

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

ALGEBRA I

Wednesday, August 16, 2023 — 8:30 to 11:30 a.m., only

MODEL RESPONSE SET

Table of Contents

Question 25.....	2
Question 26.....	9
Question 27.....	12
Question 28.....	17
Question 29.....	22
Question 30.....	28
Question 31.....	32
Question 32.....	37
Question 33.....	43
Question 34.....	51
Question 35.....	56
Question 36.....	64
Question 37.....	70

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

$$\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$$

$$\frac{2}{12} + \frac{13}{3}$$

$$\frac{9}{2}$$

$$4.5$$

$\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ is rational because its solution is 4.5 which is a terminating decimal.

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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

rational because $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3} = 4.5$ and it can be changed into a fraction of $9/2$.

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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

rational + rational = rational

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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

$$\frac{2}{12} + \frac{13}{3} = 4.5 \quad 4\frac{1}{2}$$

rational

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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

Irrational, the resulting answer
is a fraction/decimal that terminates

Score 1: The student made a conceptual error.

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

$$\frac{2}{12} = \frac{13}{3}$$

↓
This expression is irrational because the numbers have repeating digits and they are NEVER ENDING.

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

Question 25

25 Classify the expression $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$ as rational or irrational. Explain your reasoning.

$$\frac{2}{\sqrt{144}} = \frac{2}{\sqrt{\underset{12}{12} \cdot \underset{12}{12}}} = \frac{2}{12} = \frac{1}{6}$$

$$\frac{\sqrt{169}}{3} = \frac{\sqrt{\overset{13}{13} \cdot \overset{13}{13}}}{3} = \frac{13}{3}$$

$$\begin{array}{r} \frac{1}{6} \rightarrow \frac{1}{6} \\ + \frac{13}{3} \rightarrow \frac{26}{6} \\ \hline \end{array}$$

$$\frac{\cancel{27}9}{\cancel{6}2}$$

$$\frac{9}{2}$$

IRRATIONAL

Score 0: The student did not state rational and did not write an explanation.

Question 26

26 Julia surveyed 150 of her classmates at City Middle School to determine their favorite animals. Of the 150 students, 46% were male.

Forty-two students said their favorite animal was a horse, and $\frac{1}{3}$ of those students were female.

Of the 60 students who said dolphins were their favorite animal, 30% were male.

Using this information, complete the two-way frequency table below.

	Horse	Dolphin	Penguin	Total
Male	28	18	23	69
Female	14	42	25	81
Total	42	60	48	150

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

Question 26

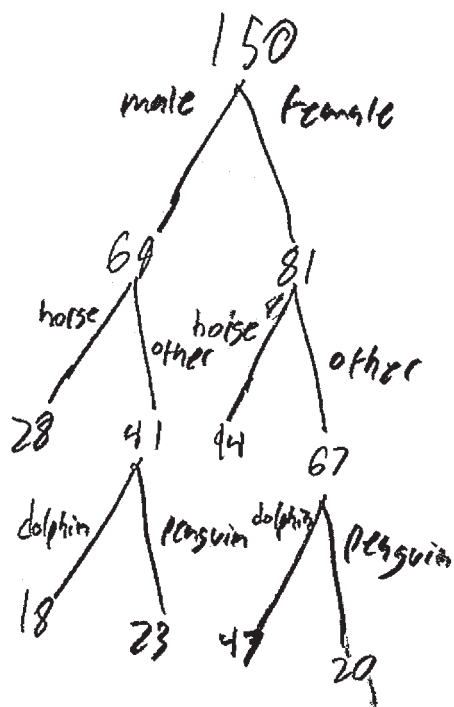
26 Julia surveyed 150 of her classmates at City Middle School to determine their favorite animals. Of the 150 students, 46% were male.

Forty-two students said their favorite animal was a horse, and $\frac{1}{3}$ of those students were female.

Of the 60 students who said dolphins were their favorite animal, 30% were male.

Using this information, complete the two-way frequency table below.

	Horse	Dolphin	Penguin	Total
Male	28	18	23	69
Female	14	47	20	81
Total	42	65	43	150



14 female like horse

Score 1: The student placed 14, 18, and 69 correctly in the table.

Question 26

26 Julia surveyed 150 of her classmates at City Middle School to determine their favorite animals. Of the 150 students, 46% were male.

Forty-two students said their favorite animal was a horse, and $\frac{1}{3}$ of those students were female.

Of the 60 students who said dolphins were their favorite animal, 30% were male.

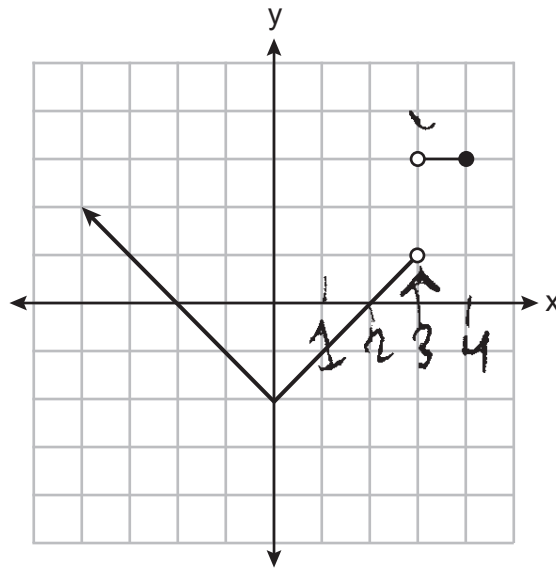
Using this information, complete the two-way frequency table below.

	Horse	Dolphin	Penguin	Total
Male	24	35	6	65
Female	18	25	33	85
Total	42	60	148	150

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

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



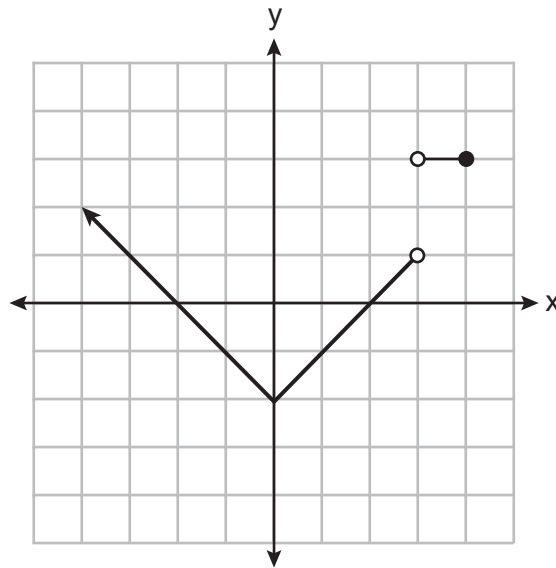
State *two* reasons why Bryan is *incorrect*.

- 1) The function is not defined at $x=3$.
- 2) The function is not defined after $x=4$.

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

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



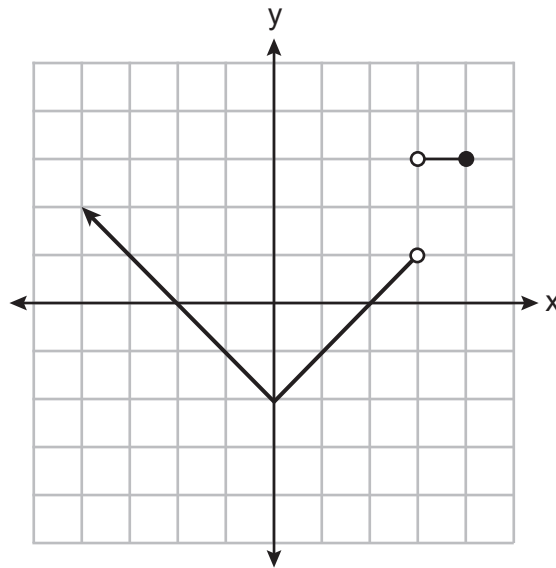
State *two* reasons why Bryan is *incorrect*.

There is no value for 3 because both dots are open and he forgot put an arrow on the function at (4,3).

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

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



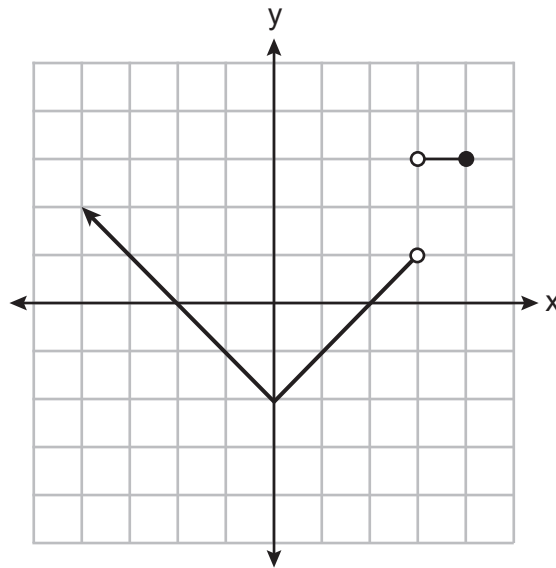
State *two* reasons why Bryan is *incorrect*.

Bryan is incorrect because the domain is not continuous.

Score 1: The student wrote only one correct reason.

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



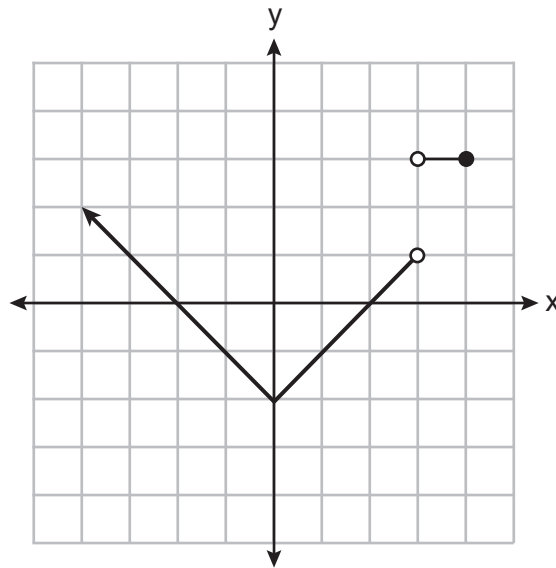
State *two* reasons why Bryan is *incorrect*.

Bryan is incorrect because the dots at $x=3$ are both open, it has to be one open, one closed. Another reason is the line need to be straight.

Score 1: The student wrote only one correct reason.

Question 27

27 Bryan said that the piecewise function graphed below has a domain of all real numbers.



State *two* reasons why Bryan is *incorrect*.

- One reason bryan is wrong because all real numbers should not include negatives
- Another reason he is incorrect would be because the functions are both different + don't show real numbers.

Score 0: The student wrote two incorrect reasons.

Question 28

28 The formula $d = t \left(\frac{v_i + v_f}{2} \right)$ is used to calculate the distance, d , covered by an object in a given period of time, t .

Solve the formula for v_f , the final velocity, in terms of d , t , and v_i , the initial velocity.

$$d = t \left(\frac{v_i + v_f}{2} \right)$$
$$\frac{d}{t} = \frac{v_i + v_f}{2}$$
$$2 \left(\frac{d}{t} \right) = v_i + v_f$$
$$2 \left(\frac{d}{t} \right) - v_i = v_f$$

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

Question 28

28 The formula $d = t \left(\frac{v_i + v_f}{2} \right)$ is used to calculate the distance, d , covered by an object in a given period of time, t .

Solve the formula for v_f , the final velocity, in terms of d , t , and v_i , the initial velocity.

$$2 \cdot d = t \left(\frac{v_i + v_f}{2} \right) \cdot 2$$

$$2d = t(v_i + v_f)$$

$$-v_i = -v_i$$

$$\frac{2d - v_i}{t} = \frac{t(v_f)}{t}$$

$$v_f = \frac{2d - v_i}{t}$$

Score 1: The student made one error by subtracting v_i before dividing it by t .

Question 28

28 The formula $d = t \left(\frac{v_i + v_f}{2} \right)$ is used to calculate the distance, d , covered by an object in a given period of time, t .

Solve the formula for v_f , the final velocity, in terms of d , t , and v_i , the initial velocity.

$$d = t \left(\frac{v_i}{2} + \frac{v_f}{2} \right)$$

$$d = t \left(\left(\frac{2}{t} \right) \frac{v_i}{2} + \frac{v_f}{2} \left(\frac{2}{t} \right) \right)$$

$$d = t(v_i + v_f)$$

$$\frac{d}{t} = \frac{t(v_i + v_f)}{t}$$

$$\frac{d}{t} = v_i + v_f$$

$$v_i - v_i$$

$$\frac{d}{t} - v_i = v_f$$

$$\boxed{\frac{d}{t} - v_i = v_f}$$

Score 1: The student made one error by not multiplying both sides by 2.

Question 28

28 The formula $d = t \left(\frac{v_i + v_f}{2} \right)$ is used to calculate the distance, d , covered by an object in a given period of time, t .

Solve the formula for v_f , the final velocity, in terms of d , t , and v_i , the initial velocity.

$$(2) d = t \left(\frac{v_i + v_f}{2} \right) (2)$$

$$\frac{2d}{t} = \frac{(v_i + v_f)}{t}$$

$$\frac{2d}{t} = v_i + v_f$$

$$\frac{2d}{t} - v_f = v_i$$

Score 1: The student solved for v_i .

Question 28

28 The formula $d = t \left(\frac{v_i + v_f}{2} \right)$ is used to calculate the distance, d , covered by an object in a given period of time, t .

Solve the formula for v_f , the final velocity, in terms of d , t , and v_i , the initial velocity.

$$d = t \left(\frac{v_i + v_f}{2} \right)$$

$$d = \frac{tv_i + tv_f}{2} \cdot t$$

$$dt = \frac{v_i + v_f}{2} \cdot 2$$

$$\frac{2dt}{v_i} = \frac{v_i + v_f}{v_i}$$

$$\frac{2dt}{v_i} = v_f$$

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

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x .

$$x^2 - 9x - 36 = 0$$

$$(x - 12)(x + 3) = 0$$

$$x - 12 = 0 \quad x + 3 = 0$$

$$x = 12 \quad x = -3$$

$$\{12, -3\}$$

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

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x .

$$x^2 - 9x - 36 = 0$$

$$\frac{9 \pm \sqrt{225}}{2}$$

a

B - 9

C - 36

$$\frac{9 \pm 15}{2}$$

$$D (9)^2 - 4(1)(-36) = 225$$

$$\begin{aligned} x &= 12 \\ x &= -3 \end{aligned}$$

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

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x .

$$-36-36$$

$$x^2 - 9x - 36 = 0$$

$$\begin{array}{r} -36x^2 \\ -12x \quad 3x \\ -9x \end{array}$$

	$x - 12$	
x	x^2	$-12x$
$+3$	$3x$	-36

$$(x-12)(x+3) = 0$$

Score 1: The student factored $x^2 - 9x - 36 = 0$ correctly, but did not solve for the values of x .

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x .

$$x^2 - 9x - 36 = 0$$

$$(x - 3)(x + 12) = 0$$

$$\begin{array}{|c|c|} \hline x = 3 & x = -12 \\ \hline \end{array}$$

Score 1: The student made a factoring error.

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x .

$$x^2 - 9x = 36$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

A = 1
B = -9
C = 0

$$x = \frac{-(-9) \pm \sqrt{-9^2 - 4(1)(0)}}{2(1)}$$

$$x = \frac{9 \pm \sqrt{-81}}{2}$$

No Real Solutions.

(value in radical is NEGATIVE)

Score 0: The student used $c = 0$ and did not square -9 correctly.

Question 29

29 Solve $x^2 - 9x = 36$ algebraically for all values of x .

$$\sqrt{x^2 - 9x} = \sqrt{36}$$

$$x - 3x = 6$$

$$\frac{-2x}{-2} = \frac{6}{-2}$$

$$x = -3$$

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

Question 30

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.

$$\begin{array}{l} 17-5=12 \\ \frac{12}{4}=3 \end{array} \quad \boxed{d=3} \quad \begin{array}{c} 5, 8, 11, 14, 17 \\ \hline 1 \quad 2 \quad 3 \quad 4 \quad 5 \end{array}$$

Determine the 21st term of this sequence.

5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, 53, 56, 59

$\boxed{65}$

↙
62, 65

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

Question 30

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.

$$d = 3$$
$$\begin{aligned} 5 + 3 &= 8 \\ 8 + 3 &= 11 \\ 11 + 3 &= 14 \\ 14 + 3 &= 17 \end{aligned}$$

Determine the 21st term of this sequence.

$$\begin{aligned} a_n &= a_1 + (n-1)d \\ a_{21} &= 5 + (21-1)3 \\ a_{21} &= 5 + (20)3 \\ a_{21} &= 5 + 60 \\ a_{21} &= 65 \end{aligned}$$

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

Question 30

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.

Determine the 21st term of this sequence.

5, 8, 11, 14, 17, 20, 23, 26
29, 32, 35, 38, 41, 44, 47,
50, 53, 56, 59, 62, 65

$$a_{21} = 65$$

Score 1: The student showed correct work to find 65.

Question 30

30 Determine the common difference of the arithmetic sequence in which $a_1 = 5$ and $a_5 = 17$.

Determine the 21st term of this sequence.

5, 8, 11, 14, 17, 20, 40, 60, 63, 66, 69
1 2 3 4 5 6 12 18 19 20 21

$$a_{21} = 69$$

Score 0: The student made multiple errors.

Question 31

31 Factor $18x^2 - 2$ completely.

$$2(9x^2 - 1)$$
$$2(3x-1)(3x+1)$$

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

Question 31

31 Factor $18x^2 - 2$ completely.

$$\frac{18x^2-2}{2} = \frac{2(9x^2-1)}{2} = \underline{(3x-1)(3x+1)}$$

Score 1: The student did not include the common factor in their final answer.

Question 31

31 Factor $18x^2 - 2$ completely.

$$x = \frac{-(0) \pm \sqrt{(0)^2 - 4(18)(-2)}}{2(18)}$$

$$x = \frac{0 \pm \sqrt{144}}{36}$$

$$x = \frac{0 \pm 12}{36}$$

$$x = \frac{0+12}{36} \quad x = \frac{0-12}{36}$$

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

Score 0: The student solved the expression as an equation.

Question 31

31 Factor $18x^2 - 2$ completely.

$$2(9x-1)(9x+1)$$

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

Question 31

31 Factor $18x^2 - 2$ completely.

$$2(9x^2 - 1)$$

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

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x . Round your answer to the nearest hundredth.

$$\begin{aligned} &x^2 + 3x - 9 = 0 \\ a &= 1 \\ b &= 3 \\ c &= -9 \end{aligned}$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$x = \frac{-(3) \pm \sqrt{(3)^2 - 4(1)(-9)}}{2(1)}$$
$$x = \frac{-3 \pm \sqrt{45}}{2}$$
$$x = \frac{-3 \pm \sqrt{9 \cdot 5}}{2}$$
$$x = \frac{-3 \pm 3\sqrt{5}}{2}$$
$$x = \frac{-3 + 3\sqrt{5}}{2} \quad x = \frac{-3 - 3\sqrt{5}}{2}$$
$$x = 1.85 \quad x = -4.85$$

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

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x . Round your answer to the nearest hundredth.

$$\begin{array}{l} a = 1 \\ b = 3 \\ c = -9 \end{array}$$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-9)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{45}}{2}$$

$$x = \{ 1.85, -4.85 \}$$

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

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x . Round your answer to the *nearest hundredth*.

$$x^2 + 3x - 9 = 0$$

$$x^2 + 3x + \frac{9}{4} = 9 + \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = \frac{45}{4}$$

$$x + \frac{3}{2} = \pm \sqrt{\frac{45}{4}}$$

$$x + 1.5 = \pm 3.354$$

$$x = -1.5 \pm 3.354$$

$$x \in \{1.85, -4.85\}$$

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

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x . Round your answer to the *nearest hundredth*.

$$\begin{aligned}x^2 + 3x - 9 &= 0 & x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\a=1 \quad b=3 \quad c=-9 & & & \\x &= \frac{-3 \pm \sqrt{3^2 - 4(1)(-9)}}{2(1)} & & \\x &= \frac{-3 \pm \sqrt{9 + 36}}{2} & & \\x &= \frac{-3 \pm \sqrt{45}}{2} & & \\x &= \frac{-3 \pm 6.71}{2} & & \\x &= \frac{-3 + 6.71}{2} \quad \text{or} \quad x = \frac{-3 - 6.71}{2} & & \\x &\approx 1.86 \quad \text{or} \quad x \approx -4.86 & & \end{aligned}$$

Score 1: The student made one rounding error.

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x . Round your answer to the nearest hundredth.

$$\begin{aligned}x^2 + 3x - 9 &= 0 \\ \cancel{+9} + 9 & \\ \hline x^2 + 3x &= 9 \\ \left(\frac{3}{2}\right)^2 &= (1.5)^2 = 2.25 \\ x^2 + 3x + 2.25 &= 9 + 2.25 \\ \sqrt{(x+1.25)^2} &= \pm\sqrt{11.25} \\ \begin{array}{r} x + 1.25 = 3.35 \\ -1.25 \quad -1.25 \\ \hline x = 2.10 \end{array} & \quad \begin{array}{r} x + 1.25 = -3.35 \\ -1.25 \quad -1.25 \\ \hline x = -4.60 \end{array} \\ & \{2.10, -4.60\} \end{aligned}$$

Score 1: The student made a mistake when factoring $x^2 + 3x + 2.25$.

Question 32

32 Solve $x^2 + 3x - 9 = 0$ algebraically for all values of x . Round your answer to the nearest hundredth.

$$x^2 + 3x - 9 = 0$$

$$a = 1$$

$$b = 3$$

$$c = -9$$

$$x = \frac{-(3) \pm \sqrt{(3)^2 - 4(1)(-9)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{9 - 36}}{2}$$

$$x = \frac{-3 \pm \sqrt{-27}}{2}$$

$$x = \frac{-3 + \sqrt{-27}}{2} \quad \Bigg| \quad x = \frac{-3 - \sqrt{-27}}{2}$$

$$x = 1.10$$

$$x = -4.10$$

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

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$$15.79x + 5.69y \leq 125$$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$$15.79x + 5.69(9) \leq 125$$

$$\begin{array}{r} 15.79x + 51.21 \leq 125 \\ -51.21 \quad -51.21 \\ \hline \end{array}$$

$$\frac{15.79x \leq 73.79}{15.79 \quad 15.79}$$

$$\frac{15.79x \leq 73.79}{15.79 \quad 15.79}$$

$$x \leq 4.7$$

4 cases of sports drinks, do not have enough money to purchase 5. Can't buy a part of a case.

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

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$$15.79x + 5.69y \leq 125$$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$$15.79x + 5.69(9) \leq 125$$

$$15.79x + 51.21 \leq 125$$
$$-51.21$$

$$15.79x \leq \frac{73.79}{15.79}$$
$$x \leq 4.673$$

only 4 cases of sport drinks can be bought because 9 waters cost \$51.21 and with the rest of the money only four cases of sports drinks can be bought.

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

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$$15.79x + 5.69y \leq 125$$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$$15.79x + 5.69(9) \leq 125$$

$$\begin{array}{r} \checkmark \\ 15.79x + 51.21 \leq 125 \\ - 51.21 \quad - 51.21 \\ \hline \end{array}$$

$$\begin{array}{r} 15.79x \leq 73.79 \\ \hline 15.79 \quad \quad 15.79 \end{array}$$

$$\underline{\underline{x \leq 4.67}}$$

4 cases of sports drinks were purchased

Score 3: The student did not explain why only 4 cases can be purchased.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$$15.79x + 5.69y \leq 125$$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$$\begin{array}{l} 5.69 \times 9 = 51.21 \\ 4 \times 15.79 = 63.16 \end{array} \quad \left. \begin{array}{l} \\ \end{array} \right\} 114.37$$

4 cases of sports drinks can be purchased.
IF you purchase 5 it will end up being more than 125.

Score 3: The student used a method other than algebraic to find 4.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$$15.79x + 5.69y \geq 125$$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$$\begin{array}{r} 15.79x + 5.69(9) \geq 125 \\ 15.79x + 51.21 \geq 125 \\ \underline{-51.21 \quad -51.21} \\ 15.79x \geq 73.79 \\ \underline{15.79 \quad 15.79} \\ x \geq 4.67 \end{array}$$

5 or they will go over there price limit.

Score 2: The student wrote an incorrect inequality but solved it appropriately, and no further correct work is shown.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$$5.69x + 15.79x \leq 125$$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$$\begin{array}{r} 68 \\ 5.69 \\ \times 9 \\ \hline \$51.21 \end{array}$$

$$\begin{array}{r} 125.00 \\ - 51.21 \\ \hline 73.79 \\ 15.79 \overline{) 73.79} \end{array}$$

$$\begin{array}{r} 004 \\ 15.79 \overline{) 73.79} \end{array}$$

Only 4 cases of sports drinks can be purchased because $73.79 \div 15.79 = 4.67$ and $15.79 \times 5 = 78.95$ - which is over the budget.

Score 2: The student wrote an incorrect inequality, found 4 using a method other than algebraic, and wrote a correct explanation.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$$15.79x \leq 5.69y$$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

Explain your answer.

$$5.69(9) = 51.21$$

$$\begin{array}{r} \$125.00 \\ - \$51.21 \\ \hline \$73.79 \\ \quad \underline{\$15.79} \end{array}$$

4 cases
of sport drinks can be bought

Score 1: The student used a method other than algebraic to find 4.

Question 33

33 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks.

If x represents the number of cases of sports drinks and y represents the number of cases of bottled water purchased, write an inequality that models this situation.

$$15.79s + 5.69w \leq 125$$

Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased.

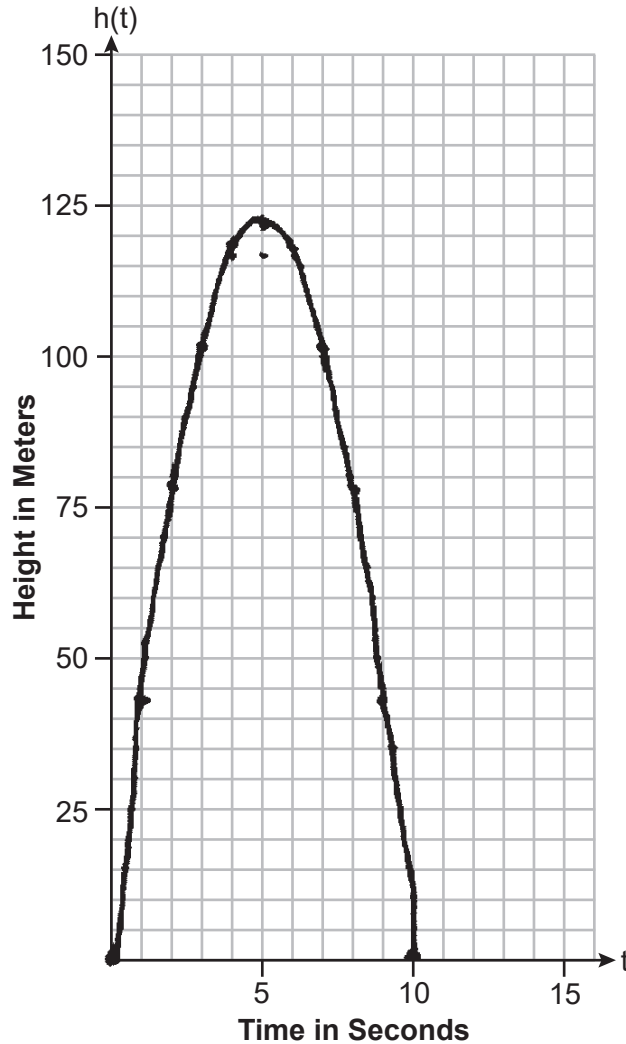
Explain your answer.

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

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

$(5, 122.5)$

Explain what the vertex means in the context of this situation.

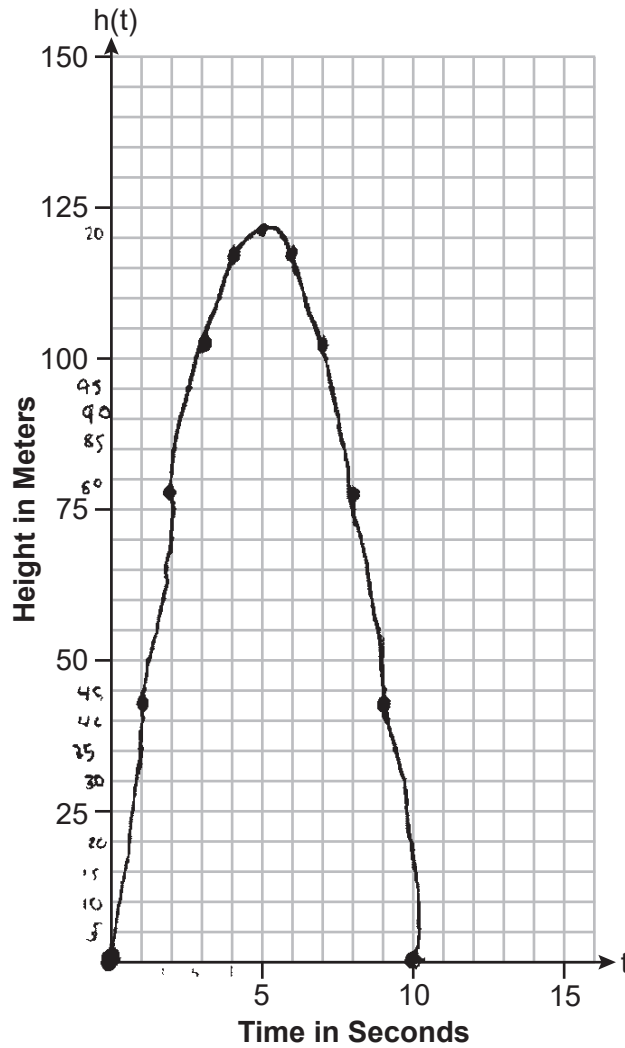
It took 5 seconds for the rocket to reach the highest height of 122.5 meters.

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

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

$$(5, 122.5)$$

Explain what the vertex means in the context of this situation.

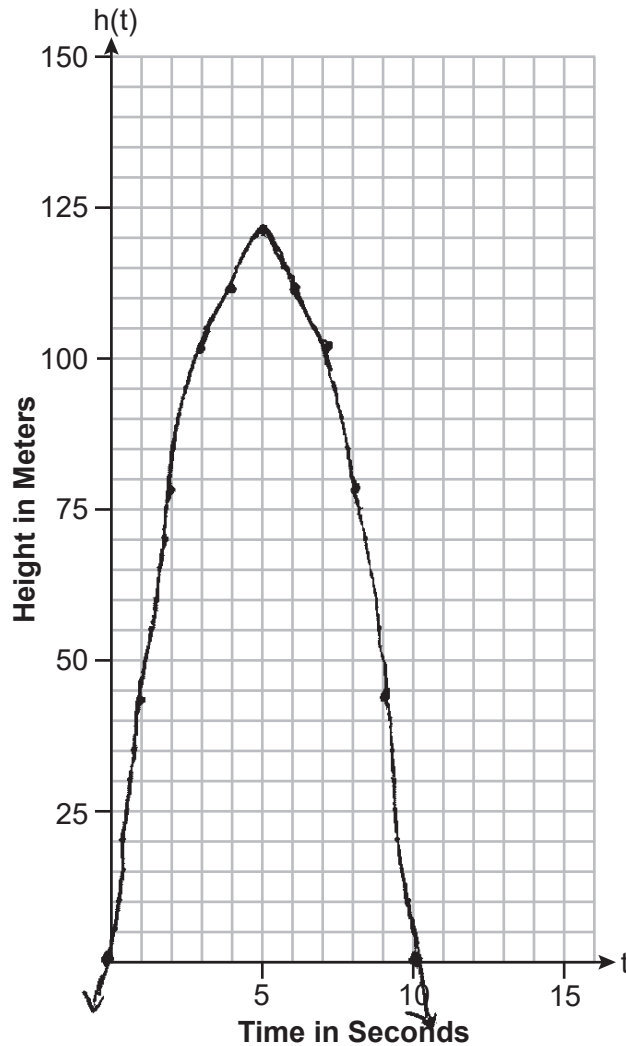
at 5 seconds
the rocket
was 122.5 ft
in the air

Score 3: The student wrote incorrect units in the explanation.

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

Explain what the vertex means in the context of this situation.

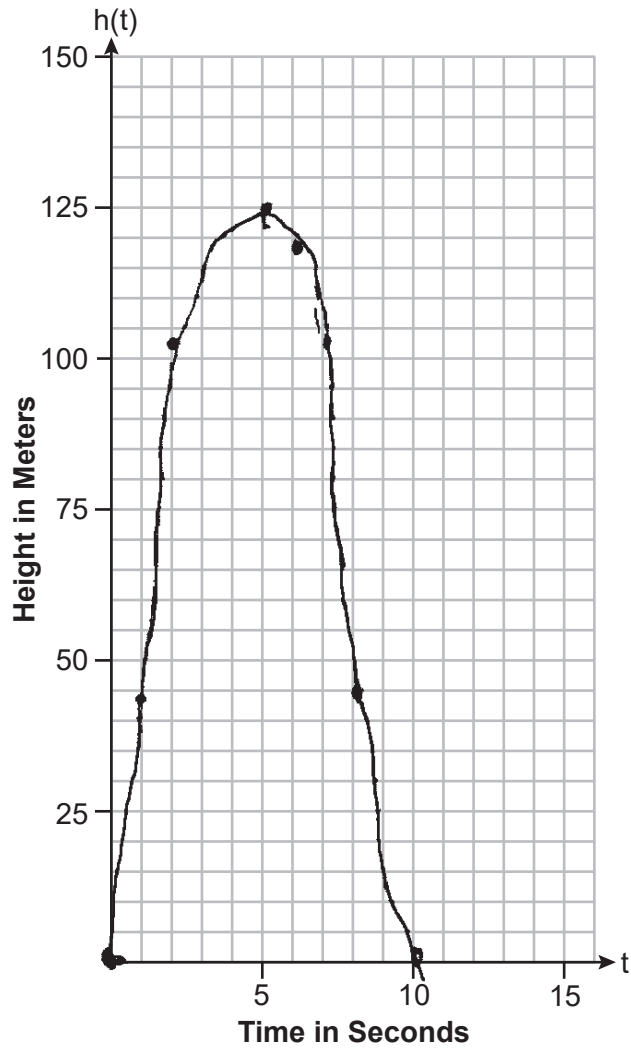
The vertex is at $t = 5$ seconds. The highest distance the rocket will reach before falling down is 122.5 meters.

Score 2: The student made one graphing error and did not state the vertex.

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

$(5, 122.5)$

Explain what the vertex means in the context of this situation.

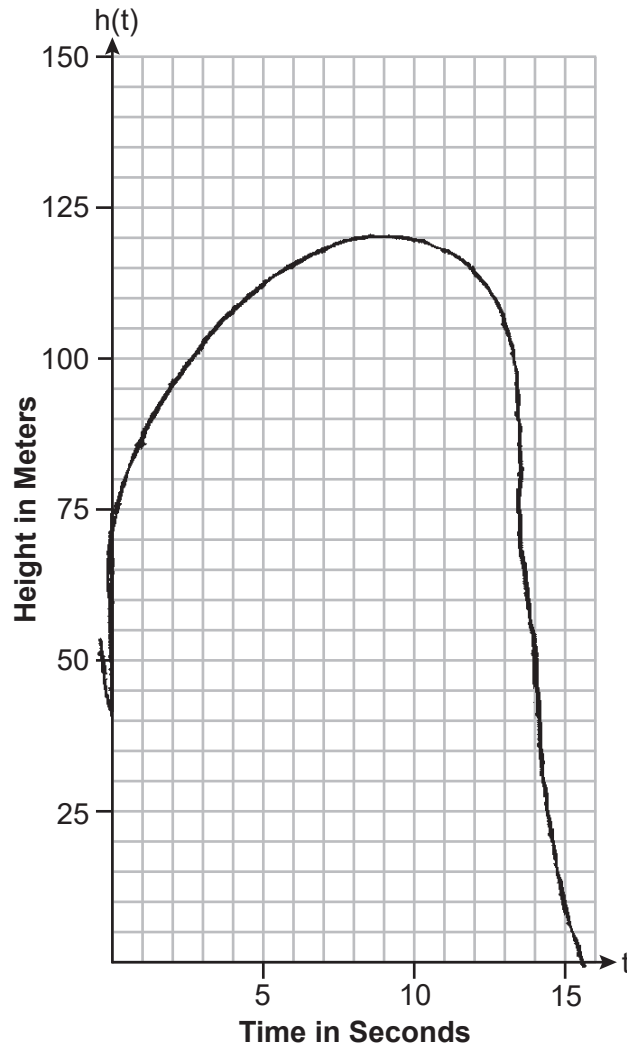
it is the highest the rocket got

Score 1: The student stated the vertex correctly.

Question 34

34 The path of a rocket is modeled by the function $h(t) = -4.9t^2 + 49t$, where h is the height, in meters, above the ground and t is the time, in seconds, after the rocket is launched.

Sketch the graph on the set of axes below.



State the vertex of this function.

$(6.06, 116.95)$

Explain what the vertex means in the context of this situation.

it is the middle point
of the graph

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

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, \$) (x)	Profit (in millions, \$) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$$y = 0.41x - 2.31$$

State, to the nearest hundredth, the correlation coefficient of these linear data.

0.99 is the correlation coefficient

State what this correlation coefficient indicates about the linear fit of the data.

It indicates that the linear fit of the data is a good fit and it strong positive correlation.

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

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, \$) (x)	Profit (in millions, \$) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$$y = .41x - 2.31$$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

$$r = .99$$

State what this correlation coefficient indicates about the linear fit of the data.

The correlation coefficient indicates the data has a nearly perfect linear fit.

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

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, \$) (x)	Profit (in millions, \$) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$$y = ax + b$$

$$a = 0.3823139852$$

$$b = -1.941176471$$

$$r = 0.9844368877$$

$$y = 0.38x - 1.94$$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

0.98

State what this correlation coefficient indicates about the linear fit of the data.

strong

Score 3: The student wrote the full display of their calculator showing incorrect values for a , b , and r .

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, \$) (x)	Profit (in millions, \$) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$$y = .41x + -2.31$$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

$$r = .99$$

State what this correlation coefficient indicates about the linear fit of the data.

Score 3: The student wrote a correct regression equation and correlation coefficient.

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, \$) (x)	Profit (in millions, \$) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$$y = .41x - 2.31$$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

State what this correlation coefficient indicates about the linear fit of the data.

Score 2: The student wrote a correct linear regression equation.

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, \$) (x)	Profit (in millions, \$) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$$y = .41x + 2.31$$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

$$r = .98$$

State what this correlation coefficient indicates about the linear fit of the data.

Strong positive

Score 2: The student wrote an incorrect sign in the linear regression equation and wrote an incorrect correlation coefficient.

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, \$) (x)	Profit (in millions, \$) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

$$.41x + 2.31$$

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

$$.97$$

State what this correlation coefficient indicates about the linear fit of the data.

its increase of profit

Score 1: The student wrote a correct expression.

Question 35

35 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

Annual Advertising Budget (in thousands, \$) (x)	Profit (in millions, \$) (y)
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data.

.2

State, to the *nearest hundredth*, the correlation coefficient of these linear data.

.2

State what this correlation coefficient indicates about the linear fit of the data.

100

Score 0: The student showed no correct work.

Question 36

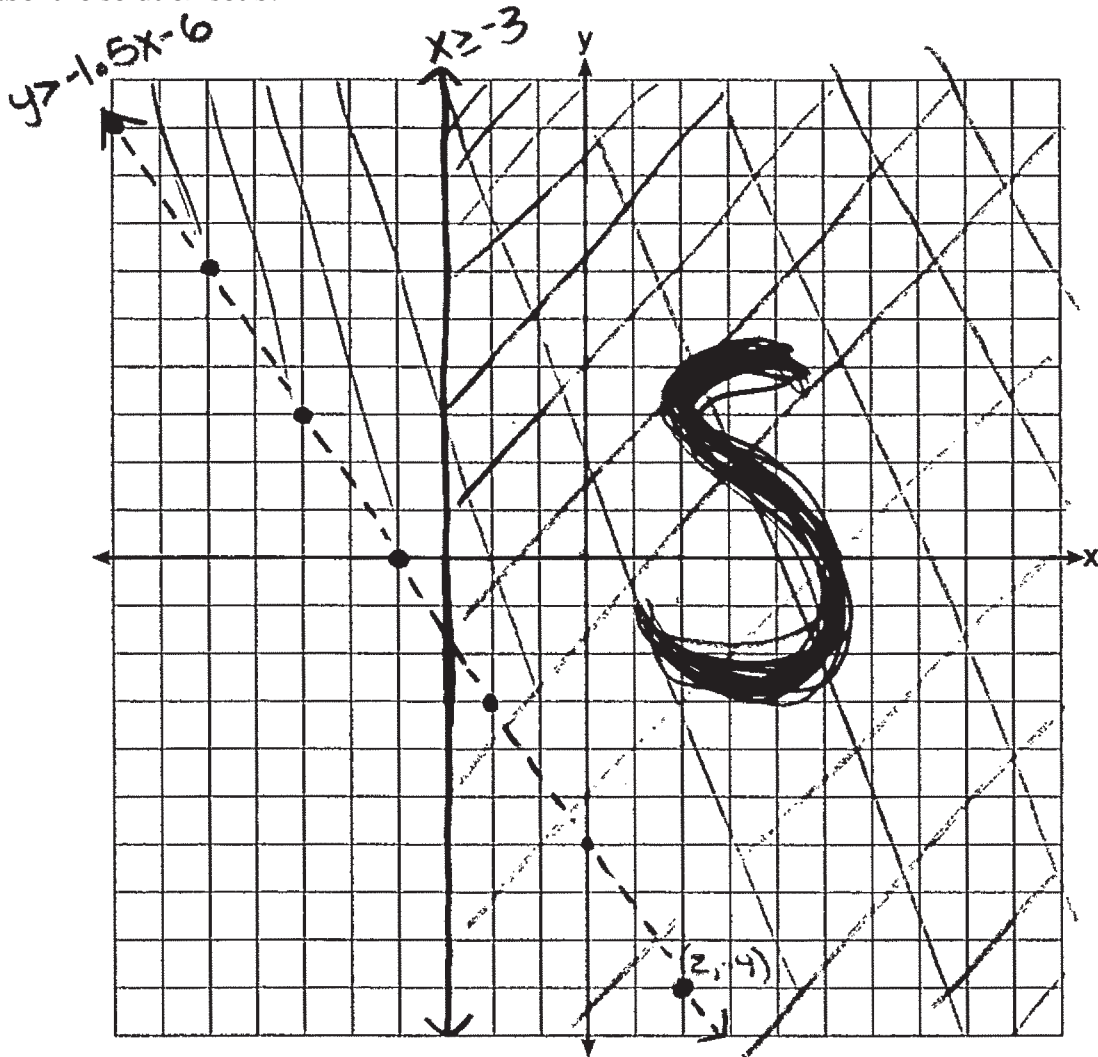
36 Graph the following system of inequalities on the set of axes below:

$$-2y < 3x + 12 \rightarrow \frac{-2y}{-2} < \frac{3x+12}{-2}$$

$$x \geq -3$$

$$y > -1.5x - 6$$

Label the solution set S.



Allison thinks that $(2, -9)$ is a solution to this system. Determine if Allison is correct. Justify your answer.

Allison is not correct because $(2, -9)$ falls on a dotted line, which is not part of the solution set.

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

Question 36

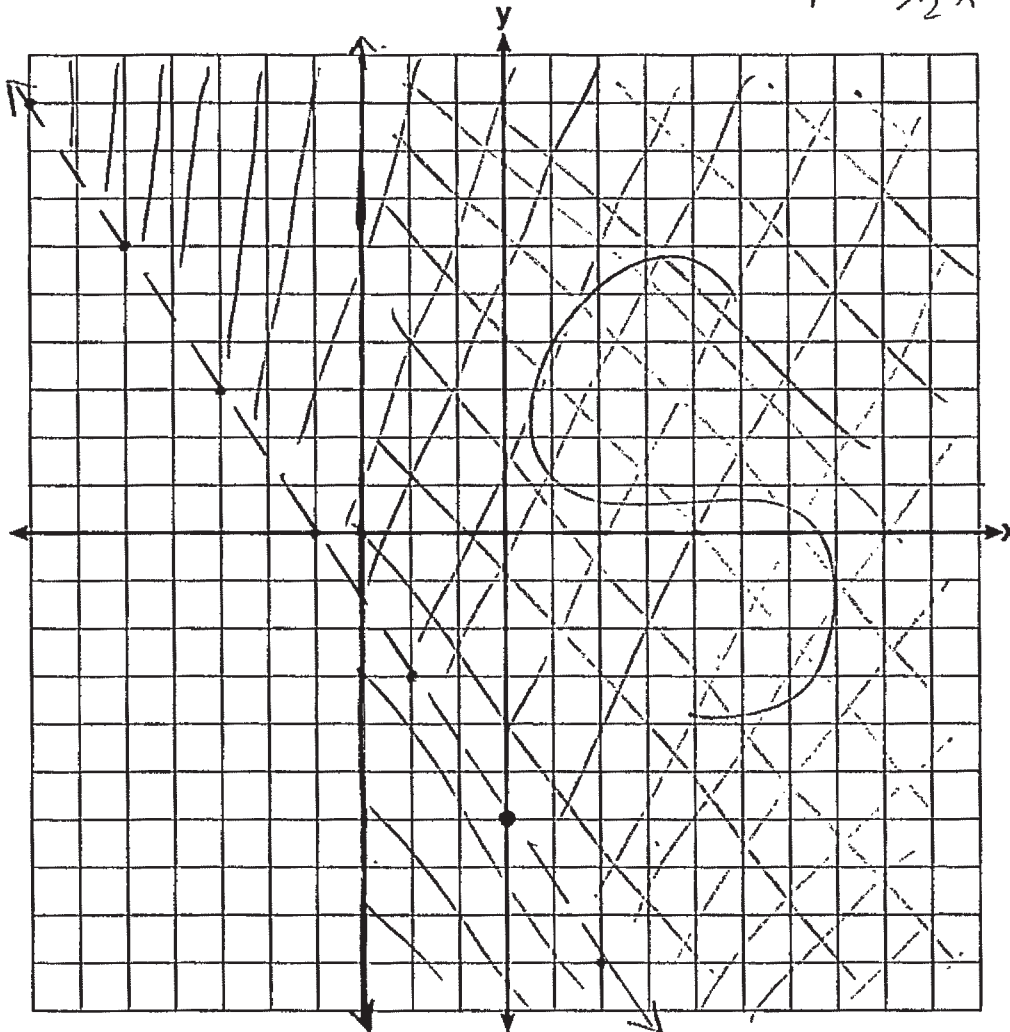
36 Graph the following system of inequalities on the set of axes below:

$$\begin{aligned} -2y &< 3x + 12 \\ x &\geq -3 \end{aligned}$$

$$\frac{-2y}{-2} < \frac{3x + 12}{-2}$$

$$y > -\frac{3}{2}x - 6$$

Label the solution set S.



Allison thinks that $(2, -9)$ is a solution to this system. Determine if Allison is correct.

Justify your answer. $(2, -9)$ is not a solution to the system because it falls on an inequality that cannot contain any solutions since it is not equal to.

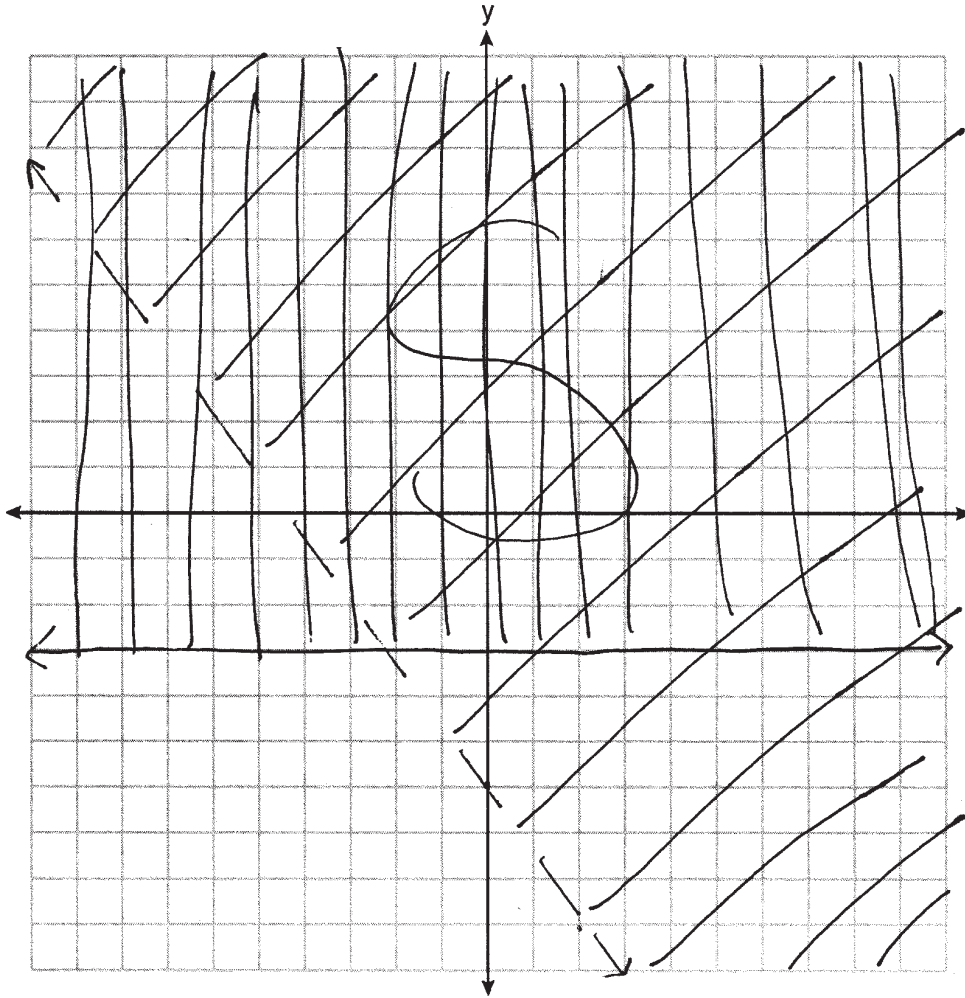
Score 3: The student did not label either inequality.

Question 36

36 Graph the following system of inequalities on the set of axes below:

$$\begin{aligned} -2y &\leq 3x + 12 & y &\leq -\frac{3}{2}x - 6 \\ \frac{-2y}{-2} &\leq \frac{3x + 12}{-2} & & \\ x &\geq -3 & & \end{aligned}$$

Label the solution set S.



Allison thinks that $(2, -9)$ is a solution to this system. Determine if Allison is correct. Justify your answer.

No because it is on the dashed line which doesn't include the points on the line.

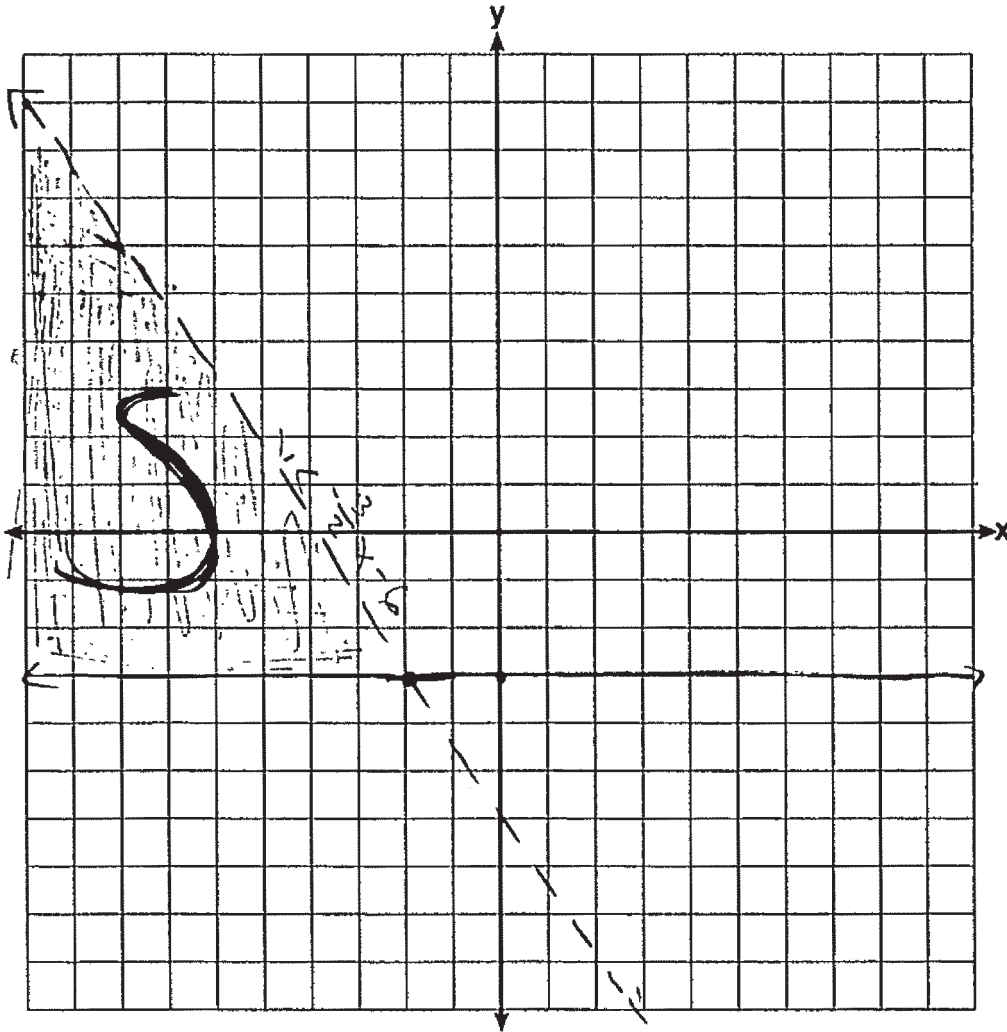
Score 2: The student labeled S correctly based on their graph and wrote an appropriate justification.

Question 36

36 Graph the following system of inequalities on the set of axes below:

$$\begin{aligned} \frac{-2y}{-2} &< \frac{3x + 12}{-2} \rightarrow y < -\frac{3}{2}x - 6 \\ x &\geq -3 \end{aligned}$$

Label the solution set S.



Allison thinks that $(2, -9)$ is a solution to this system. Determine if Allison is correct. Justify your answer.

Score 1: The student labeled S correctly, based on their graph.

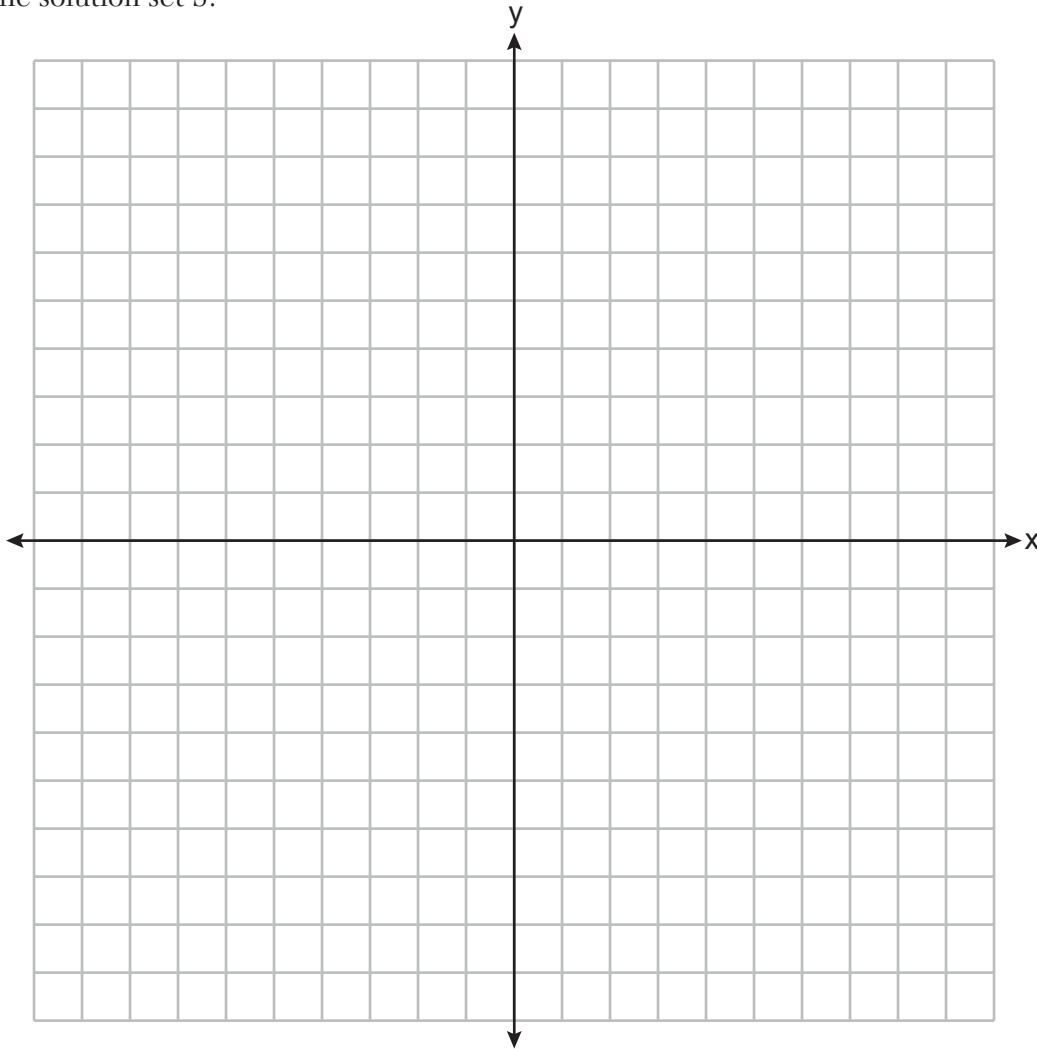
Question 36

36 Graph the following system of inequalities on the set of axes below:

$$-2y < 3x + 12$$

$$x \geq -3$$

Label the solution set S.



Allison thinks that $(2, -9)$ is a solution to this system. Determine if Allison is correct.

Justify your answer.

$$2(-9) < 3(2) + 12 \quad 18 \geq -3 \checkmark$$

$$18 < 18 \times$$

No $(-2, 4)$ does not satisfy both inequalities

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

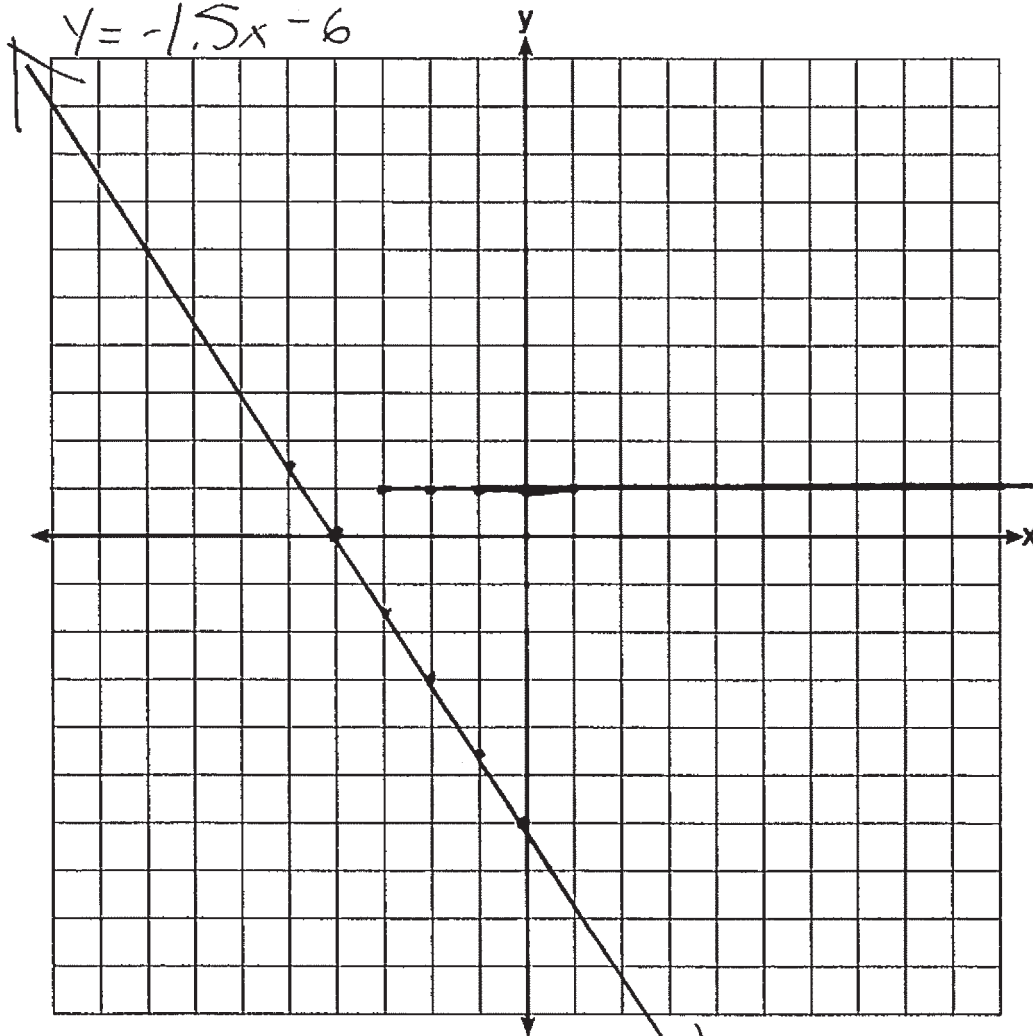
Question 36

36 Graph the following system of inequalities on the set of axes below:

$$-2y < 3x + 12$$

$$x \geq -3 \quad y < -1.5x - 6$$

Label the solution set S.



Allison thinks that $(2, -9)$ is a solution to this system. Determine if Allison is correct. Justify your answer.

Yes it is, the line crosses over it

Score 0: The student only graphed one equation correctly.

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

$y = \text{total cost of Center A}$ Center A
 $y = 25x + 25$

Write an equation that models this situation, where B represents the total cost of Center B.

$y = \text{total cost of Center B}$ Center B
 $y = 15x + 75$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less.

Center A
 $y = 25x + 25$
 $y = 250 + 25$
 $y = 275$

Center B
 $y = 15x + 75$
 $y = 150 + 75$
 $y = 225$

Center B is the better choice
as it costs \$225 dollars which
is less than center A's \$275 dollars
for 10 hours of classes.

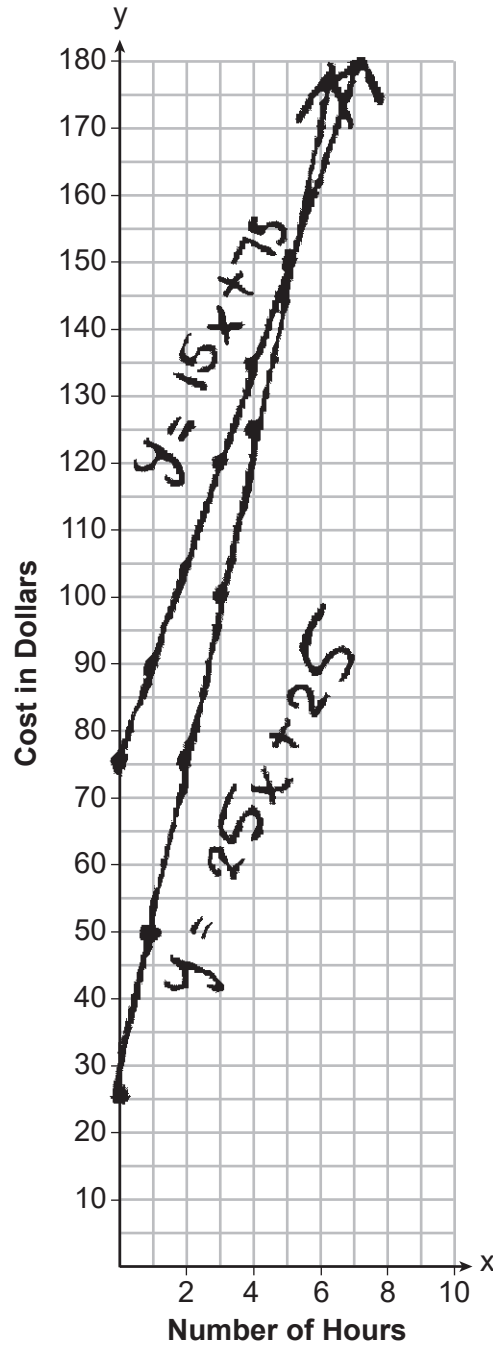
Question 37 is continued on the next page.

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

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

$$25x + 25 = 15x + 75$$

$$10x = 50$$

$$x = 5$$

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

$$a = 25x + 25$$

Write an equation that models this situation, where B represents the total cost of Center B.

$$b = 15x + 75$$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less.

The graph shows that Center B is the better option since it will cost less at 10 hours since Center B is below Center A.

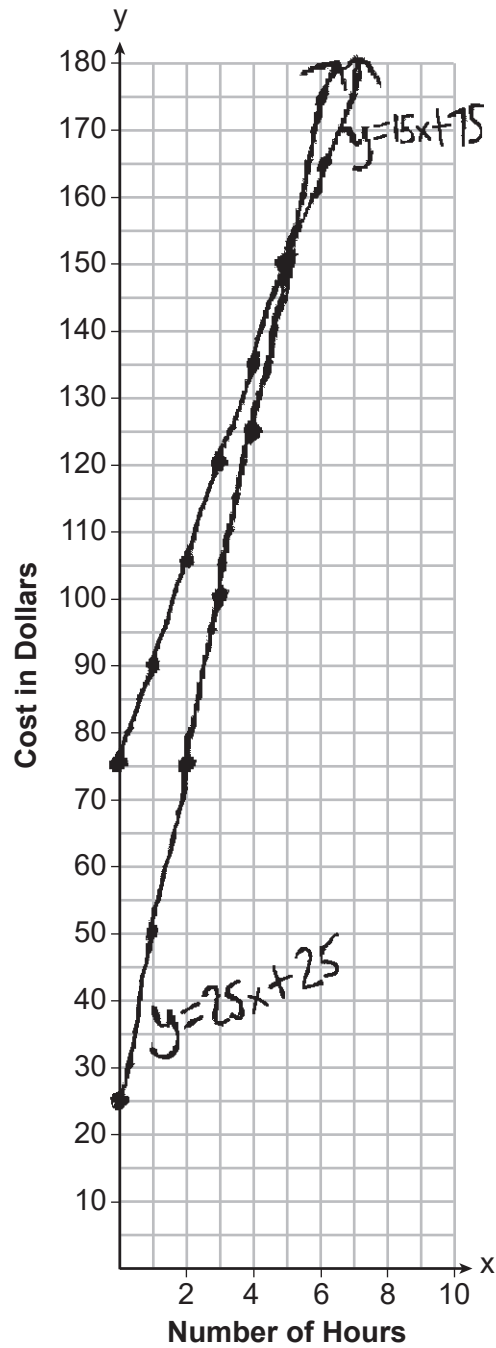
Question 37 is continued on the next page.

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

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

$$\text{Center A} \rightarrow 25x + 25$$

Write an equation that models this situation, where B represents the total cost of Center B.

$$\text{Center B} \rightarrow 15x + 75$$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less.

$$\text{center A} \rightarrow 25(10) + 25 = 275$$

$$\text{center B} \rightarrow 15(10) + 75 = 225$$

Center B

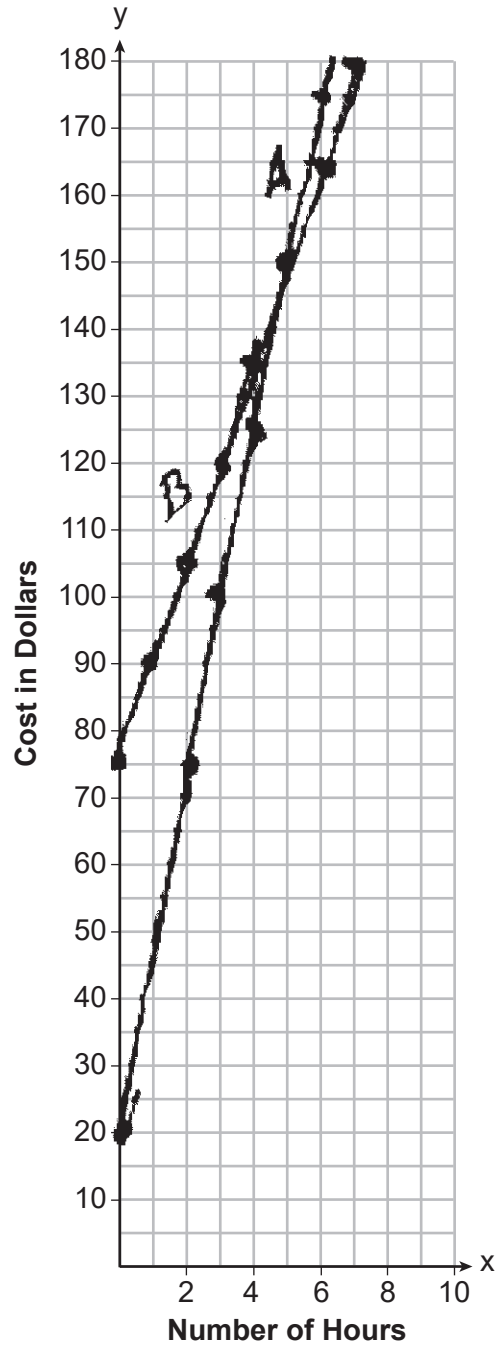
Question 37 is continued on the next page.

Score 5: The student wrote expressions for Center A and Center B.

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

$$A = 25x + 25$$

Write an equation that models this situation, where B represents the total cost of Center B.

$$B = 15x + 75$$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less.

$$A = 25(10) + 25 = 275$$

$$B = 15(10) + 75 = 225$$

Center B is a better choice.

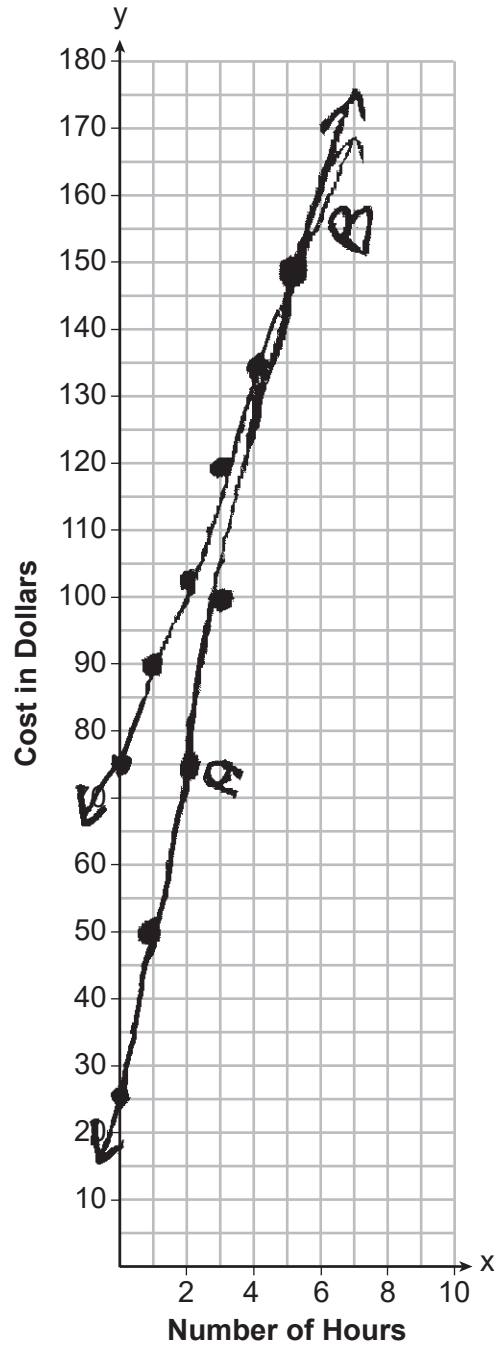
Question 37 is continued on the next page.

Score 5: The student made one graphing error by extending the lines with arrows on the left.

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

at 5 hrs.

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

Write an equation that models this situation, where B represents the total cost of Center B.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less.

$$\text{Option A} - 10 \text{ hours} = \$275$$

$$\text{Option B} - 10 \text{ hours} = \$225$$

Option B is the cheaper choice.

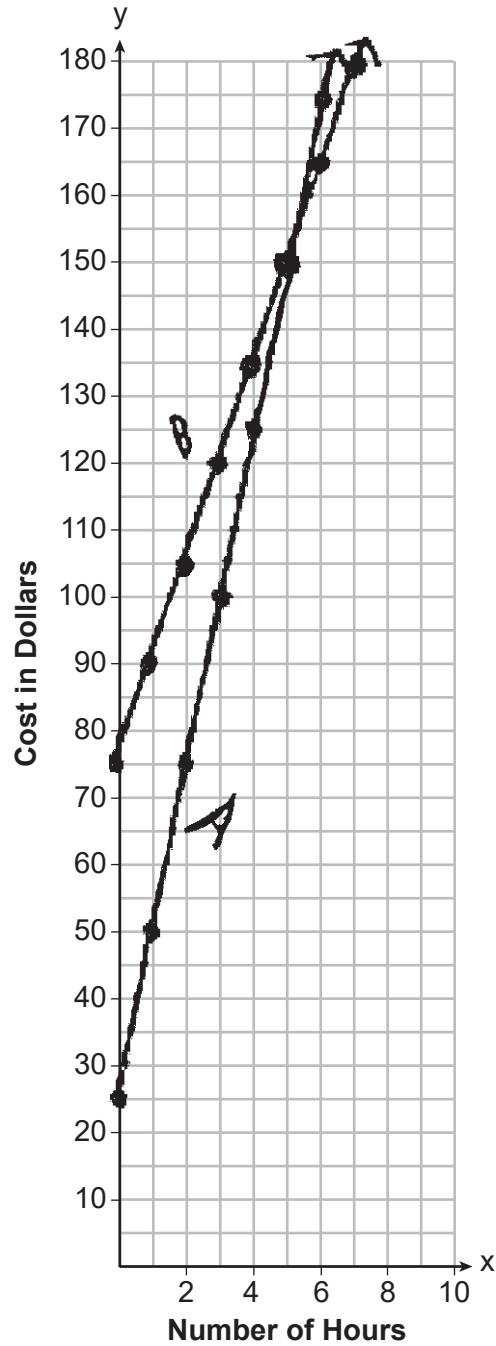
Question 37 is continued on the next page.

Score 4: The student did not write a system of equations.

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

$$y = 25x + 25$$

Write an equation that models this situation, where B represents the total cost of Center B.

$$y = 15x + 75$$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less.

$$\begin{aligned} 15(10) + 75 &= y \\ 150 + 75 &= y \\ 225 &= y \end{aligned}$$

$$\begin{aligned} 25(10) + 25 &= y \\ 250 + 25 &= y \\ 275 &= y \end{aligned}$$

she should use center B because it costs less

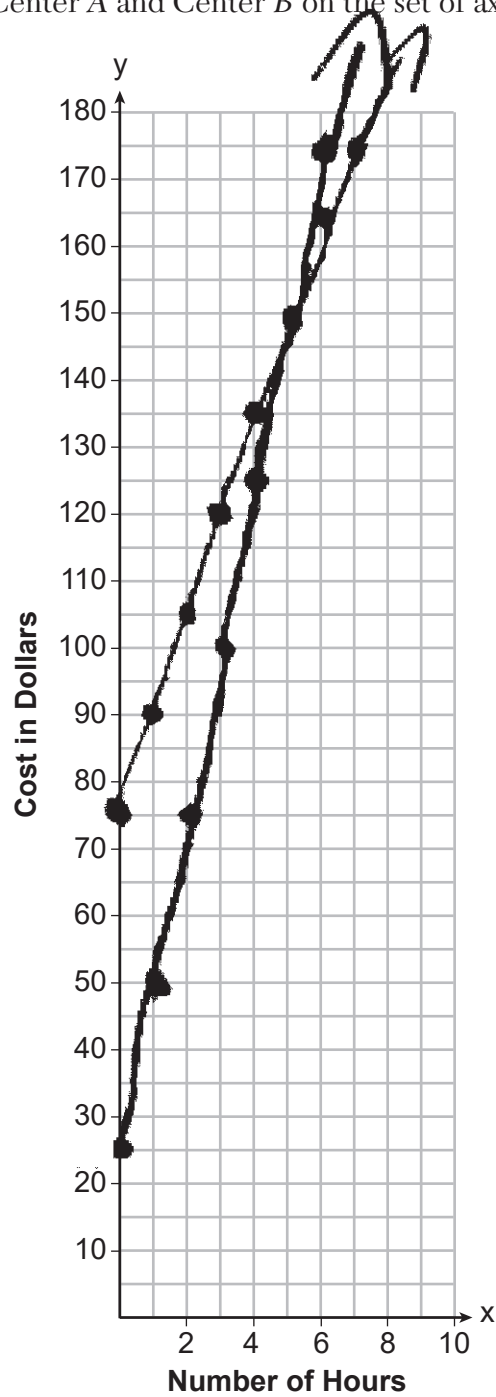
Question 37 is continued on the next page.

Score 4: The student wrote both equations in terms of y and did not label either graph.

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

Write an equation that models this situation, where B represents the total cost of Center B.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less.

My graphs show that Center B is the better choice because the amount of money paid increases slower. By 10 hours, at Center A you would have spent more money than you would've at Center B.

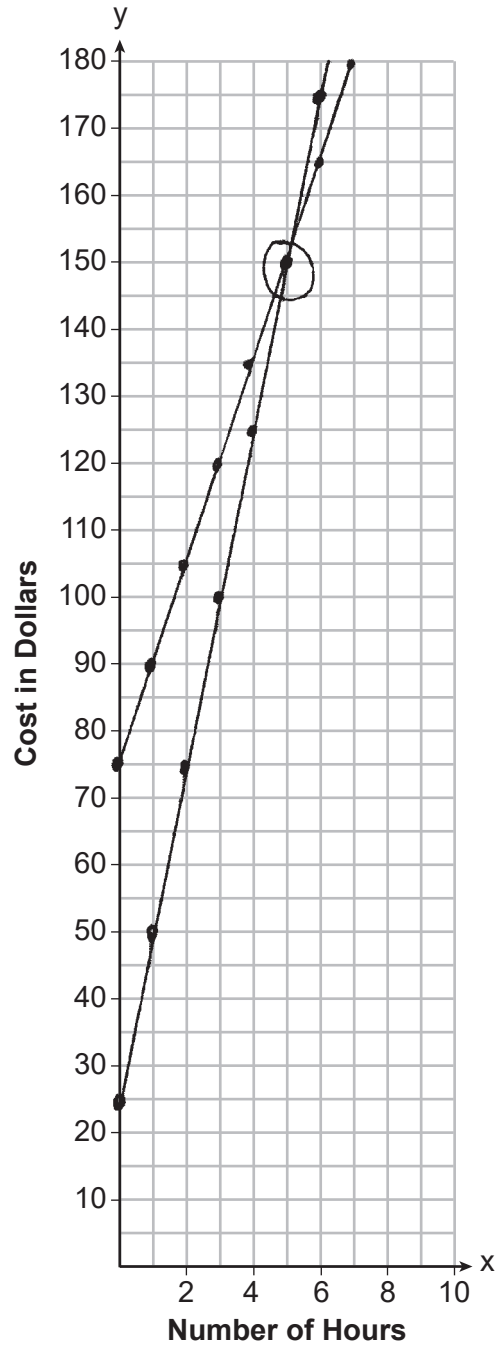
Question 37 is continued on the next page.

Score 3: The student did not write a system of equations and did not label either equation on their graph.

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5 hours

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

Write an equation that models this situation, where B represents the total cost of Center B.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less.

$$\begin{array}{l} 25(10) + 25 = 275 \\ 15(10) + 75 = 225 \\ \text{Center B} \end{array}$$

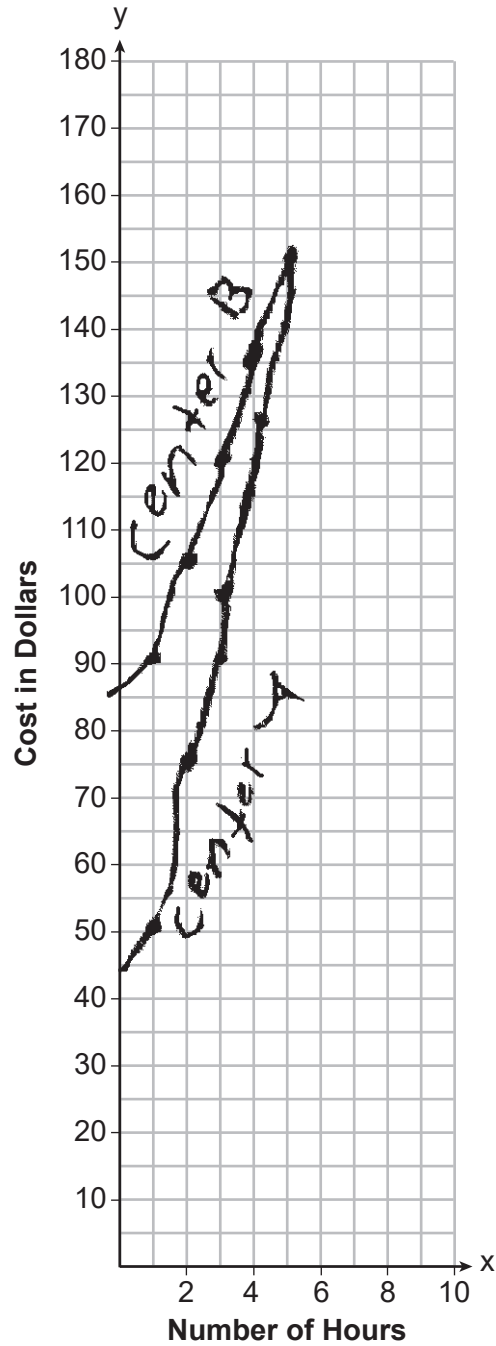
Question 37 is continued on the next page.

Score 2: The student stated 5 and determined that Center B was less expensive.

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

5

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

$$C_1 = 25x + 25$$

Write an equation that models this situation, where B represents the total cost of Center B.

$$C_2 = 15x + 75$$

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*.

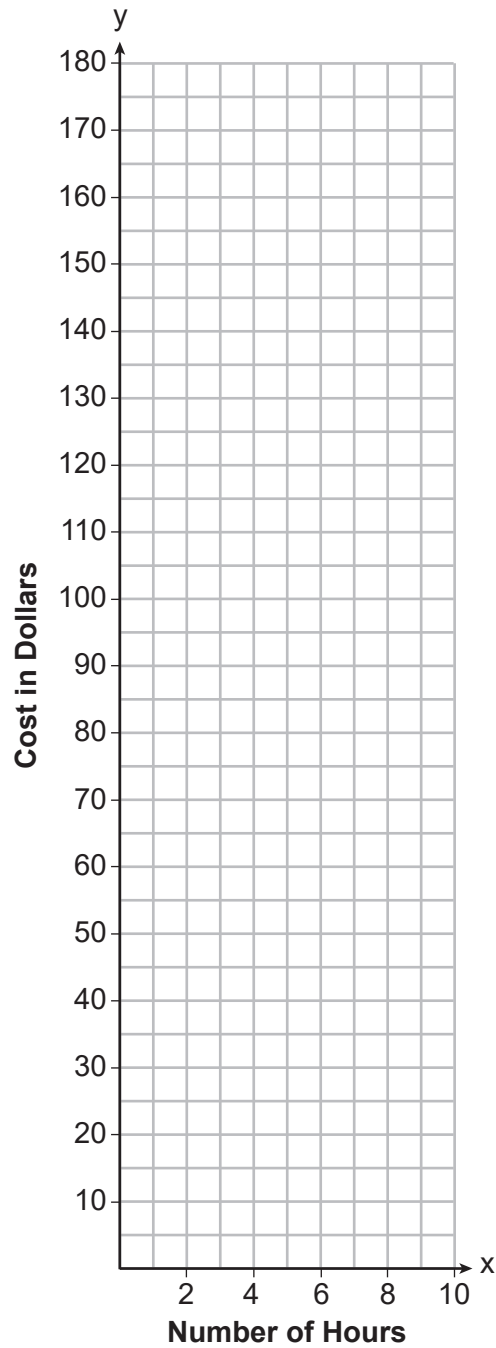
Question 37 is continued on the next page.

Score 1: The student wrote C_1 and C_2 in the system of equations.

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

Question 37

37 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take x hours of classes.

Write an equation that models this situation, where A represents the total cost of Center A.

Write an equation that models this situation, where B represents the total cost of Center B.

If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost less. (10c)

$$\begin{aligned} 25(x) + 25 + 75 \\ 25 - 15 + 75 \\ \boxed{+10} \end{aligned}$$

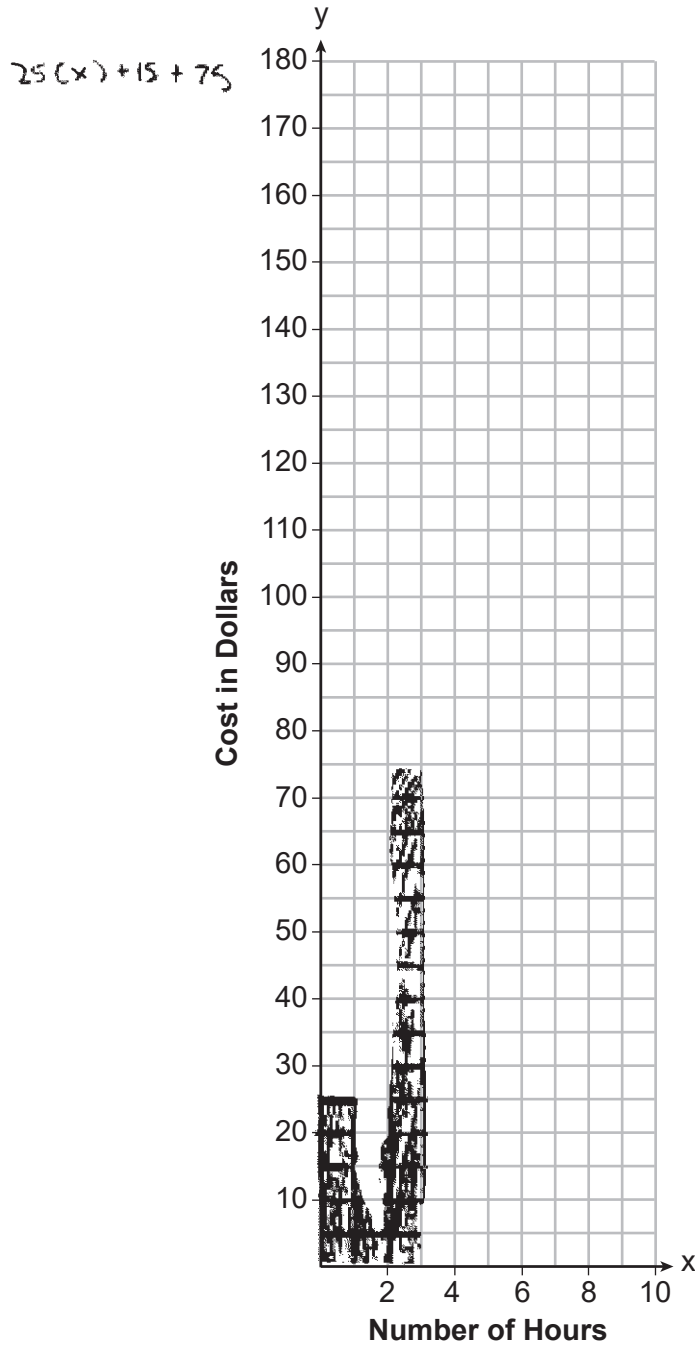
Question 37 is continued on the next page.

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

Question 37

Question 37 continued

Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

3 hours