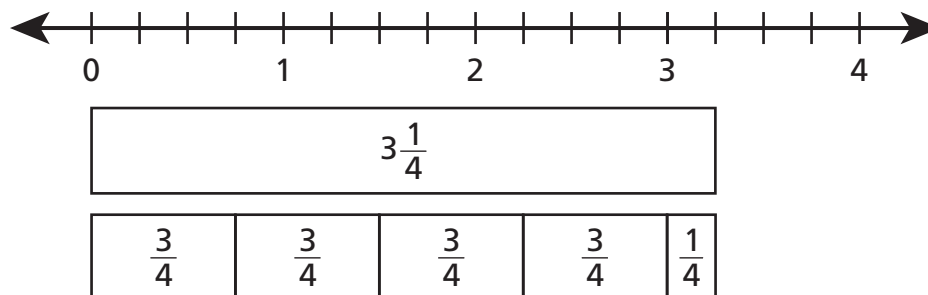
Answer Choice D: "17.4"; This response is incorrect and may occur if a student finds the perimeter, using 5.8 centimeters as the length of each of the three sides.

$$3 \times 5.8 = 17.4$$

A student who selects this response may have limited understanding of the difference between area and perimeter or how to calculate the area of a triangle.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when finding the area of triangles.

Which expression is modeled by the diagram below?



- A** $3\frac{1}{4} \div \frac{3}{4}$
- B** $\frac{3}{4} \div 3\frac{1}{4}$
- C** $3 \div \frac{1}{4}$
- D** $\frac{1}{4} \div 3$

Key: A

Measured CCLS: 6.NS.1

Commentary: This question measures 6.NS.1 because it assesses the student's ability to interpret visual fraction models and represent the division of fractions using numerical expressions.

Extended Rationale

Answer Choice A: " $3\frac{1}{4} \div \frac{3}{4}$ "; This answer represents the expression modeled by the given diagram. The student may have observed that the model shows that $3\frac{3}{4}$ can be divided into four groups of size $\frac{3}{4}$, with $\frac{1}{4}$ left over; this $\frac{1}{4}$ is then interpreted as $\frac{1}{3}$ of $\frac{3}{4}$, leading to the correct quotient of $4\frac{1}{3}$. A student who selects this response understands how to interpret visual fraction models and represent the division of fractions using numerical expressions.

Answer Choice B: " $\frac{3}{4} \div 3\frac{1}{4}$ "; This response is incorrect and may occur if a student reverses the dividend and the divisor. A student who selects this response may have limited understanding of how to interpret visual fraction models and represent the division of fractions using numerical expressions.

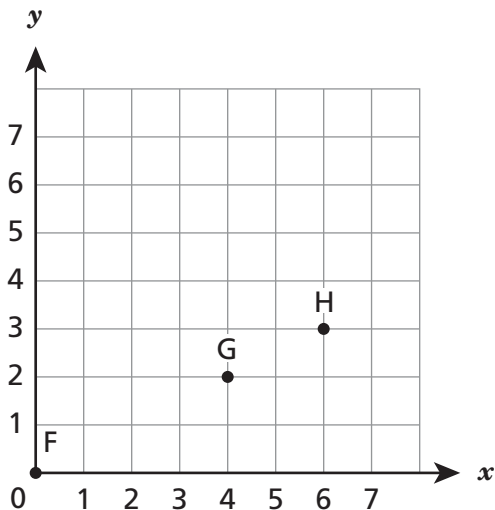
Answer Choice C: " $3 \div \frac{1}{4}$ "; This response is incorrect and may occur if a student does not recognize the fraction that represents the divisor. A student who selects this response may have limited understanding of how to interpret visual fraction models and represent the division of fractions using numerical expressions.

Answer Choice D: " $\frac{1}{4} \div 3$ "; This response is incorrect and may occur if a student does not recognize the fraction that represents the divisor and also does not understand that $3\frac{1}{4}$ is the dividend. A student who

selects this response may have limited understanding of how to interpret visual fraction models and represent the division of fractions using numerical expressions.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when interpreting visual fraction models and representing the division of fractions using numerical expressions.

Points F, G, and H are represented on the grid shown below.



Which statement is true for each of the points?

- A** The x-coordinate is $\frac{1}{2}$ the y-coordinate.
- B** The x-coordinate is 2 times the y-coordinate.
- C** The x-coordinate is 2 more than the y-coordinate.
- D** The x-coordinate is 3 more than the y-coordinate.

Key: B

Measured CCLS: 5.OA.3

Commentary: This question measures 5.OA.3 because it assesses the student's ability to identify apparent relationships between corresponding terms in a pattern and how to graph ordered pairs consisting of corresponding terms from two patterns. Standard 5.OA.3 is designated as May-to-June in Grade 5. As indicated in the test guide, test questions may assess standards from previous grades.

Extended Rationale

Answer Choice A: "The x-coordinate is $\frac{1}{2}$ the y-coordinate." This response is incorrect and may occur if a student reverses the relationship between the x- and y-coordinates for each pair. A student who selects this response may have limited understanding of how to identify apparent relationships between corresponding terms in a pattern and how to graph ordered pairs consisting of corresponding terms from two patterns.

Answer Choice B: "The x -coordinate is 2 times the y -coordinate." This statement is true for each of the given points. The student may have compared the x - and y -coordinates for each pair.

F(0, 0), G(4, 2), H(6, 3)

$$2(0) = 0$$

$$2(2) = 4$$

$$2(3) = 6$$

A student who selects this response understands how to identify apparent relationships between corresponding terms in a pattern and how to graph ordered pairs consisting of corresponding terms from two patterns.

Answer Choice C: "The x -coordinate is 2 more than the y -coordinate." This response is incorrect and may occur if a student examines only the coordinates for point G at (4, 2). A student who selects this response may have limited understanding of how to identify apparent relationships between corresponding terms in a pattern and how to graph ordered pairs consisting of corresponding terms from two patterns.

Answer Choice D: "The x -coordinate is 3 more than the y -coordinate." This response is incorrect and may occur if a student examines only the coordinates for point H at (6, 3). A student who selects this response may have limited understanding of how to identify apparent relationships between corresponding terms in a pattern and how to graph ordered pairs consisting of corresponding terms from two patterns.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when identifying apparent relationships between corresponding terms in a pattern and graphing ordered pairs consisting of corresponding terms from two patterns.

The coordinates of the vertices of a rectangle are $(-2, 3)$, $(4, 3)$, $(4, -4)$, and $(-2, -4)$. What are the dimensions of the rectangle?

- A 1 unit by 2 units
- B 1 unit by 6 units
- C 7 units by 2 units
- D 7 units by 6 units

Key: D

Measured CCLS: 6.NS.8

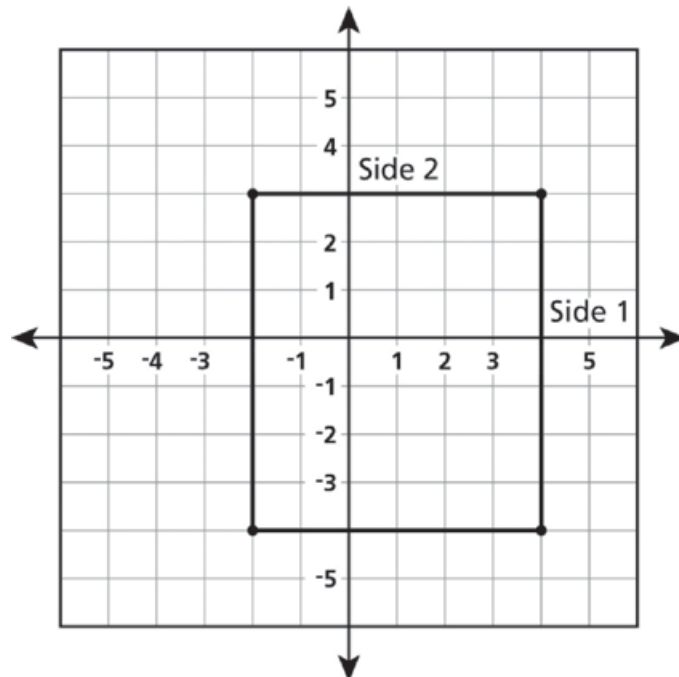
Commentary: This question measures 6.NS.8 because it assesses the student's ability to find the distance between points located in all four quadrants with the same first coordinate or the same second coordinate.

Extended Rationale

Answer Choice A: "1 unit by 2 units"; This response is incorrect and may occur if a student does not correctly interpret the negative signs on the coordinates when determining the length of both sides. One possible error is shown below.

Side 1: $(4, -4)$ and $(4, 3)$, $|4 - 3| = 1$

Side 2: $(4, 3)$ and $(-2, 3)$, $|4 - 2| = 2$



A student who selects this response may have limited understanding of how to use coordinates to find distances between points with the same first coordinate or the same second coordinate.

Answer Choice B: "1 unit by 6 units"; This response is incorrect and may occur if a student does not correctly interpret the negative signs on the coordinates when determining the length of one side. One possible error is shown below.

$$\text{Side 1: } (4, -4) \text{ and } (4, 3), |4 - 3| = 1$$

A student who selects this response cannot consistently apply an understanding of how to use coordinates to find distances between points with the same first coordinate or the same second coordinate.

Answer Choice C: "7 units by 2 units"; This response is incorrect and may occur if a student does not consider the negative signs on the coordinates when determining the length of one side. One possible error is shown below.

$$\text{Side 2: } (4, 3) \text{ and } (-2, 3), |4 - 2| = 2$$

A student who selects this response may have limited understanding of how to use coordinates to find distances between points located in different quadrants with the same first coordinate or the same second coordinate.

Answer Choice D: "7 units by 6 units"; This response represents the correct dimensions of the rectangle. The student may have used a method such as the one below.

$$\text{Side 1: } (4, 3) \text{ and } (4, -4), |3 - (-4)| = 7$$

$$\text{Side 2: } (4, 3) \text{ and } (-2, 3), |4 - (-2)| = 6$$

A student who selects this response understands how to find distances between points with the same first coordinate or the same second coordinate.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors and misconceptions made when using coordinates to find distances between points with the same first coordinate or the same second coordinate.

Lars wrote rules for two patterns.

Pattern for x-values	Pattern for y-values
Starting number = 1	Starting number = 1
Rule: Add 2	Rule: Multiply by 2

Lars then wrote ordered pairs (x, y) using the patterns above. Which ordered pair could Lars have written?

- A (2, 3)
- B (3, 2)
- C (3, 6)
- D (5, 5)

Key: B

Measured CCLS: 5.OA.3

Commentary: This question measures 5.OA.3 because it assesses the student's ability to form ordered pairs consisting of corresponding terms from two patterns using two given rules. Standard 5.OA.3 is designated as May-to-June in Grade 5. As indicated in the test guide, test questions may assess standards from previous grades.

Extended Rationale

Answer Choice A: "(2, 3)"; This response is incorrect and may occur if a student reverses the relationship between the x - and y -values. A student who selects this response may have limited understanding of how to form ordered pairs consisting of corresponding terms from two patterns using two given rules.

Answer Choice B: "(3, 2)"; This response represents an ordered pair that could be written using the given patterns. The student may have written out the terms of each pattern, which led to determining a pair that uses both rules.

x -value rule: 1, 3, 5, 7, 9, ...

y -value rule: 1, 2, 4, 8, 16, ...

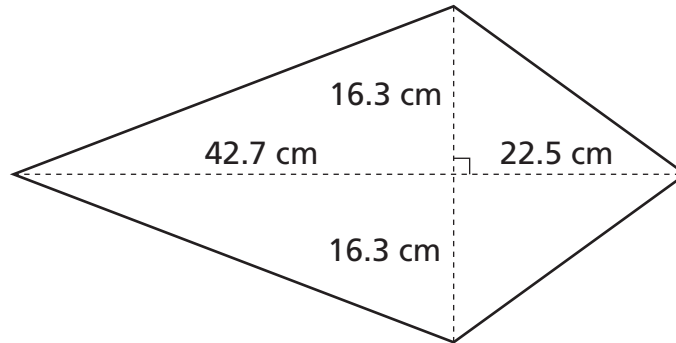
A student who selects this response understands how to generate two numerical patterns using two given rules, how to identify apparent relationships between corresponding terms, and how to form ordered pairs consisting of corresponding terms from the two patterns.

Answer Choice C: "(3, 6)"; This response is incorrect and may occur if a student does not understand the rule for the y -values, thinking that each y -value can be obtained by multiplying the x -value by 2. A student who selects this response may have limited understanding of how to form ordered pairs consisting of corresponding terms from two patterns using two given rules.

Answer Choice D: "(5, 5)"; This response is incorrect and may occur if a student mistakenly interprets the rule for the y -values to be "Add 2." instead of "Multiply by 2." A student who selects this response may have limited understanding of how to form ordered pairs consisting of corresponding terms from two patterns using two given rules.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors and misconceptions made when forming ordered pairs consisting of corresponding terms from two patterns using two given rules.

Noah wants to make the kite shown below out of cloth.



He wants to determine how much cloth he needs. What is the area, rounded to the nearest square centimeter, of Noah's kite?

- A 531
- B 1,063
- C 1,430
- D 2,126

Key: B

Measured CCLS: 6.G.1

Commentary: The question measures 6.G.1 because it asks the student to find the area of a special quadrilateral by decomposing it into triangles. Additionally, this technique is applied in the context of solving a real-world problem of finding the area of Noah's kite.

Extended Rationale

Answer Choice A: "531"; This response is incorrect and may reflect an error in decomposing the polygon into triangles. The student may have found the correct areas of the two different sizes of triangles but neglected to include the area of all four triangles to find the total area of the kite.

$$(0.5 \times 22.5 \times 16.3) + (0.5 \times 42.7 \times 16.3) = 531.38$$

531.38 rounded to the nearest square centimeter is 531.

Answer Choice B: "1,063"; This response represents the correct total area of the kite. A student who selects this response understands how to find the area of a special quadrilateral by decomposing it into triangles and applying this technique in the context of solving a real-world problem.

$$2[(0.5 \times 22.5 \times 16.3) + (0.5 \times 42.7 \times 16.3)] = 1,062.76$$

1,062.76 rounded to the nearest square centimeter is 1,063.

Answer Choice C: "1,430"; This response is incorrect and may reflect an error in determining the area of the triangles. The student may have recognized the decomposition of the kite into triangles but then may not have multiplied by 0.5 when finding the area of the smaller triangle.

$$2(22.5 \times 16.3) + 2(0.5 \times 42.7 \times 16.3) = 1,429.51$$

1,429.51 rounded to the nearest square centimeter is 1,430.

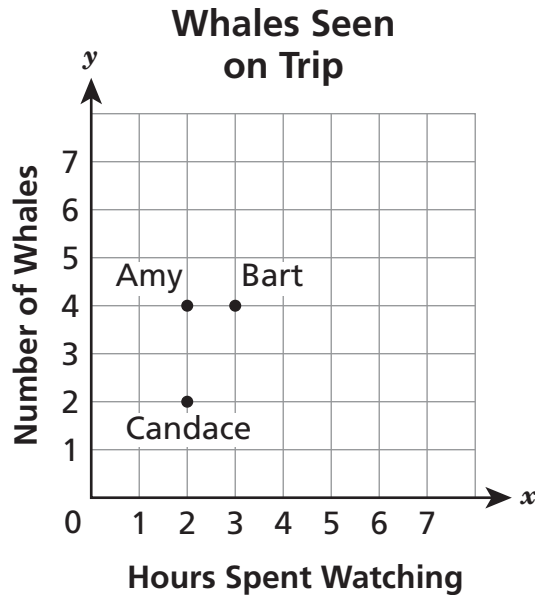
Answer Choice D: "2,126"; This response is incorrect and may reflect an error in determining the area of the triangles. The student may have recognized the decomposition of the kite into triangles but then may not have multiplied by 0.5 when finding the area of each triangle.

$$2[22.5 \times 16.3] + (42.7 \times 16.3) = 2,125.52$$

2,125.52 rounded to the nearest square centimeter is 2,126.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors made when finding the area of a special quadrilateral by decomposing it into triangles and applying this technique in the context of solving a real-world problem.

Amy, Bart, and Candace each went on a whale watching trip. On the coordinate plane below, x represents the number of hours they spent whale watching and y represents the number of whales seen.



Which statement is true based on the points plotted on the grid?

- A** Bart saw 3 whales in 4 hours.
- B** Bart saw 1 more whale than Amy.
- C** Amy and Bart saw the same number of whales.
- D** Amy and Candace saw the same number of whales.

Key: C

Measured CCLS: 5.G.2

Commentary: This question measures 5.G.2 because it assesses the student's ability to interpret coordinate values of points in the context of a given situation. Standard 5.G.2 is designated as May-to-June in Grade 5. As indicated in the test guide, test questions may assess standards from previous grades.

Extended Rationale

Answer Choice A: "Bart saw 3 whales in 4 hours." This response is incorrect and may occur if a student does not understand how the labels on the axes relate to the plotted points, and mistakenly interprets the point associated with Bart to indicate that he saw 3 whales in 4 hours instead of the correct interpretation that he saw 4 whales in 3 hours. A student who selects this response may have limited understanding of how to interpret coordinate values of points in the context of the situation.

Answer Choice B: "Bart saw 1 more whale than Amy." This response is incorrect and may occur if a student does not understand how the labels on the axes relate to the plotted points, and mistakenly interprets the points associated with Bart and Amy as indicating that Bart saw one more whale than Amy, instead of the correct interpretation that Bart spent one more hour than Amy watching whales. A student who selects this response may have limited understanding of how to interpret coordinate values of points in the context of the situation.

Answer Choice C: "Amy and Bart saw the same number of whales." This statement is true based on the given points plotted on the grid. The student may have observed that the y-coordinate is the same for the points labeled as "Amy" and "Bart," and that the y-axis measures the number of whales seen on the trip. A student who selects this response understands how to interpret coordinate values of points in the context of the situation.

Answer Choice D: "Amy and Candace saw the same number of whales." This response is incorrect and may occur if a student does not understand how the labels on the axes relate to the plotted points, and mistakenly interprets the points associated with Amy and Candace as indicating that they saw the same number of whales, instead of the correct interpretation that they spent the same number of hours watching whales. A student who selects this response may have limited understanding of how to interpret coordinate values of points in the context of the situation.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors and misconceptions made when interpreting coordinate values of points in the context of the situation.

134060089_4

The base of a right rectangular prism has an area of 173.6 square centimeters and a height of 9 centimeters. What is the volume, in cubic centimeters, of the right rectangular prism?

- A 182.6
- B 781.2
- C 14,061.6
- D 1,562.4

Key: D

Measured CCLS: 6.G.2

Commentary: This question measures 6.G.2 because it assesses the student's ability to apply the formula $V = b h$ to find the volume of a right rectangular prisms with fractional edge lengths in the context of solving a mathematical problem.

Extended Rationale

Answer Choice A: "182.6"; This response is incorrect and may occur if a student adds the given values.

$$173.6 + 9 = 182.6$$

A student who selects this response may have limited understanding of the concept of volume and how to apply the formula $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving mathematical problems.

Answer Choice B: "781.2"; This response is incorrect and may occur if a student multiplies by $\frac{1}{2}$, perhaps misapplying the triangle area formula of $A = \frac{1}{2} b h$.

$$\frac{1}{2} \times 173.6 \times 9 = 781.2$$

A student who selects this response may have limited understanding of how to apply the formula $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving mathematical problems.

Answer Choice C: "14,061.6"; This response is incorrect and may occur if a student multiplies by 9 two times, perhaps misapplying the volume formula $V = l w h$.

$$173.6 \times 9 \times 9 = 14,061.6$$

A student who selects this response may have limited understanding of how to apply the formula $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving mathematical problems.

Answer Choice D: "1,562.4"; This answer represents the correct volume, in cubic centimeters, of the given right rectangular prism. The student may have used a method such as the one below.

$$V = bh$$

$$V = 173.6 \times 9$$

$$V = 1,562.4$$

A student who selects this response understands how to apply the formula $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving mathematical problems.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors and misconceptions made when applying the formula $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving mathematical problems.

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.

Answer _____ p.m.

Measured CCLS: 6.NS.4

Commentary: This question measures 6.NS.4 because it assesses a student's ability to find the least common multiple of two whole numbers less than or equal to 12. Given that red line buses were scheduled to leave the stadium every six minutes and blue line buses were scheduled to leave the stadium every eight minutes, determining the next time that a red line bus and blue line bus leave the stadium together requires finding the least common multiple of 6 and 8.

Extended Rationale: This question asks students to determine the next time at which two bus lines will depart together, given a previous time at which the buses departed together and the intervals at which both buses depart. 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 an understanding of finding the least common multiple of two whole numbers less than or equal to 12. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct time at which two bus lines will next depart together may be arrived at by listing multiples of 6 and 8 and finding the smallest number that is on both lists:

Multiples of 6: 6, 12, 18, 24, 30, ...

Multiples of 8: 8, 16, 24, ...

$$6 \times 4 = 24$$

Least Common Multiple (LCM) of 6 and 8: $8 \times 3 = 24$

The answer to the problem can then be found by finding the time 24 minutes after 4:00 pm:

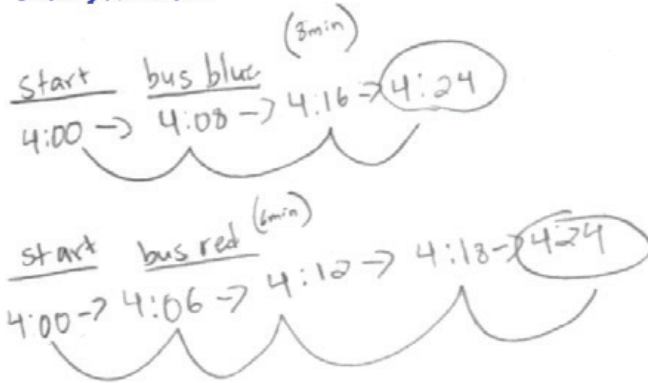
$$4:00 \text{ p.m.} + 24 \text{ min} = 4:24 \text{ p.m.}$$

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.



Answer 4:24 p.m.

Score Point 2 (out of 2 points)

This response includes the correct solution (4:24) and demonstrates a thorough understanding of the mathematical concepts in the task. The response shows successive 8 minute intervals for the blue line and successive 6 minute intervals for the red line with the next common time at 4:24.

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.



6: (2), (3)
8: (2), (4)
 $2 \times 3 \times 4 = 24$

4:00
+ 0:24

4:24

Answer 4:24 p.m.

Score Point 2 (out of 2 points)

This response includes the correct solution (4:24) and demonstrates a thorough understanding of the mathematical concepts in the task. The response shows a comparison of the factors of 6 and 8 and the selection of the unique factors to determine the least common multiple ($2 \times 3 \times 4 = 24$). Twenty-four is then added to the initial time to determine the next common time ($4:00 + 0:24 = 4:24$).

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.

$$\begin{aligned}6 \times 1 &= 6 \\6 \times 2 &= 12 \\6 \times 3 &= 18 \\6 \times 4 &= \textcircled{24} \\6 \times 5 &= 30\end{aligned}$$

$$\begin{aligned}8 \times 1 &= 8 \\8 \times 2 &= 16 \\8 \times 3 &= \textcircled{24} \\8 \times 4 &= 32 \\8 \times 5 &= 40\end{aligned}$$

Answer 4:24 p.m.

Score Point 2 (out of 2 points)

This response includes the correct solution (4:24) and demonstrates a thorough understanding of the mathematical concepts in the task. The response shows the first five multiples of 6 and the first five multiples of 8, circling the least common multiple (24).

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.

They will leave together
In 24 minutes
6: 6, 12, 18, 24
8: 8, 16, 24

Answer _____ p.m.

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response correctly lists the common multiples of 6 and 8, identifies 24 is the least common multiple and provides a valid statement (They will leave together In 24 minutes). However, the next common time after 4:00 is not determined.

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.

<p><u>Red Line</u></p> $\begin{array}{r} 4:00 \\ + \quad 6 \\ \hline 4:06 \\ + \quad 6 \\ \hline 4:12 \\ + \quad 6 \\ \hline 4:18 \\ + \quad 6 \\ \hline 4:24 \\ + \quad 6 \\ \hline 4:30 \\ + \quad 6 \\ \hline 4:36 \\ + \quad 6 \\ \hline 4:42 \\ + \quad 6 \\ \hline \boxed{4:48} \end{array}$	<p><u>Blue Line</u></p> $\begin{array}{r} 4:00 \\ + \quad 8 \\ \hline 4:08 \\ + \quad 8 \\ \hline 4:16 \\ + \quad 8 \\ \hline 4:24 \\ + \quad 8 \\ \hline 4:32 \\ + \quad 8 \\ \hline 4:40 \\ + \quad 8 \\ \hline \boxed{4:48} \end{array}$
--	---

Answer 4:48 p.m.

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response applies a mathematically appropriate process, but contains an incorrect solution. Beginning with 4:00, 6 is repeatedly added to determine the red line times and 8 is repeatedly added to determine the blue line times. The process shows 4:24 is a common time; however, 4:48 is incorrectly identified as the next common time after 4:00.

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.

Red line - 4:06 → 4:12 → 4:20 → 4:26

4:00 p.m.

Blue line - 4:08 → 4:18 → 4:26

Answer 4:26 p.m.

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical procedures in the task. The response shows subsequent times following 4:00 and identifies the next common time listed. However, multiple arithmetic errors result in an incorrect solution (4:26).

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.

$$\begin{array}{r} - 4:00 \\ + \quad 6 \\ \quad 8 \\ \hline 4:14 \\ + 14 \\ \hline 4:28 \end{array}$$

Answer 4:28 p.m.

Score Point 0 (out of 2 points)

This response is incorrect. The response provides an incorrect solution and an inappropriate mathematical process.

Timothy went to a baseball game. After the game, he wanted to ride the bus home. The red line and the blue line buses both stop at the stadium.

- A red line and a blue line bus both left the stadium at 4:00 p.m.
- Red line buses were scheduled to leave the stadium every 6 minutes.
- Blue line buses were scheduled to leave the stadium every 8 minutes.

If the buses run on schedule, when is the next time a red line and a blue line bus will leave together?

Show your work.

4:50

$$\begin{array}{r} 4:50 \\ 8 \overline{) 4:00} \\ \underline{4:00} \\ .00 \end{array}$$

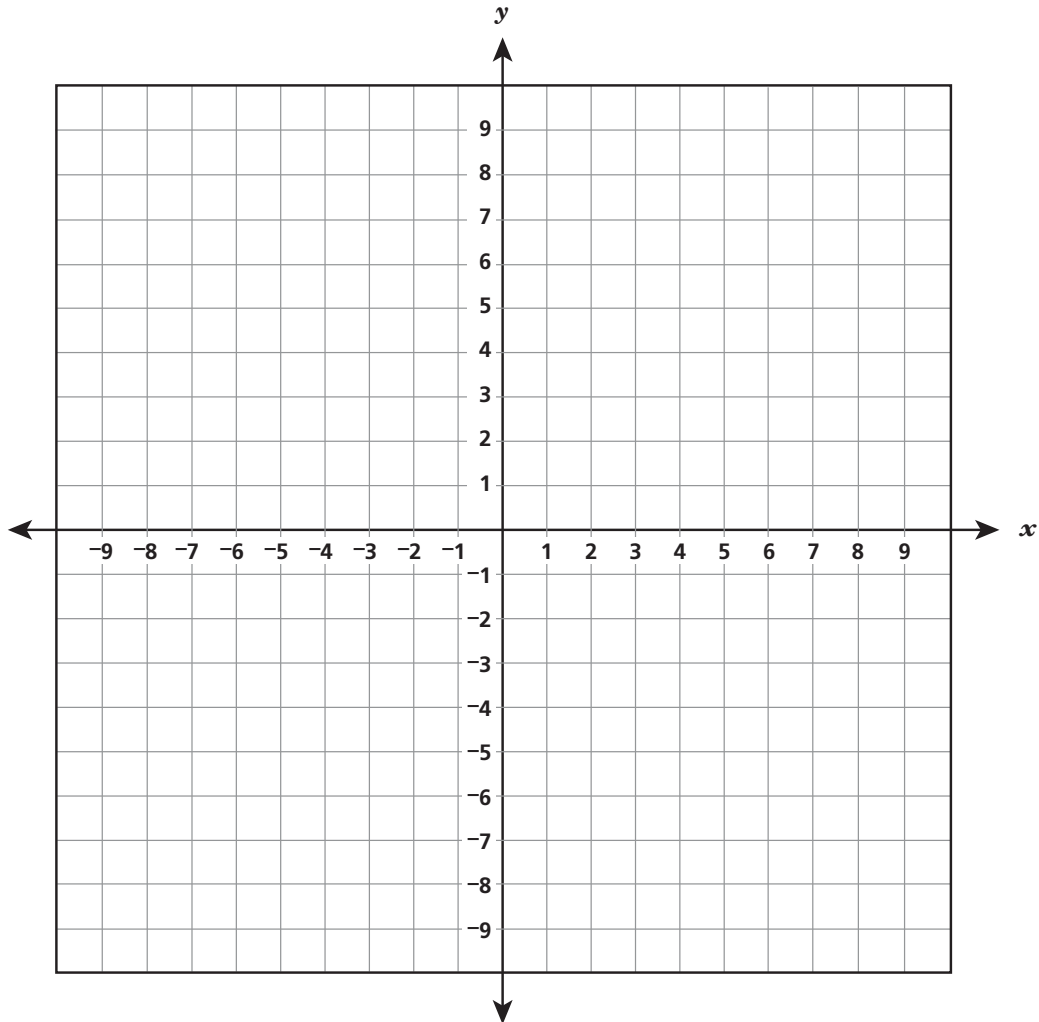
4:50
Answer _____ p.m.

Score Point 0 (out of 2 points)

This response is incorrect. The response provides an incorrect solution and an inappropriate mathematical process.

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

$A(-4, 7)$, $B(6, 7)$, $C(6, -2)$, $D(-8, -2)$, $E(-8, 3)$, $F(-4, 3)$



What is the perimeter of polygon ABCDEF?

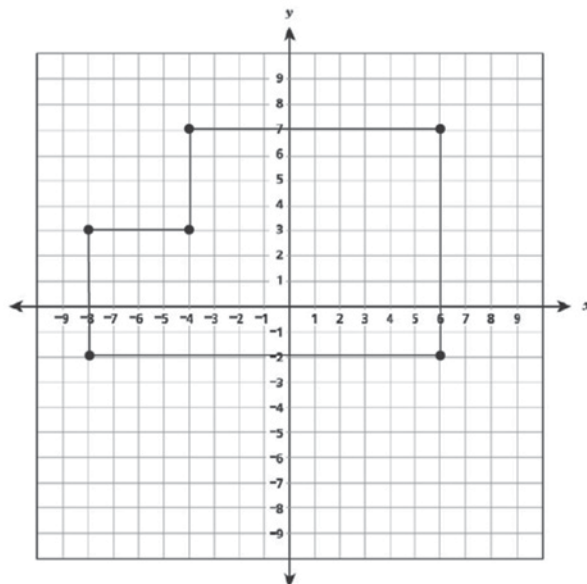
Answer _____ units

Measured CCLS: 6.G.3

Commentary: This question measures 6.G.3 because it assesses a student's ability to draw polygons in the coordinate plane given coordinates for the vertices, use those coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate, and apply these techniques in the context of solving mathematical problems.

Extended Rationale: This question asks students to graph a polygon given the coordinates of the vertices. Then, students must determine the perimeter of the polygon. Students must correctly graph the polygon and correctly determine the perimeter. As indicated in the rubric, student responses will be rated on whether they demonstrate understanding of these skills, drawing polygons in the coordinate plane given coordinates for the vertices, using those coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate, and applying these techniques in the context of solving mathematical problems. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

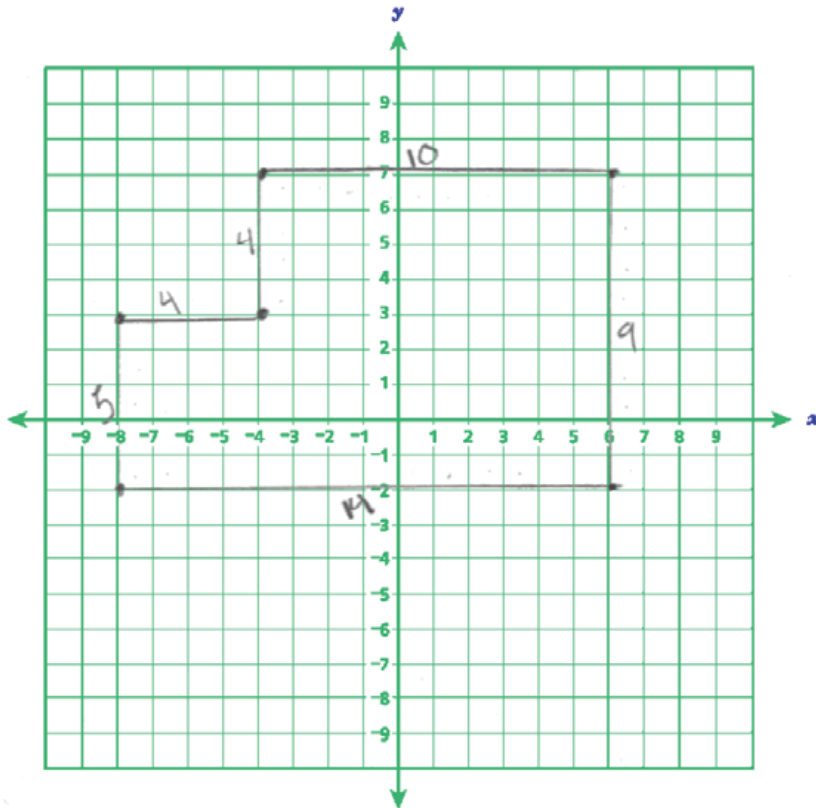
The correct drawing of the polygon is shown below:



Students must then determine the correct perimeter of the polygon, possibly by using coordinates or by counting units. The perimeter is 46 units.

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

A(-4, 7), B(6, 7), C(6, -2), D(-8, -2), E(-8, 3), F(-4, 3)



What is the perimeter of polygon ABCDEF?

$$P = 505$$
$$P = 4 + 4 + 5 + 9 + 10 + 4$$
$$P = 46$$

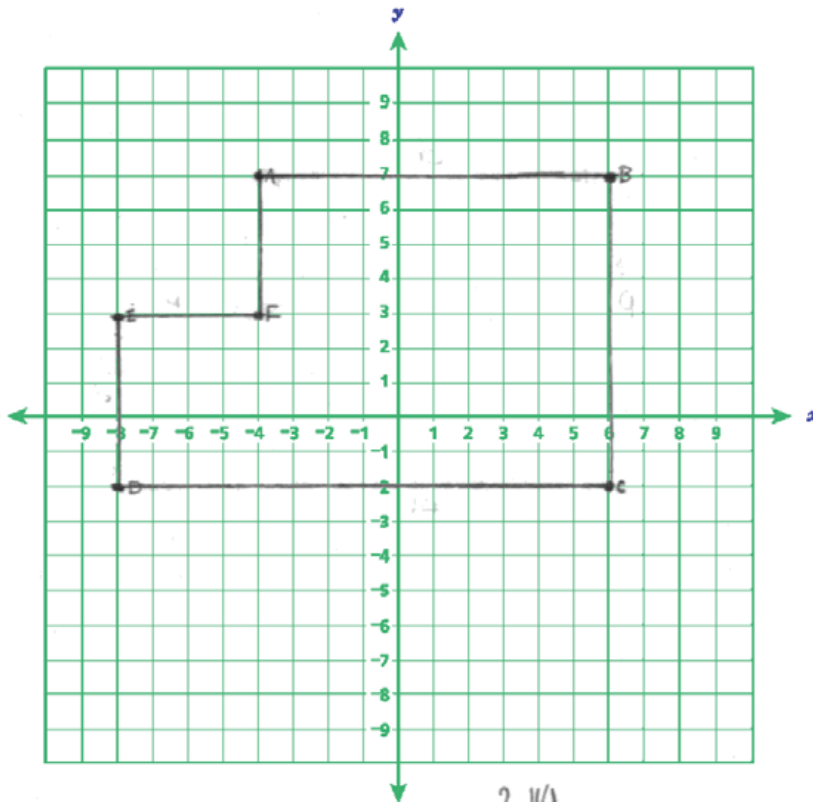
Answer $P = 46$ units

Score Point 2 (out of 2 points)

This response includes the correct solutions and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly graphs the polygon and provides the correct perimeter (46). Per [scoring policy #11](#), any work shown is not scored.

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

A(-4, 7), B(6, 7), C(6, -2), D(-8, -2), E(-8, 3), F(-4, 3)



What is the perimeter of polygon ABCDEF?

$$\begin{array}{r}
 214 \\
 10 \\
 9 \\
 14 \\
 1 \\
 4 \\
 \hline
 46
 \end{array}$$

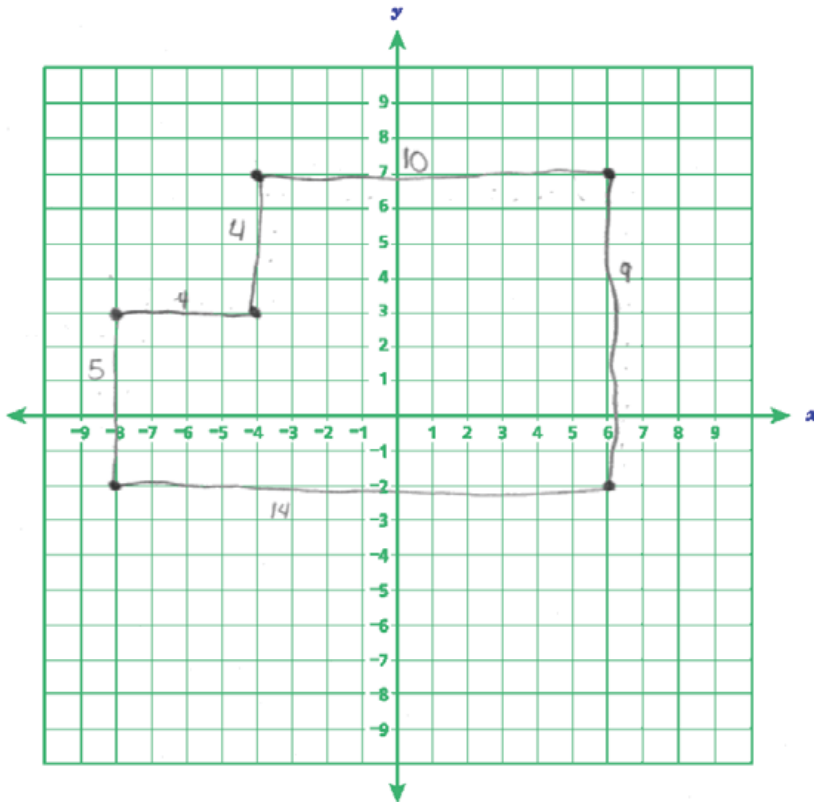
Answer 46 units

Score Point 2 (out of 2 points)

This response includes the correct solutions and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly graphs the polygon and provides the correct perimeter (46). Per [scoring policy #11](#), any work shown is not scored.

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

A(-4, 7), B(6, 7), C(6, -2), D(-8, -2), E(-8, 3), F(-4, 3)



What is the perimeter of polygon ABCDEF?

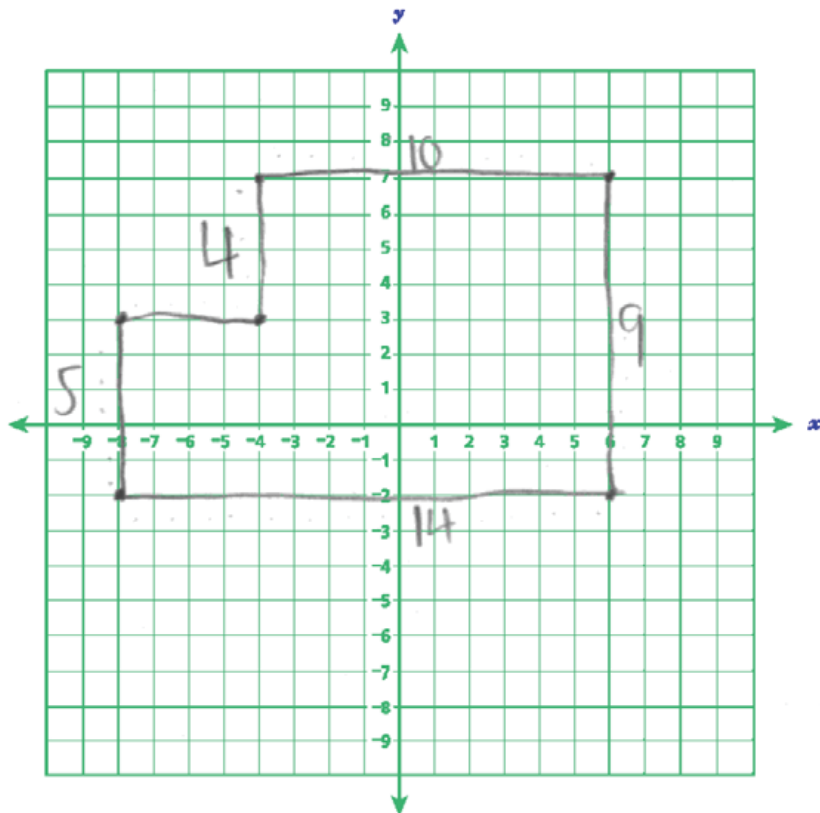
Answer 46 units

Score Point 2 (out of 2 points)

This response includes the correct solutions and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly graphs the polygon and provides the correct perimeter (46). Per [scoring policy #11](#), any work shown is not scored.

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

A(-4, 7), B(6, 7), C(6, -2), D(-8, -2), E(-8, 3), F(-4, 3)



What is the perimeter of polygon ABCDEF?

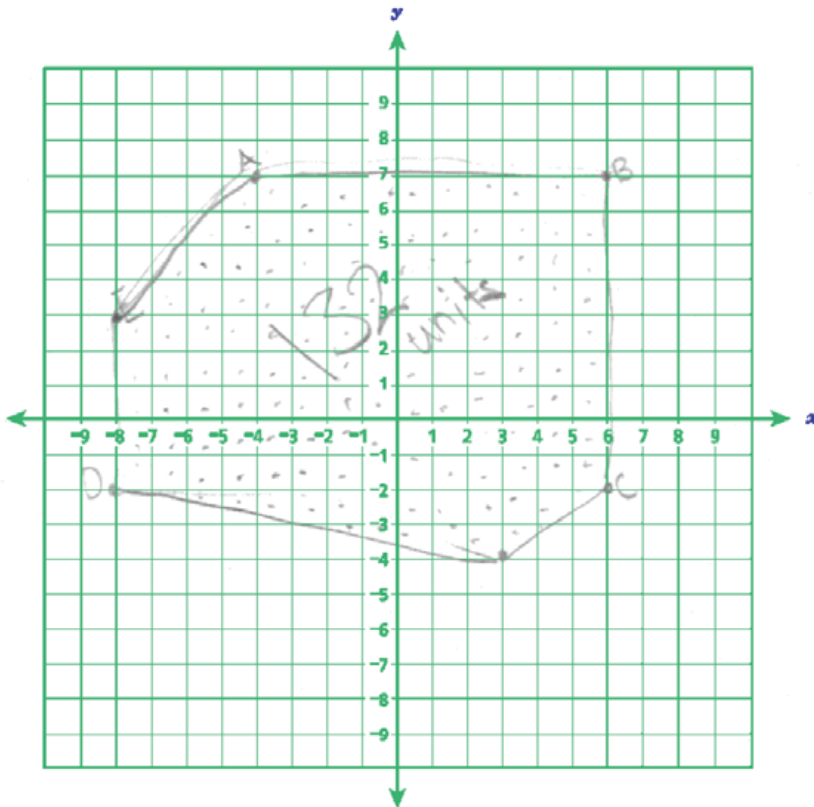
Answer 42 units

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response correctly graphs the polygon but provides an incorrect perimeter (42). Per [scoring policy #11](#), any work shown is not scored.

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

A(-4, 7), B(6, 7), C(6, -2), D(-8, -2), E(-8, 3), F(-4, 3)



What is the perimeter of polygon ABCDEF?

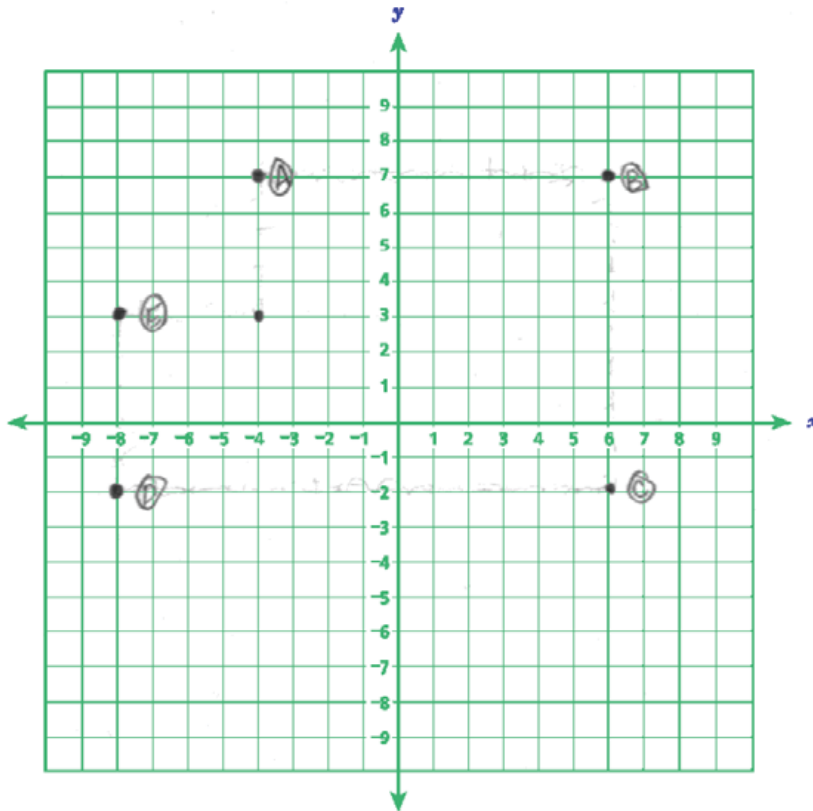
Answer 132 units

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response incorrectly graphs the polygon and provides an incorrect perimeter (132); however, the graph provided does include 5 of the 6 correct points and does form a polygon which is sufficient to demonstrate partial understanding.

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

A(-4, 7), B(6, 7), C(6, -2), D(-8, -2), E(-8, 3), F(-4, 3)



What is the perimeter of polygon ABCDEF?

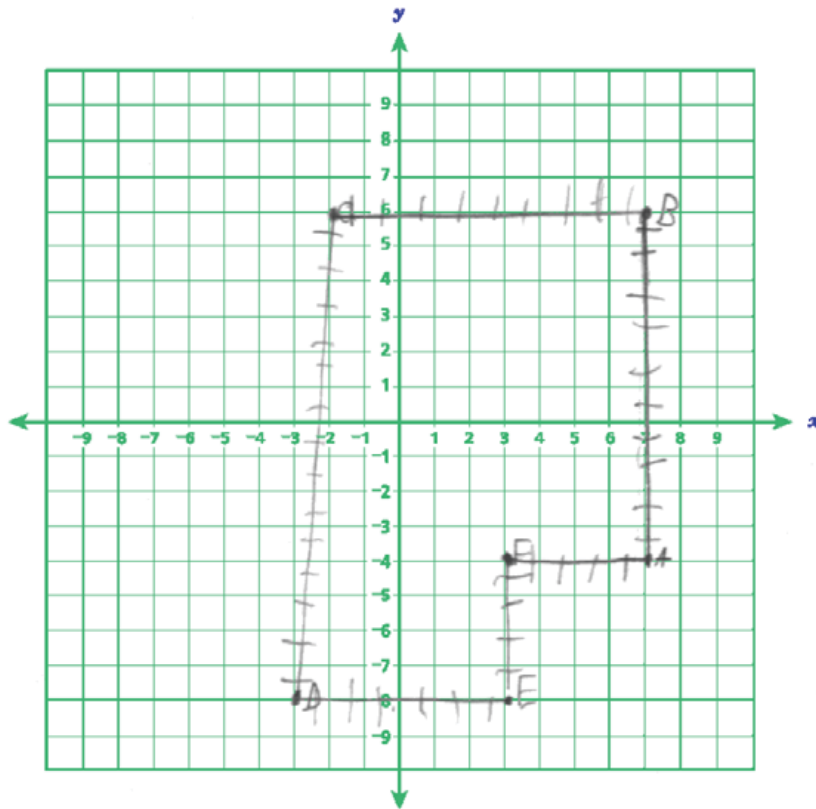
Answer 46 units

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response incorrectly graphs the polygon (the points are correctly placed but not connected) and provides a correct perimeter (46).

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

A(-4, 7), B(6, 7), C(6, -2), D(-8, -2), E(-8, 3), F(-4, 3)



What is the perimeter of polygon ABCDEF?

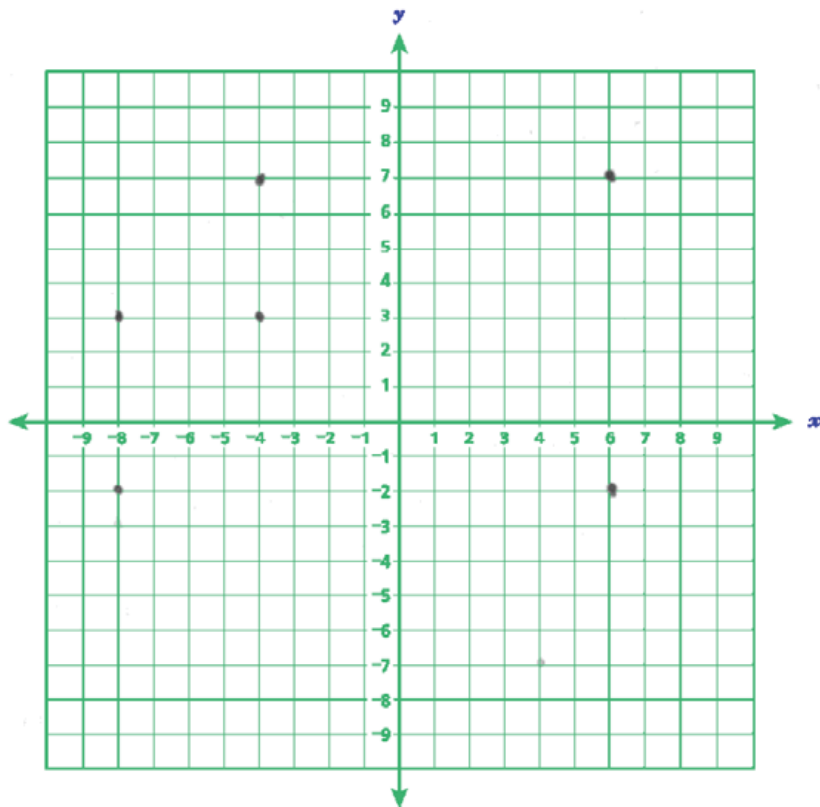
Answer 48 units

Score Point 0 (out of 2 points)

This response is incorrect. The response incorrectly graphs the polygon and provides an incorrect perimeter (48).

Graph the polygon ABCDEF, which has vertices at the following coordinates, on the coordinate grid below.

A(-4, 7), B(6, 7), C(6, -2), D(-8, -2), E(-8, 3), F(-4, 3)



What is the perimeter of polygon ABCDEF?

Answer (-8, -2) units

Score Point 0 (out of 2 points)

This response is incorrect. The response incorrectly graphs the polygon (the points are correctly placed but not connected) and provides an incorrect perimeter (-8, -2).

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

Answer _____ laps per hour

Measured CCLS: 6.RP.2

Commentary: This question measures 6.RP.2 because it assesses a student's ability to understand the concept of a unit rate a/b associated in the context of a ratio relationship. In this case, the student must determine the unit rate, in laps per hour, given a description of the relationship between the laps that Sebastian swam and the time he spent swimming.

Extended Rationale: This question asks students to determine the average rate, in laps per hour, at which a person swam laps in a pool. 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 (although an absence of the step determining the number of days, $5 \times 12 = 60$, does not detract from demonstrating thorough understanding). As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of knowing the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and using rate language in the context of a ratio relationship. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct average rate, in laps per hour, at which the person swam laps in the pool may be determined by first determining the total time, in hours, Sebastian spent swimming:

$$\text{Total time: } \frac{3 \text{ hr}}{4 \text{ day}} \times \frac{5 \text{ days}}{\text{week}} \times 12 \text{ weeks} = 45 \text{ hr}$$

The average rate, in laps per hour, can then be calculated by dividing the number of laps, 1,800, by 45, the number of hours:

$$\text{Average rate: } 1,800 \text{ laps} \div 45 \text{ hr} = 40 \text{ laps/hr}$$

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

$$\begin{array}{r}
 12 \\
 \times 5 \\
 \hline
 60 \text{ days} \\
 \times 45 \\
 \hline
 300 \\
 2400 \\
 \hline
 2700 \text{ min.}
 \end{array}$$

$$\begin{array}{r}
 45 \\
 60 \overline{) 2700} \\
 \underline{- 240} \downarrow \\
 300 \\
 \underline{- 300} \\
 0
 \end{array}$$

$$\begin{array}{r}
 40 \\
 45 \overline{) 1800} \\
 \underline{- 480} \downarrow \\
 00
 \end{array}$$

45 hours

Answer 40 laps per hour

Score Point 2 (out of 2 points)

This response includes the correct solution (40) and demonstrates a thorough understanding of the mathematical concepts in the task. The response uses mathematically sound procedures to correctly determine the total days ($5 \times 12 = 60$), the total minutes ($45 \times 60 = 2,700$), the total hours

($60 \overline{) 2,700}$), and the laps per hour ($45 \overline{) 1,800}$). All calculations are accurate.

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

$$\begin{array}{r} 3 \\ 45 \\ \times 60 \\ \hline 00 \\ 2700 \\ \hline 2700 \end{array}$$

$$\begin{array}{r} .75 \\ \times 60 \\ \hline 4500 \\ 4500 \\ \hline 4500 \end{array}$$

~~$$\begin{array}{r} 1800 \\ \div 45 \\ \hline 40 \\ 1800 \\ \hline 0000 \end{array}$$~~

$$\begin{array}{r} 40 \\ 45 \overline{)1800} \\ \underline{180} \\ 00 \\ \underline{0} \\ 0 \end{array}$$

Answer 40 laps per hour

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 uses mathematically sound procedures to correctly determine the number of hours ($60 \times .75 = 45.00$) and the laps per hour ($45 \overline{)1800}$). Not showing the calculation for the total days, $5 \times 12 = 60$, does not detract from the demonstration of a thorough understanding. All calculations are accurate.

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

$$\begin{array}{r}
 45 \\
 \times 5 \\
 \hline
 225
 \end{array}
 \qquad
 \begin{array}{r}
 225 \\
 \times 12 \\
 \hline
 2700
 \end{array}
 \qquad
 \begin{array}{r}
 \div 45 \\
 \downarrow \\
 \begin{array}{r}
 45 \text{ min.} = 1 \text{ h.} \\
 1,800 = x \text{ laps} \\
 \div 45 \quad 40
 \end{array}
 \end{array}$$

Answer 40 laps per hour

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 uses mathematically sound procedures to correctly determine the total minutes ($5 \times 45 = 225$, $12 \times 225 = 2700$), the total hours ($60 \overline{)2700}^{\frac{45}{}}$, and the laps per hour ($1,800 \div 45 = 40$). All calculations are accurate.

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

$$\begin{array}{r} 45 \times 5 \\ \hline 225 \\ \downarrow \\ 225 \times 12 \\ \hline 2700 \\ \downarrow \\ 2700 \div 60 = 45 \end{array}$$

Answer 45 laps per hour

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response correctly determines the total hours ($45 \times 5 = 225$, $225 \times 12 = 2700$, $2700 \div 60 = 45$), but does not complete the process, $1,800 \div 45 = 40$, to determine the laps per hour.

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

1.5 average rate in laps per hour.

$$\begin{array}{r} 45 \\ \times 5 \\ \hline 225 \\ \times 12 \\ \hline 2700 \end{array}$$

$$18,00 \overline{) 27,00} \begin{array}{l} 1 \\ 1.5 \end{array}$$

Answer 1.5 laps per hour

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response correctly determines the total minutes ($5 \times 45 = 225 \times 12 = 2700$) and completes an irrelevant operation to determine the minutes per lap ($18,00 \overline{) 27,00}$).

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

$$12 \overline{)1,800} \qquad 5 \overline{)150}$$

Answer 30 laps per hour

Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task.

The response determines the laps per week ($12 \overline{)1,800}$) and the laps per day ($5 \overline{)150}$), but does not complete the process, $(30 \div 45) \times 60 = 40$, to determine the laps per hour.

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

$$60 \text{ min} = 1 \text{ hr}$$

45 minutes

40 laps/min
1,800 laps

$$\begin{array}{r} 40 \\ 45 \overline{) 1800} \\ \underline{1800} \\ 0 \end{array}$$

40
160
2400

Answer 2400 laps per hour

Score Point 0 (out of 2 points)

This response is incorrect. Although the response shows 1,800 divided by 45, this is 1,800 laps divided 45 minutes which is a quotient of 40 laps per minute. The response then shows 40 laps per minute multiplied by 60 minutes which is a product of 2,400 laps.

Sebastian swam laps every day in the community swimming pool. He swam 45 minutes each day, 5 days each week, for 12 weeks. In that time, he swam 1,800 laps. What was his average rate in laps per hour?

Show your work.

$$\begin{array}{r} 45 \\ \times 5 \\ \hline 225 \\ \times 12 \\ \hline 440 \\ 2250 \\ \hline 2690 \end{array}$$

Answer 59.7 laps per hour

Score Point 0 (out of 2 points)

Although $(5 \times 45 = 225 \times 12 = 2690)$ is an appropriate process for determining the total minutes, the multiplication error and the incorrect solution (59.7), which is the result of the calculated 2690 minutes divided by 45 minutes, holistically this response is not sufficient to demonstrate even a limited understanding.

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box? Do not round your answer.

Show your work.

Answer _____ cubic inches

Measured CCLS: 6.G.2

Commentary: This question measures 6.G.2 because it assesses a student's ability to apply the formula $V = lwh$ to find volumes of right rectangular prisms with fractional edge lengths.

Extended Rationale: This question asks students to determine the volume, in cubic inches, of a right rectangular prism with given dimensions. 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 applying the formulas $V = lwh$ to find volumes of right rectangular prisms with fractional edge lengths. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct volume, in cubic inches, of the right rectangular prism may be determined by applying the formula $V = lwh$ using the given values:

$$V = lwh$$

$$V = 8.5 \text{ in} \cdot 4.5 \text{ in} \cdot 3.75 \text{ in}$$

$$V = 143.4375 \text{ in}^3$$

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box? Do not round your answer.

Show your work.

$$\begin{array}{r} 3.75 \\ \times 8.5 \\ \hline 31.875 \end{array}$$

$$\begin{array}{r} 31.875 \\ \times 4.5 \\ \hline 143.4375 \end{array}$$

$$\begin{aligned} V &= lhw \\ V &= 8.5 \times 3.75 \times 4.5 \\ V &= \overbrace{31.875} \times 4.5 \\ V &= \overbrace{143.4375} \end{aligned}$$

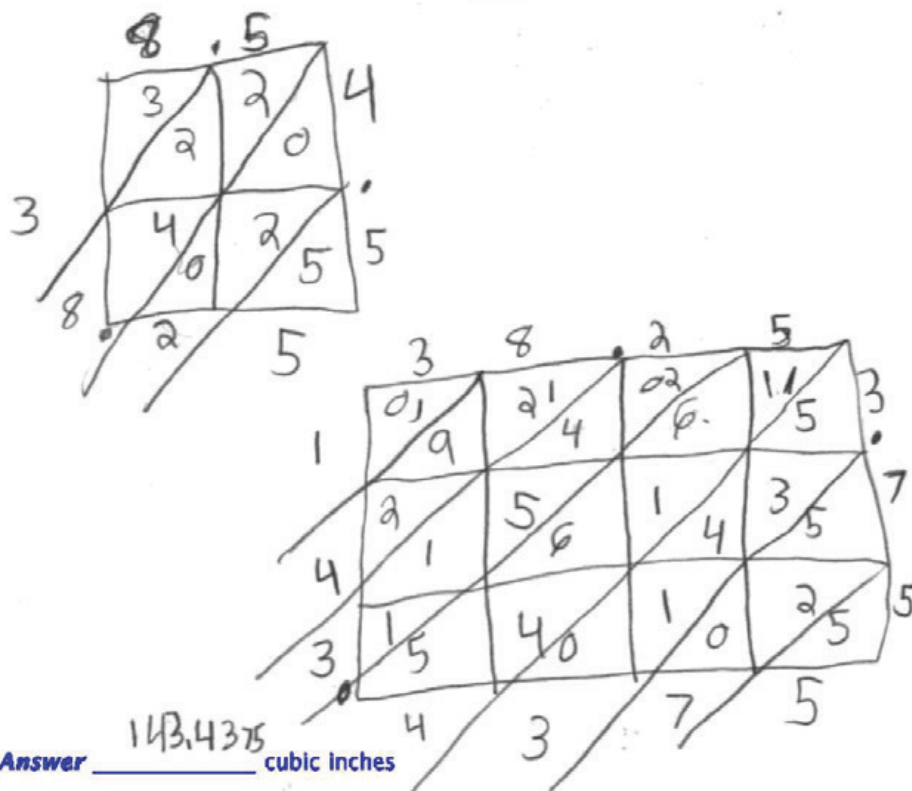
Answer 143.4375 cubic inches

Score Point 2 (out of 2 points)

This response includes the correct solution (143.4375) and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly applies the formula $v = lwh$ ($v = 8.5 \times 3.75 \times 4.5$, $v = 143.4375$).

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box? Do not round your answer.

Show your work.



Score Point 2 (out of 2 points)

This response includes the correct solution (143.4375) and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly applies the formula $v = lwh$ ($4.5 \times 8.5 = 38.25$, $3.75 \times 38.25 = 143.4375$).

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box?
Do not round your answer.

Show your work.

$$\begin{array}{r} 8.5 \\ 4.5 \\ \times 3.75 \\ \hline \end{array}$$

Answer 143.4375 cubic inches

Score Point 2 (out of 2 points)

This response includes the correct solution (143.4375) and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly applies the formula $v = lwh$ ($3.75 \times 4.5 \times 8.5$).

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box? Do not round your answer.

Show your work.

$$\begin{aligned} V &= l \cdot w \cdot h \\ V &= 8.5 \cdot 4.5 \cdot 3.75 \\ V &= 38.25 \cdot 3.75 \\ V &= 143.4375 \end{aligned}$$

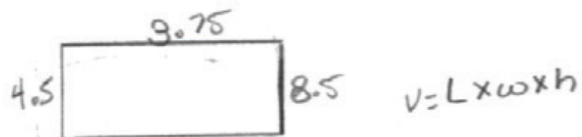
Answer 143.43 cubic inches

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 appropriate mathematical process ($v = 8.5 \cdot 4.5 \cdot 3.75$); however, the solution is incorrect (143.43). Note that only an exact correct solution (143.4375) is acceptable; neither truncation nor rounding is acceptable.

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box? Do not round your answer.

Show your work.



$$V = 4.5 \times 3.75 \times 8.5 =$$

$$\begin{array}{r} 4.5 \\ \times 8.5 \\ \hline 22.5 \\ 38.25 \\ \hline 38.25 \\ \times 3.75 \\ \hline 55.50 \end{array}$$

Answer 55.50 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 appropriate mathematical process ($v = 4.5 \times 3.75 \times 8.5$); however, the solution is incorrect (55.50).

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box? Do not round your answer.

Show your work.

$$V = 2 \times L \times W \times H$$

$$V = 2 \times 8.5 \times 4.5 \times 3.75$$

$$V = 286.875 \text{ in}^3$$

Answer 286.875 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 a partially correct mathematical process ($8.5 \times 4.5 \times 3.75$); however, the volume is incorrectly multiplied by 2.

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box? Do not round your answer.

Show your work.

8.5 in. length
4.5 in width
3.75 in height

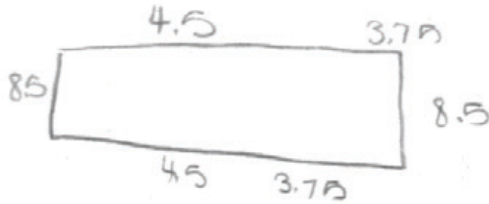
Answer 118.4375 cubic inches

Score Point 0 (out of 2 points)

Although this response includes the correct solution, without any supporting work, this is not sufficient to demonstrate even a limited understanding of the mathematical concepts.

A box in the shape of a right rectangular prism has a length of 8.5 inches, a width of 4.5 inches, and a height of 3.75 inches. What is the volume, in cubic inches, of the box? Do not round your answer.

Show your work.



$$\begin{array}{r} 18.5 \\ \times 2 \\ \hline 170 \end{array}$$
$$\begin{array}{r} 4.5 \\ \times 2 \\ \hline 9.0 \end{array}$$
$$\begin{array}{r} 13.75 \\ \times 2 \\ \hline 7.50 \end{array}$$
$$\begin{array}{r} 17.0 \\ + 9.0 \\ \hline 26.0 \\ + 7.50 \\ \hline 2010 \end{array}$$

Answer 1.010 cubic inches

Score Point 0 (out of 2 points)

This response is incorrect.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

Answer _____ wrote an equivalent expression.

Measured CCLS : 6.EE.4

Commentary: This question measures 6.EE.4 because it assesses a student's ability to identify when two expressions are equivalent.

Extended Rationale: This question asks students to identify which, if any, of three given expressions are equivalent to $4(3x + 5y + 2z) + 3(x - z)$. 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 demonstrate that they accurately identified one of the expressions as equivalent. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The only expression that is equivalent to $4(3x + 5y + 2z) + 3(x - z)$ is Jenna's expression, which may be determined by applying the distributive property to rewrite the expression:

$$\begin{aligned} \text{Jenna's expression: } 4(3x + 5y + 2z) + 3(x - z) &= \\ 12x + 20y + 8z + 3x - 3z &= \\ 15x + 20y + 5z &= 5(3x + 4y + z) \end{aligned}$$

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

$$x=10 \quad y=2 \quad z=5$$

$$4(3 \cdot 10 + 5(2 + 2 \cdot 5)) + 3(10 - 5)$$

$$= 4(50) + 3(5)$$

$$= 200 + 15$$

$$= \underline{215}$$

$$\text{Tom} \\ \cancel{12(10) + 20(2) + 8(5)}$$

$$\cancel{= 120 + 40 + 40}$$

$$\cancel{= 200}$$

$$\text{Jenna} \\ 5(3 \cdot 10 + 4 \cdot 2 + 5)$$

$$= 5(43)$$

$$= \underline{215}$$

Answer Jenna wrote an equivalent expression.

Score Point 3 (out of 3 points)

This response includes the correct solution (Jenna) and demonstrates a thorough understanding of the mathematical concepts in the task. The response uses a substitution strategy correctly to determine that Jenna's expression is equivalent to Ms. Peterson's expression. Note that it is not necessary to prove that the other expressions are not equivalent.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

$$\begin{aligned}x &= 1 \\ y &= 2 \\ z &= 3\end{aligned}$$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

Ms. Peterson

$$4(3 \cdot 1 + 5 \cdot 2 + 2 \cdot 3) + 3(1 - 3) = 70$$

TOM

$$12 \cdot 1 + 20 \cdot 2 + 8 \cdot 3 = 76$$

JENNA

$$5(3 \cdot 1 + 4 \cdot 2 + 1 \cdot 3) = 70$$

CHRIS

$$15 \cdot 1 + 20 \cdot 2 - 5 \cdot 3$$

$$30$$

Answer Jenna wrote an equivalent expression.

Score Point 3 (out of 3 points)

This response includes the correct solution (Jenna) and demonstrates a thorough understanding of the mathematical concepts in the task. The response uses a substitution strategy correctly to determine that Jenna's expression is equivalent to Ms. Peterson's expression. Note that it is not necessary to prove that the other expressions are not equivalent.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

$$4(3x + 5y + 2z) + 3(x - z)$$

$$\boxed{12x} + 20y + \boxed{8z} + \boxed{3x} - \boxed{3z}$$

$$15x + 20y + 5z$$

Jenna's $5(3x + 4y + z)$

$$15x + 20y + 5z = 4(3x + 5y + 2z) + 3(x - z)$$

$$\boxed{12x} + 20y + \boxed{8z} + \boxed{3x} - \boxed{3z}$$

Answer Jenna wrote an equivalent expression.

Score Point 3 (out of 3 points)

This response includes the correct solution (Jenna) and demonstrates a thorough understanding of the mathematical concepts in the task. The response uses a strategy of correctly simplifying the expressions to determine that Jenna's expression is equivalent to Ms. Peterson's expression. Note that it is not necessary to prove that the other expressions are not equivalent.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

Substituted values: $x=3, y=2, z=1$

Original expression: $4(3x+5y+2z) + 3(x-z)$

Tom's work: $12x + 20y + 8z$
 $12 \times 3 + 20 \times 2 + 8 \times 1$
 $36 + 40 + 8$
 84

Jenna's work: $5(3x+4y+z)$
 $5(3 \times 3 + 4 \times 2 + 1)$
 5×28
 140

Chris's work: $15x + 20y - 5z$
 $15 \times 3 + 20 \times 2 - 5 \times 1$
 $45 + 40 - 5$
 80

Handwritten work for original expression:
 $4(3 \times 3 + 5 \times 2 + 2 \times 1) + 3(3 - 1)$
 $4 \times 21 + 3 \times 2$
 $84 + 6$
 90

Answer Nobody wrote an equivalent expression.

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response demonstrates an appropriate strategy (substitution); however, the resolution of Jenna's expression contains a calculation error which results in an incorrect solution (Nobody).

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$4(3x + 5y + 2z) + 3(x - z)$ *arithmetic equivalent using 1 set of parentheses.*

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

Handwritten student work:

$4(3x + 5y + 2z) + 3(x - z)$

Tom's work:
 $12x + 20y + 8z$
 $12 \cdot 6 + 20 \cdot 4 + 8 \cdot 2$
 $72 + 20 \cdot 4 + 8 \cdot 2$
 $72 + 80 + 16$
 168

Jenna's work:
 $5(3x + 4y + z)$
 $5 \cdot (3 \cdot 6 + 4 \cdot 4 + 2)$
 $5 \cdot (18 + 16 + 2)$
 $5 \cdot (36)$
 180

Chris's work:
 $15x + 20y - 5z$
 $15 \cdot 6 + 20 \cdot 4 - 5 \cdot 2$
 $90 + 80 - 10$
 160

Substitution work:
 $x = 6$
 $y = 4$
 $z = 2$

$4 \cdot (3 \cdot 6 + 5 \cdot 4 + 2 \cdot 2) + 3 \cdot (6 - 2)$
 $4 \cdot (18 + 20 + 4) + 3 \cdot (4)$
 $4 \cdot (42) + 3 \cdot (4)$
 $168 + 12 = 180$

Final answer: Jenna wrote an equivalent expression.

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response demonstrates an appropriate strategy (substitution); however, the calculations for both Tom and Chris' expression contain calculation errors. Note that, while it is not necessary to show that Tom and Chris' expressions are not equivalent once it has been shown that Jenna's expression is, if the response does attempt to compare Tom and Chris, the work must be correct to earn a score of 3.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent. Tom

Handwritten work for Tom, Jenna, and Chris:

Tom: $4(3 \cdot 4 + 5 \cdot 2 + 2 \cdot 3) + 3(4 - 3) = 12 \cdot 4 + 20 \cdot 2 + 8 \cdot 3 + 3 \cdot 1 = 48 + 40 + 24 + 3 = 115$ (marked with an X)

Jenna: $5(3 \cdot 4 + 4 \cdot 2 + 3) = 5(12 + 8 + 3) = 5 \cdot 23 = 115$ (marked with an X)

Chris: $15 \cdot 4 + 20 \cdot 2 - 5 \cdot 3 = 60 + 40 - 15 = 85$ (marked with an X)

Answer No One wrote an equivalent expression.

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response uses a substitution strategy to successfully evaluate the three student's expressions; however, Ms. Peterson's expression is incompletely resolved leading to an incorrect solution (No One).

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$ ✗
- Chris wrote $15x + 20y - 5z$ ✗

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

$$4(3x + 5y + 2z) + 3(x - z)$$

$$12x + 20y + 8z + 3x - 3z$$

$$4(3x + 5y + 2z) + 3(x - z)$$

$$12x + 20y + 8z + 3x - 3z$$

$$48 + 60 + 16 + 12 - 6$$

$$48 + 60 + 16 + 6 = 130$$

$$12x + 20y + 8z$$

$$48 + 60 + 16 = 124$$

$$x = 4$$

$$y = 3$$

$$z = 2$$

$$\begin{array}{r} 12 \\ \times 4 \\ \hline 48 \end{array}$$

?

Answer no one wrote an equivalent expression.

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response demonstrates an appropriate strategy (substitution); however, there is no attempt to compare Chris or Jenna's expressions and the work shown only demonstrates that Tom's expression is not equivalent.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

$4(3x + 5y + 2z) + 3(x - z)$
 $12x + 20y + 8z + 3x - 3z$
 $15x + 20y + 5z$

Chris

Answer _____ wrote an equivalent expression.

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response demonstrates an appropriate strategy (applying the distributive property and combining like terms to simplify); however, the only expression that is simplified is Ms. Peterson's and the answer provided (Chris) is not supported by the work.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z) \quad 43 \quad 13$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

$$x=2 \quad y=3 \quad z=4$$

$$132$$

$$4(3x+5y+2z)+3(x-z)=132$$

Tom

$$\sum 12x + 20y + 8z = 116$$

$$\text{Jenna} - 5(3x+4y+z) = 110$$

$$\text{Chris} - 15x + 20y - 5z$$

Answer Tom wrote an equivalent expression.

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response demonstrates an appropriate strategy (substitution); however, only Jenna and Tom's expressions are evaluated correctly. The work to evaluate Ms. Peterson's expression contains a calculation error, there is no attempt to evaluate Chris' expression, and the answer provided (Tom) is not supported by the work.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

$$\begin{aligned} & 4(3x + 5y + 2z) + 3(x - z) \\ & (12x + 20y + 8z) + 3(x - z) \\ & 12x + 20y + 8z + 3x - 3z \end{aligned}$$

Answer none wrote an equivalent expression.

Score Point 0 (out of 3 points)

This response is incorrect. The response makes some attempt to simplify Ms. Peterson's expression but does so incorrectly and there is no other work shown.

Ms. Peterson wrote the expression below on the chalkboard for her class. She asked the students to write an equivalent expression using no more than one set of parentheses.

$$4(3x + 5y + 2z) + 3(x - z)$$

- Tom wrote $12x + 20y + 8z$
- Jenna wrote $5(3x + 4y + z)$
- Chris wrote $15x + 20y - 5z$

Which, if any, of the three students wrote an expression that is equivalent to Ms. Peterson's expression?

Show your work to prove which expressions, if any, are equivalent.

She said only one set of parentheses and Jenna was the only one.

Answer Jenna wrote an equivalent expression.

Score Point 0 (out of 3 points)

This response is incorrect. The answer provided (Jenna) is correct; however, the work does not support the correct answer.

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

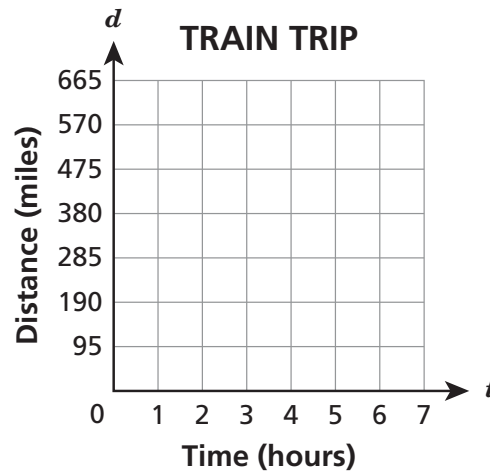
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer _____

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer _____ miles

Measured CCLS: 6.EE.9

Commentary: This question measures 6.EE.9 because it assesses a student's ability to use variables to represent two quantities in a real-world problem that change in relationship to one another, including writing equations to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable, and applying the relationship between the dependent and independent variables expressed in graphs, tables, and equations to solve a real-world problem.

Extended Rationale: This question asks students to write an equation in order to represent the relationship between t , the time, and d , the total distance traveled by a train, based on data given in a table. The student is then required to graph this relationship and determine the total number of miles the train would travel in a given number of hours. Correct responses indicate a thorough understanding of

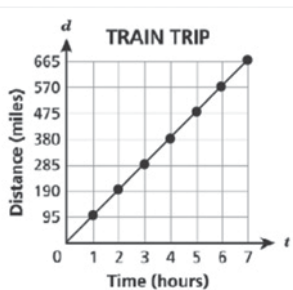
- using variables to represent two quantities in a real-world problem that change in relationship to one another,
- representing the relationship between two quantities using a coordinate plane, and
- applying the relationship between the dependent and independent variables expressed in graphs, tables, and equations to solve a real-world problem.

The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

In the first part, the correct equation could be arrived at by recognizing that the train is traveling at a constant speed of 95 miles per hour, which can be represented by the following equation:

$$d = 95t$$

In the second part, the correct graph of this relationship for a trip that lasted from 0 to 7 hours is shown below:



The correct total distance, in miles, d , that the train would travel in a 5.5 hour trip is 522.5 miles. This could be determined through a precise analysis of the relationship depicted in the graph or by applying the equation determined in the first part:

$$d = 95t$$

$$d = 95(5.5)$$

$$d = 522.5$$

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

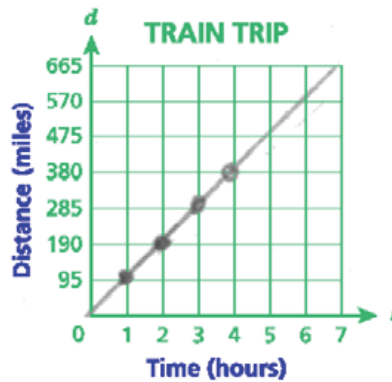
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer $t \cdot 95 = d$

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



$$\begin{array}{r}
 4 \\
 \times 5.5 \text{ cd} \\
 \hline
 220 \\
 2000 \\
 \hline
 22.0
 \end{array}$$

If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 522.5 miles

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. The response provides a correct equation ($t \cdot 95 = d$), a correct graph of the relationship between t and d , and the correct number of miles the train would travel in 5.5 hours (522.5 miles).

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

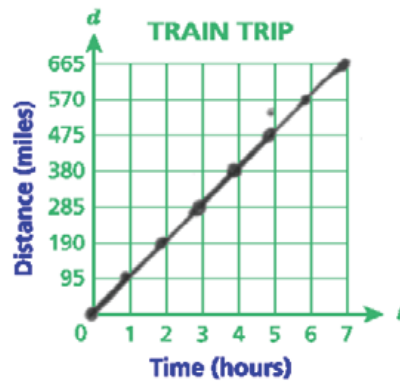
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer $95 \times T = D$

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 522.5 miles

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. The response provides a correct equation ($95 \times T = D$), a correct graph of the relationship between t and d , and the correct number of miles the train would travel in 5.5 hours (522.5 miles).

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

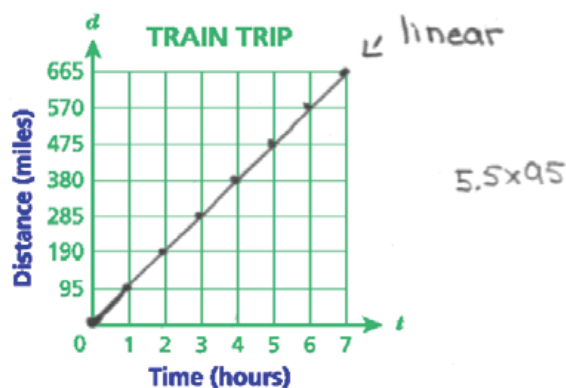
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer $t \cdot 95 = d$

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 522.5 miles

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. The response provides a correct equation ($t \cdot 95 = d$), a correct graph of the relationship between t and d , and the correct number of miles the train would travel in 5.5 hours (522.5 miles).

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

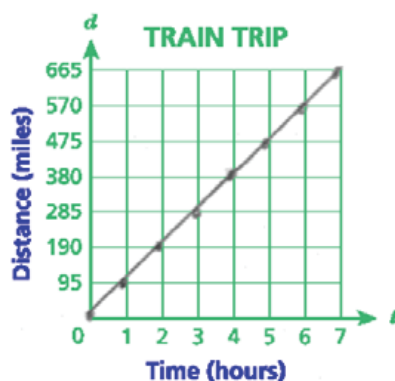
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer $T \times 95 = D$

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 520 miles

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response provides a correct equation ($T \times 95 = D$) and a correct graph of the relationship between t and d . However, the number of miles the train would travel in 5.5 hours is incorrect (520 miles).

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

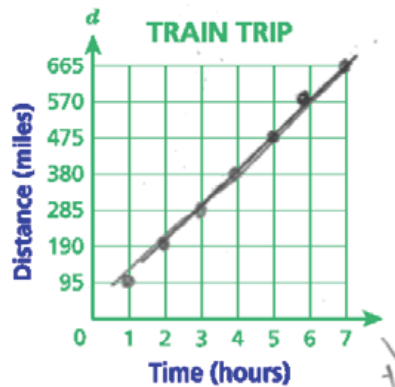
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer $95t = d$

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



Handwritten calculations showing a multiplication problem: $95 \times 5.5 = 522.5$. The work includes $95 \times 5 = 475$ and $95 \times 0.5 = 47.5$, which are then added to get 522.5.

If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 522.5 miles

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response provides a correct equation ($95t = d$) and the correct number of miles the train would travel in 5.5 hours (522.5 miles). However, the graph of the relationship between t and d is incomplete as it does not include the hour from 0 – 1.

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

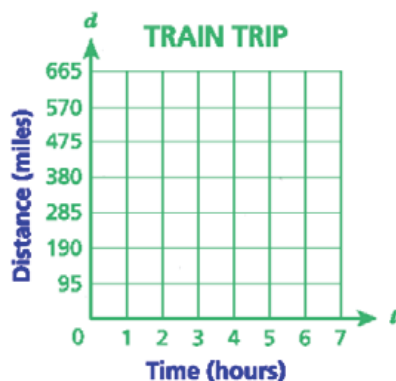
$$\begin{array}{r} d \\ 95 \\ \times 5 \\ \hline 475 \end{array}$$

$$\begin{array}{r} d \\ 95.0 \\ \times 5.5 \\ \hline 475.0 \\ 4750 \\ \hline 522.50 \end{array}$$

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer 5 hours 475 miles

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 522.5 miles

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response provides the correct number of miles the train would travel in 5.5 hours (522.5 miles). However, the response does not provide an equation or a graph.

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

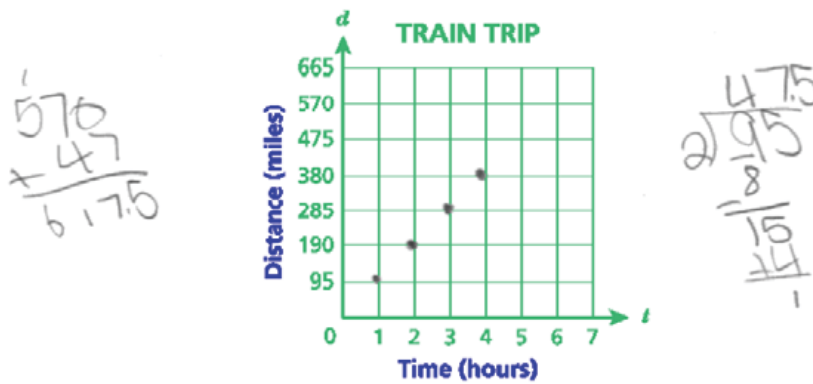
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer $95(t) = d$

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 617.5 miles

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response provides a correct equation ($95(t) = d$). However, the graph of the relationship between t and d is incorrect and the number of miles the train would travel in 5.5 hours (617.5 miles) is also incorrect.

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

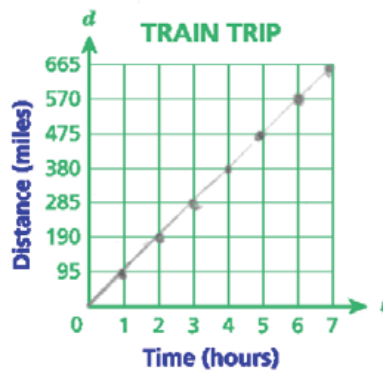
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer $T \times 4 = d$

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



$$\begin{array}{r} 01810 \\ - 95 \\ \hline 95 \\ 1380 \\ + 95 \\ \hline 475 \end{array}$$

If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 517.5 miles

$$\begin{array}{r} 475.0 \\ + 42.5 \\ \hline 517.5 \end{array}$$

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response provides a correct graph of the relationship between t and d . However, the response provides an incorrect equation ($T \times 4 = d$) and an incorrect description of how many miles the train would travel in 5.5 hours (517.5 miles).

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

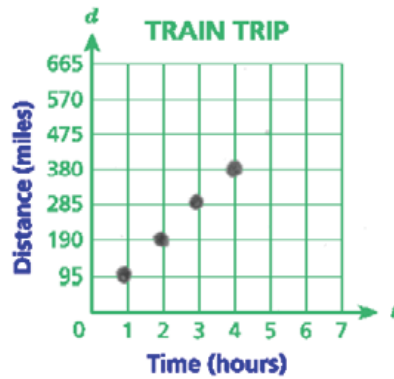
TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer 380

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 475 miles

Score Point 0 (out of 3 points)

This response is incorrect.

A train was traveling at a constant speed. The table below shows the distance, in miles, the train traveled for the first 4 hours.

TRAIN TRIP

Time (hours)	Distance (miles)
1	95
2	190
3	285
4	380

Handwritten notes in a box:

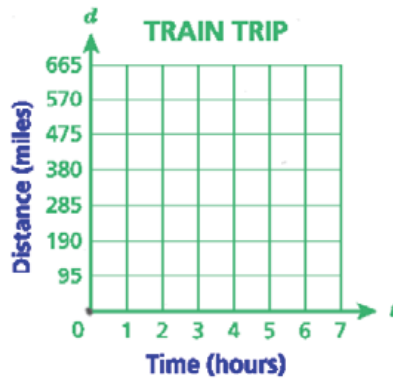
$$t(4+d380)$$

$$(4t+16d380)$$

Write an equation to represent the relationship between t , the time, and d , the total distance traveled by the train.

Answer $(4t + 16d) 380$

On the grid below, draw a graph of the relationship between t and d for a trip that lasted from 0 to 7 hours.



If the train was traveling nonstop, how many miles would it travel in 5.5 hours?

Answer 6.5 miles

Score Point 0 (out of 3 points)

This response is incorrect.

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

Answer _____ miles

Measured 6.RP.3b

Commentary: This question measures 6.RP.3b because it assesses a student's ability to solve unit rate problems including those involving unit pricing and constant speed.

Extended Rationale: This question asks students to determine the number of miles driven during a given period of time, given the rates at which that person traveled for two different intervals. 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 (although an absence of the addition step to determine the second rate, $48 + 5 = 53$, does not detract from demonstrating thorough understanding). As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of solving unit rate problems, specifically, those involving constant speed. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct number of miles driven during the $5\frac{3}{4}$ -hour period may be determined by first determining the rate traveled by Mr. Anderson during the first $3\frac{1}{2}$ hours by dividing the distance traveled, 168, by $3\frac{1}{2}$:

$$168 \text{ mi} \div 3\frac{1}{2} \text{ hr} = 48 \text{ mi/hr}$$

The student could then add 5 to this rate of 48 miles per hour to get 53 miles per hour and then multiply by $2\frac{1}{4}$ hours to find the distance traveled during the second part of the trip:

$$(48 + 5) \text{ mi/hr} \times 2\frac{1}{4} \text{ hr} =$$

$$53 \text{ mi/hr} \times 2\frac{1}{4} \text{ hr} = 119.25 \text{ mi}$$

Adding this result to the 168 given for the first part of the trip results in the total distance traveled for the $5\frac{3}{4}$ -hour period:

$$168 \text{ mi} + 119.25 \text{ mi} = 287.25 \text{ mi}$$

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

The student's work is divided into three sections:

- Left section:** A handwritten problem $\frac{168}{3.5}$ is crossed out with a large 'X'. Below it, the number 119.25 is written.
- Middle section:** A long division problem: $3.5 \overline{)168}$. The student subtracts 14 to get 28, then subtracts 28 to get 0. To the right of this, they calculate $48 \text{ mi} + 5 \text{ mi} = 53 \text{ mi per hr}$.
- Right section:** A multiplication problem: $2.25 \text{ hr} \times 53 \text{ mi per hr}$. The student calculates 675 and 11250 , resulting in $119,250$ (with a comma in the wrong place).

Answer 287.25 miles

Score Point 3 (out of 3 points)

This response includes the correct solution (287.25) and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly calculates the additional distance traveled ($168 \div 3.5 = 48$, $48 + 5 = 53$, $53 \times 2.25 = 119.25$) and adds that to the previous distance traveled ($168.00 + 119.25 = 287.25$).

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

$$\begin{array}{r} \text{mi} \quad 168 \overline{) 48} \\ \text{hr} \quad 3.5 \overline{) 1} \\ \underline{3.5} \\ 0.5 \end{array}$$

$48 + 5 = 53$

$$\begin{array}{r} 53 \\ \times 2.25 \\ \hline 119.25 \\ 168.00 \\ \hline 287.25 \end{array}$$

Answer 287.25 miles

Score Point 3 (out of 3 points)

This response includes the correct solution (287.25) and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly calculates the initial rate ($168 \div 3.5 = 48$), the new rate ($48 + 5 = 53$) and the additional distance traveled ($53 \times 2.25 = 119.25$). The two distances are added to determine the total distance traveled ($119.25 + 168.00 = 287.25$).

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

$$168 \div 3\frac{1}{2} = 48$$

$$\frac{168}{1} \div \frac{7}{2}$$

$$\begin{array}{l} \cancel{24} \overline{)168} \\ \underline{48} \\ 0 \end{array} \quad \frac{2}{41} = \frac{48}{1} = 48 \text{ mph} \quad \begin{array}{l} +5 \\ \hline 53 \text{ mph} \end{array} \quad 53 \cdot 2\frac{1}{4} = 119\frac{1}{4}$$

$$\begin{array}{r} 168.00 \\ +119.25 \\ \hline 287.25 \end{array}$$

Answer $287\frac{1}{4}$ miles

Score Point 3 (out of 3 points)

This response includes the correct solution ($287\frac{1}{4}$) and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly calculates the additional distance traveled ($168 \div 3\frac{1}{2} = 48$, $48 + 5 = 53$, $53 \times 2\frac{1}{4} = 119\frac{1}{4}$) and adds that to the previous distance traveled ($168.00 + 119.25 = 287.25$).

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

Handwritten work showing calculations for the problem:

Initial rate calculation: $168 \text{ mi} \div 3.5 \text{ hr} = 48$

New rate calculation: $53 \text{ mph} = \frac{119.25 \text{ mi}}{2.25}$

Distance traveled at new rate: $53 \times 2.25 = 119.25$

Distance traveled at initial rate: 168

Total distance: $119.25 + 168 = 187.25 \text{ miles}$

Answer 187.25 miles

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response correctly calculates the initial rate ($168 \div 3.5 = 48$), the new rate (53), the additional distance traveled ($53 \times 2.25 = 119.25$), and adds the additional distance traveled to the previous distance traveled. However, an addition error ($119.25 + 168 = 187.25$) results in an incorrect solution (187.25).

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

$$168 = 3\frac{1}{2} \quad 168 + 108$$
$$168 \div 3\frac{1}{2} = 48$$
$$48 \times 2\frac{1}{4} = 108$$
$$168 + 108 = \textcircled{276}$$

Answer 276 miles

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response correctly calculates the initial rate ($168 \div 3\frac{1}{2} = 48$) but then incorrectly uses the initial rate (48) as the new rate ($48 \times 2\frac{1}{4} = 108$) leading to an incorrect solution (276). However, other than not determining and using the new rate, this procedure is correct.

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

$$3.5 \overline{) 168}$$

$$\begin{array}{r} 48 \\ 35 \overline{) 1680} \\ \underline{-140} \\ 280 \end{array}$$

$$\begin{array}{r} \underline{-280} \\ 0 \end{array}$$

168 mi. in $3\frac{1}{2}$ hr. 48 mph

$2\frac{1}{4}$ mi. $2\frac{1}{4}$ hr. 5 mi. faster
~~48~~

$$\begin{array}{r} 253 \\ \times 9 \\ \hline 477 \end{array}$$

$$2\frac{1}{4} \times 53$$

$$\begin{array}{r} 9 \\ 4 \times 53 \\ \hline 477 \\ 4 \end{array}$$

$$\begin{array}{r} 119.25 \\ 4 \overline{) 477} \\ \underline{-4} \\ 37 \\ \underline{-36} \\ 108 \\ \underline{-108} \\ 0 \end{array}$$

Answer $119\frac{1}{4}$ miles

Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response correctly calculates the initial rate ($168 \div 3.5 = 48$), the new rate (53), and the additional distance traveled ($2\frac{1}{4} \times 53 = 119.25$). However, the response does not add the additional distance traveled to the initial distance traveled, resulting in an incorrect solution ($119\frac{1}{4}$).

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

$$\begin{array}{r}
 \times 48 \\
 3.5 \overline{) 168} \\
 \underline{140} \\
 028
 \end{array}$$

$$\begin{array}{r}
 11 \\
 + 168 \\
 \hline
 341
 \end{array}$$

$$\begin{array}{r}
 125 \\
 + 5.75 \\
 \hline
 718.75
 \end{array}$$

$$\begin{array}{r}
 1 \\
 48 \\
 + 77 \\
 \hline
 125
 \end{array}$$

$$\begin{array}{r}
 1 \\
 168 \\
 + 5 \\
 \hline
 173
 \end{array}$$

$$\begin{array}{r}
 5.75 \overline{) 341}
 \end{array}$$

Answer 718.75 miles

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response correctly calculates the initial rate ($168 \div 3.5 = 48$); however, the response does not calculate the new rate, 53, the additional distance traveled, 119.25, or total distance traveled, 287.25. After determining the initial rate, the response completes a series of irrelevant operations.

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

$$168 \div 3\frac{1}{2}$$
$$48$$

$$48 \times 5 = 240$$

Answer 240 miles

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response correctly calculates the initial rate ($168 \div 3\frac{1}{2} = 48$). However, the response then incorrectly multiplies 48 by 5 and provides the resulting product (240) as the solution.

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

Handwritten work showing calculations:

$$\frac{168}{3\frac{1}{2}} = \frac{168}{3.5} = 48$$

$$48 + 5 = 53$$

$$53 \times 5\frac{3}{4} = 53 \times 5.75 = 304.75$$

$$168 + 304.75 = 472.75$$

The student also shows a calculation for $35 \times 8 = 280$ and $35 \times 7 = 245$, which are not directly relevant to the problem.

Answer 53 miles

Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response correctly calculates the initial rate ($168 \div 3.5 = 48$) and the new rate ($48 + 5 = 53$). However, the response does not attempt to calculate the additional distance traveled or the total distance traveled. The response provides an incorrect solution (53).

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

10 mi.
per hour
faster $2\frac{1}{4}$

$$\begin{array}{r} 11 \\ 168 \\ + 158 \\ \hline 326 \text{ mi.} \end{array}$$

$$\begin{array}{r} 168 \\ - 10 \\ \hline 158 \end{array}$$

Answer 326 miles

Score Point 0 (out of 3 points)

This response is incorrect.

Mr. Anderson drove 168 miles in $3\frac{1}{2}$ hours. He then drove the next $2\frac{1}{4}$ hours at a rate of 5 miles an hour faster than the first rate.

How many miles did Mr. Anderson drive during the $5\frac{3}{4}$ hours?

Show your work.

Handwritten work showing calculations and corrections:

~~$3\frac{1}{2} \text{ h} = x \text{ miles}$~~
 ~~$3\frac{1}{2} \text{ h} = 168 \text{ miles}$~~

~~$\frac{3.5}{3.5} = \frac{378}{3.5}$~~

$\frac{3.5}{3.5} = \frac{378}{3.5}$

$x = \frac{108}{5}$

$\frac{108}{5} = 21.6$

$21.6 \times 5 = 108$

$108 + 168 = 276$

$x = 276$

$\frac{3.5}{3.5} = \frac{5.75(168)}{3.5}$

$\frac{966}{3.5} = 276$

$108 + 168 = 276$

$x = 276$

$\frac{108}{5} = 21.6$

$21.6 \times 5 = 108$

$108 + 168 = 276$

Answer 708 miles

Score Point 0 (out of 3 points)

This response is incorrect.

2-Point Holistic Rubric

Score Points:

2 Points	<p>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.</p> <p>This response</p> <ul style="list-style-type: none">• 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	<p>A one-point response demonstrates only a partial understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none">• 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*	<p>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.</p>

* 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	<p>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.</p> <p>This response</p> <ul style="list-style-type: none"> • 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	<p>A two-point response demonstrates a partial understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> • 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	<p>A one-point response demonstrates only a limited understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"> • 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*	<p>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.</p>

* 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.**