The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I

Tuesday, January 23, 2018 — 1:15 to 4:15 p.m.
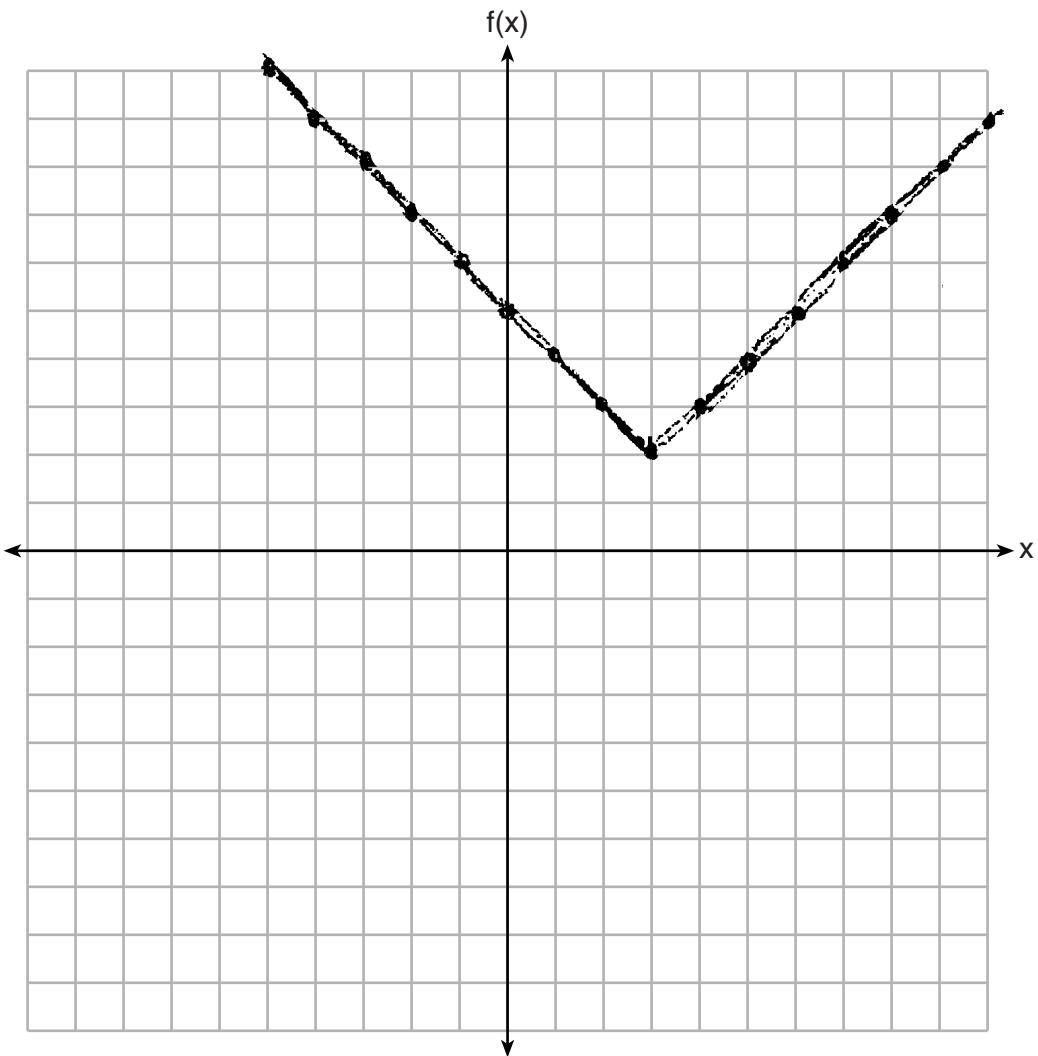
MODEL RESPONSE SET

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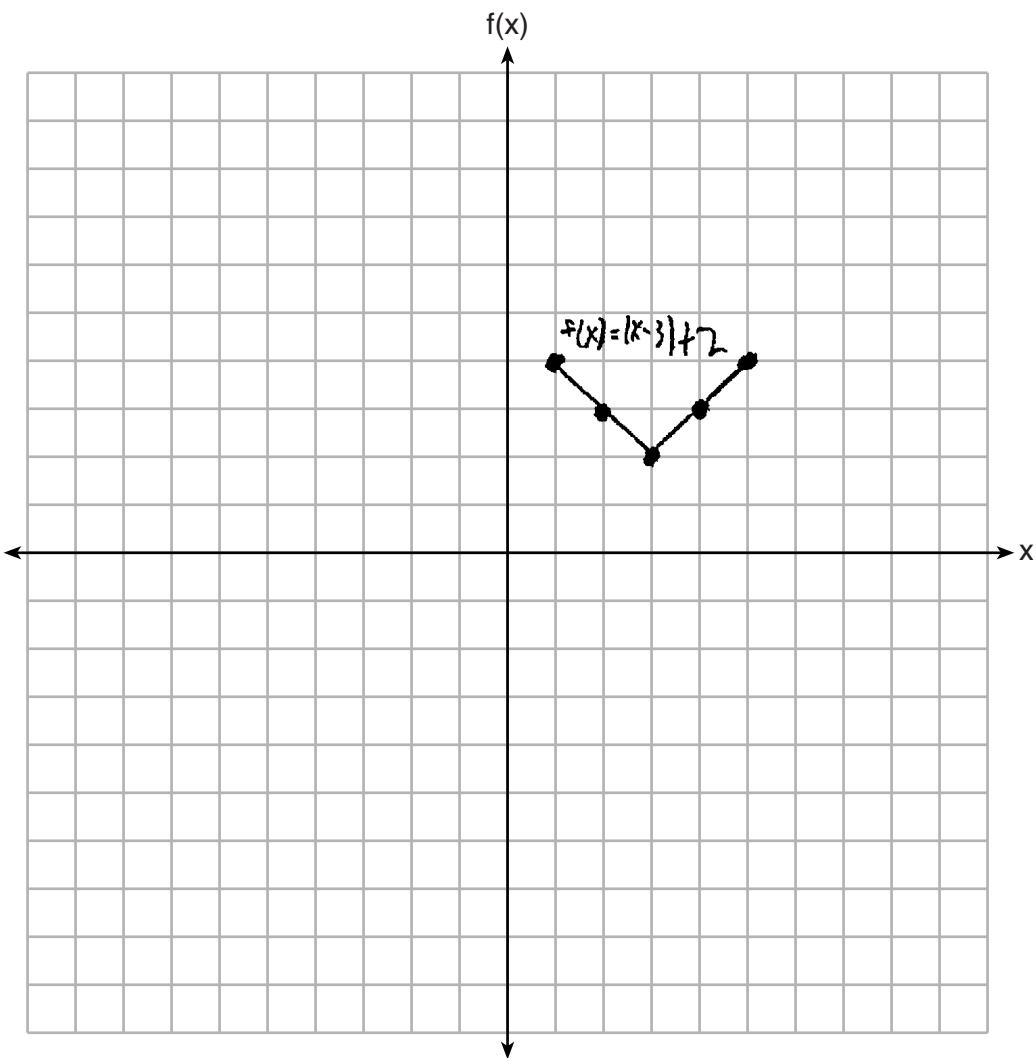
25 On the set of axes below, graph $f(x) = |x - 3| + 2$.

Score 2:   The student gave a complete and correct response.

25 On the set of axes below, graph $f(x) = |x - 3| + 2$.

f(x)

$f(x) = |x-3| + 2$

X

Score 1: The student only graphed the absolute value over the interval $1 \le x \le 5$.
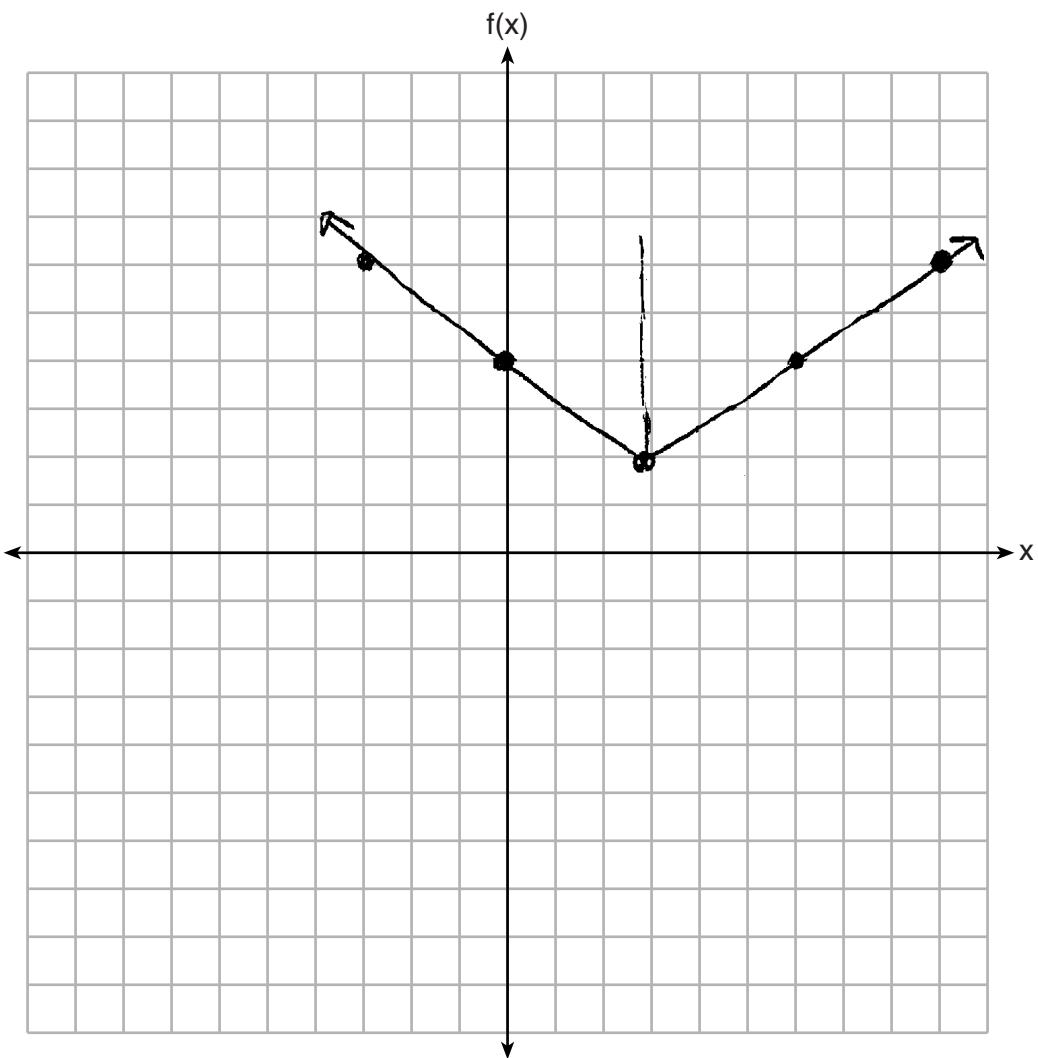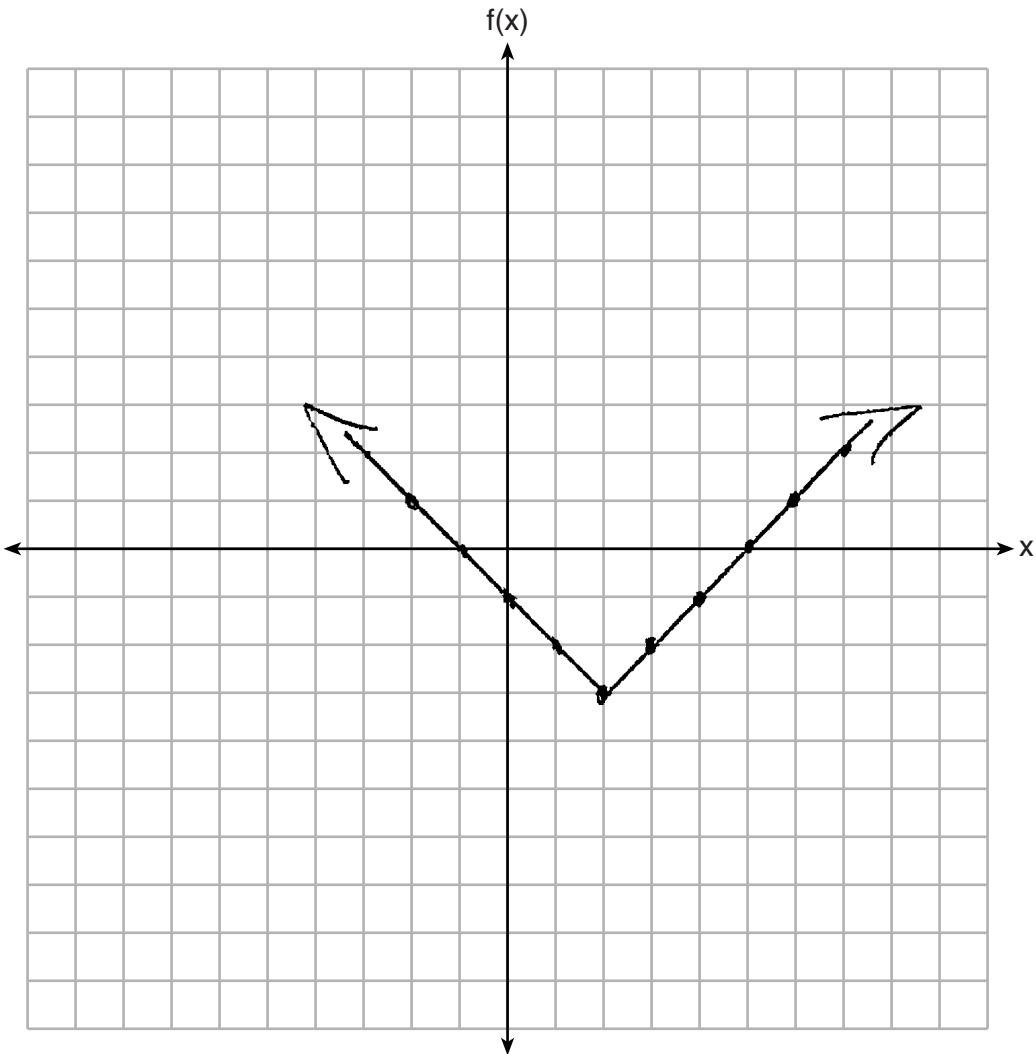
25 On the set of axes below, graph $f(x) = |x - 3| + 2$.

Score 1: The student only graphed (3,2), the vertex of the absolute value, correctly.

25 On the set of axes below, graph $f(x) = |x - 3| + 2$.

Score 0: The student interchanged the horizontal and vertical shifts and shifted in the wrong direction.

26 Determine all the zeros of $m(x) = x^2 - 4x + 3$, algebraically.

$$(x-3)(x-1)$$

$$x-3=0 \qquad x-1=0$$
$$+3 \quad +3 \qquad +1 \quad +1$$
$$\boxed{x=3} \qquad \boxed{x=1}$$

Score 2: The student gave a complete and correct response.

26 Determine all the zeros of $m(x) = x^2 - 4x + 3$, algebraically.

$$x = \boxed{1, 3}$$

Score 1: The student did not show any work.

26 Determine all the zeros of $m(x) = x^2 - 4x + 3$, algebraically.

$$x^2 - 4x + 3 = 0$$

$$(x + 1)(x - 4) = 0$$

$$x + 1 = 0 \qquad x - 4 = 0$$
$$+1 \ +1 \qquad +4 \ +4$$

$$\boxed{x = -1} \qquad \boxed{x = 4}$$

Score 0: The student factored incorrectly and made a computational error.

27 The distance traveled is equal to the rate of speed multiplied by the time traveled. If the distance is measured in feet and the time is measured in minutes, then the rate of speed is expressed in which units? Explain how you arrived at your answer.

$$d = rt \rightarrow \text{mins}$$

feet ↙ ↘ ?

The rate of speed would be feet per minute. This is because it is measuring how far something is traveling in a certain amount of minutes.

Score 2: The student gave a complete and correct response.

27 The distance traveled is equal to the rate of speed multiplied by the time traveled. If the distance is measured in feet and the time is measured in minutes, then the rate of speed is expressed in which units? Explain how you arrived at your answer.

$$\frac{\text{feet}}{\text{min}}$$

Score 1: The student wrote the correct units, but no explanation.
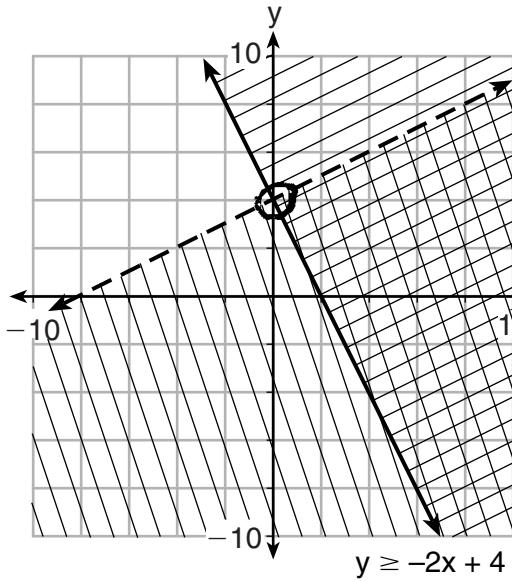
27 The distance traveled is equal to the rate of speed multiplied by the time traveled. If the distance is measured in feet and the time is measured in minutes, then the rate of speed is expressed in which units? Explain how you arrived at your answer.

Mph, because if your finding the rate of speed it wouldn4 make sense to do minutes or feet because none of those have anything to do with speed.

Score 0: The student wrote a completely incorrect response.

28 Determine if the point (0,4) is a solution to the system of inequalities graphed below. Justify your answer.

$y \geq -2x + 4$
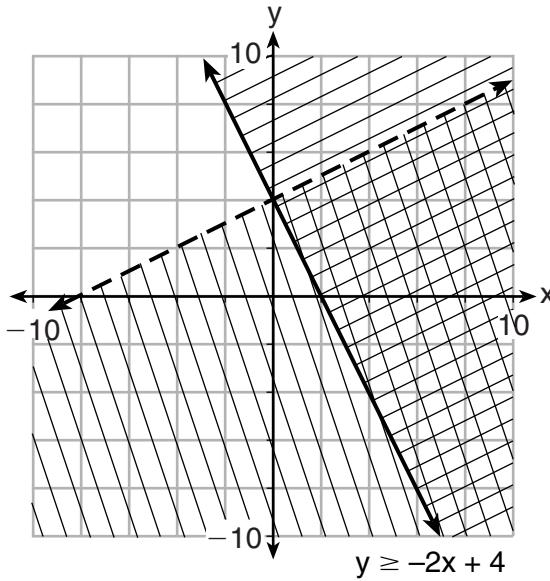
No because the line with the Positive slope is a dashed line meaning if a point falls on the line it is not a solution.

Score 2: The student gave a complete and correct response.

28 Determine if the point (0,4) is a solution to the system of inequalities graphed below. Justify your answer.

$$y < \frac{1}{2}x + 4$$

$$4 < \frac{1}{2} \cdot 0 + 4$$
$$4 < 4 \quad NO!$$

$$y \ge -2x + 4$$
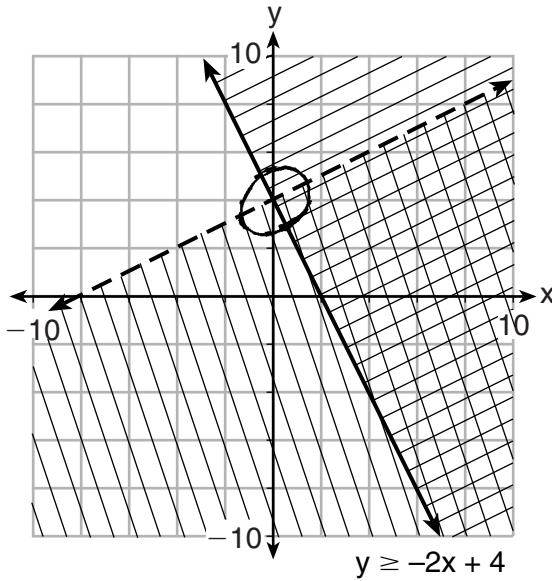
$$4 \ge -2 \cdot 0 + 4$$
$$4 \ge 4 \quad YES!$$

(0,4) IS NOT IN BOTH

Score 2: The student gave a complete and correct response.

28 Determine if the point (0,4) is a solution to the system of inequalities graphed below. Justify your answer.

$$y \geq -2x + 4$$
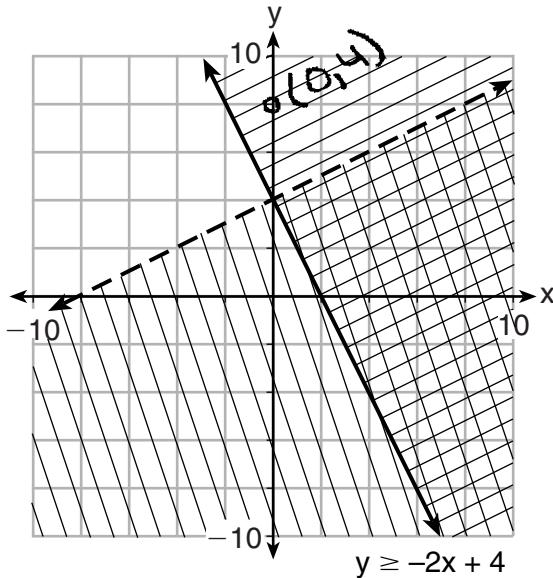
(0,4) is a solution to the inequalities because it is the point of intersection of the two lines.

Score 1: The student did not understand that a point on a dashed line is not part of the solution set.

28 Determine if the point (0,4) is a solution to the system of inequalities graphed below. Justify your answer.

$$y \geq -2x + 4$$
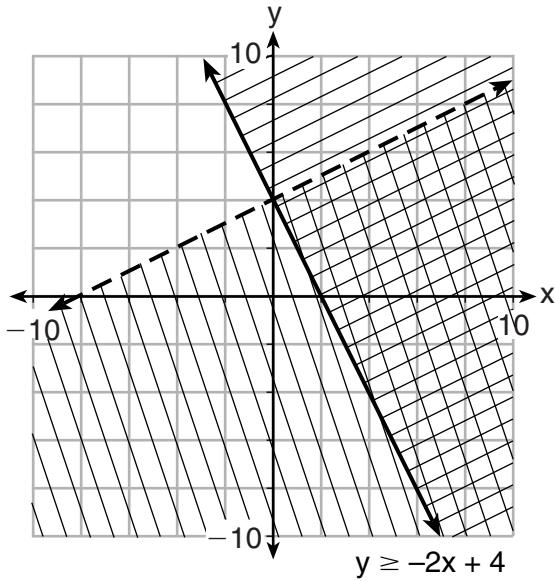
Point (0,4) is only a solution to one of the inequality's graphed. It is only a point in the top section with diagnol or horizontal lines. It is not in the waffle cross section or the other section

Score 1: The student graphed (0,4) incorrectly, but gave an appropriate justification.

28 Determine if the point (0,4) is a solution to the system of inequalities graphed below. Justify your answer.

y ≥ −2x + 4
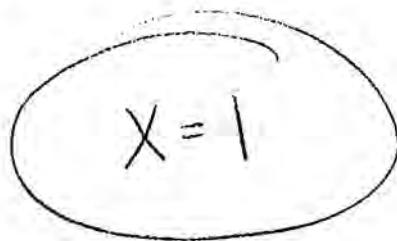
(0,4) is not a solution to the system of inequalities..

Score 0: The student did not give any justification.

29 If the zeros of a quadratic function, F, are -3 and 5, what is the equation of the axis of symmetry of F? Justify your answer.

$$\frac{-3+5}{2} = \frac{2}{2} = 1$$

$$X = 1$$

Score 2: The student gave a complete and correct response.

29 If the zeros of a quadratic function, F, are -3 and 5, what is the equation of the axis of symmetry of F? Justify your answer.

$$(x+3)(x-5) = y$$

$$
\begin{array}{c|c}
x & y \\
\hline
-1 & -12 \\
0 & -15 \\
1 & -16 \\
2 & -15 \\
3 & -12 \\
\end{array}
$$

$$x = 1$$

Score 2: The student gave a complete and correct response.

29 If the zeros of a quadratic function, F, are -3 and 5, what is the equation of the axis of symmetry of F? Justify your answer.

1, because ▮ −3 and 5 are 8 apart and half way on ~~~~ a graph is 1

Score 1: The student did not write the equation, but had a correct justification.

29 If the zeros of a quadratic function, F, are -3 and 5, what is the equation of the axis of symmetry of F? Justify your answer.

$$(x+3)(x-5)=0$$

$$y = x^2 - 2x - 15$$

Score 0: The student did not show enough work to receive any credit.

30 The formula $F_g = \dfrac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where G is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and r is the distance between them. Solve for the positive value of r in terms of F_g, G, M_1, and M_2.

Score 2: The student gave a complete and correct response.

30 The formula $F_g = \dfrac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where G is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and r is the distance between them. Solve for the positive value of r in terms of F_g, G, M_1, and M_2.

$$Fg = \frac{GM_1 M_2}{r^2} \cdot \frac{r^2}{F_1}$$

$$\frac{r^2 \cdot fg}{Fg} = \frac{GM_1 M_2}{Fg}$$

$$r^2 = \frac{GM_1 M_2}{Fg}$$

Score 1: The student solved for r^2, not r.

30 The formula $F_g = \dfrac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where G is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and r is the distance between them. Solve for the positive value of r in terms of F_g, G, M_1, and M_2.

$$F_g = \frac{GM_1M_2}{r^2}$$

$$r^2F_g = GM_1M_2$$

$$r^2 = \frac{GM_1M_2}{F_g}$$

$$r = \pm\sqrt{\frac{GM_1M_2}{F_g}}$$

Score 1: The student solved for both values of r.

30 The formula $F_g = \dfrac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where G is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and r is the distance between them. Solve for the positive value of r in terms of F_g, G, M_1, and M_2.

$$F_g = GM_1M_2 \over r^2$$

$$F_g \cdot r^2 = GM_1M_2$$
$$- F_g \qquad\qquad - F_g$$

$$\frac{r^2}{r} = \frac{GM_1M_2 - F_g}{r}$$

$$r = G\frac{M_1M_2 - F_g}{r}$$

Score 0: The student made multiple errors.

31 At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

Mathematics	55	93	89	60	90	45	64	76	89
Physics	66	89	94	52	84	56	66	73	92

State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data.

$$y = 0.8x + 15.19$$

$$r = 0.92$$

Explain what the correlation coefficient means with regard to the context of this situation.

$$r = 0.92$$

There is a high positive corellation between mathematics & Physics scores.

Score 2: The student gave a complete and correct response.

31 At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

Mathematics	55	93	89	60	90	45	64	76	89
Physics	66	89	94	52	84	56	66	73	92

State the correlation coefficient, to the _nearest hundredth_, for the line of best fit for these data.

$$y = 0.81x + 15.19$$

$$r = .92$$

Explain what the correlation coefficient means with regard to the context of this situation.

It means that the predicted <u>almost</u> represents the actual data perfectly

Score 1: The student wrote a correct correlation coefficient, but the explanation was not in context.

31 At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

Mathematics	55	93	89	60	90	45	64	76	89
Physics	66	89	94	52	84	56	66	73	92

State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data.

$$r = 0.92$$

Explain what the correlation coefficient means with regard to the context of this situation.

There is a strong positive correlation.

Score 1: The student wrote an explanation that was not in context.

31 At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

Mathematics	55	93	89	60	90	45	64	76	89
Physics	66	89	94	52	84	56	66	73	92

State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data.

.9215
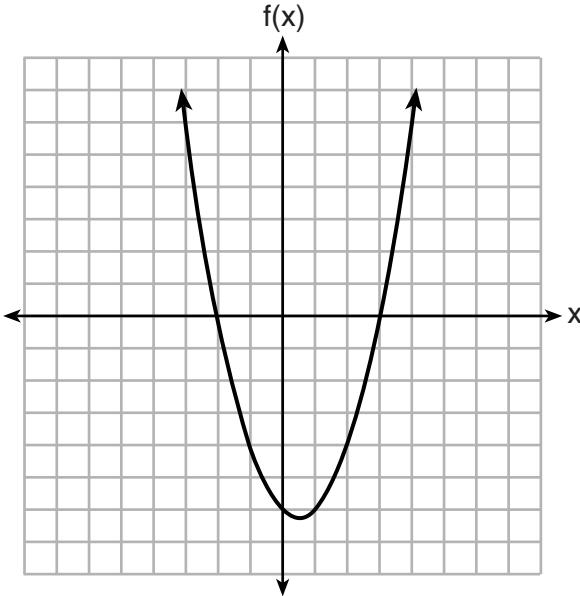
Explain what the correlation coefficient means with regard to the context of this situation.

I4b a best fit

Score 0: The student made a rounding error and wrote an incorrect explanation.

32 The graph of the function $f(x) = ax^2 + bx + c$ is given below.

f(x)
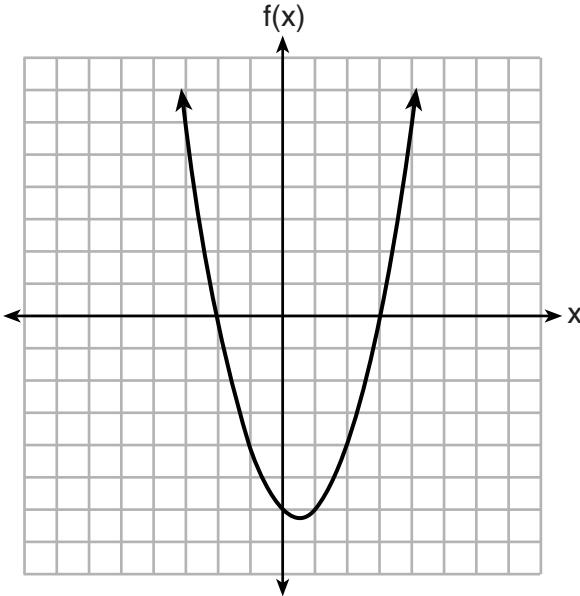
Could the factors of $f(x)$ be $(x + 2)$ and $(x - 3)$? Based on the graph, explain why or why *not*.

yes, because the x intercepts are (-2, 0) and (3, 0)

Score 2: The student gave a complete and correct response.

32 The graph of the function $f(x) = ax^2 + bx + c$ is given below.
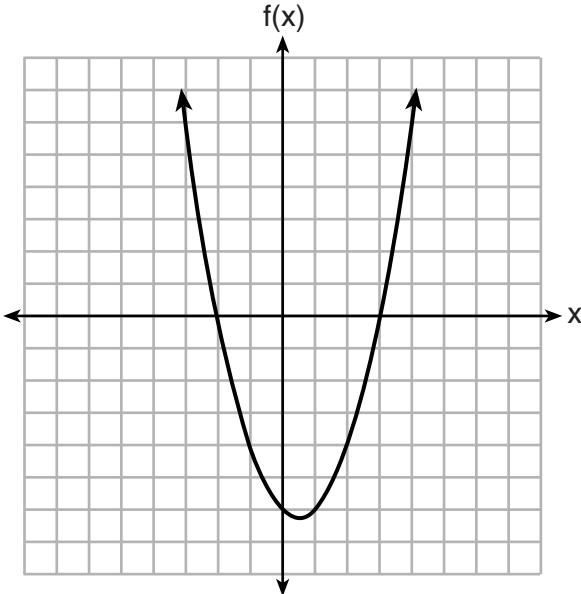
Could the factors of $f(x)$ be $(x + 2)$ and $(x - 3)$? Based on the graph, explain why or why *not*.

yes. $(x+2)=0$ $x-3=0$

    -2 -2 $+3$ $+3$

     $x = -2$ ✓ $x = 3$ ✓

Score 1: The student gave a justification, not an explanation.

32 The graph of the function $f(x) = ax^2 + bx + c$ is given below.

f(x)

Could the factors of $f(x)$ be $(x + 2)$ and $(x - 3)$? Based on the graph, explain why or why *not*.

$(x+2)=0$
-2
$x=-2$
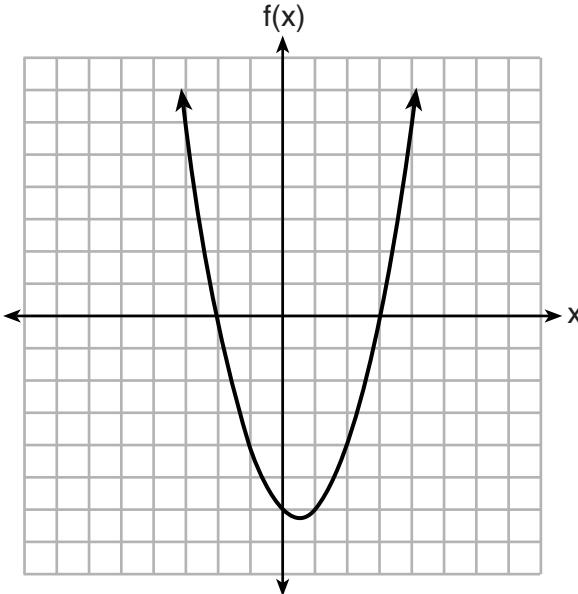
$(x-3)=0$
$+3$
$x=3$

yes because both negative 2
+ 3 are both represented in the
graph.

Score 1: The student wrote an incomplete explanation.

32 The graph of the function $f(x) = ax^2 + bx + c$ is given below.

f(x)


Could the factors of $f(x)$ be $(x + 2)$ and $(x - 3)$? Based on the graph, explain why or why *not*.

No, because its not on the palabra.

Score 0:   The student wrote a completely incorrect response.

33 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

$$P(x) = 300 + .035x$$

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

$P(x) = 300 + .035(x) \cdot$

$P(x) = 300 + .035(8250)$

$P(x) = 300 + 288.75$

$P(x) = 588.75$

Score 4: The student gave a complete and correct response.

33 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

$$33 \quad 300 + .035x = \text{pay for the week}$$

The function is
$p(x) = 300 + .035x$

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

$$300 + .035\ (8250) = p(x) \text{ pay for the week}$$

$$300 + 288.75 = p(x) \text{ for the week}$$

$$3187.5 = p(x) \text{ week}$$

If Jim's total sales is $8250, Jim's total pay would be $3187.50.

Score 3: The student made a computational error in calculating Jim's pay.

33 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

$$300 + .035x = p(x)$$

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

$$300 + .035(8250) = p(x)$$

Score 3:   The student made a correct substitution into their correct function, but did not complete the calculation.

33 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

300 + .035(8250)
300 + 288.75
588.75

Score 2: The student showed appropriate work to determine Jim's pay.

33 Jim is a furniture salesman. His weekly pay is \$300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

$$P = 300 + (x)(.035)$$

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is \$8250.

$$P = 300 + (8,250)(.035)$$

$$P = 300 + (409.02)$$

$$\boxed{P = \$709.02}$$

$$
\begin{array}{r}
8,250 \\
\times \ \ .035 \\
\hline
41520 \\
251500 \\
\hline
409.020
\end{array}
$$

Score 2: The student did not write the function in terms of $P(x)$ and made a multiplication error.

33 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

.035

$$p(x) = 300 + .035x$$

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

$$8250 = 300 + .035x$$
$$300 \quad -300$$
$$7950 = .035x$$
$$\overline{.035} \quad \overline{.035}$$

$$x = \$227142.86$$

Score 2: The student wrote the correct function, but no further correct work was shown.

33 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

$$300 + .035x$$

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

$$300 + .035(8250)$$

Score 1: The student wrote an expression and substituted the 8250 for the only variable in the expression.

33 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week.

$$300 + .35x$$

Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

$$8256 = 300 + .35x$$
$$7950 = .35x$$
$$x = 22714.29$$

Score 0: The student did not show enough correct work to receive any credit.

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth,* the linear regression equation that approximates the length, *y*, of the rope after tying *x* knots.

$$y = -8.5x + 99.2$$

Explain what the *y*-intercept means in the context of the problem.

how long the rope originally was before any knots were tied.

Explain what the slope means in the context of the problem.

how much shorter the rope gets after each knot is tied

Score 4: The student gave a complete and correct response.

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth,* the linear regression equation that approximates the length, y, of the rope after tying x knots.

$$y = -8.5x + 99.2$$

Explain what the y-intercept means in the context of the problem.

The original length of the Rope was 99.2 cm.

Explain what the slope means in the context of the problem.

The Rope is shorter by 8.5 ~~inches~~ cm with each knot that is tied.

Score 4: The student gave a complete and correct response.

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth,* the linear regression equation that approximates the length, y, of the rope after tying x knots.

$$y = -8.5x + 49.2$$

Explain what the y-intercept means in the context of the problem.

The y intercept is your length of rope before tying any knots

Explain what the slope means in the context of the problem.

as the number of knots increases the length of the rope decreases

Score 3: The student wrote an incomplete explanation for the slope. The student did not indicate that there was a constant rate of change.

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth,* the linear regression equation that approximates the length, y, of the rope after tying x knots.

$$f(x) = -8.5x + 99.2$$

Explain what the y-intercept means in the context of the problem.

The length of the rope at 0 Knots is 99.2cm

Explain what the slope means in the context of the problem.

Each knot decreases the length of rope by 8.5 cm

Score 3: The student wrote an equation that was not written in terms of x and y.

---

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

$-6 \quad -6$

State, to the *nearest tenth,* the linear regression equation that approximates the length, y, of the rope after tying x knots.

$$y = 64 - 6x$$

Explain what the y-intercept means in the context of the problem.

The y intercept means that the original length of the rope was 64 cm.

Explain what the slope means in the context of the problem.

The slope means that the length of the rope is decreasing by 6 cm each time.

Score 2: The student wrote an incorrect equation, but wrote two appropriate explanations.

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth,* the linear regression equation that approximates the length, y, of the rope after tying x knots.

$$y = ax + b$$
$$a = -8.5$$
$$b = \boxed{99.2}$$

$$-8.5(4) + 99.2$$

Explain what the y-intercept means in the context of the problem.

the y- intercept means length of Rope

Explain what the slope means in the context of the problem.

The slope means the number of knots

Score 2: The student wrote a correct equation, but the explanations were incomplete or incorrect.

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth,* the linear regression equation that approximates the length, y, of the rope after tying x knots.

Explain what the y-intercept means in the context of the problem.

y-intercept is the length of the rope without any knots.

Explain what the slope means in the context of the problem.

length of rope left after each knot

Score 1: The student wrote one correct explanation.

34 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth,* the linear regression equation that approximates the length, y, of the rope after tying x knots.

$$y = 1x + 64$$

Explain what the y-intercept means in the context of the problem.

It is the length of the rope.

Explain what the slope means in the context of the problem.

It means goa up 1 to the right one.

Score 0: The student did not show enough correct work to receive any credit.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

Price

$2x + 1.5y \geq 500$ — dollars

$x + y \leq 360$ — cans

$x = \# \text{ of lemonade cans}$

$y = \# \text{ of watter bottles}$

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$$2(144) + 1.5y \geq 500$$

$$288 + 1.5y \geq 500$$
$$-288 \qquad\quad -288$$

$$\frac{1.5y}{1.5} \geq \frac{212}{1.5}$$

$$y \geq 141.\overline{3}$$

$$\downarrow$$

$$\boxed{142}$$

Score 4:   The student gave a complete and correct response.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

$x = $ cans

$y = $ bottles
$\qquad$ $2x + 1.50y \geq 500$ $\qquad\qquad$ $x + y \leq 360$

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$x = $ cans

$y = $ bottles $\qquad$ $2 \cdot 144 + 1.50y \geq 500$

$\qquad\qquad\qquad$ $288 + 1.50y \geq 500$

$\qquad\qquad\qquad$ $-288 \qquad\quad -288$

$\qquad\qquad\qquad$ $\dfrac{1.50y}{1.50} \geq \dfrac{212}{1.50}$

$\qquad\qquad\qquad\qquad y \geq 141.\overline{3}$

She can have at least 141 bottles.

Score 3: The student made a rounding error when determining the least number of bottles.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

$$1.50x + 2y \geq 500$$

$$x + y \leq 360$$

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$$\begin{array}{r} 360 \\ -144 \\ \hline 216 \end{array}$$

142 bottles, so they still have ~~less~~ less than 360 cans + bottle but make at least $500.

Score 3: The student wrote a correct system of inequalities, but no work was shown to get 142.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

$$x = cans$$
$$y = bottles$$

$$2x + 1.5y \geq 500$$
$$x + y \leq 360$$

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$$2(144) + 1.5y \geq 500$$
$$288 + 1.5y \geq 500$$
$$-288 \qquad -288$$

$$\frac{1.5y}{1.5} \geq \frac{212}{1.5}$$

Score 3: The student did not complete their calculations to determine the least number of bottles.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

$$\cancel{360(2x + 1.50x) = 360}$$

$$2x + 1.5x = 360$$

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$$144 \times 2 = \$288$$

$$\$500 - \$288 = \$212$$

$$\$212 \div \$1.50 = 141.\overline{3}$$

So they would need 142 water bottles to reach their $500 goal.

Score 2:   The student did not write a correct system of inequalities.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of <u>inequalities that</u> can be used to represent this situation.

$$c = \text{cans of lemonade}$$
$$b = \text{bottles of water}$$

$$c + b \leq 360$$
$$c(2.00) + b(1.5) \geq 500$$

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$$144 + b = 360$$
$$\boxed{b = 216}$$

with 144 cans of lemonade, there can be only 216 bottles to reach the max of 360.

Score 2: The student wrote a correct system of inequalities.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

l = lemonade
w = water

$$l + w = 360$$
$$2l + 1.5w \geq 500$$

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$$\begin{array}{r} 360 \\ -\ 144 \\ \hline 216 \end{array}$$

The club can by up to 216 bottles of water because they can only get 360 cans and bottles and they got 144 cans already.

Score 1: The student wrote one correct inequality.

35 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

C = Cans and bottles

360 ≥ C
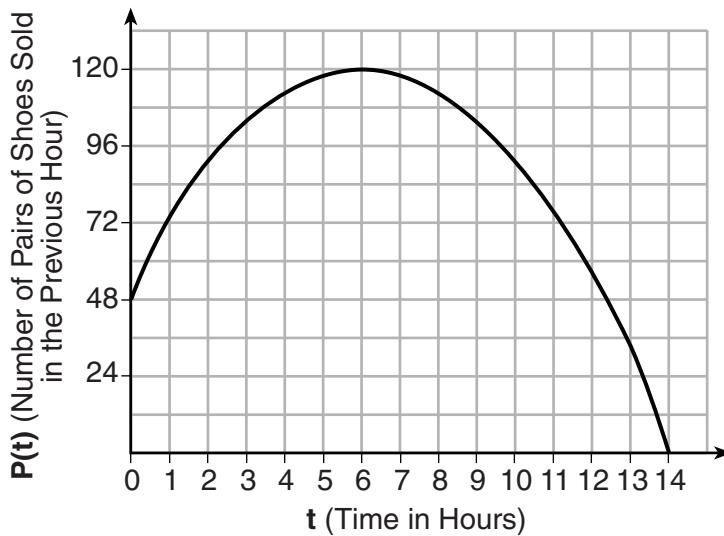
The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

The least number of bottles that can be purchased is 216 bottles

Score 0: The student had no correct work.

36 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.

The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*.

Time can be fractions and decimals

State the entire interval for which the number of pairs of shoes sold is increasing.

$0 < x < 6$

Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.
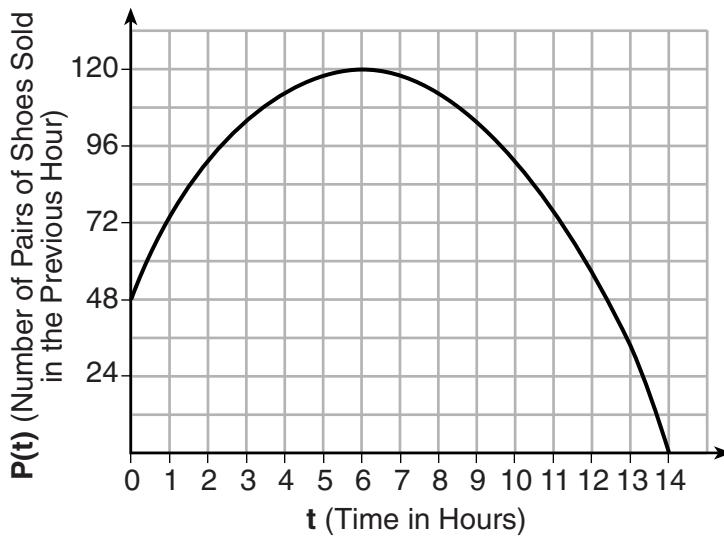
$(6,120)\ (14,0)$

$\dfrac{120-0}{6-14} = \dfrac{120}{-8} = -15$

15 less pairs of shoes were sold each hour.

Score 4: The student gave a complete and correct response.

36 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.

The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*. Because there is shoes being sold within the hour therefore it should not be individual intigers because that would mean only that exact second of the hour for example 1pm with his domain 1:00pm <X< 2:00pm would not be recorded.

State the entire interval for which the number of pairs of shoes sold is increasing.

$$0 \leq X < 6$$

Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.
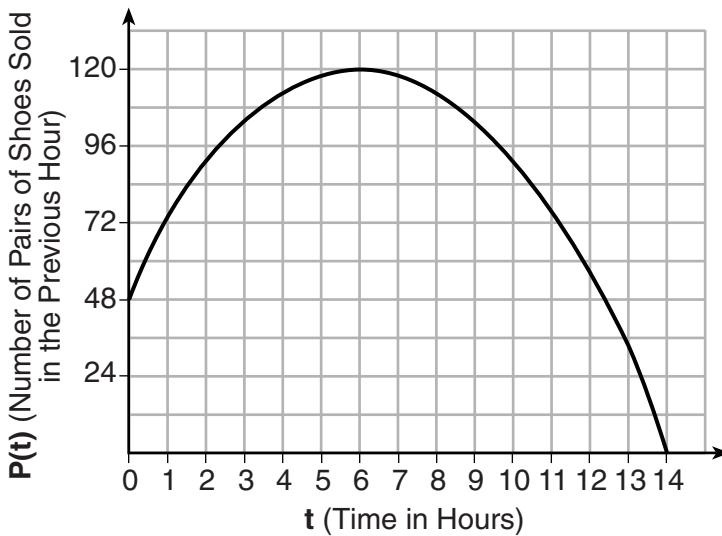
(6, 120) (14, 0) $\frac{14-6}{}$ $\frac{8}{-120}$ $-\frac{1}{15}$

$\boxed{-\frac{1}{15}}$ the amount of pairs of shoes being bought is decreasing by 15 every hour

Score 3: The student stated an incorrect average rate of change.

36 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.

The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*.

He is incorrect because integars have negative and you cant sell negative amounts of shoes.

State the entire interval for which the number of pairs of shoes sold is increasing.

0 hours to 6 hours the number of shoes Kept increasing.
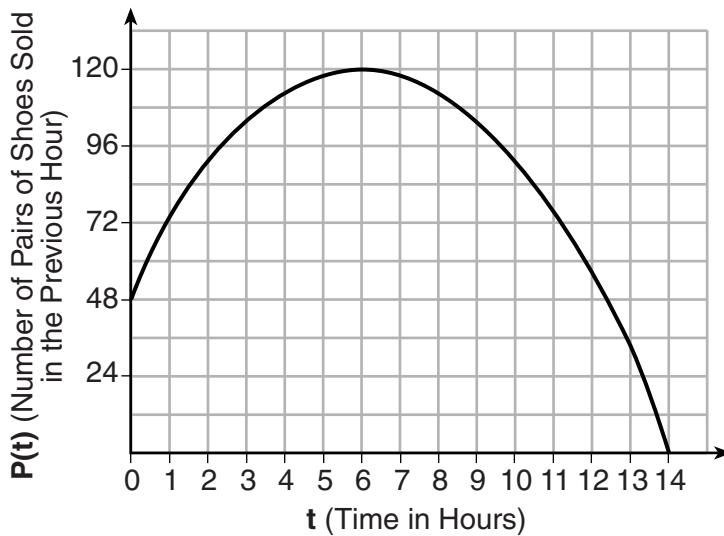
Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.

rate of change means that every hour after 6 the amount sales. is decreasing by the same amount.

Score 2: The student stated a correct interval and explained the rate of change in the context of the problem.

36 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.

The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*.

Time can't be negative

State the entire interval for which the number of pairs of shoes sold is increasing.

$[0, 6]$
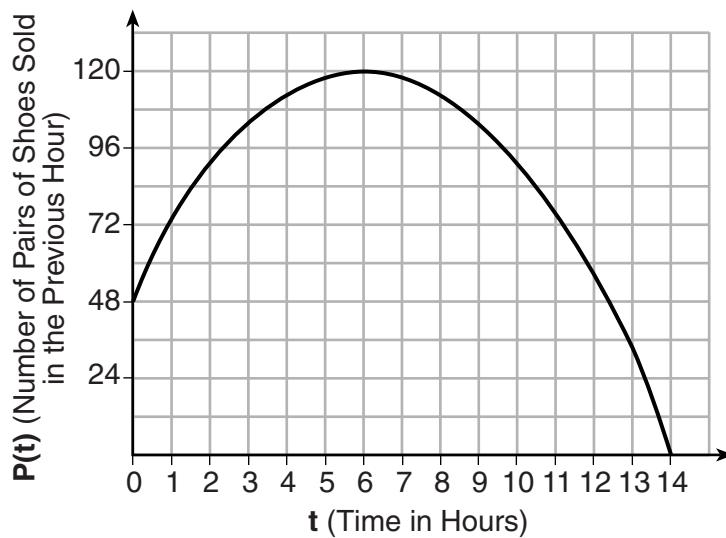
Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.

It decreases

Score 2:   The student wrote a correct explanation for the domain and stated a correct interval.

36 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.

The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*.

Can only be in quadrant 1

State the entire interval for which the number of pairs of shoes sold is increasing.

$0 \leq x \leq 6$

Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.
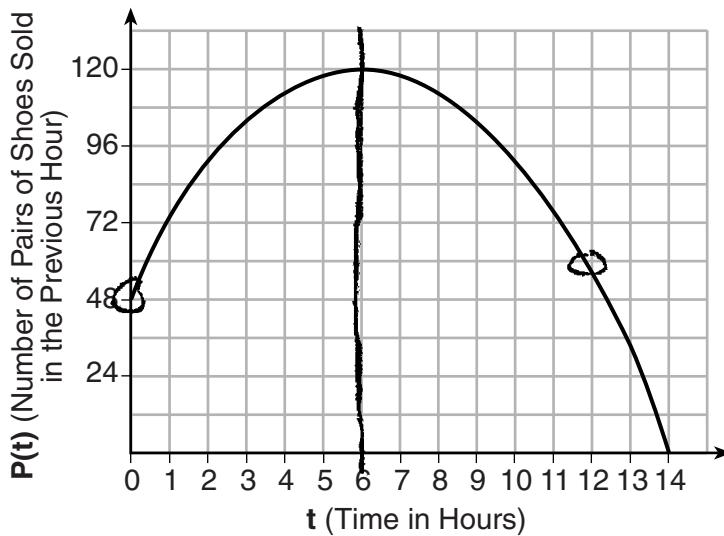
$\frac{120-0}{14-6} = \frac{120}{6} = 15$

15 less pair of shoes were sold each hour

Score 2: The student stated a correct interval and wrote a correct explanation in the context of the problem.

36 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.

The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*.

Yes he correct because the domain
IS 14 for Elapsed time in hours

State the entire interval for which the number of pairs of shoes sold is increasing.

From 0 to 6
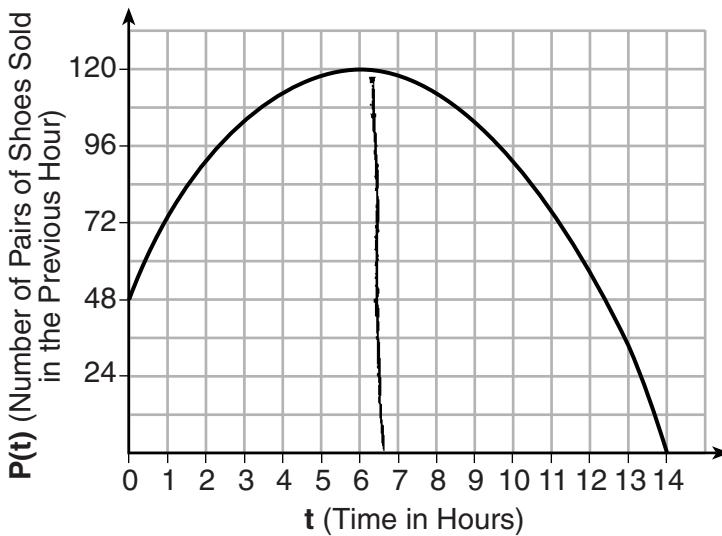
Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.

auto & 60, add all them up
and divide by 8. In 8 hours he
has 60 shoes sold.

Score 1: The student stated a correct interval.

36 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.

The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*.

He is incorrect because the independent variable is always the domain. In this situation, the independent variable is time and dependent variable is shoe number.

State the entire interval for which the number of pairs of shoes sold is increasing.

Between 0 and 6.5, the shoes sold increased, to 120 pairs of shoes sold, After that every pairs sold decreased and sold 48-120 pairs between 0-6.5

Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.

Between 5-14 hours it decreased.

Score 0: The student had no correct work.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$$\begin{cases} d = 2c - 5 \\[2mm] \dfrac{c+3}{d+3} = \dfrac{3}{4} \end{cases}$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

If Bea's Pet shop have 15 cats and 20 dogs

$$20 = 2 \times 15 - 5$$
$$20 = 30 - 5$$
$$20 = 25 \text{ (false)}$$

$$\frac{-15+3}{20+3} = \frac{18}{23} \neq \frac{3}{4}$$

Bea's Pet shop could not have 15 cats and 20 dogs because when I put the number into the equation, it can't make sense. these two number can not match the conditions.

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

$$\frac{c+3}{d+3} = \frac{3}{4}$$

$$4(c+3) = 3(d+3)$$

$$4c + 12 = 3d + 9$$

$$\because d = 2c - 5$$

$$\therefore 4c + 12 = 3(2c - 5) + 9$$

$$4c + 12 = 6c - 15 + 9$$

$$6c - 4c = 12 + 15$$
$$2c = 12 + 15 - 9$$
$$2c = 27 - 9$$
$$2c = 18$$
$$c = 9$$

$$\therefore d = 2 \times 9 - 5$$
$$= 18 - 5$$
$$= 13$$

The number of cats in Bea's Pet shop is 9 and the number of dogs in Bea's Pet shop is 13.

Score 6: The student gave a complete and correct response.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$$d = 2c - 5$$

$$\frac{c+3}{d+3} = \frac{3}{4}$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

$$20 = 2(15) - 5$$
$$20 = 30 - 5$$
$$20 \neq 25$$

No it doesn't work in the equation.

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

$$d = (2c - 5)$$

$$\frac{c+3}{(2c-5)+3} = \frac{3}{4}$$

$$4c + 12 = 6c - 15 + 9$$
$$4c + 12 = 6c - 6$$
$$-2c = -18$$
$$c = 9$$

9 cats 13 dogs

Score 6: The student gave a complete and correct response.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$$d = 2c - 5$$

$$\frac{c+3}{d+3} = \frac{3}{4}$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

$$(20) = (15)(2) - 5$$
$$20 = 30 - 5$$
$$20 \neq 25$$

$$\frac{15+3}{20+3} = \frac{18}{23} \neq \frac{9}{11.5}$$

No, because when you plug the numbers into the equation, they do not work together.

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

$$d = 2c - 5$$

$$\frac{c+3}{d+3} = \frac{3}{4} \rightarrow \frac{6}{8} \rightarrow \frac{12}{16}$$

$$\boxed{\begin{array}{l} c = 9 \\ d = 13 \end{array}}$$

$$2(9) - 5 = (13)$$
$$13 = 13$$

$$6 - 3 = 3$$
$$8 - 5$$

$$12 - 3 = 9$$
$$16 - 3 = 13$$

Score 5: The student used a method other than algebraic to solve the problem.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If

she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$$y = \text{dogs}$$
$$x = \text{cats}$$
$$y = 2x - 5$$

$$\frac{x+3}{y+3} = \frac{3}{4}$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

No because if x was 15 and y was 20 it would be $\frac{18}{23}$ which $\neq \frac{3}{4}$.

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

$$2x - 5 = y$$
$$+5 \quad +5$$
$$\frac{2x}{2} = \frac{y+5}{2}$$
$$(x = \frac{1}{2}y + 2.5) \cdot 4$$

$$(y+3)(\frac{x+3}{y+3}) = (3/4)(y+3)$$
$$x + 3 = \frac{3}{4}y + 2.25$$
$$-3 \qquad -3$$
$$(x = \frac{3}{4}y - .75) \cdot 4$$

$$4x = 3y + 9$$
$$4x = 2y + 10$$

① $4x = 2y + 10$
② $4x = 3y - 3$

$$0 = -y + 13$$
$$y = 13$$
$$y = 13$$

13 Dogs and 8 cats

Score 5:   The student redefined their variables, but stated an incorrect number of cats.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If

she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

dogs=x cats=y

$X = \boxed{2y-5}$

$\frac{(y+3)}{(x+3)} = {}^{\times}\frac{3}{4}$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

No it could not because if you take the equation x= 2y -5 and replace "y" with 15, you would get 25 dogs.

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

$3(2y-5+3) = 4x + 12$

$\boxed{\text{Cats: 3}}$

$\boxed{\text{Dogs: 2}}$

$6y - 15 + 9 = 4x + 12$

$6y - 24 = 4x + 12$

$ + 24 \qquad + 24$

$\frac{6y}{6} = 4x + \frac{36}{6} \to y = \frac{4x}{4} + \frac{6}{4} \to y = \frac{3}{2}x$

Score 4: The student made multiple errors in solving for the number of cats and dogs.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If

she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

$$d = 2c - 5 \qquad \text{let } d = \text{dogs, let } c = \text{cats}$$

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$$\begin{cases} d = 2c - 5 \\ \dfrac{d+3}{c+3} = \dfrac{3}{4} \end{cases}$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

$$\begin{array}{lll} c = 15 & 20 = 2(15) - 5 & \dfrac{18}{23} = \dfrac{3}{4} \\ d = 20 & 20 = 30 - 5 & \\ & 20 \neq 25 & 72 \neq 49 \end{array}$$

No because using the formula $\dfrac{d+3}{c+3} = \dfrac{3}{4}$ the ratio of cats to dogs is not $\dfrac{3}{4}$.

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

let $d = $ dogs and $c = $ cats

$$\boxed{\begin{array}{c} d = 2(c) - 5 \\ c = \dfrac{d - 5}{2} \end{array}}$$

$$d = 2c - 5$$
$$\dfrac{d - 5}{2} = \dfrac{2c}{2}$$
$$\dfrac{d - 5}{2} = c$$

Score 3: The student wrote one correct equation in two variables and wrote a correct explanation.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If

she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea
has in her pet shop.

$$d = 2c - 5$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

No   because $20 \neq 2(15) - 5$

$20 \neq 25$

Determine algebraically the number of cats and the number of dogs Bea initially had in her
pet shop.

$\neq 2(\cdot 0)$

Score 2: The student wrote one correct equation in two variables and gave a justification instead
of writing an explanation.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If

she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$$d = (2c-5) + 3$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

$$20 = (2(15)-5)+3$$
$$20 = (30-5)+3$$
$$20 = 25+3$$
$$20 \neq 28$$

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

$$d = (2c-5)+3 \qquad d=(2(3)-5)+3$$
$$d = 6c\div15 \qquad d=(6-5)+3$$
$$\underset{+15}{} \qquad\qquad d = 1+4=4$$
$$\frac{15+d}{6} = \frac{6c}{6}$$
$$3 = c$$

Score 1: The student gave a justification, not an explanation, based upon their incorrect equation.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If

she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea
has in her pet shop.

$$d = 2c - 5$$

$$\frac{3}{4} = (c+3)(d+3)$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

$$\text{yes,} \quad \frac{3}{4} = \frac{15}{20}$$

Determine algebraically the number of cats and the number of dogs Bea initially had in her
pet shop.

Score 1: The student wrote one correct equation in two variables.

37 At Bea's Pet Shop, the number of dogs, d, is initially five less than twice the number of cats, c. If she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$$d - 5 = 2c$$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

$$\frac{15}{20} = \frac{3}{4} \quad yes \; b/c$$

Here still is a $\frac{3}{4}$ ratio

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

15 cats and 20 dogs

Score 0: The student did not have any correct work.