

**Algebra I End of Course Exam Answer Key
Segment I
Scientific Calculator Only**

Question 1

Reporting Category: Algebraic Concepts & Procedures

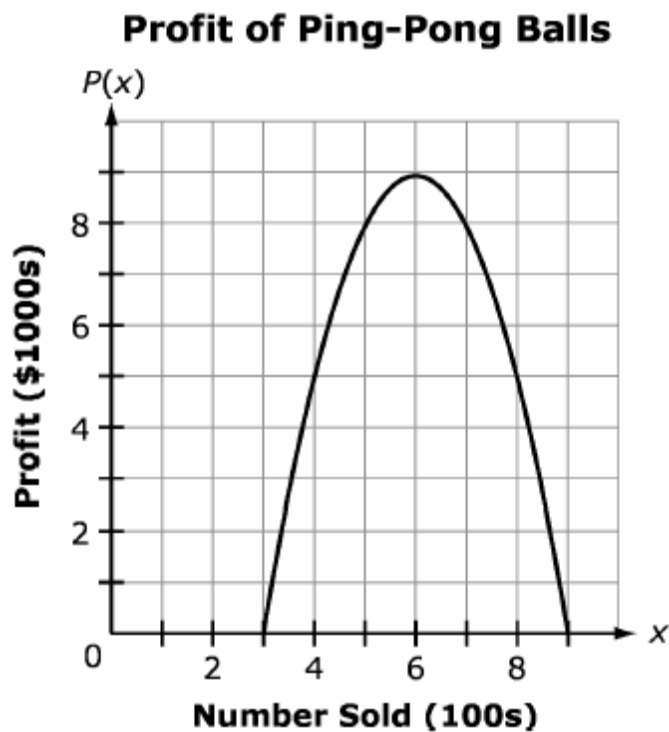
Common Core Standard: A-APR.3: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Answer Key: A

A manufacturer of ping-pong balls has a daily profit/loss given by the function

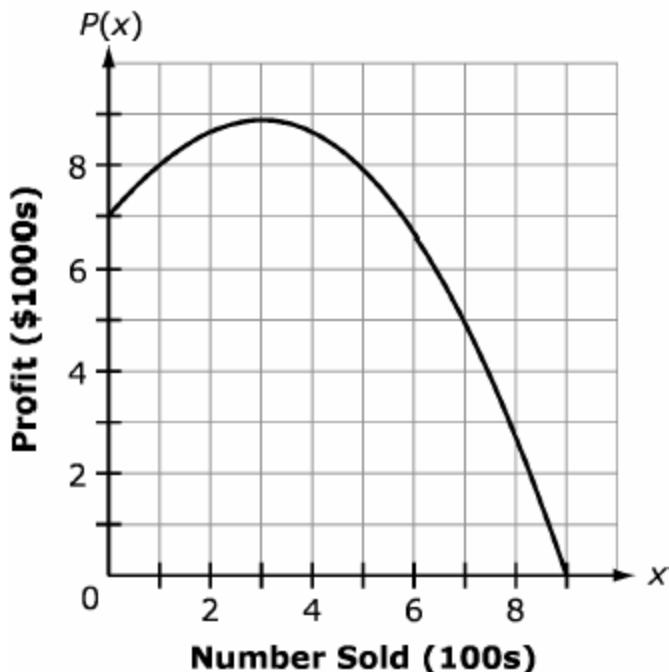
$P(x) = -x^2 + 12x - 27$, where x is measured in hundreds of ping-pong balls sold, and $P(x)$ is measured in thousands of dollars.

Which graph represents the function?



This answer is correct. The student has correctly identified the factors of the function $(x - 3)(x - 9)$ and the zeros at 3 and 9.

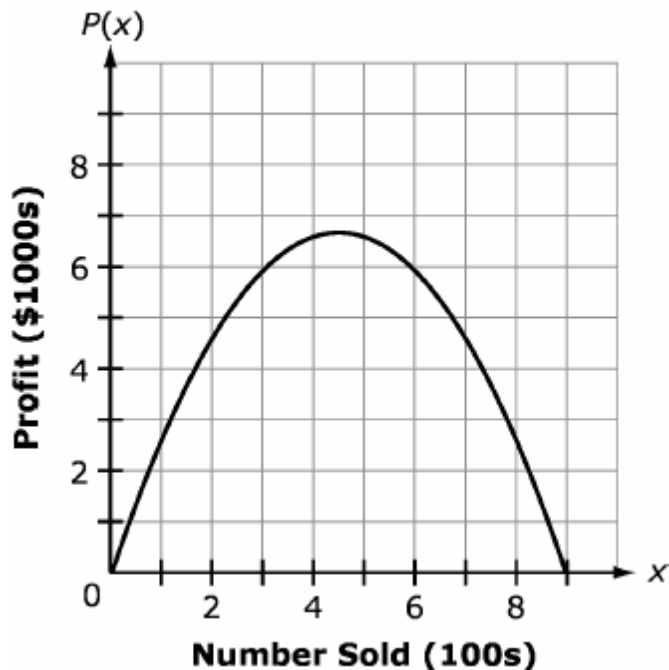
Profit of Ping-Pong Balls



B.

This answer is not correct. The student may have had trouble factoring with the incorrect sign in the factor involving 3.

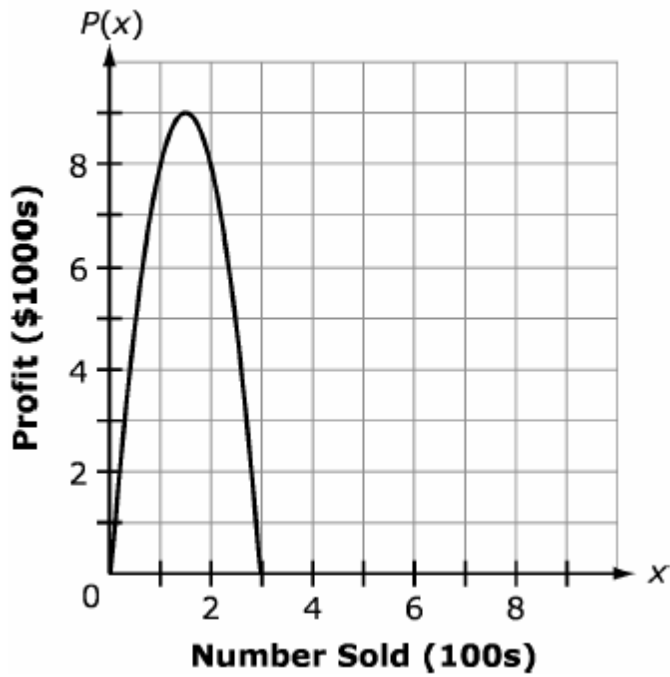
Profit of Ping-Pong Balls



C.

This answer is not correct. The student may have recognized 9 as one of the zeros and may have thought that the function should pass through the origin as well.

Profit of Ping-Pong Balls



D.

This answer is not correct. The student may have recognized 3 as one of the zeros and may have thought that the function should pass through the origin as well.

Question 2

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.4a: Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

An equation is shown.

$$x^2 + 8x + 19 = 0$$

What is an equivalent equation that results from completing the square?

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

Scoring Rubric:

1 point

For this item, the response correctly

- identifies an equivalent equation.

Sample Correct Answer:

An equation is shown.

$$x^2 + 8x + 19 = 0$$

What is an equivalent equation that results from completing the square?

$(x+4)^2 = -3$											
← → ↶ ↷ ✕											
1	2	3	x	y							
4	5	6	+	-	*	÷					
7	8	9	<	≤	=	≥	>				
0	.	-	$\frac{\square}{\square}$	\square^\square	\square_\square	()		$\sqrt{\square}$	$\sqrt[\square]{\square}$	π	i

Explanation of Correct Answer:

The steps to complete the square are shown.

$$x^2 + 8x + 19 = 0$$

$$x^2 + 8x = -19$$

$$x^2 + 8x + \left(\frac{8}{2}\right)^2 = -19 + \left(\frac{8}{2}\right)^2$$

$$x^2 + 8x + 16 = -19 + 16$$

$$(x + 4)^2 = -3$$

Sequence of Keypad Clicks to Enter the Answer:

(), x, +, 4, →, \square^\square , 2, =, -, 3

Question 3

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A system of equations is shown.

$$y = x + 2$$

$$y = -2x - 1$$

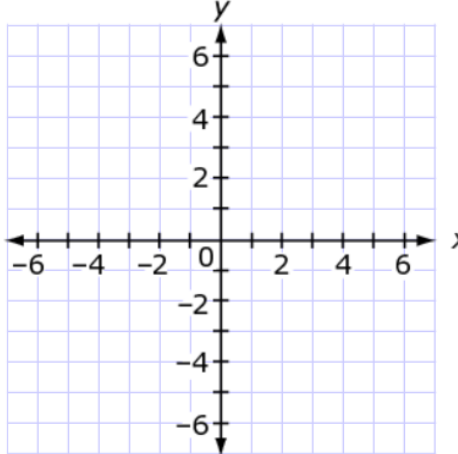
- A. Use the Add Arrow tool to graph the two equations.
- B. What is the solution to the system of equations?

Drag numbers to the boxes to show the solution.

6

Delete Add Arrow

A.



B. Coordinates of solution

(,)

Scoring Rubric:

1 point

For this item, the response correctly

- draws the two lines and identifies the coordinates of the solution.

Sample Correct Answer:

A system of equations is shown.

$$y = x + 2$$

$$y = -2x - 1$$

- A. Use the Add Arrow tool to graph the two equations.
- B. What is the solution to the system of equations?

Drag numbers to the boxes to show the solution.

6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6

Delete Add Arrow

A.

B. Coordinates of solution

(,)

Explanation of Correct Answer:

Since both equations are in slope-intercept form, use the y -intercept and slope to graph each equation. For the first equation, the y -intercept is 2. From that point, use the slope of $1\left(\frac{1}{1}\right)$ to arrive at $(1, 3)$. The graph of $y = x + 2$ is the line through the points $(0, 2)$ and $(1, 3)$.

For the second equation, the y -intercept is -1 . From that point, use the slope of $-2\left(\frac{-2}{1}\right)$ to arrive at $(1, -3)$. The graph of $y = -2x - 1$ is the line through $(0, -1)$ and $(1, -3)$.

Finally, the solution of the system can be found by determining the intersection point of the two lines. This intersection occurs at the coordinates $(-1, 1)$.

Question 4

Reporting Category: Algebraic Concepts & Procedures

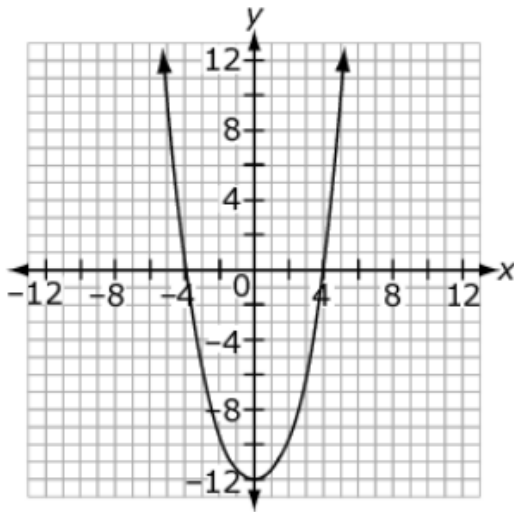
Common Core Standard: F-IF.7a: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

Answer Key: A

A function has an x -intercept at $(4, 0)$ and a y -intercept at $(0, -12)$.

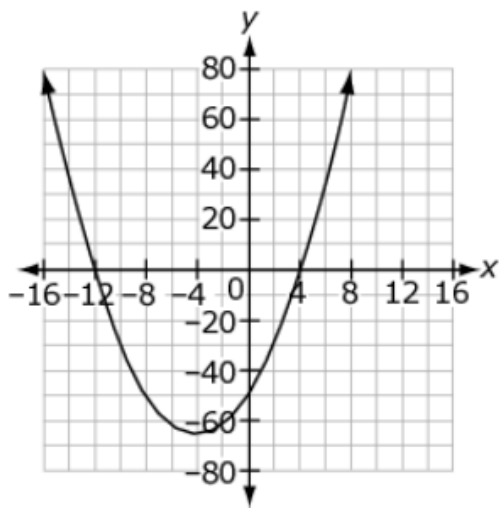
Which graph could represent the function?

A.



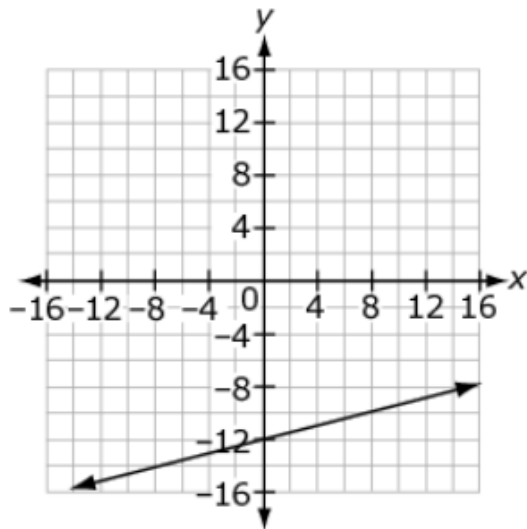
This answer is correct. The student recognized that the given intercepts were on the graph.

B.



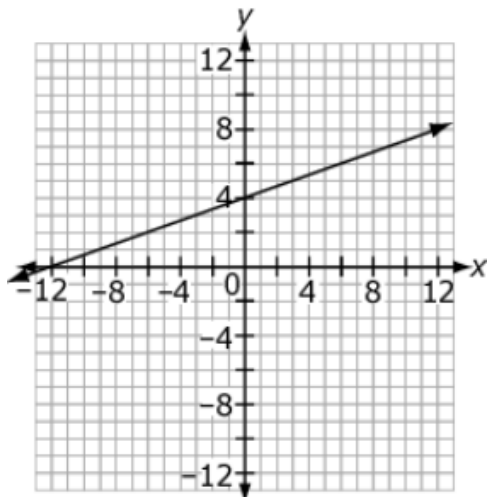
This answer is not correct. The student may have treated the y-intercept as a second x-intercept.

C.



This answer is not correct. The student may have treated the x-intercept as the slope.

D.



This answer is not correct. The student may have reversed the x- and y- intercepts.

**Algebra I End of Course Exam Answer Key
Segment II
Scientific/Graphing/Regression Calculator Allowed**

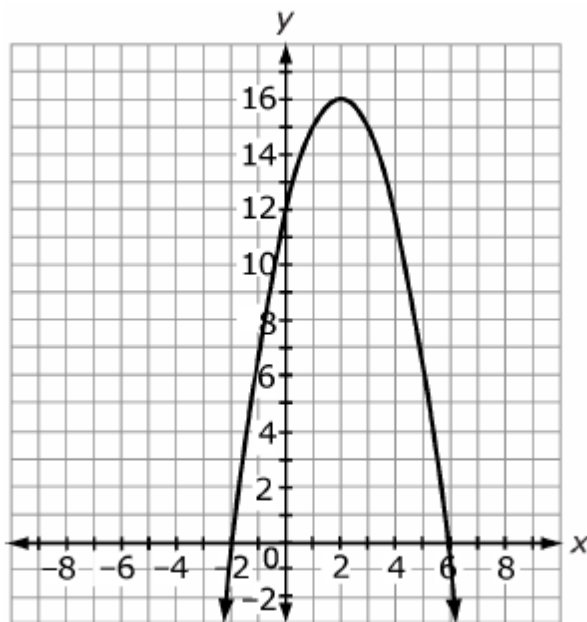
Question 5

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-SSE.3a: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines.

Answer Key: B

A graph is shown.



Which equation represents the graph?

A. $y = -(x - 2)(x + 6)$

This answer is not correct. The student may have used the direct sign of the intercepts instead of the distance $(x - p)(x - q)$ form.

B. $y = -(x + 2)(x - 6)$

This answer is correct. *The student correctly identified the roots and vertex to identify the equation.*

C. $y = (x - 2)(x + 6)$

This answer is not correct. The student may have confused the signs of each root and misunderstood how to show the direction of the parabola.

D. $y = (x + 2)(x - 6)$

This answer is not correct. The student may have misunderstood how to show the direction of the parabola.

Question 6

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-SSE.3a: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines.

A quadratic equation is shown.

$$x^2 - 6x - 72 = 0$$

What is the factored form of the quadratic equation?

←	→	↶	↷	✕							
1	2	3	x								
4	5	6	+	-	*	÷					
7	8	9	<	≤	=	≥	>				
0	.	-	$\frac{\square}{\square}$	\square^\square	\square_\square	()		$\sqrt{\square}$	$\sqrt[\square]{\square}$	π	i

Scoring Rubric:

1 point

For this item, the response correctly

- identifies an equivalent equation.

Sample Correct Answer:

A quadratic equation is shown.

$$x^2 - 6x - 72 = 0$$

What is the factored form of the quadratic equation?

$(x-12)(x+6)=0$

← → ↶ ↷ ✕												
1	2	3	x									
4	5	6	+	-	*	÷						
7	8	9	<	≤	=	≥	>					
0	.	-	$\frac{\square}{\square}$	\square^\square	\square_\square	()		$\sqrt{\square}$	$\sqrt[\square]{\square}$	π	i	

Explanation of Correct Answer:

The steps to factor the equation are shown.

$$x^2 - 6x - 72 = 0$$

$$x^2 + (-12 + 6)x + (-12 \cdot 6) = 0$$

$$(x - 12)(x + 6) = 0$$

Sequence of Keypad Clicks to Enter the Answer:

(, x, -, 12, →, (, x, +, 6, →, =, 0

Question 7

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-SSE.3b: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

Answer Key: A

Which equation is an equivalent form of $y = x^2 - 2x - 15$?

A. $y = (x - 1)^2 - 16$

This answer is correct. The student correctly completed the square.

B. $y = (x - 1)^2 - 14$

This answer is not correct. The student may have added 1 twice when completing the square instead of adding and then subtracting 1.

C. $y = (x + 1)^2 - 16$

This answer is not correct. The student may have factored incorrectly.

D. $y = (x + 1)^2 - 14$

This answer is not correct. The student may have factored incorrectly and added 1 twice when completing the square.

Question 8

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-CED.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V = IR$ to highlight resistance R .*

Answer Key: A

The equation $I = Prt$ models the amount of simple interest, I , that is earned on a principal amount, P , invested at an annual interest rate, r , for t years.

Which equation shows this given equation solved for r ?

A. $r = \frac{I}{Pt}$

This answer is correct. The student understood that to isolate r , it is necessary to divide both sides of the equation by P and t .

B. $r = \frac{Pt}{I}$

This answer is not correct. The student may have realized that the problem calls for division but may have mixed up the direction of the quotient.

C. $r = IPt$

This answer is not correct. The student may have rearranged the variables into a similar format, without realizing that division is needed to solve for r .

D. $r = \frac{IP}{t}$

This answer is not correct. The student may have realized that the problem calls for division but may have mixed up the terms that belong in the numerator and denominator.

Question 9

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-CED.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V = IR$ to highlight resistance R .*

The formula that can be used to determine the speed of a wave pulse traveling along a string or wire is shown.

$$T = \frac{mv^2}{L}$$

Write an equation that shows the given formula solved for v .

← → ↶ ↷ ✕											
1	2	3	T	m	v	L					
4	5	6	+	-	*	÷					
7	8	9	<	≤	=	≥	>				
0	.	-	$\frac{\square}{\square}$	\square^\square	\square_\square	()		$\sqrt{\square}$	$\sqrt[\square]{\square}$	π	i

Scoring Rubric:

1 point

For this item, the response correctly

- identifies an equivalent equation.

Sample Correct Answer:

The formula that can be used to determine the speed of a wave pulse traveling along a string or wire is shown.

$$T = \frac{mv^2}{L}$$

Write an equation that shows the given formula solved for v .

$$v = \sqrt{\frac{TL}{m}}$$

←	→	↶	↷	✖							
1	2	3	T	m	v	L					
4	5	6	+	-	*	÷					
7	8	9	<	≤	=	≥	>				
0	.	-	$\frac{\square}{\square}$	\square^\square	\square_\square	()		$\sqrt{\square}$	$\sqrt[\square]{\square}$	π	i

Explanation of Correct Answer:

The steps to solve the equation for v are shown.

$$T = \frac{mv^2}{L}$$
$$LT = mv^2$$
$$\frac{LT}{m} = v^2$$
$$\pm \sqrt{\frac{LT}{m}} = v$$

Then, since the speed must be positive, a correct equation for the formula solved for v is

$$v = \sqrt{\frac{LT}{m}}$$

Sequence of Keypad Clicks to Enter the Answer:

$V, =, \sqrt{\square}, \frac{\square}{\square}, T, L,$ click on the denominator, $m, \rightarrow,$

Question 10

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.1: Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Answer Key: B

Meredith is solving the equation $7x + 3(x - 2) = 14$.

Her first step is shown as $7x + 3x - 6 = 14$.

Which statement **best** describes Meredith's work in her first step?

A. She combined the terms 3 and x .

This answer is not correct. The student may have thought only the 3 and x terms were combined instead of applying the distributive property.

B. She distributed 3 to the terms in the parentheses.

This answer is correct. *The student used the distributive property to get from $3(x - 2)$ to $3x - 6$.*

C. She combined like terms by adding them together.

This answer is not correct. The student may have confused the distributive property with combining like terms.

D. She removed parentheses in order to isolate the variable.

This answer is not correct. The student may have thought the terms were regrouped using the associative property.

Question 11

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.1: Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Answer Key: B

Which equation could represent the first step in solving $\frac{4x-8}{2} = 16 + 3x$?

A. $\frac{4x+3x-8}{2} = 16 + 3x + 3x$

This answer is not correct. The student may have combined terms without adjusting for the fraction.

B. $2\left(\frac{4x-8}{2}\right) = 2(16 + 3x)$

This answer is correct. *The student correctly recognized that multiplying both sides by 2 maintains equality.*

C. $2\left(\frac{4x-8}{2}\right) = \frac{16+3x}{2}$

This answer is not correct. The student may have thought that applying inverse operations on each side would maintain equality.

D. $\frac{2(4x)-8}{2} = 16 + 2(3x)$

This answer is not correct. The student may not have distributed when multiplying by 2.

Question 12

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Answer Key: B

A soccer team must raise at least \$660 to buy new equipment. To reach this goal, each of the 12 soccer players sells tickets to a game. Tickets cost \$2.75 each. The school athletics fund donates an additional \$10 per player. The situation is modeled by the inequality shown.

$$12(2.75x + 10) \geq 660$$

How many tickets must each player sell to raise the money?

A. at least 16

This answer is not correct. The student may have assumed that "at least" meant to round down.

B. at least 17

This answer is correct. The student selected the least number of tickets that each player must sell for the team to reach its goal.

C. at least 19

This answer is not correct. The student may have failed to multiply the constant term when using the distributive property and assumed that "at least" meant to round down.

D. at least 20

This answer is not correct. The student may have failed to multiply the constant term when using the distributive property.

Question 13

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.4a: Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

Answer Key: A

Jason uses completing the square to rewrite the equation shown.

$$2x^2 + 20x = -10$$

Which equation shows his result?

A. $(x + 5)^2 = 20$

This answer is correct. The student selected the equation that could be the result of completing the square.

B. $(x + 5)^2 = -30$

This answer is not correct. The student may have subtracted 25 from the right side instead of adding it.

C. $2(x + 5)^2 = 15$

This answer is not correct. The student may have added 25 to the right side.

D. $2(x + 5)^2 = -35$

This answer is not correct. The student may have subtracted 25 from -10 on the right side instead of adding 50.

Question 14

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.4b: Solve quadratic equations in one variable. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

Answer Key: B

Maggie is building a rectangular deck. She determines that the length x of the shorter side in feet must satisfy the equation $x^2 + 4x = 60$.

What is the length of the shorter side in feet?

A. $x = 5$

*This answer is not correct. The student may have factored 60 as $5 * 12$ and may have forgotten to check the cross-term in the quadratic function that these zeros would generate.*

B. $x = 6$

This answer is correct. *The student correctly rearranged the given equation to get $x^2 + 4x - 60 = 0$, which factors as $(x - 6)(x + 10) = 0$ with 6 as the positive zero.*

C. $x = 10$

This answer is not correct. The student may have factored the equation correctly but may have been confused about the values of the zeros.

D. $x = 12$

*This answer is not correct. The student may have factored 60 as $5 * 12$ and may have forgotten to check the cross-term in the quadratic function. The student also may have been confused about the sign of the zeros.*

Question 15

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.11: Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Answer Key: B, F

Two functions are shown.

$$f(x) = x - 1$$

$$g(x) = -x^2 + 2x + 5$$

Select **all** the values of x that are solutions to $f(x) = g(x)$.

A. -3

This answer is not correct. The student may have incorrectly determined that $(x + 3)$ was one factor of the resulting quadratic expression.

B. -2

This answer is correct. The student identified a solution to the system.

C. -1

This answer is not correct. The student may have factored out a negative 1 and thought that would represent a solution.

D. 1

This answer is not correct. The student may have factored out a negative 1 and thought changing the sign would represent a solution.

E. 2

This answer is not correct. The student may have incorrectly determined that $(x - 2)$ was a factor of the resulting quadratic expression.

F. 3

This answer is correct. The student identified a solution to the system.

Question 16

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.11: Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Answer Key: C

John compares the subscription costs of two Internet service plans. Each plan consists of a one-time fee and a cost per month, as shown.

- Plan 1: $f(x) = 30x + 5$
- Plan 2: $g(x) = 20x + 25$

John says $f(x) = g(x)$ at $x = 2$.

What is the meaning of John's statement?

A. The one-time fee for both plans is the same.

This answer is not correct. The student may have mistakenly believed the solution is where the costs per month are the same.

B. The number of months for each plan is the same.

This answer is not correct. The student may have mistakenly believed the solution is where the number of months is the same.

C. The cost for both plans is the same at 2 months.

This answer is correct. The student understood that the solution to a system of equations is the point at which the graphs of each equation intersect. This intersection is the point at which both functions have the same value. For the system described, the solution is where the total costs are the same.

D. The cost per month for both plans is the same for 2 months.

This answer is not correct. The student may have mistakenly believed the solution is where the constants are the same.

Question 17

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.11: Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Answer Key: C

A manufacturer compares its income, $f(x)$, to its expenses, $g(x)$, for x number of units sold.

What does the solution to $f(x) = g(x)$ represent for the manufacturer?

A. the number of units sold when the manufacturer had an overall loss for the year

This answer is not correct. The student may have thought the point of intersection of the two functions is where the manufacturer had a loss.

B. the number of units sold when the manufacturer had an overall profit for the year

This answer is not correct. The student may have thought the point of intersection of the functions is where the manufacturer has a profit.

C. the number of units sold when the manufacturer's income equaled the manufacturer's expenses

This answer is correct. *The student correctly identified the meaning of the two functions being equal.*

D. the number of units sold when the manufacturer's income and expenses were both positive values

This answer is not correct. The student may have misinterpreted the situation.

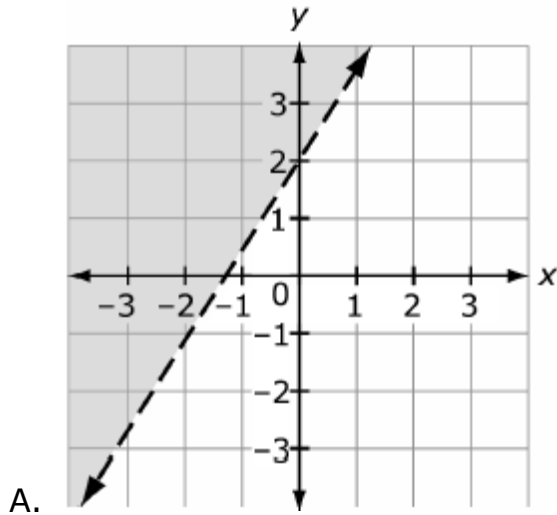
Question 18

Reporting Category: Algebraic Concepts & Procedures

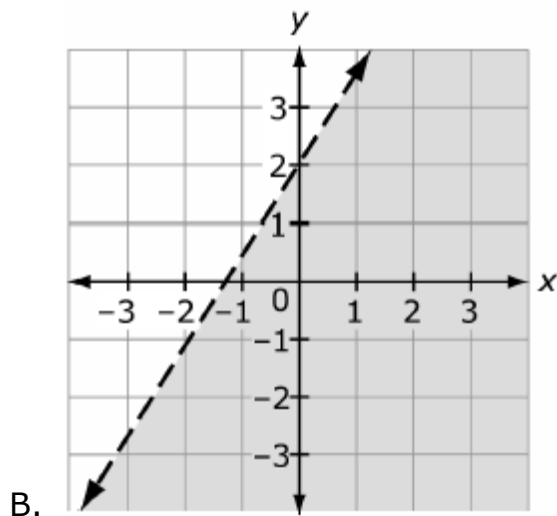
Common Core Standard: A-REI.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Answer Key: D

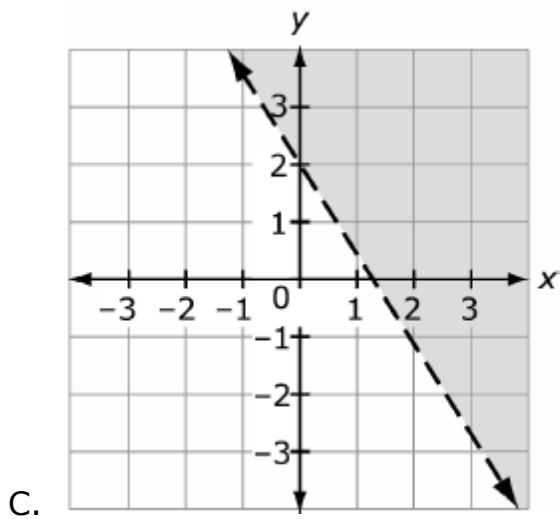
Which graph represents the solution set of the inequality $3x + 2y < 4$?



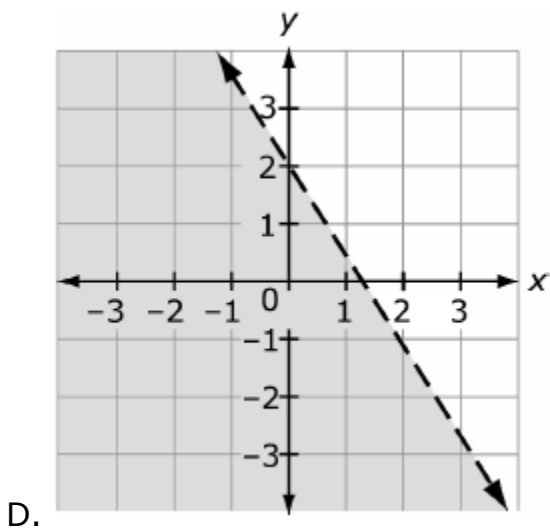
This answer is not correct. The student may have mixed up the sign on the slope and may have confused the correct region to shade.



This answer is not correct. The student may have mixed up the sign on the slope.



This answer is not correct. The student may have identified the correct boundary line but may have confused the correct region to shade.



This answer is correct. *The student identified that the inequality can be rewritten in slope-intercept form as $y < -(3/2)x + 2$ and has identified the correct region to shade.*

Question 19

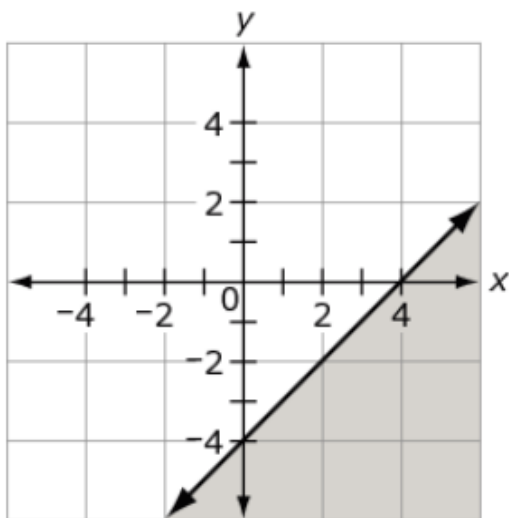
Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: A-REI.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Answer Key: A

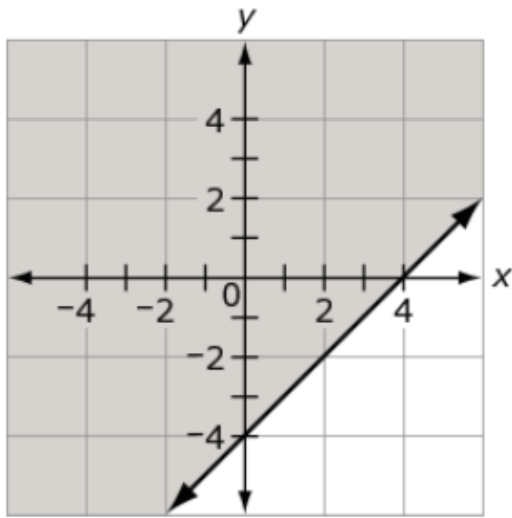
Which graph represents the solution set of the inequality $y \leq x - 4$?

A.



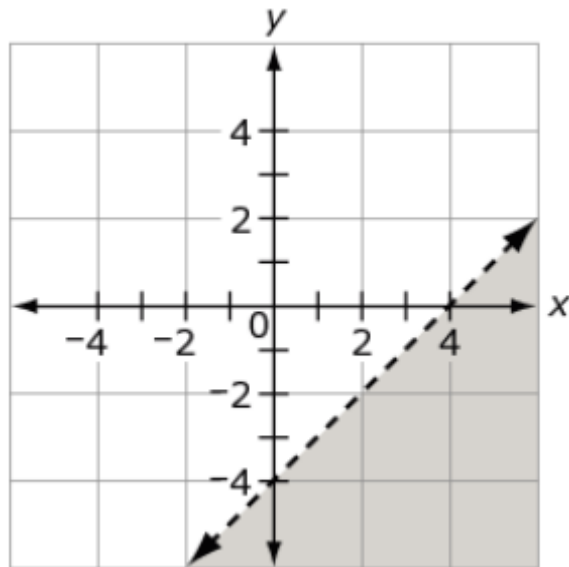
This answer is correct. The correct boundary line is $y = x - 4$. It is a solid line, and part of the graph beneath the line is shaded because the inequality is "less than or equal to." Using test-point $(4, -2)$, the inequality is $-2 < 4 - 4$, which is $-2 < 0$. This is a true statement.

B.



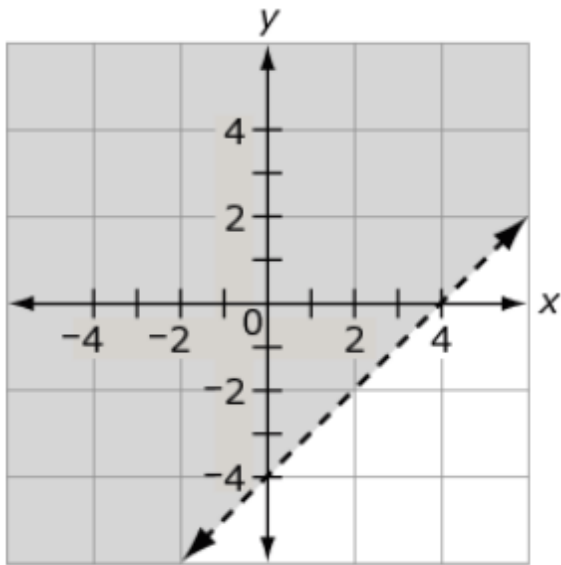
This answer is not correct. The correct boundary line is a solid line at $y = x - 4$. But the top portion of the graph should not be shaded because the inequality is "less than or equal to." Using test-point $(0, 0)$, the inequality is $0 < 0 - 4$, which is $0 < -4$. This is a false statement.

C.



This answer is not correct. The boundary line should be solid because the inequality is "less than or equal to."

D.



This answer is not correct. The boundary line should be solid because the inequality is "less than or equal to." The portion of the graph below the line should be shaded instead of the top portion because the inequality is "less than or equal to."

Question 20

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: F-IF.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Answer Key: C

A function is shown.

$$f(x) = x^2 + 8x + 6$$

What is the value of $f(4)$?

A. 42

This answer is not correct. The student may have forgotten to square the 4 when substituting the value in for x .

B. 46

This answer is not correct. The student may have multiplied the 4 by 2 instead of squaring it.

C. 54

This answer is correct. *The student correctly determined the value for $f(4)$.*

D. 102

This answer is not correct. The student may have added 4 squared to 8, then multiplied that value by 4, then added 6.

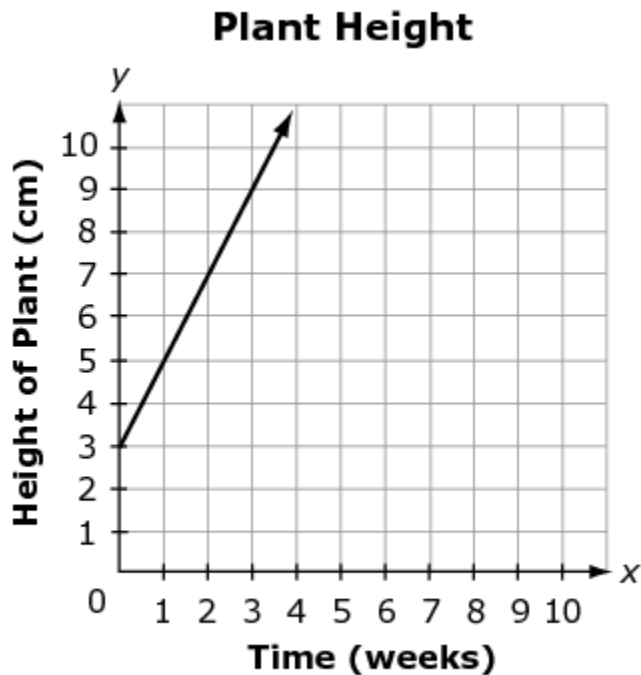
Question 21

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: F-IF.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Answer Key: C

The graph shows the height of a plant in centimeters measured over several weeks.



At what rate is the plant growing?

A. $\frac{1}{5}$ centimeter each week

This answer is not correct. The student may have assumed the height of the plant at 0 weeks was 0 cm and calculated the change in weeks divided by the change in height.

B. $\frac{1}{2}$ centimeter each week

This answer is not correct. The student may have calculated the change in weeks divided by the change in height.

C. 2 centimeters each week

This answer is correct. The student calculated the rate of plant growth by dividing the change in height by the change in time. Using the points $(0, 3)$ and $(1, 5)$, the change in height is 1 cm and the change in weeks is 2. The rate of plant growth is 2 cm per week.

D. 5 centimeters each week

This answer is not correct. The student may have assumed the height of the plant at 0 weeks was 0 cm and at 1 week was 5 cm.

Question 22

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: F-IF.7a: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

Answer Key: B

A function is shown.

$$f(x) = -2x^2 + 8$$

What does the sign of the coefficient of x^2 explain about the graph of the function?

A. The function has a minimum value.

This answer is not correct. The student may have confused the maximum value for the minimum value.

B. The function has a maximum value.

This answer is correct. The student has identified the correct statement.

C. The function will intercept the y-axis at $(0, 8)$.

This answer is not correct. The student may have been confused about the prompt and chose a statement that was correct based on the equation.

D. The function will intercept the x-axis at $(-2, 0)$.

This answer is not correct. The student may have not known that the -2 coefficient determines the shape of the function.

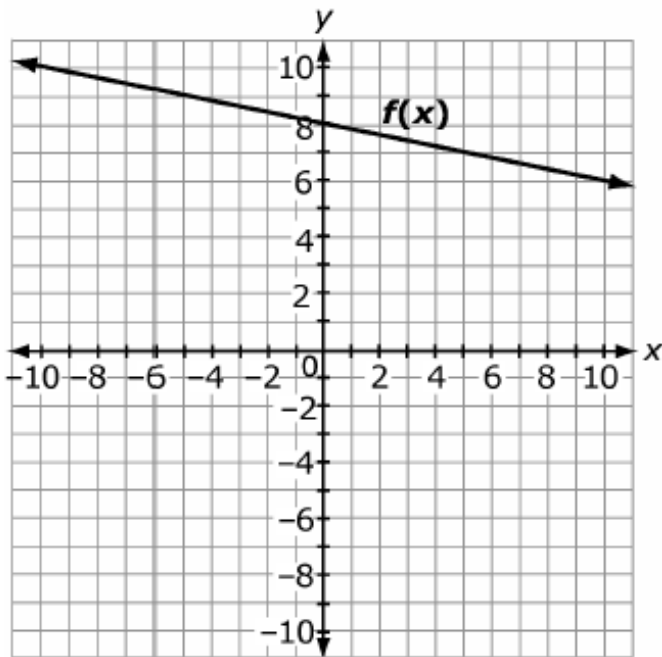
Question 23

Reporting Category: Algebraic Concepts & Procedures

Common Core Standard: F-IF.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*

Answer Key: C

Two functions, $f(x)$ and $g(x)$, are shown.



$$g(x) = 2x^2 - 10x + 8$$

Which statement about their intercepts is true?

- A. The x-intercepts of $f(x)$ and $g(x)$ are equal.

This answer is not correct. The student may have thought the 8 in both the linear and quadratic revealed the x-intercepts.

- B. The x-intercept of $f(x)$ is less than the x-intercept of $g(x)$.

This answer is not correct. The student may have recognized the quadratic has two x-intercepts and confused the functions' properties.

- C. The y-intercepts of $f(x)$ and $g(x)$ are equal.

This answer is correct. The student correctly compared $g(x)$ and $f(x)$ to determine that their y-intercepts are equivalent.

D. The y -intercept of $f(x)$ is greater than the y -intercept of $g(x)$.

This answer is not correct. The student may have believed the linear y -intercept was greater than the quadratic y -intercept.

Question 24

Reporting Category: Modeling & Problem Solving

Common Core Standard: N-Q.2: Define appropriate quantities for the purpose of descriptive modeling.

Answer Key: A

Mrs. Williams predicts that as students spend more time studying for a math test, their scores will improve.

What are the appropriate variables to model this situation?

- independent variable: the number of hours spent studying
A. dependent variable: the scores on the tests

This answer is correct. The student identified the variables that represent the situation.

- independent variable: the scores on the tests
B. dependent variable: the number of hours spent studying

This answer is not correct. The student may have mixed up the dependent and independent variables.

- independent variable: the number of minutes spent completing the test
C. dependent variable: the scores on the tests

This answer is not correct. The student may have thought the amount of time spent completing the test was relevant.

- independent variable: the scores on the tests
D. dependent variable: the number of minutes spent completing the test

This answer is not correct. The student may have thought the amount of time spent completing the test is the dependent variable and that that information would be relevant.

Question 25

Reporting Category: Modeling & Problem Solving

Common Core Standard: N-Q.2: Define appropriate quantities for the purpose of descriptive modeling.

Answer Key: B

The manager of a coffee shop suspects that as the outside temperature decreases in the evening, the number of hot beverages she sells will increase. The manager creates a model to see whether this is true.

What are the **most appropriate** variables for this model?

- A. independent variable: number of hot beverages sold
dependent variable: hourly outside temperature

This answer is not correct. The student may not have understood that the hourly outside temperature does not depend on the number of hot beverages sold.

- B. independent variable: hourly outside temperature
dependent variable: number of hot beverages sold

This answer is correct. *The student understands that the manager is interested in how the sales of hot beverages change based on temperature throughout the evening. Therefore, the hourly temperature and number of hot beverages sold are appropriate variables for this model.*

- C. independent variable: number of hot beverages sold
dependent variable: average evening outside temperature

This answer is not correct. The student may not have understood that the average evening outside temperature does not depend on the number of hot beverages sold.

- D. independent variable: average evening outside temperature
dependent variable: number of hot beverages sold

This answer is not correct. The student may not have understood that "throughout the evening" indicates tracking temperature in units smaller than one evening.

Question 26

Reporting Category: Modeling with Problem Solving

Common Core Standard: A-CED.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

Answer Key: C

John is replacing two strings of his guitar, and he has two pieces of information about them.

- One string is 3 inches longer than the other string.
- The product of the strings' lengths is 108 inches.

Which equation should John solve to find the length of the shorter string, x ?

A. $108 = (x + 3)^2$

This answer is not correct. The student may have misunderstood that the strings' lengths are relative to each other, and that $x + 3$ cannot represent both of two different lengths.

B. $108 = x(x - 3)$

This answer is not correct. The student may have thought that $x - 3$ represents the shorter string.

C. $108 = x(x + 3)$

This answer is correct. The student set up the equation $x(x + 3) = 108$.

D. $108 = (x + 3)(x - 3)$

This answer is not correct. The student may have thought that the long string could be represented by $x + 3$ and the short string could be represented by $x - 3$.

Question 27

Reporting Category: Modeling & Problem Solving

Common Core Standard: A-CED.1: Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

The height of a triangle is 4 feet less than the length of its base, b . The area of the triangle is 30 square feet.

Use the Connect Line tool to draw this triangle.

1 foot

Scoring Rubric:

1 point

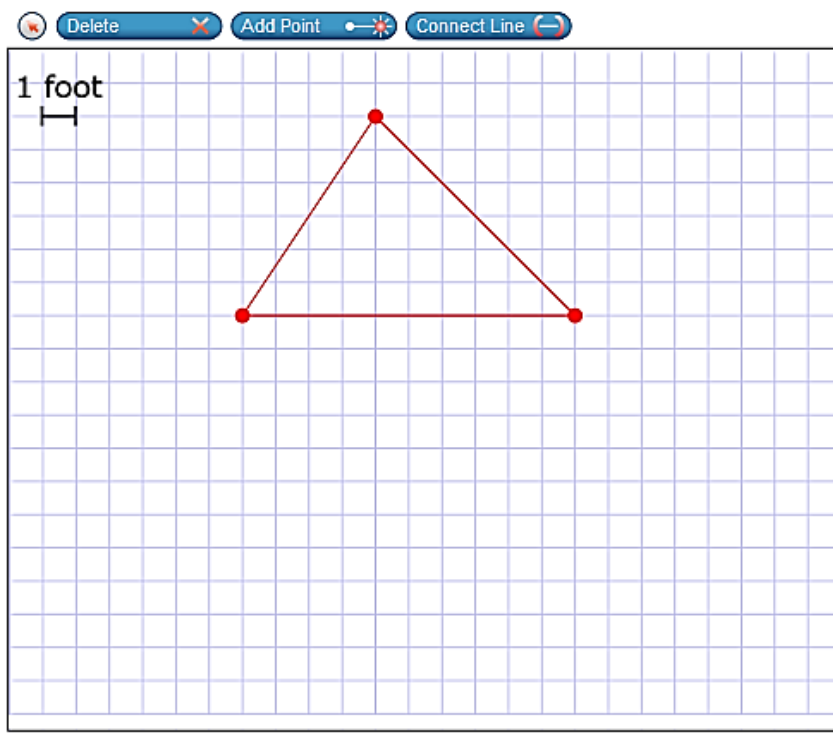
For this item, the response correctly

- includes a triangle with the proper base and height.

Sample Correct Answer:

The height of a triangle is 4 feet less than the length of its base, b . The area of the triangle is 30 square feet.

Use the Connect Line tool to draw this triangle.



Explanation of Correct Answer:

First, to write an equation to describe the situation, note that the formula for the area of a triangle A is $A = \frac{1}{2}bh$. Since the height is 4 feet less than the length of the base, the height can be represented by $b - 4$. Then, substituting this expression for h and the given area for A in the formula gives the equation $30 = \frac{1}{2}b(b - 4)$. The steps to solve this equation for b are shown below.

$$30 = \frac{1}{2}b(b - 4)$$

$$60 = b(b - 4)$$

$$60 = b^2 - 4b$$

$$0 = b^2 - 4b - 60$$

$$0 = (b - 10)(b + 6)$$

Thus, the solutions for b are 10 and -6 . Since the length of the base cannot be negative, it must be 10 feet. Then, because the height of the triangle is given by $b - 4$, the height of the triangle is 6 feet. A correct response is obtained by drawing any triangle whose base is 10 feet and height is 6 feet.

Question 28

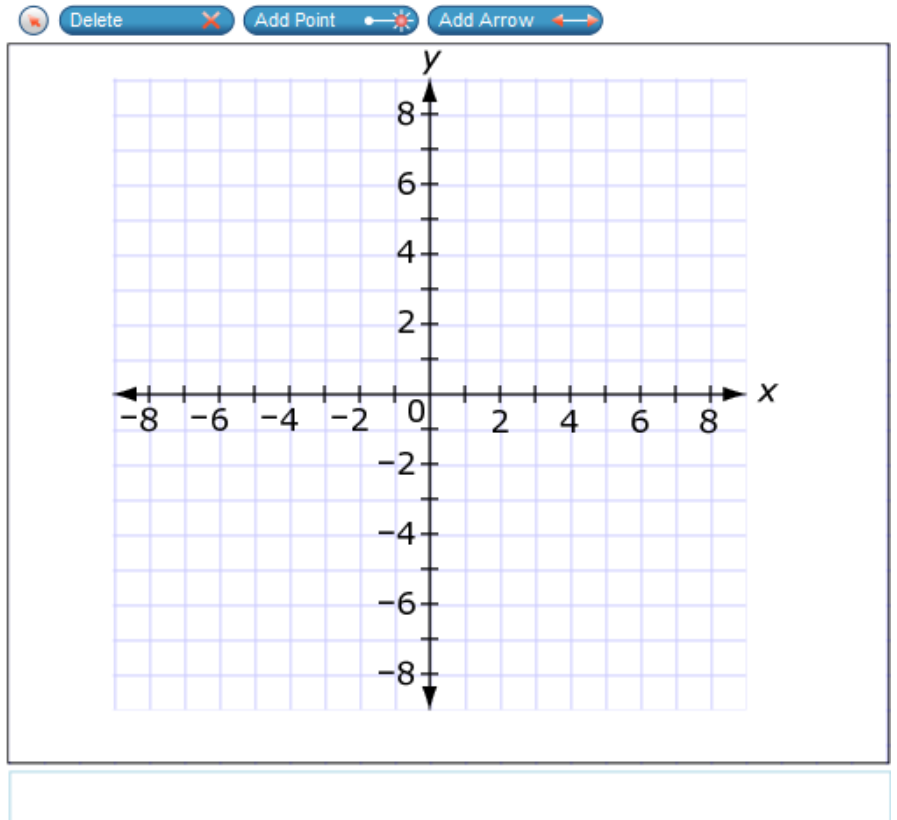
Reporting Category: Modeling & Problem Solving

Common Core Standard: A-CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A linear equation is shown.

$$3x + 2y = 6$$

Use the Add Arrow tool to graph this equation.



Scoring Rubric:

1 point

For this item, the response correctly

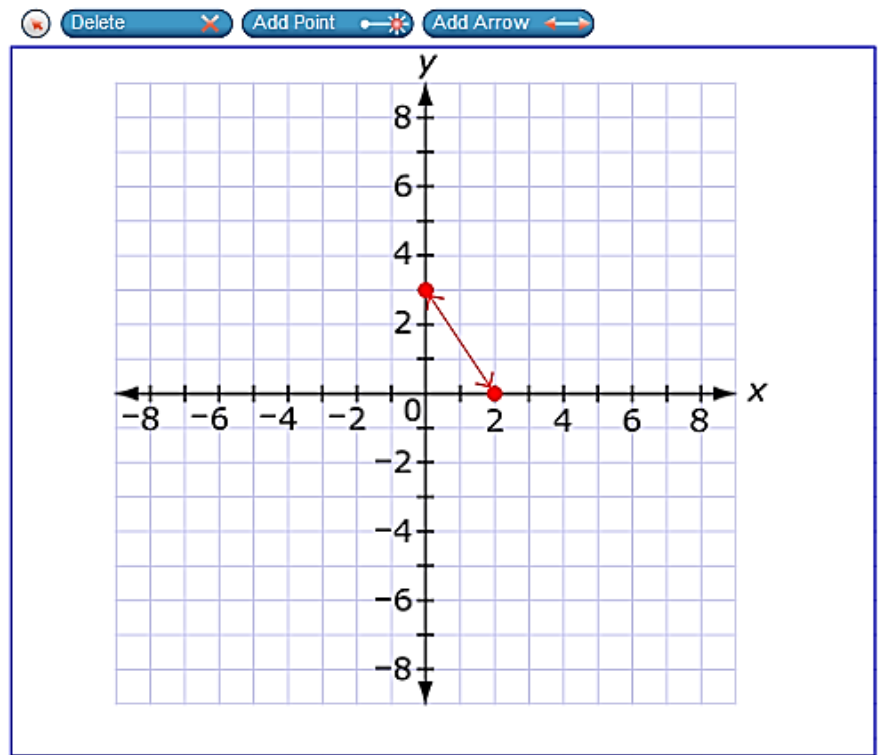
- draws a line with a slope of $-\frac{3}{2}$ and a y-intercept of 3.

Sample Correct Answer:

A linear equation is shown.

$$3x + 2y = 6$$

Use the Add Arrow tool to graph this equation.



Explanation of Correct Answer:

The linear equation $3x + 2y = 6$ can be rewritten in slope-intercept form as $y = -\frac{3}{2}x + 3$.

This form indicates that the line has a slope of $-\frac{3}{2}$ and a y-intercept at $(0, 3)$.

Question 29

Reporting Category: Modeling & Problem Solving

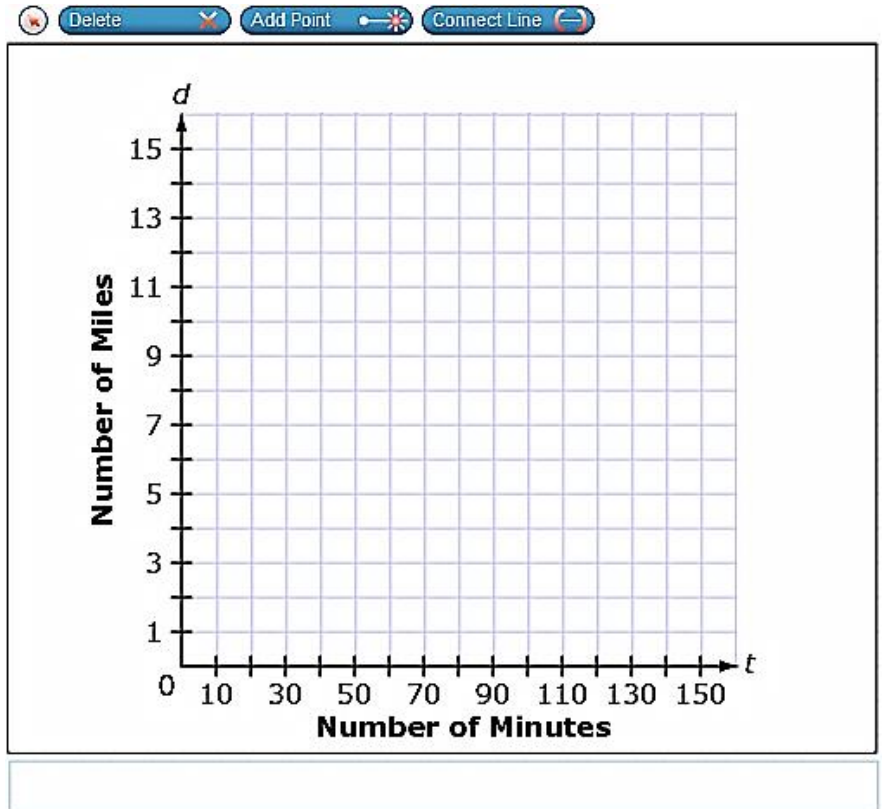
Common Core Standard: A-SSE.1a: Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients.

Beth is running around a park on a trail that is 7 miles long. The number of miles Beth has run, d , after t minutes is modeled by the equation shown.

$$d = \frac{1}{15}t + 1$$

Kyle is running around the same trail and starts at the same time as Beth. His speed is $\frac{3}{4}$ as fast as Beth's speed, and he starts a mile behind her.

Use the Connect Line tool to graph the equation that models Kyle's run at this speed.



Scoring Rubric:

1 point

For this item, the response correctly

- graphs the equation.

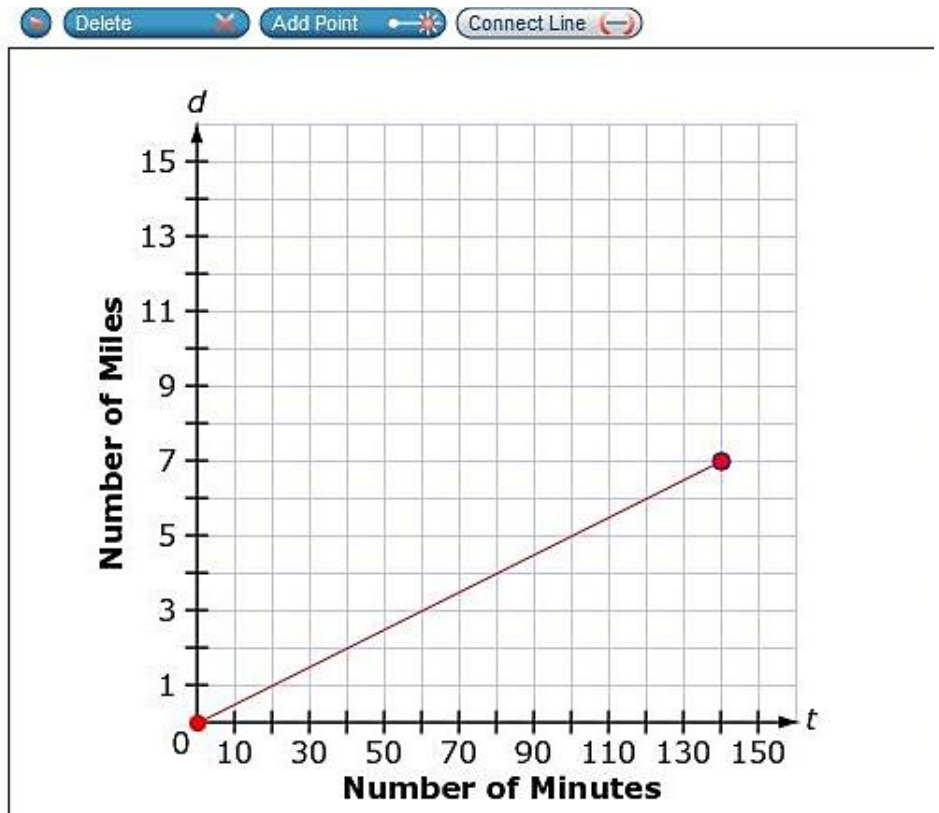
Sample Correct Answer:

Beth is running around a park on a trail that is 7 miles long. The number of miles Beth has run, d , after t minutes is modeled by the equation shown.

$$d = \frac{1}{15}t + 1$$

Kyle is running around the same trail and starts at the same time as Beth. His speed is $\frac{3}{4}$ as fast as Beth's speed, and he starts a mile behind her.

Use the Connect Line tool to graph the equation that models Kyle's run at this speed.



Explanation of Correct Answer:

First, note that the slope of Beth's equation indicates that she runs at a pace of $\frac{1}{15}$ mile per minute. Since Kyle runs $\frac{3}{4}$ as fast, he runs at a pace of $\frac{1}{15} \cdot \frac{3}{4} = \frac{1}{20}$ mile per minute, and the slope of his equation should be $\frac{1}{20}$.

Also, note that the y -intercept of Beth's equation is 1, meaning that she starts 1 mile into the trail. Since Kyle starts a mile behind her, he starts at the beginning of the trail, and the y -intercept of his equation is 0. Thus, the equation that models Kyle's run is $d = \frac{1}{20}t$.

To graph this equation, use the y -intercept and slope. Two points on the line are (0, 0) and (20, 1). Since the trail is 7 miles long, the line segment ends at (140, 7). The graph of the equation for Kyle's run is determined by drawing a line segment connecting the points (0, 0) and (140, 7).

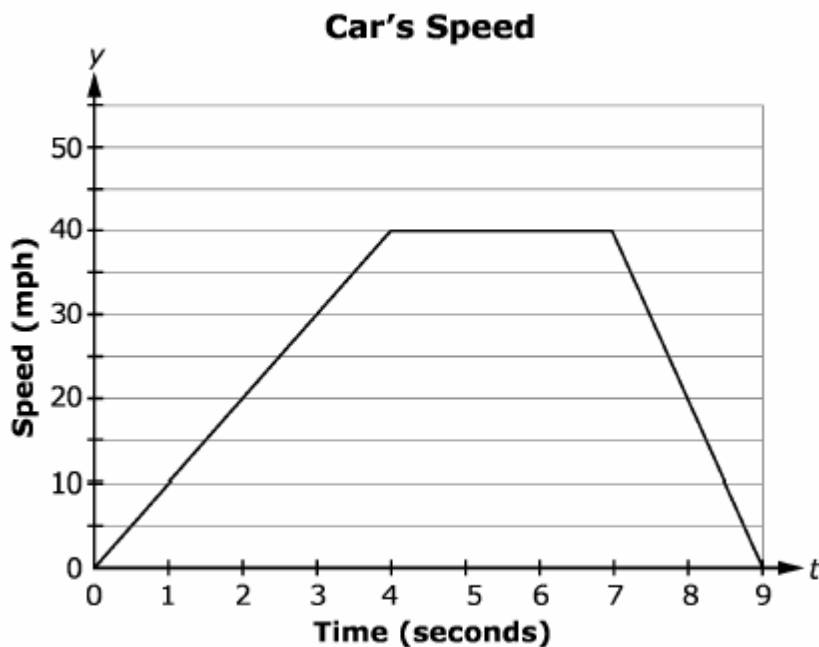
Question 30

Reporting Category: Modeling with Problem Solving

Common Core Standard: F-IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

Answer Key: C

The graph shows a car's speed, in miles per hour, over time.



During which interval of time is the car's speed constant?

A. $0 < t < 9$

This answer is not correct. The student may have thought the speed was constant the entire time.

B. $0 < t < 4$

This answer is not correct. The student may have confused the slope with the constant speed.

C. $4 < t < 7$

This answer is correct. The student correctly identified the interval where the speed was constant.

D. $7 < t < 9$

This answer is not correct. The student may have thought constant speed was the same as a constantly decreasing slope.

Question 31

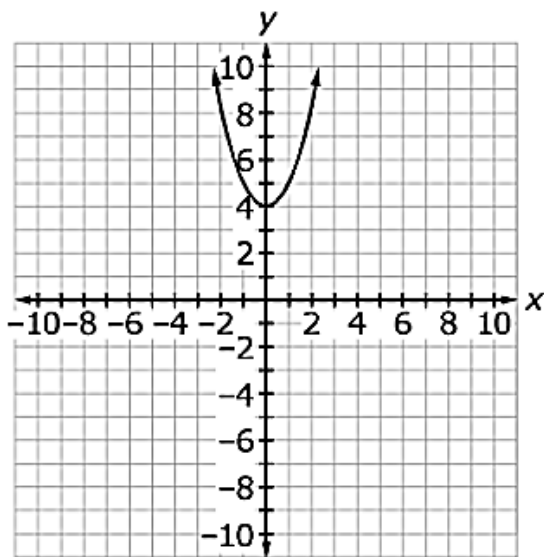
Reporting Category: Modeling & Problem Solving

Common Core Standard: F-IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

Answer Key: B

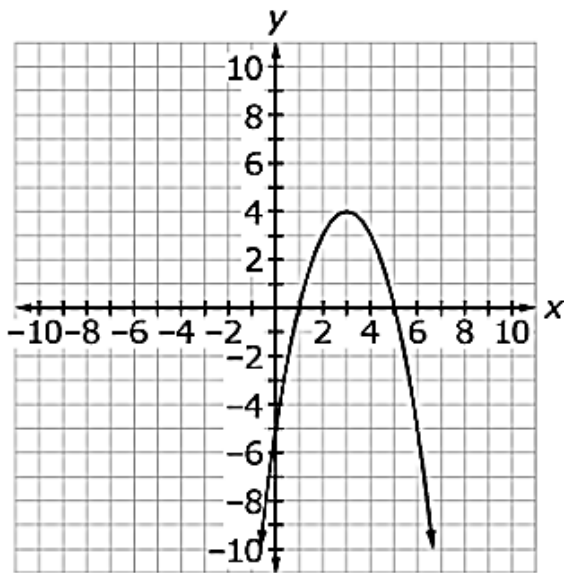
Which graph changes from increasing to decreasing after $y = 4$?

A.



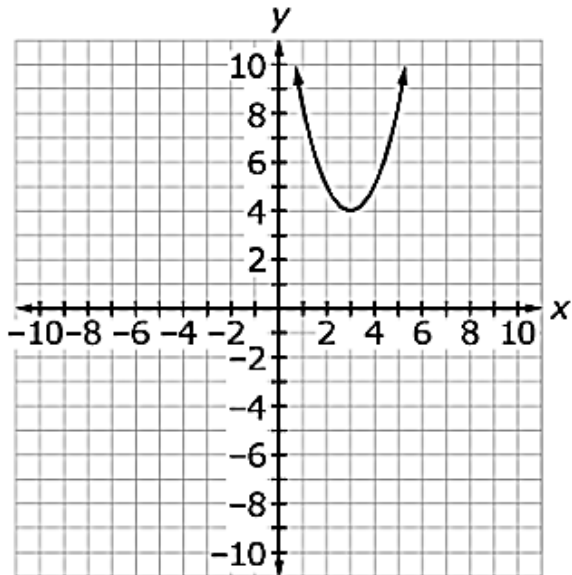
This answer is not correct. This graph changes from decreasing to increasing where $y = 4$, which is the opposite of the change we are looking for. The graph should have a maximum at that point, not a minimum.

B.



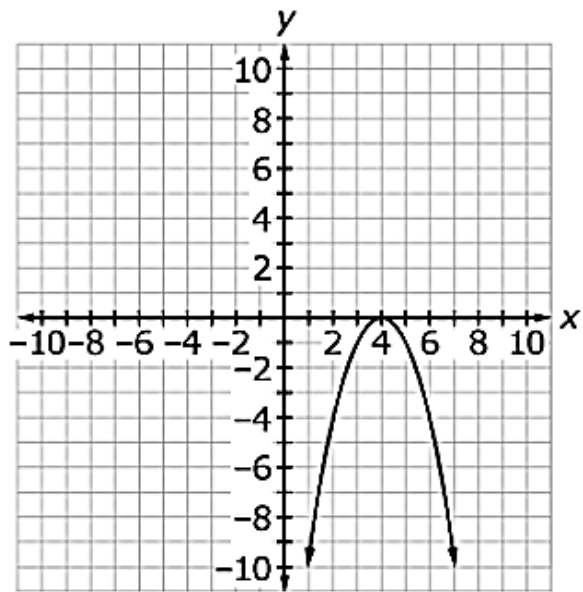
This answer is correct. The graph has a maximum value at $y = 4$. This means that it changes from increasing to decreasing at that point.

C.



This answer is not correct. The graph intersects $y = 4$, but it changes from decreasing to increasing, which is the opposite of the change we are looking for.

D.



This answer is not correct. This graph changes from increasing to decreasing at $x = 4$, not at $y = 4$.

Question 32

Reporting Category: Modeling & Problem Solving

Common Core Standard: F-IF.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*

Answer Key: A

A student creates a function to represent the cost of pencils available for purchase at the school store. The store charges 5 cents a pencil for up to 20 pencils.

What is the domain of this function?

A. all integers from 0 to 20

This answer is correct. *The student recognized the domain of the function.*

B. all real numbers from 0 to 20

This answer is not correct. The student may have thought that the domain was all real numbers but did not realize that you cannot buy part of a pencil.

C. all integer multiples of 5 from 5 to 100

This answer is not correct. The student may have confused the domain and range.

D. all real number multiples of 5 from 5 to 100

This answer is not correct. The student may have confused the domain and range and thought the values were real numbers instead of integers.

Question 33

Reporting Category: Modeling & Problem Solving

Common Core Standard: F-IF.5: Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*

Answer Key: C

The function $h(n)$ describes the total amount of money a movie theater receives for n tickets sold.

Which domain is appropriate for this function?

A. all integers

This answer is not correct. The student may not have understood that integers include negative numbers or that the number of tickets sold cannot be negative.

B. all real numbers

This answer is not correct. The student may have incorrectly stated the domain of a linear function.

C. all positive integers and zero

This answer is correct. *The number of tickets sold must be a positive whole number.*

D. all positive real numbers and zero

This answer is not correct. The student may not have realized that the positive real numbers include fractions and decimals, which are not possible since only whole tickets can be sold to a movie theater.

Question 34

Reporting Category: Modeling & Problem Solving

Common Core Standard: F-IF.8a: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of the context.

A quadratic function is shown.

$$f(x) = -x^2 + 7x - 12$$

One factor of this function is $(x - 4)$.

What is the other factor of the quadratic function?

← → ↶ ↷ ✕											
1	2	3	$f(x)$	x							
4	5	6	+	-	*	÷					
7	8	9	<	≤	=	≥	>				
0	.	-	$\frac{\square}{\square}$	\square^\square	\square_\square	()		$\sqrt{\square}$	$\sqrt[\square]{\square}$	π	i

Scoring Rubric:

1 point

For this item, the response correctly

- identifies the other factor.

Sample Correct Answer:

A quadratic function is shown.

$$f(x) = -x^2 + 7x - 12$$

One factor of this function is $(x - 4)$.

What is the other factor of the quadratic function?

(-x+3)											
← → ↶ ↷ ✕											
1	2	3	f(x)	x							
4	5	6	+	-	*	÷					
7	8	9	<	≤	=	≥	>				
0	.	-	$\frac{\square}{\square}$	\square^\square	\square_\square	()		$\sqrt{\square}$	$\sqrt[\square]{\square}$	π	i

Explanation of Correct Answer:

The quadratic function can be factored as shown.

$$\begin{aligned} f(x) &= -x^2 + 7x - 12 \\ &= -x^2 + 4x + 3x - 12 \\ &= -x(x - 4) + 3(x - 4) \\ &= (-x + 3)(x - 4) \end{aligned}$$

Since the factor $(x - 4)$ is given, the other factor is $(-x + 3)$.

Sequence of Keypad Clicks to Enter the Answer:

(, -, x, +, 3

Question 35

Reporting Category: Modeling with Problem Solving

Common Core Standard: F-IF.8a: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Answer Key: B

Kevin solves the quadratic equation shown by completing the square.

$$x^2 + 6x - 9 = 0$$

Which equation is equivalent to the quadratic equation shown?

A. $(x + 3)^2 = 9$

This answer is not correct. The student may have correctly added to move 9 to the right side but forgot to add $(6/2)^2$ to both sides when completing the square on the left.

B. $(x + 3)^2 = 18$

This answer is correct. *The student correctly completed the square. First, the constant was moved to the other side of the equation. Then, the coefficient of x was divided by 2 and squared, then added to both sides. So, moving 9 yielded $x^2 + 6x = 9$. Then $(6/2)^2 = 3^2 = 9$, which was added to both sides. This resulted in $x^2 + 6x + 9 = 18$, or $(x + 3)^2 = 18$.*

C. $(x + 6)^2 = 27$

This answer is not correct. The student may have added 9 to the left side but subtracted it from the right, yielding $x^2 + 6x = -9$. The student may have continued by using 6^2 rather than $(6/2)^2$ to complete the square.

D. $(x + 6)^2 = 45$

This answer is not correct. The student may have used 6^2 rather than $(6/2)^2$.

Question 36

Reporting Category: Modeling & Problem Solving

Common Core Standard: F-BF.1a: Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

An artist uses tiles to create a design. The design is created in stages and the total number of tiles the artist uses in each stage follows a pattern, as shown in the table.

Artist's Design

Stage Number	Total Number of Tiles
1	1
2	3
3	5
4	7
5	9
6	11
7	13

Create an equation that models the number of tiles in a given stage.

←→↶↷✖

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

Scoring Rubric:

1 point

For this item, the response correctly

- identifies an equivalent equation.

Sample Correct Answer:

An artist uses tiles to create a design. The design is created in stages and the total number of tiles the artist uses in each stage follows a pattern, as shown in the table.

Artist's Design

Stage Number	Total Number of Tiles
1	1
2	3
3	5
4	7
5	9
6	11
7	13

Create an equation that models the number of tiles in a given stage.

$$y=2x-1$$

← → ↶ ↷ ✖

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

Explanation of Correct Answer:

Since the difference between consecutive numbers of tiles is constant, the given information should be modeled by a linear equation.

To determine the slope of the equation, find the slope between any two points in the table. For example, find the slope between (1, 1) and (2, 3) as shown.

$$\begin{aligned} m &= \frac{3-1}{2-1} \\ &= 2 \end{aligned}$$

To determine the y -intercept of the equation, use the value of m and any point in the table in the equation $y = mx + b$ and solve. The steps to solve for b using the point $(3, 5)$ from the table are shown.

$$\begin{aligned}y &= mx + b \\5 &= (2)(3) + b \\5 &= 6 + b \\-1 &= b\end{aligned}$$

Thus, the equation that models the number of tiles is $y = 2x - 1$.

Sequence of Keypad Clicks to Enter the Answer:

y , =, 2, x , -, 1

Question 37

Reporting Category: Modeling with Problem Solving

Common Core Standard: F-BF.1a: Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

The table shows some values of a linear relationship between two quantities.

x	$f(x)$
5	6
8	?
?	42
14	60

Create a linear function $f(x)$ that represents this relationship in terms of x .

← → ↶ ↷ ✖

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

Scoring Rubric:

1 point

For this item, the response correctly

- identifies the function.

Sample Correct Answer:

The table shows some values of a linear relationship between two quantities.

x	$f(x)$
5	6
8	?
?	42
14	60

Create a linear function $f(x)$ that represents this relationship in terms of x .

$f(x) = 6x - 24$

← → ↶ ↷ ✖

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

Explanation of Correct Answer:

Since the function $f(x)$ is linear, it will have the form $f(x) = mx + b$, where m is the slope of the line and b is the y -intercept of the line.

To determine the slope, find the slope between any two points in the table. For example, find the slope between (5, 6) and (14, 60) as shown.

$$m = \frac{60 - 6}{14 - 5} = 6$$

To determine the y -intercept, substitute the value of m and one of the points in the table in the function $f(x) = mx + b$ and solve. The steps to solve for b using the point (5, 6) from the table are shown.

$$\begin{aligned}y &= mx + b \\6 &= (5)(6) + b \\6 &= 30 + b \\-24 &= b\end{aligned}$$

Thus, the linear function that models the number of tiles is $f(x) = 6x - 24$.

Sequence of Keypad Clicks to Enter the Answer:

$f(x)$, =, 6, x , -, 2, 4

Question 38

Reporting Category: Modeling with Problem Solving

Common Core Standard: F-LE.5: Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.

Answer Key: B

The total cost for a rental car, C , and the number of miles driven, m , can be modeled by the equation shown.

$$C = 0.99m + 25$$

What is the **best** interpretation of the slope in the equation?

A. the number of miles driven

This answer is not correct. The student may have confused the rate for each mile with the number of miles driven.

B. the cost for each mile driven

This answer is correct. The student identified that the slope is the cost for each mile driven.

C. the total cost for the rental car

This answer is not correct. The student may have confused the slope with the total cost for the rental car.

D. the initial cost for the rental car

This answer is not correct. The student may have confused the slope with the constant term in the equation.

Question 39

Reporting Category: Modeling & Problem Solving

Common Core Standard: F-LE.5: Interpret the parameters in a linear or exponential function in terms of a context.


The students in a science class constructed bridges made from toothpicks and glue. Each bridge was made following these rules:

- Each bridge used the same number of toothpicks.
- The width of each bridge was the same.
- The length of each bridge could vary.

Students recorded the maximum number of pennies each bridge could hold in a cup hanging from the center of the bridge before breaking. They called this number the breaking weight.

The function $f(x) = -6x + 136$ represents the breaking weight of the pennies, $f(x)$, in terms of bridge length, x .

What is the change in the breaking weight of the pennies, for each increase in one unit of the length of the bridge?



The calculator interface includes a top row of navigation buttons: left arrow, right arrow, undo, redo, and delete. Below this is a numeric keypad with buttons for digits 1-9, 0, a decimal point, and a negative sign.

Scoring Rubric:

1 point

For this item, the response correctly

- identifies a value equivalent to 6 or -6.

Sample Correct Answer:

The students in a science class constructed bridges made from toothpicks and glue. Each bridge was made following these rules:

- Each bridge used the same number of toothpicks.
- The width of each bridge was the same.
- The length of each bridge could vary.

Students recorded the maximum number of pennies each bridge could hold in a cup hanging from the center of the bridge before breaking. They called this number the breaking weight.

The function $f(x) = -6x + 136$ represents the breaking weight of the pennies, $f(x)$, in terms of bridge length, x .

What is the change in the breaking weight of the pennies, for each increase in one unit of the length of the bridge?

-6				
←	→	↶	↷	✖
1	2	3		
4	5	6		
7	8	9		
0	.	-		

Explanation of Correct Answer:

First, note that the length of the bridge is represented by the variable x . The change in the value of y for each increase in one unit of x is given by the slope in a linear equation. Thus, since the breaking weight $f(x)$ is given by the function $f(x) = -6x + 136$, the change in the breaking weight for each increase of one unit of the length of the bridge is -6 .

Question 40

Reporting Category: Modeling & Problem Solving

Common Core Standard: S-ID.6a: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.

Scott records the number of people waiting at a bus stop throughout the afternoon and evening, as shown in the scatter plot.

Click a number or numbers to show the y -intercept for the line of best fit.

To help solve the problem, you can use the Add Arrow tool to draw the line of best fit.

Delete Add Point Add Arrow

People at a Bus Stop

Time of Day (p.m.)	Number of People
1	6
2	4
3	8
4	12
5	14
6	16
7	16
8	14

The y -intercept for the line of best fit is:

<input type="text"/>	<input type="text"/>
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Scoring Rubric:

1 point

For this item, the response correctly

- identifies a y -intercept of 2, 3, 4, or 5.

Sample Correct Answer:

Scott records the number of people waiting at a bus stop throughout the afternoon and evening, as shown in the scatter plot.

Click a number or numbers to show the y -intercept for the line of best fit.

To help solve the problem, you can use the Add Arrow tool to draw the line of best fit.

People at a Bus Stop

Time of Day (p.m.)	Number of People
12	6
2	4
3	8
4	12
5	14
6	16
7	16
8	14

The y -intercept for the line of best fit is:

<input type="text"/>	<input type="text" value="4"/>
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Explanation of Correct Answer:

To get a better idea of the answer, draw an approximate line of best fit on the provided scatter plot. Note that this line does not need to be included to get full credit for this response. Since the line drawn intersects the y -axis at $y = 4$, the y -intercept is 4. Any value from 2 through 5 inclusive would be acceptable for the y -intercept.

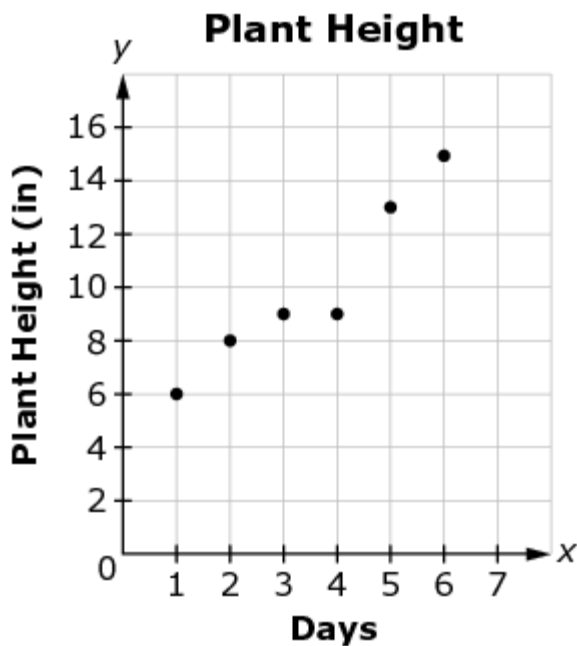
Question 41

Reporting Category: Modeling with Problem Solving

Common Core Standard: S-ID.6c: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. c. Fit a linear function for a scatter plot that suggest a linear association.

Answer Key: C

Kate is growing a tomato plant and records its height over several days, as shown.



Which equation represents a line of best fit for the height of Kate's plant?

A. $y = \frac{1}{2}x + 4$

This answer is not correct. The student may have underestimated the slope.

B. $y = -\frac{1}{2}x + 4$

This answer is not correct. The student may have thought the line of best fit should have a negative slope.

C. $y = 2x + 4$

This answer is correct. The student recognized that the line should have a slope of about 2 and a y-intercept around 4.

D. $y = -2x + 4$

This answer is not correct. The student may have reversed the sign of the slope.

Question 42

Reporting Category: Modeling with Problem Solving

Common Core Standard: S-ID.7: Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Answer Key: B

A moving company observes a relationship between the size of a house and the number of boxes needed to move the contents of that house.

The line of best fit is $y = \frac{1}{20}x + 10$ for the data, where x is the size of the house in square feet and y is the number of boxes needed.

What is the meaning of the slope of this line?

A. The company needs about 20 boxes for each square foot of the house.

This answer is not correct. The student may have mixed up the slope and its reciprocal.

B. The company needs another box for every 20 square feet of the house.

This answer is correct. The student found the slope to be $1/20$, which means that y increases by 1 whenever x increases by 20. In the context of the problem, this means that approximately 1 box is needed for every 20 square feet of house.

C. The company needs fewer than 20 boxes, regardless of the size of the house.

This answer is not correct. The student may have confused the meaning of the slope and y -intercept within this context.

D. The company needs at least 20 boxes, regardless of the size of the house.

This answer is not correct. The student may have confused the slope's number with the y -intercept's meaning.

Question 43

Reporting Category: Modeling & Problem Solving

Common Core Standard: S-ID.7: Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Answer Key: A

The annual average temperature of a location depends in part on its distance from the equator. The latitude at the equator is 0. Scientists collected data from a number of locations. The line of best fit for the data is $y = 90 - x$, where x is measured in degrees latitude and y is measured in degrees Fahrenheit.

What is the meaning of the constant term in this equation?

A. It is the average temperature at the equator.

***This answer is correct.** The constant term is the value of y when $x = 0$. Thus, $y = 90$ when the latitude is 0, that is, at the equator.*

B. It is the rate of change in temperature at the equator.

This answer is not correct. The student may have thought the constant term represented the rate of change.

C. It is the number of different locations where data were collected.

This answer is not correct. The student may have been confused by the equation parameters.

D. It is the rate of decrease of 1 degree in temperature for each degree in distance from the equator.

This answer is not correct. The student may have confused the meaning of slope and y -intercept.