

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

ALGEBRA I

Wednesday, January 22, 2025 — 1:15 to 4:15 p.m., only

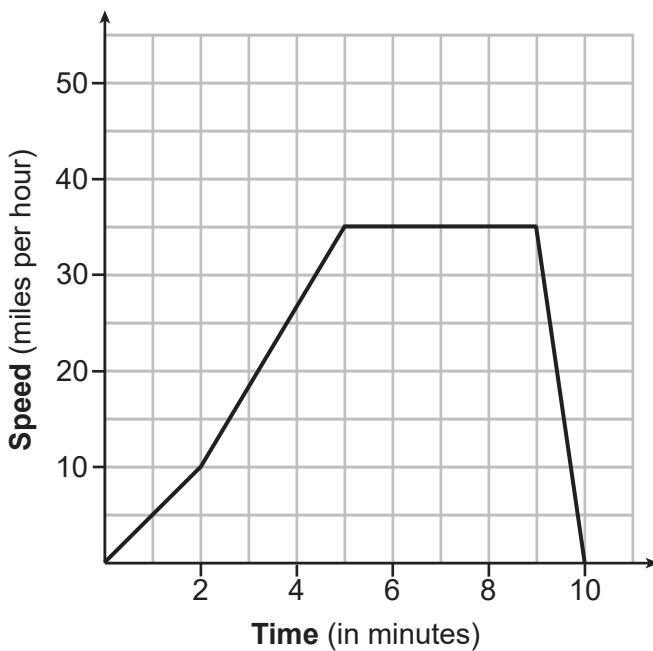
MODEL RESPONSE SET

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Question 25

25 The graph below models Sally's drive to the store.



State an interval when Sally is traveling at a constant speed.

5 to 9 minutes

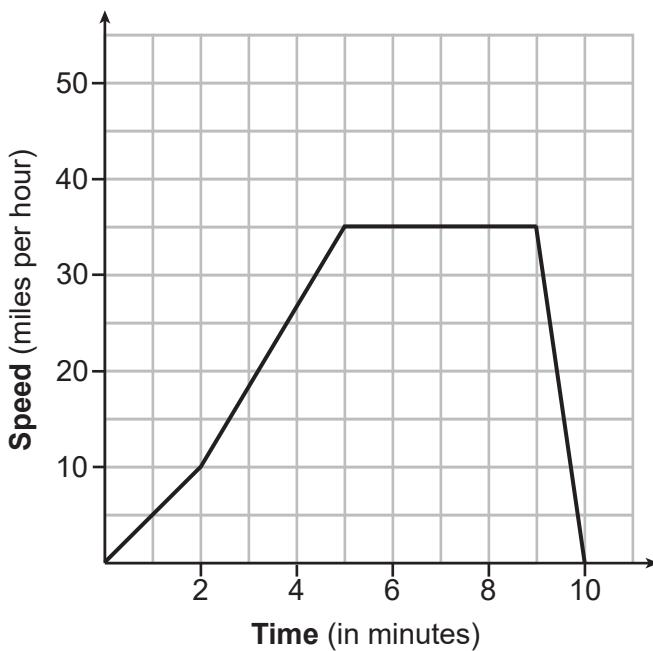
Explain your reasoning.

At 5 to 9 minutes Sally is traveling at a constant speed because the rate of change is 0 and the speed is not increasing nor decreasing.

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

Question 25

25 The graph below models Sally's drive to the store.



State an interval when Sally is traveling at a constant speed.

$$(5, 9)$$

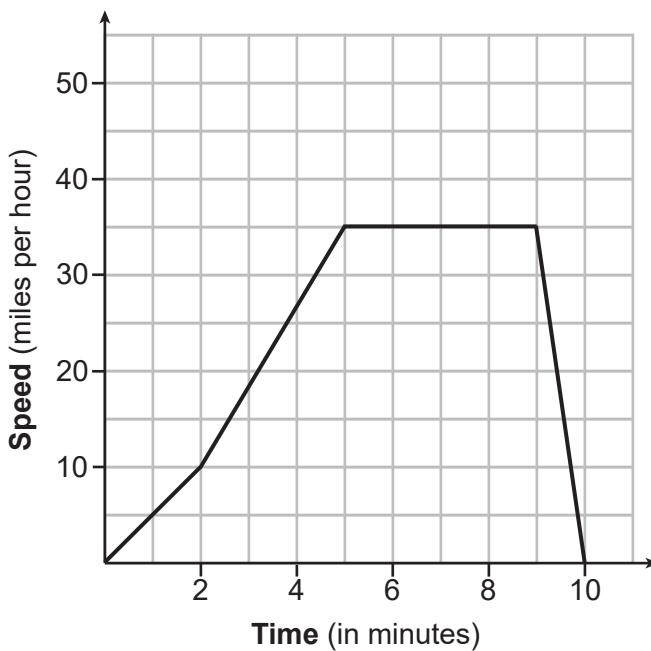
Explain your reasoning.

She starts
at 35 mph

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

Question 25

25 The graph below models Sally's drive to the store.



State an interval when Sally is traveling at a constant speed.

$$4 \leq x \leq 9.$$

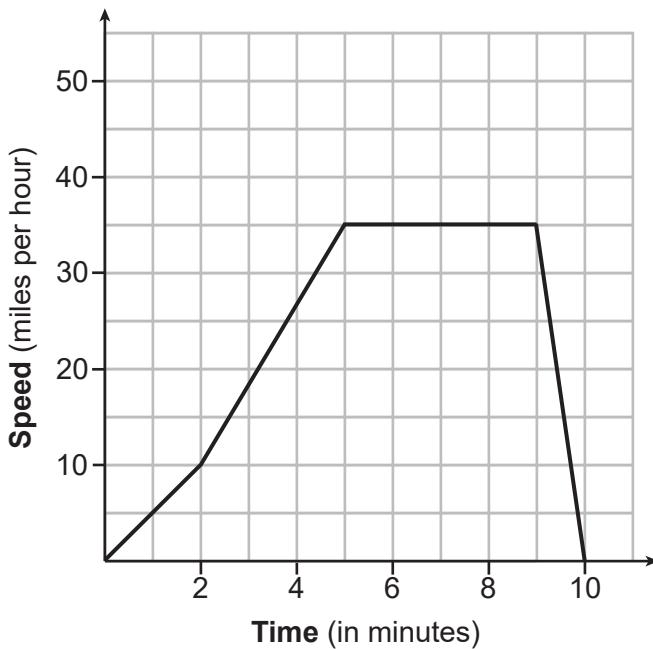
Explain your reasoning.

-the line is flat and speed is
the same.

Score 1: The student gave a correct explanation.

Question 25

25 The graph below models Sally's drive to the store.



State an interval when Sally is traveling at a constant speed.

5 to 7

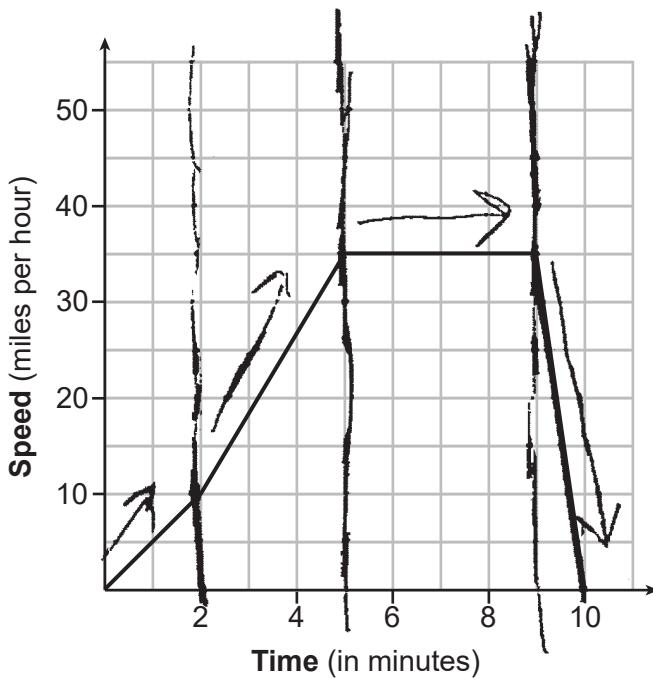
Explain your reasoning.

She take interval at 5 to 7.

Score 1: The student only wrote a correct interval.

Question 25

25 The graph below models Sally's drive to the store.



State an interval when Sally is traveling at a constant speed.

$$(5, 35)$$

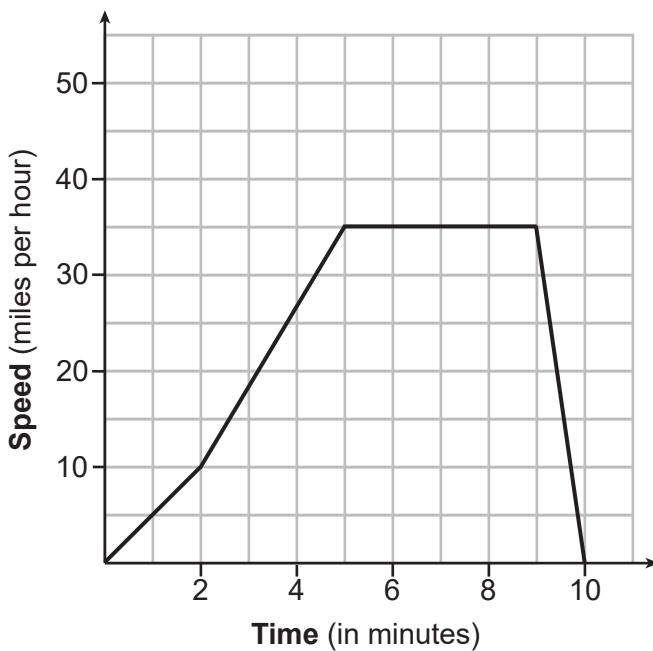
Explain your reasoning.

The graph shows straight line.

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

Question 25

25 The graph below models Sally's drive to the store.



State an interval when Sally is traveling at a constant speed.

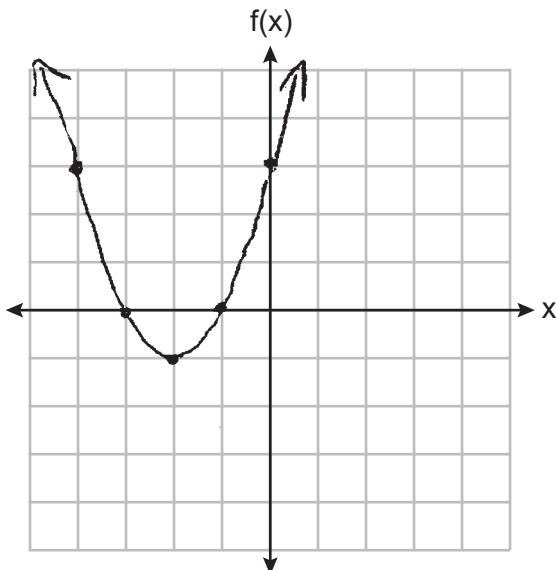
Explain your reasoning.

Sally is traveling at a constant +
using the interval $10 - \cancel{10} .35$.

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

Question 26

26 Graph the function $f(x) = x^2 + 4x + 3$.



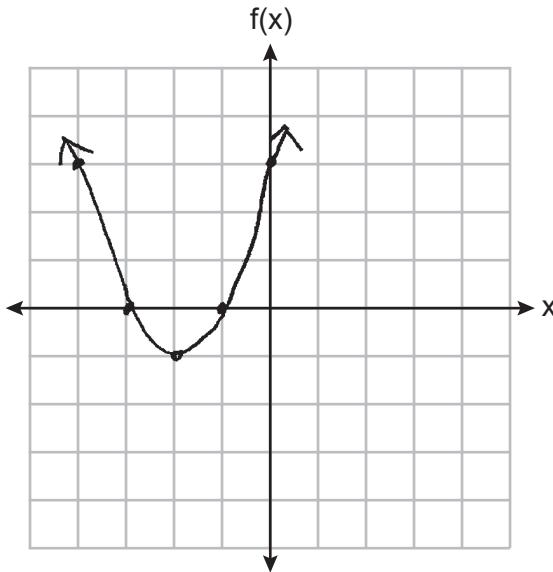
State the equation of the axis of symmetry of $f(x)$.

$$x = -2$$

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

Question 26

26 Graph the function $f(x) = x^2 + 4x + 3$.



State the equation of the axis of symmetry of $f(x)$.

$$x = -\frac{b}{2a}$$

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

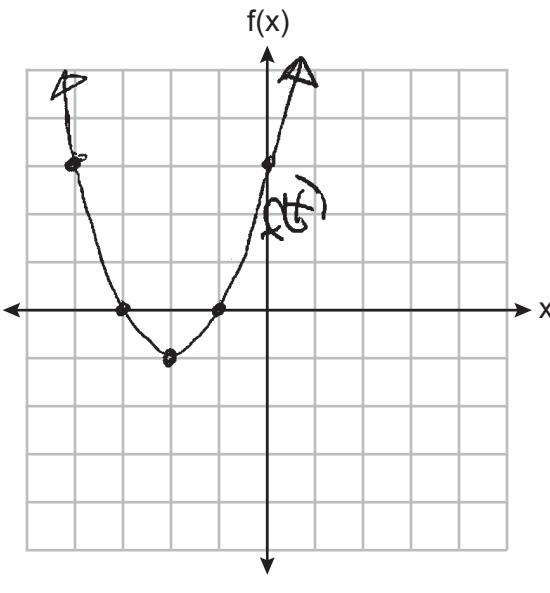
$$x = -\frac{4}{2}$$

$$x = -2$$

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

Question 26

26 Graph the function $f(x) = \frac{a}{x^2} + \frac{b}{4x} + 3$.



$$\frac{-b}{2a}$$

State the equation of the axis of symmetry of $f(x)$.

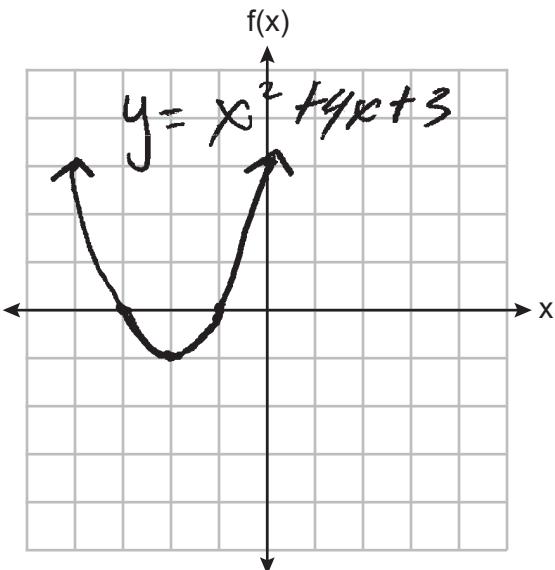
$$\frac{-b}{2a} = \frac{-4}{2(1)} = -2$$

Score 1: The student did not state the axis of symmetry as an equation.

Question 26

26 Graph the function $f(x) = x^2 + 4x + 3$.

x	y
-3	6
-2	1
-1	0
0	3
1	8
2	3



State the equation of the axis of symmetry of $f(x)$.

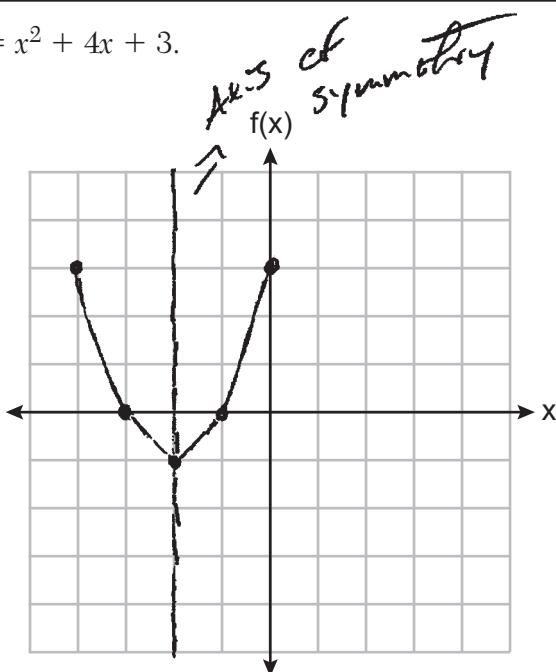
$$y = \frac{-b}{2a}$$

$$y = -2$$

Score 1: The student graphed the function correctly.

Question 26

26 Graph the function $f(x) = x^2 + 4x + 3$.



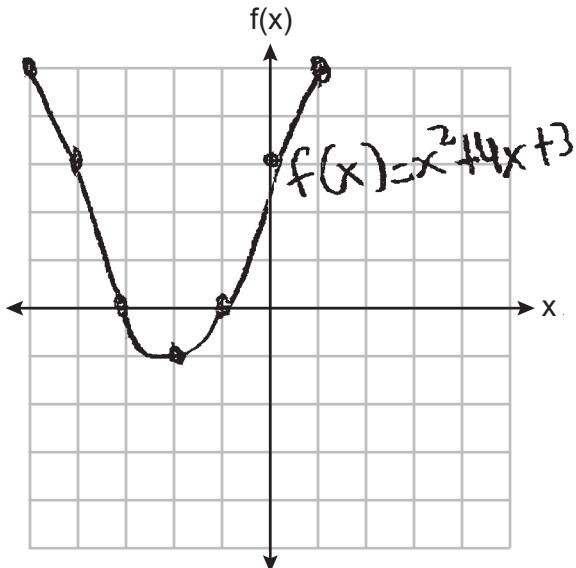
State the equation of the axis of symmetry of $f(x)$.

The axis of symmetry is -2

Score 0: The student made a graphing error by not extending the function, and the student did not express the axis of symmetry as an equation.

Question 26

26 Graph the function $f(x) = x^2 + 4x + 3$.



x	y
-5	8
-4	3
-3	0
-2	-1
-1	0
0	3
1	8

State the equation of the axis of symmetry of $f(x)$.

$$x^2 + 4x + 3$$

x	y
-5	8
-4	3
-3	0
-2	-1
-1	0
0	3
1	8

Score 0: The student made a graphing error and did not state the equation of the axis of symmetry.

Question 27

27 The function $f(x)$ is shown in the table below.

x	0	3	2	6	1	5	4	m
f(x)	6	2	7	5	8	4	3	9

State an appropriate value for m in the table, so that $f(x)$ remains a function.

7

Explain your reasoning.

The number I chose was 7, but any number that isn't already listed in the x section of the table is an appropriate value. This is because in functions each point must have a different input.

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

Question 27

27 The function $f(x)$ is shown in the table below.

x	0	3	2	6	1	5	4	m
f(x)	6	2	7	5	8	4	3	9

State an appropriate value for m in the table, so that $f(x)$ remains a function.

$$m = 7$$

Explain your reasoning.

The input value has to be unique.

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

Question 27

27 The function $f(x)$ is shown in the table below.

x	0	3	2	6	1	5	4	m
f(x)	6	2	7	5	8	4	3	9

State an appropriate value for m in the table, so that $f(x)$ remains a function.

$$f(x) = 7$$

Explain your reasoning.

Since 7 does not repeat throughout the x values it will have the specific output of 9. If 7 was already in the x values then it could not be used again.

Score 1: The student wrote a correct explanation.

Question 27

27 The function $f(x)$ is shown in the table below.

x	0	3	2	6	1	5	4	m
f(x)	6	2	7	5	8	4	3	9

State an appropriate value for m in the table, so that $f(x)$ remains a function.

An appropriate value for m in the table
so that $f(x)$ remains a function is 8

Explain your reasoning.

I say it's 8 because there is a pattern when the numbers increase and decrease. The next step is add 4, so the appropriate value for m is 8

Score 1: The student stated a correct value for m .

Question 27

27 The function $f(x)$ is shown in the table below.

x	0	3	2	6	1	5	4	m
f(x)	6	2	7	5	8	4	3	9

State an appropriate value for m in the table, so that $f(x)$ remains a function.

you would have to change m to a number
to have a value and be a function

Explain your reasoning.

it would not be a function because
m is not a number and has no value

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

Question 27

27 The function $f(x)$ is shown in the table below.

x	0	3	2	6	1	5	4	m
f(x)	6	2	7	5	8	4	3	9

State an appropriate value for m in the table, so that $f(x)$ remains a function.

○

Explain your reasoning.

0 because it would go back to the
x axis

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

Question 28

28 Solve $x^2 + 8x = 33$ for x by completing the square.

$$\begin{aligned}x^2 + 8x &= 33 \\x^2 + 8x + 16 &= 33 + 16 \\\sqrt{(x+4)^2} &= \sqrt{49} \\x+4 &= \pm 7\end{aligned}$$

$$\boxed{\begin{array}{l}x=3 \\x=-11\end{array}}$$

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

Question 28

28 Solve $x^2 + 8x = 33$ for x by completing the square.

$$\begin{array}{l} x^2 + 8x = 33 \\ \underline{+16 \quad +16} \\ x^2 + 8x + 16 = 49 \\ (x+4)^2 = 49 \\ \sqrt{(x+4)^2} = \pm \sqrt{49} \\ x+4 = \pm 7 \\ \begin{array}{c} x+4=7 \\ -4 -4 \\ \hline x=3 \end{array} \quad \begin{array}{c} x+4=-7 \\ -4 -4 \\ \hline x=-11 \end{array} \end{array}$$

$(=\left(\frac{b}{2}\right)^2)$ $(=\left(\frac{8}{2}\right)^2)$ $(=(4)^2)$
 $C=16$

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

Question 28

28 Solve $x^2 + 8x = 33$ for x by completing the square.

$$\begin{array}{c} \text{u A u} \\ x^2 + 8x - 33 = 0 \\ \swarrow \quad \searrow \\ (x+11)(x-3) = 0 \\ \hline x+11=0 & x-3=0 \\ -11 -11 & +3 +3 \\ x = -11 & x = +3 \end{array}$$

-33×1
 -13×11
 -11×3
 -1×33

$$x = -11$$

$$x = +3$$

Score 1: The student used a method other than completing the square.

Question 28

28 Solve $x^2 + 8x = 33$ for x by completing the square.

$$\begin{aligned} x^2 + 8x &= 33 \\ x^2 + 8x + 16 &= 33 + 16 \\ x^2 + 8x + 16 &= 49 \\ \sqrt{(x+4)^2} &= \sqrt{49} \\ x+4 &= \pm 7 \end{aligned}$$
$$\begin{aligned} x+4 &= 7 & x+4 &= -7 \\ -4 & -4 & -4 & -4 \\ x &= 3 & x &= -11 \end{aligned}$$

OR

$$x = 3 \quad \text{OR} \quad x = -11$$

Score 1: The student did not find the square root of 49.

Question 28

28 Solve $x^2 + 8x = 33$ for x by completing the square.

$$\begin{aligned} x^2 + 8x &= 33 \\ -33 &\quad -33 \\ x^2 + 8x - 33 &= 0 \\ x^2 + 8x + 16 - 16 - 33 &= \\ \boxed{(x+16)^2 - 49} &= \end{aligned}$$

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

Question 28

28 Solve $x^2 + 8x = 33$ for x by completing the square.

~~WTF~~

$$\begin{aligned} x^2 + 8x &= 33 \\ x^2 + 8x + \underline{16} - 33 - 16 &= 0 \end{aligned}$$

$$x^2 + 8x + 16 - 16 = 0$$

$$\begin{aligned} x^2 + 8x & \\ \sqrt{(x+4)^2 - 33} &= 0 \\ +33 &+33 \end{aligned}$$

$$\begin{aligned} x+4 &= 33 \\ -4 &-4 \end{aligned}$$

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

Question 29

29 If $f(x) = \frac{-3x - 5}{2}$, algebraically determine the value of x when $f(x) = -22$.

$$-22 = \frac{-3x - 5}{2}$$

$$-44 = -3x - 5$$

$$-39 = -3x$$

$$x = 13$$

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

Question 29

29 If $f(x) = \frac{-3x - 5}{2}$, algebraically determine the value of x when $f(x) = -22$.

$$\underline{-3x - 5} = -22$$

$$\begin{array}{r} -1.5x - 2.5 = -22 \\ + 2.5 \quad + 2.5 \\ \hline -1.5x = -19.5 \end{array}$$

$$x = 13$$

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

Question 29

29 If $f(x) = \frac{-3x - 5}{2}$, algebraically determine the value of x when $f(x) = -22$.

$$f(x) = \frac{-3x - 5}{2}$$

$$f(x) = \frac{-3(-22) - 5}{2} \rightarrow f(x) = \frac{66 - 5}{2}$$

↓

$$f(x) = \frac{61}{2} = \boxed{30.5}$$

Score 1: The student incorrectly substituted -22 for x .

Question 29

29 If $f(x) = \frac{-3x - 5}{2}$, algebraically determine the value of x when $f(x) = -22$.

$$f(x) = -22 \text{ when } x = 13$$

Score 1: The student stated the correct answer.

Question 29

29 If $f(x) = \frac{-3x - 5}{2}$, algebraically determine the value of x when $f(x) = -22$.

$$-22 = \frac{-3x - 5}{2}$$

$$\frac{-3(7) - 5}{22} \approx \text{about } -22$$

$$\textcircled{x = 7}$$

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

Question 29

29 If $f(x) = \frac{-3x - 5}{2}$, algebraically determine the value of x when $f(x) = -22$.

$$\begin{aligned} & \underline{-3(65)-5} \\ & \underline{2} \\ & \frac{-195-5}{2} = -22 \end{aligned}$$

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

Question 30

30 Rationalize the denominator of the fraction below. Express the solution in simplest form.

$$\frac{4}{\sqrt{2}}$$

$$\frac{4}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$$

$$\frac{4 \sqrt{2}}{\sqrt{2} \sqrt{2}} \quad \begin{matrix} \text{numerator} \\ \text{denominator} \end{matrix}$$

$$\frac{4 \sqrt{2}}{2}$$

$$\frac{4 \cancel{\sqrt{2}}}{\cancel{2}}$$

$$4 \sqrt{2}$$

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

Question 30

30 Rationalize the denominator of the fraction below. Express the solution in simplest form.

$$\frac{\sqrt{16}}{\sqrt{2}} \leftarrow \frac{4}{\sqrt{2}}$$

$$\frac{\sqrt{16}}{\sqrt{2}} \rightarrow \sqrt{\frac{16}{2}} = \sqrt{8}$$

$$\begin{array}{c} \sqrt{8} \\ \diagdown \quad \diagup \\ \sqrt{4} \quad \sqrt{2} \\ \downarrow \\ 2\sqrt{2} \end{array}$$

$$\boxed{2\sqrt{2}}$$

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

Question 30

30 Rationalize the denominator of the fraction below. Express the solution in simplest form.

$$\frac{4}{\sqrt{2}}$$

$$\left(\frac{4}{\sqrt{2}}\right)\left(\frac{\sqrt{2}}{\sqrt{2}}\right)$$

$$\frac{4\sqrt{2}}{\sqrt{4}}$$

$$\frac{4\sqrt{2}}{2}$$

Score 1: The student did not simplify $\frac{4\sqrt{2}}{2}$.

Question 30

30 Rationalize the denominator of the fraction below. Express the solution in simplest form.

$$\frac{4}{\sqrt{2}}$$

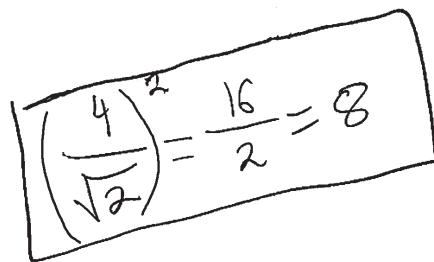
$$\frac{4}{\sqrt{2}} \cdot \sqrt{2} = 4$$

Score 1: The student multiplied by $\frac{\sqrt{2}}{1}$ instead of $\frac{\sqrt{2}}{\sqrt{2}}$.

Question 30

30 Rationalize the denominator of the fraction below. Express the solution in simplest form.

$$\frac{4}{\sqrt{2}}$$



A handwritten mathematical calculation enclosed in a rectangular box. The calculation shows the simplification of the fraction $\frac{4}{\sqrt{2}}$. The student has squared both the numerator and the denominator, resulting in $\frac{16}{2}$, which is then simplified to 8.

$$\left(\frac{4}{\sqrt{2}}\right)^2 = \frac{16}{2} = 8$$

Score 1: The student squared the fraction and simplified.

Question 30

30 Rationalize the denominator of the fraction below. Express the solution in simplest form.

$$\frac{4}{\sqrt{2}}$$

$$\frac{4}{1.41421\dots} = \boxed{2.82843\dots}$$

Score 0: The student expressed the fraction as a decimal.

Question 30

30 Rationalize the denominator of the fraction below. Express the solution in simplest form.

$$\frac{4}{\sqrt{2}} (\sqrt{2})$$

$$4\sqrt{2}$$

Score 0: The student multiplied by $\frac{\sqrt{2}}{1}$ and made a computational error.

Question 31

31 Alex had \$1.70 in nickels and dimes on his desk. There were 25 coins in all.

Write a system of equations that could be used to determine both the number of nickels, n , and the number of dimes, d , that Alex had.

$$\begin{aligned} .05n + .1d &= 1.70 \\ n + d &= 25 \end{aligned}$$

Use your system of equations to algebraically determine both the number of nickels and the number of dimes that he had.

$$\begin{array}{l} \begin{array}{rcl} .05n + .1d & = & 1.70 \\ n + d & = & 25 \\ \hline -.05n - -.05d & = & -1.25 \\ \hline .05n + .1d & = & 1.70 \\ \hline .05d & = & .45 \\ d & = & 9 \end{array} & \begin{array}{l} .05n + .1(9) = 1.70 \\ .05n + .9 = 1.70 \\ .05n = .8 \\ n = 16 \end{array} \end{array}$$

Alex has 9 dimes and 16 nickels

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

Question 31

31 Alex had \$1.70 in nickels and dimes on his desk. There were 25 coins in all.

Write a system of equations that could be used to determine both the number of nickels, n , and the number of dimes, d , that Alex had.

$$\begin{cases} n+d=25 \\ 0.05n+0.1d=1.70 \end{cases}$$

Use your system of equations to algebraically determine both the number of nickels and the number of dimes that he had.

$$\begin{aligned} n+d &= 25 \\ 0.05n+0.1d &= 1.7 \end{aligned}$$

$$\begin{array}{r} n+d=25 \\ -d -d \\ \hline n=25-d \end{array}$$

He has 16 nickles
and 9 dimes

$$\begin{aligned} 0.05(25-d)+0.1d &= 1.7 \\ 1.25-0.05d+0.1d &= 1.7 \\ 1.25+0.05d &= 1.7 \\ -1.25 & \quad -1.25 \\ \hline 0.05d &= 0.45 \\ 0.05 & \quad 0.05 \\ d &= 9 \end{aligned}$$

$$\begin{aligned} n &= 25-9 \\ n &= 16 \end{aligned}$$

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

Question 31

31 Alex had \$1.70 in nickels and dimes on his desk. There were 25 coins in all.

Write a system of equations that could be used to determine both the number of nickels, n , and the number of dimes, d , that Alex had.

$$\begin{aligned} \$1.70 &= 0.05n + 0.10d \\ n + d &= 25 \end{aligned}$$

Use your system of equations to algebraically determine both the number of nickels and the number of dimes that he had.

$$0.05n + 0.10d = 1.70$$

$$n = 16 \quad d = 9$$

$$16 + 9 = 25$$

$$0.05(16) + 0.10(9) = 1.70$$

Alex had 16 nickels
and 9 dimes

Score 3: The student wrote a correct system of equations and stated $n = 16$ and $d = 9$.

Question 31

31 Alex had \$1.70 in nickels and dimes on his desk. There were 25 coins in all.

Write a system of equations that could be used to determine both the number of nickels, n , and the number of dimes, d , that Alex had.

$$n + d = 25$$

$$0.05n + 0.10d = 1.70$$

Use your system of equations to algebraically determine both the number of nickels and the number of dimes that he had.

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

Question 31

31 Alex had \$1.70 in nickels and dimes on his desk. There were 25 coins in all.

Write a system of equations that could be used to determine both the number of nickels, n , and the number of dimes, d , that Alex had.

$$25 - n = d$$

Use your system of equations to algebraically determine both the number of nickels and the number of dimes that he had.

Score 1: The student wrote one correct equation.

Question 31

31 Alex had \$1.70 in nickels and dimes on his desk. There were 25 coins in all.

Write a system of equations that could be used to determine both the number of nickels, n , and the number of dimes, d , that Alex had.

$$\begin{array}{rcl} 1.70n + 1.70d & = & 25 \\ n + d & = & 15 \end{array}$$

Use your system of equations to algebraically determine both the number of nickels and the number of dimes that he had.

$$\begin{aligned} & \cancel{\begin{array}{l} 1.70n + 1.70d = 25 \\ n + d = 15 \end{array}} \\ & \begin{array}{rcl} 1.70n + 1.70d & = & 25 \\ -1.70n - 1.70d & = & 15 \\ \hline 0 & = & 40 \\ 0 & = & 0 \\ \hline n & = & 0 \end{array} \end{aligned}$$

$$\begin{array}{rcl} 1.70(0) + 1.70d & = & 25 \\ 1.70d & = & 25 \\ \hline d & = & 14 \end{array}$$

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

Question 32

- 32** The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*.

$$y = 9.1x - 527.6$$

State the correlation coefficient, rounded to the *nearest tenth*.

$$0.9$$

State what the correlation coefficient suggests about the linear fit of these data.

very strong correlation

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

Question 32

- 32 The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*.

$$y = 9.1x - 527.6$$

State the correlation coefficient, rounded to the *nearest tenth*.

$$r = 0.9$$

State what the correlation coefficient suggests about the linear fit of these data.

Since the correlation coefficient is close to 1, it suggests that the linear fit is strong for this data.

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

Question 32

- 32 The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*.

$$Y = m_x + b$$

$$y = 9.1x - 527.5$$

State the correlation coefficient, rounded to the *nearest tenth*.

.9

State what the correlation coefficient suggests about the linear fit of these data.

Strong positive

Score 3: The student made one rounding error.

Question 32

- 32 The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*.

$$y = 9.1x + -527.6$$

$$y = mx + b$$

State the correlation coefficient, rounded to the *nearest tenth*.

$$0.9$$

State what the correlation coefficient suggests about the linear fit of these data.

its no a straight line.

Score 3: The student wrote the correct linear regression equation and stated the correct correlation coefficient.

Question 32

- 32 The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*.

$$y = 9.2x - 540.4$$

State the correlation coefficient, rounded to the *nearest tenth*.

0.9

State what the correlation coefficient suggests about the linear fit of these data.

This means there is a strong correlation between average heart rate and calories burned since 0.9 is close to one

Score 2: The student stated a correct correlation coefficient and stated its strength.

Question 32

- 32 The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*.

$$y = 9.1x + 527.6$$

State the correlation coefficient, rounded to the *nearest tenth*.

$$\rho_x = .52$$

State what the correlation coefficient suggests about the linear fit of these data.

It represents the higher the calories burned the higher the heart rate.

-
- Score 1:** The student wrote an incorrect sign in the linear regression equation.

Question 32

- 32 The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*.

$$9.1x + -527.6$$

State the correlation coefficient, rounded to the *nearest tenth*.

$$-24.1$$

State what the correlation coefficient suggests about the linear fit of these data.

The linear fit
of this data is
not the best fit.

Score 1: The student only wrote a correct expression.

Question 32

- 32 The table below shows the average heart rate, x , and Calories burned, y , for seven men on an Olympic rowing team during a one-hour workout class.

Average Heart Rate (x)	135	147	150	144	146	153	143
Calories Burned (y)	725	812	866	761	825	863	737

Write the linear regression equation that models these data, rounding all values to the *nearest tenth*.

$$140 \quad 150 \quad 150 \quad 140 \quad 150 \quad 150 \quad 140$$

$$730 \quad 810 \quad 870 \quad 760 \quad 830 \quad 860 \quad 740$$

State the correlation coefficient, rounded to the *nearest tenth*.

$$5.5x$$

State what the correlation coefficient suggests about the linear fit of these data.

The higher the heart rate the more calories burned

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

Question 33

33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$.

Express your solution in simplest radical form.

$$\begin{aligned}x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\x &= \frac{-4 \pm \sqrt{4^2 - 4(1)(-3)}}{2(1)} \\&= \frac{-4 \pm \sqrt{16 + 12}}{2} \\&= \frac{-4 \pm \sqrt{28}}{2} \\&= \frac{-4 \pm \sqrt{4} \sqrt{7}}{2} \\&= \frac{-4 \pm 2\sqrt{7}}{2}\end{aligned}$$

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

Question 33

33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$.

Express your solution in simplest radical form.

$$x^2 + 4x - 3 = 0$$
$$x = \frac{-4 \pm \sqrt{(-4)^2 - 4(1)(-3)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{28}}{2}$$

$$\boxed{x = -2 + \sqrt{7}}$$

$$\boxed{x = -2 - \sqrt{7}}$$

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

Question 33

33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$.

Express your solution in simplest radical form.

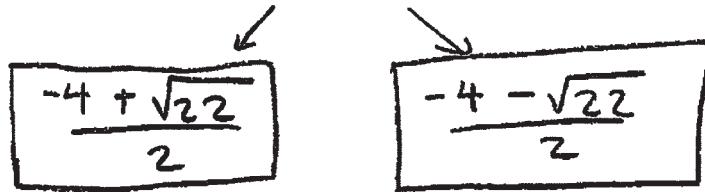
$$a = 1, b = 4, c = -3$$

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

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

$$= \frac{-4 \pm \sqrt{16 + 6}}{2}$$

$$= \frac{-4 \pm \sqrt{22}}{2}$$



Two rectangular boxes are shown side-by-side. The left box contains the expression $\frac{-4 + \sqrt{22}}{2}$. The right box contains the expression $\frac{-4 - \sqrt{22}}{2}$. Each box has a small arrow pointing towards it from the handwritten text above.

Score 3: The student made one mistake when writing the quadratic formula.

Question 33

33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$.

Express your solution in simplest radical form.

$$\textcircled{A} x^2 + \textcircled{B} x - \textcircled{C} = 0$$

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

$$x = \frac{-4 \pm \sqrt{16 + 12}}{2}$$

$$x = \frac{-4 \pm \sqrt{27}}{2}$$

$$x = \frac{-4 \pm \sqrt{9} \sqrt{3}}{2}$$

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

Score 3: The student made one computational error.

Question 33

33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$.

Express your solution in simplest radical form.

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

$$\begin{aligned} 1 &= a \\ 4 &= b \\ -3 &= c \end{aligned}$$

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

$$\frac{-4 \pm \sqrt{28}}{2} = x$$

$$x = -2 \pm \sqrt{28}$$

Score 2: The student showed correct work to find $\frac{-4 \pm \sqrt{28}}{2}$.

Question 33

33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$.

Express your solution in simplest radical form.

$$\begin{aligned}x^2 + 4x - 3 &= 0 & \left(\frac{4}{2}\right)^2 &= 4 \\x^2 + 4x &= 3 \\ \sqrt{(x+2)^2} &= \sqrt{7} \\x &= -2 \pm \sqrt{7}\end{aligned}$$

Score 1: The student did not solve the equation using the quadratic formula and made a computational error.

Question 33

33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$.

Express your solution in simplest radical form.

$$x^2 + 4x - 3 = 0 \quad \text{AMU}$$
$$\sqrt{x^2} = x$$
$$(x+1)(x+3) = 0$$
$$\begin{array}{c|c} x+1=0 & x+3=0 \\ \hline -1 & -3 \end{array}$$
$$x = -1 \quad x = -3$$

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

Question 33

33 Using the quadratic formula, solve $x^2 + 4x - 3 = 0$.

Express your solution in simplest radical form.

$$\begin{aligned}x^2 + 4x - 3 &= 0 \\+3 &\quad +3 \\x^2 + 4x &= 3\end{aligned}$$

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

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

$$a=1$$

$$b=4$$

$$c=3$$

$$-(4) \pm \sqrt{\frac{-2}{2}}$$

$$\begin{array}{ccc}&&\\&\swarrow&\searrow\\-3&&-5\end{array}$$

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

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$$\boxed{\begin{array}{l} x=6 \\ y=6 \end{array}}$$

$$\boxed{\begin{array}{l} x=3 \\ y=0 \end{array}}$$

$$\begin{array}{r} 2x - 6 = x^2 - 7x + 12 \\ \quad +6 \qquad \quad +6 \\ \hline 2x = x^2 - 7x + 18 \end{array}$$

$$\begin{array}{r} -x^2 - x^2 \\ \hline -x^2 + 2x = -7x + 18 \end{array}$$

$$\begin{array}{r} -2x \quad -2x \\ \hline -x^2 = -9x + 18 \end{array}$$

$$\begin{array}{r} +x^2 \quad +x^2 \\ \hline x^2 - 9x + 18 = 0 \end{array}$$

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

$$y = 12 - 6$$

$$y = 6$$

$$y = 2(3) - 6$$

$$y = 6 - 6$$

$$y = 0$$

$$x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(1)(18)}}{2(1)}$$

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

$$x = \frac{9 \pm 3}{2}$$

$$x = \frac{9+3}{2} = \frac{12}{2} = 6$$

$$x = 6 \text{ or } x = 3$$

$$x = \frac{9-3}{2} = \frac{6}{2} = 3$$

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

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$$2x - 6 = x^2 - 7x + 12$$

$$x^2 - 9x + 18 = 0$$

$$(x-3)(x-6) = 0$$

$$x=3 \quad x=6$$

$$y=2(3)-6 \quad y=2(6)-6$$

$$y=0 \quad y=6$$

$$(3, 0), (6, 6)$$

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

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$$\begin{array}{r} x^2 - 7x + 12 = 2x - 6 \\ -2x \quad -2x \\ \hline x^2 - 9x + 12 = -6 \\ +6 \quad +6 \\ \hline x^2 - 9x + 18 = 0 \\ +2.25 +2.25 \\ \hline x^2 - 9x + 20.25 = 2.25 \\ \sqrt{(x-4.5)^2} = \sqrt{2.25} \end{array}$$

$$\begin{array}{r} x - 4.5 = 1.5 \quad \text{or} \quad x - 4.5 = -1.5 \\ +4.5 \quad +4.5 \\ \hline x = 6 \quad \text{or} \quad x = 3 \end{array}$$

$$\begin{array}{ll} y = 2x - 6 & y = 2x - 6 \\ y = 2(6) - 6 & y = 2(3) - 6 \\ y = 6 & y = 0 \end{array}$$

$$\boxed{\begin{array}{ll} x = 6 & x = 3 \\ y = 6 & y = 0 \end{array}}$$

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

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$$b = -9 \quad \frac{1}{2}b = -4.5 \quad \frac{1}{2}b^2 =$$

$$20.25$$

$$\begin{array}{r} 2x - 6 = x^2 - 7x + 12 \\ -2x + 6 \end{array}$$

$$x^2 - 9x + 18 = 0$$

$$(x - 4.5)^2 + 8 - 20.25 = 0$$

$$(x - 4.5)^2 - 2.25 = 0$$

$$\sqrt{(x - 4.5)^2} = \sqrt{2.25}$$

$$x - 4.5 = \pm 2.25$$

$$x = 4.5 \pm 2.25$$

$$x = 6.75 \quad (6.75, 7.5)$$

$$x = 2.25 \quad (2.25, -1.5)$$

$$y = 2(6.75) - 6 \quad y = 7.5$$

$$y = 2(2.25) - 6 \quad y = -1.5$$

Score 3: The student made one computational error by not computing the square root of 2.25.

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$$\begin{aligned} x^2 - 7x + 12 &= 2x - 6 \\ +7x &\quad -2x + 12 \\ \hline x^2 - 9x + 18 &= 0 \end{aligned}$$

$\begin{array}{r} 18 \\ \swarrow \curvearrowleft \\ 2 \quad 9 \\ \times \quad 3 \end{array}$

$$(x - 6)(x - 3) = 0$$
$$\begin{aligned} x - 6 &= 0 & x - 3 &= 0 \\ +6 &\quad +6 & +3 &\quad +3 \\ \hline x = 6 & & x = 3 & \end{aligned}$$

$$\begin{aligned} y &= 3^2 - 7(3) + 12 \\ y &= 9 - 21 + 12 \\ y &= 0 \end{aligned}$$

$$\begin{aligned} y &= 6^2 - 7(6) + 12 \\ y &= 36 - 42 + 12 \\ y &= 0 \end{aligned}$$

Score 3: The student made one computational error when finding the y -value when $x = 6$.

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

(3,0) (6,6) ← intersections

check

$$0 = 3^2 - 2(3) + 12$$

$$0 = 9 - 6 + 12$$

$$0 = 0 \quad \checkmark$$

$$6 = 6^2 - 2(6) + 12$$

$$6 = 36 - 12 + 12$$

$$6 = 6 \quad \checkmark$$

$$0 = 2(3) - 6$$

$$0 = 6 - 6$$

$$0 = 0 \quad \checkmark$$

$$6 = 2(6) - 6$$

$$6 = 12 - 6$$

$$6 = 6 \quad \checkmark$$

Score 2: The student used a method other than algebraic.

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$$\begin{array}{rcl} x^2 - 7x + 12 & = & 2x - 6 \\ +7x & & +7x \end{array}$$

$$\begin{array}{rcl} x^2 & + 12 & = 9x - 6 \\ +6 & & +6 \end{array}$$

$$\begin{array}{l} A=1 \\ B=-9 \\ C=18 \end{array}$$

$$x^2 - 9x + 18 = 0$$

$$x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(1)(18)}}{2(1)}$$

Score 1: The student wrote a correct quadratic equation in standard form.

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$$\begin{array}{rcl} x^2 - 7x + 12 & = & 2x - 6 \\ +7x & & +7x \end{array}$$

$$\begin{array}{rcl} x^2 + 12 & = & 9x - 6 \\ +6 & & +6 \end{array}$$

$$\begin{array}{rcl} x^2 + 18 & = & 9x \\ -9x & & -9x \end{array}$$

$$x^2 - 9x + 18$$

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

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$\begin{aligned}y &= x^2 - 7x + 12 \\y &= 2x - 6\end{aligned}$$

$\overset{x^2}{(3,6)}$ when they
equal

$$2x - 6 = 0$$

$$\begin{array}{r}+6 \\ \hline 2x - 6 \\ \hline 2\end{array}$$

(3)

$$\begin{array}{r}x^2 - 7x + 12 = 0 \\ -12 \quad +12 \\ \hline\end{array}$$

$$\begin{array}{r}x^2 - 7x + 12 \\ +7 \quad +7 \\ \hline\end{array}$$

$$\begin{array}{r}x^2 - 19 \\ 7 \quad 3 \\ \hline\end{array}$$

(6,3)

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

Question 34

34 Solve the following system of equations algebraically for all values of x and y .

$$y = x^2 - 7x + 12$$

$$y = 2x - 6$$

$y = x^2 - 7x + 12$	
x	y
0	12
1	6
2	2
3	0

$y = 2x - 6$	
x	y
0	-6
1	-4
2	-2
3	0

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

Question 35

- 35 Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$\begin{array}{l} 2x + 1.5y = 30 \\ \underline{y = 2x} \\ \hline 1.5y = -2x + 30 \\ \hline y = \frac{-2}{1.5}x + 20 \end{array}$$

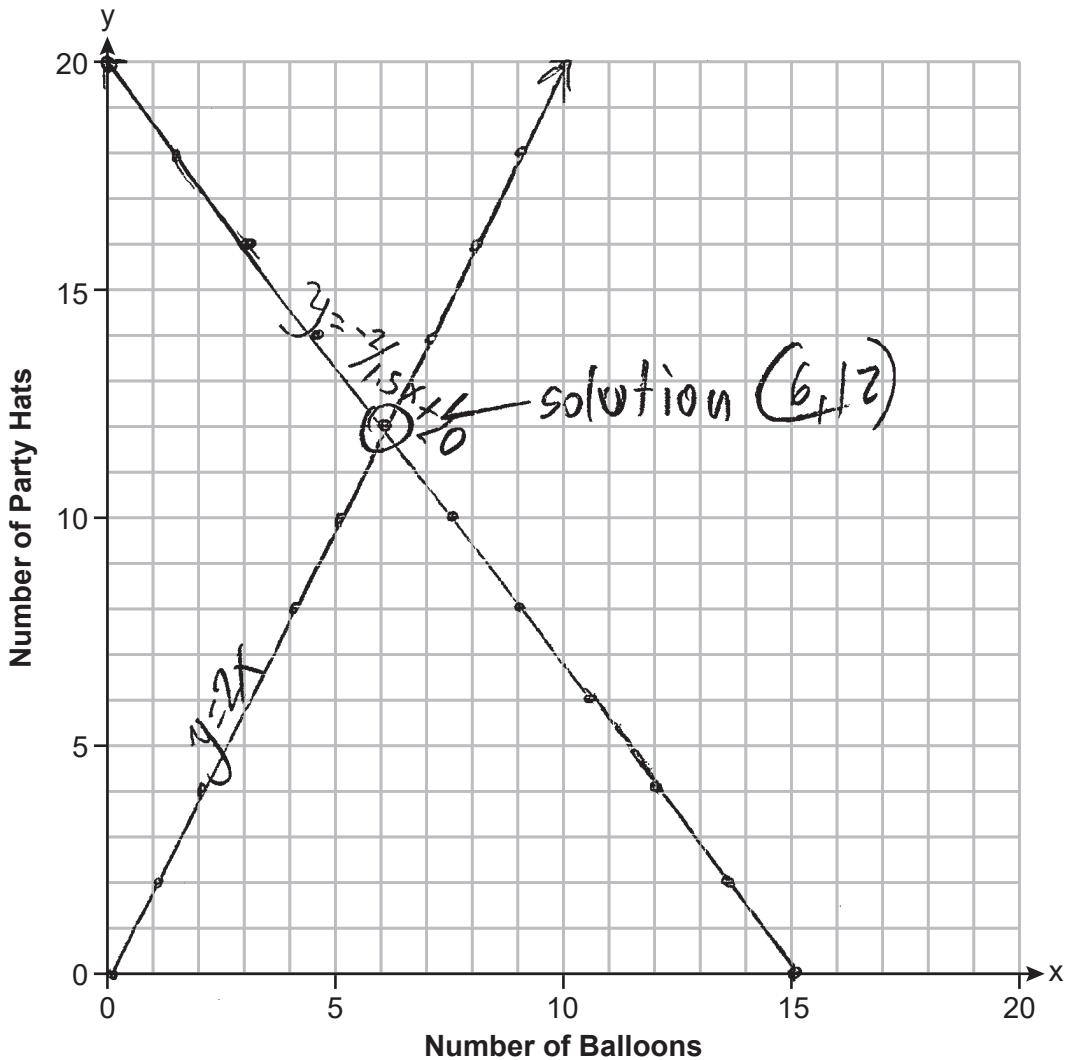
Question 35 is continued on the next page.

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

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

$$(6, 12)$$

Explain what each coordinate means in the context of the problem.

The solution is $(6, 12)$. In the context of the problem, this means that for 6 balloons and 12 party hats Annabel will have been able to pay for the supplies as well as have twice the amount of party hats than balloons.

Question 35

- 35 Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$\begin{aligned}2y + x &= 30 \\1.50y + 2x &= 30\end{aligned}$$

$$\begin{aligned}2y + x &= 30 \\1.50y + 2x &= 30\end{aligned}$$

$$\begin{aligned}2y + x &= 30 \\-x &\quad -x \\2y &= -1x + 30 \\ \frac{2}{2} &\quad \frac{2}{2} \\y &= -\frac{1}{2}x + 15\end{aligned}$$

$$\begin{aligned}1.50y + 2x &= 30 \\-2x &\quad -2 \\1.5y &= -2x + 30 \\ \frac{1.5}{1.5} &\quad \frac{1.5}{1.5} \\y &= -\frac{4}{3}x + 20\end{aligned}$$

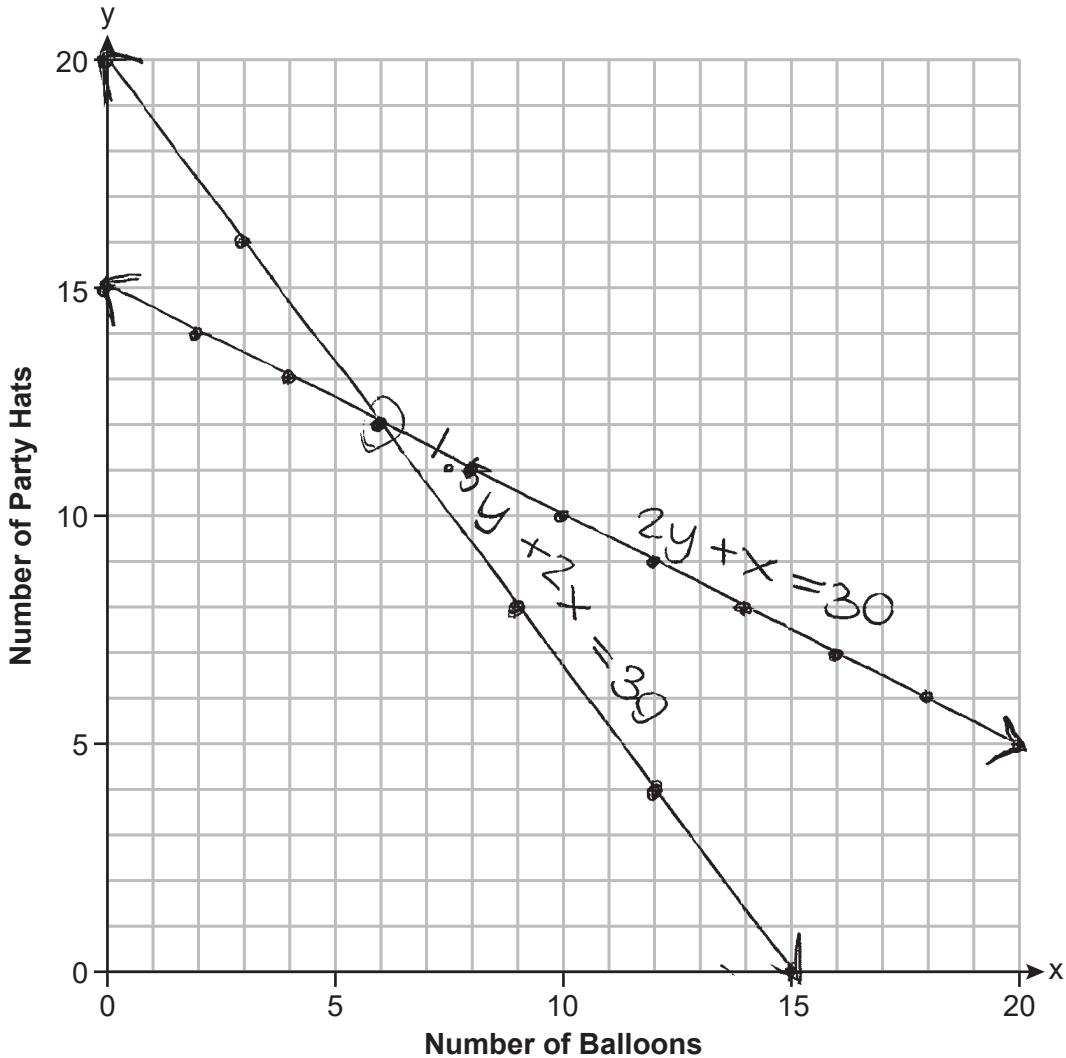
Question 35 is continued on the next page.

Score 5: The student wrote one equation incorrectly.

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

$$(6, 12)$$

Explain what each coordinate means in the context of the problem.

The x -value of 6 represents the number of balloons Anna should buy, and the y -value of 12 represents the number of party hats she should buy.

Question 35

- 35** Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$\begin{aligned}2x + 1.5y &= 30 \\y &= 2x \\n = \frac{20-6}{0-15} &= \frac{20}{-15} = -\frac{4}{3} & 2x + 1.5(0) &= 30 & 2(0) + 1.5y &= 30 \\&& 2x &= 30 & 1.5y &= 30 \\&& x &= 15 & (15, 0) & & (0, 20) \\&& (15, 0) & & (0, 20) & y &= 20\end{aligned}$$

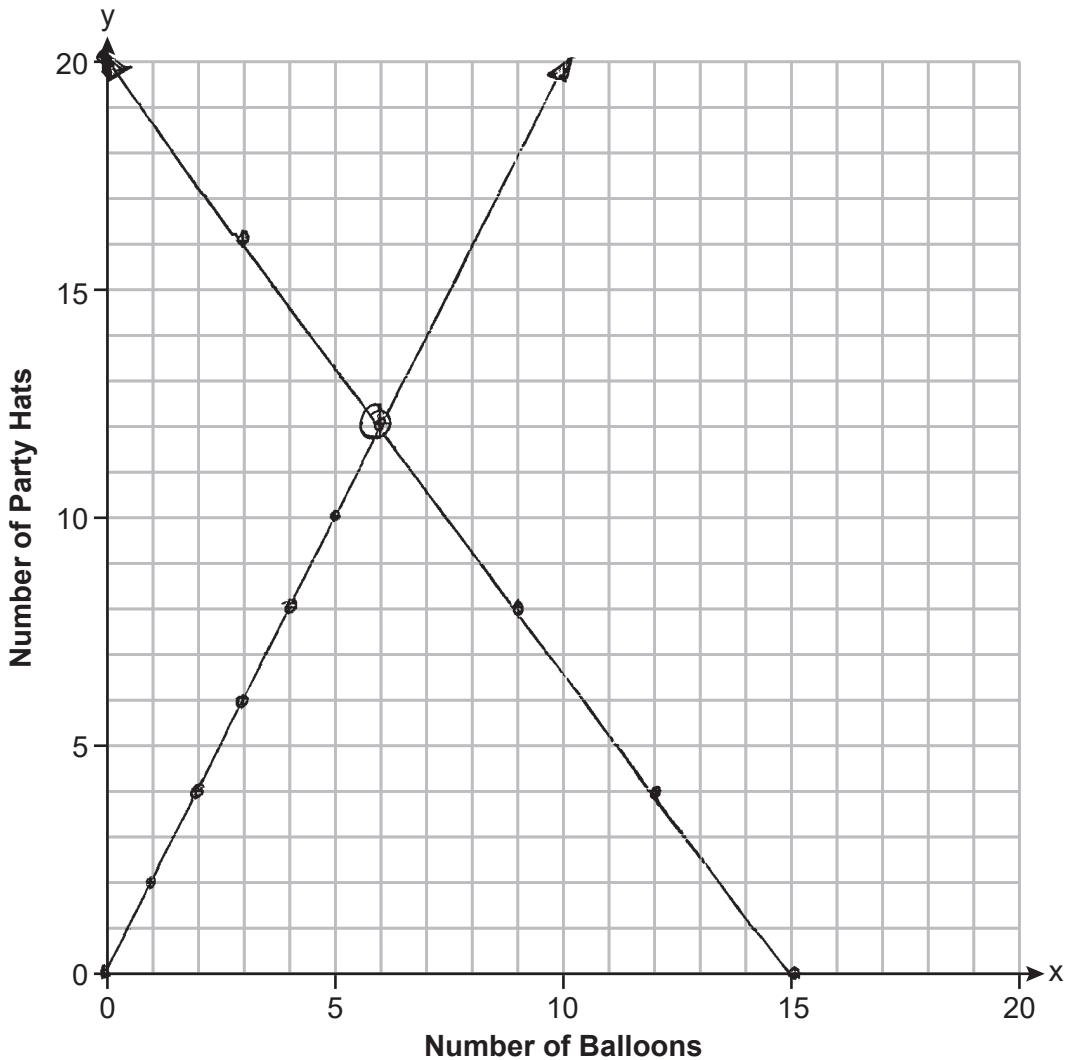
Question 35 is continued on the next page.

- Score 4:** The student did not label at least one of the lines they graphed and their explanation was incorrect.

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

$$(6, 12)$$

Explain what each coordinate means in the context of the problem.

for every balloon, the number of party hats doubles by the amount of balloons there are.

Question 35

- 35 Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$2x + 1.50y = 30$$
$$x = 2y$$
$$2x + 1.50y = 30$$

$$\begin{aligned} 30 &= 2x + 1.50y \\ -1.50y &= 2x - 30 \\ \hline -1.50 &\quad -1.50 \quad -1.50 \\ y &= -\frac{4}{3}x + 20 \end{aligned}$$
$$\begin{aligned} 2y &= -x \\ \hline 2 &\quad 2 \\ y &= -\frac{1}{2}x \end{aligned}$$

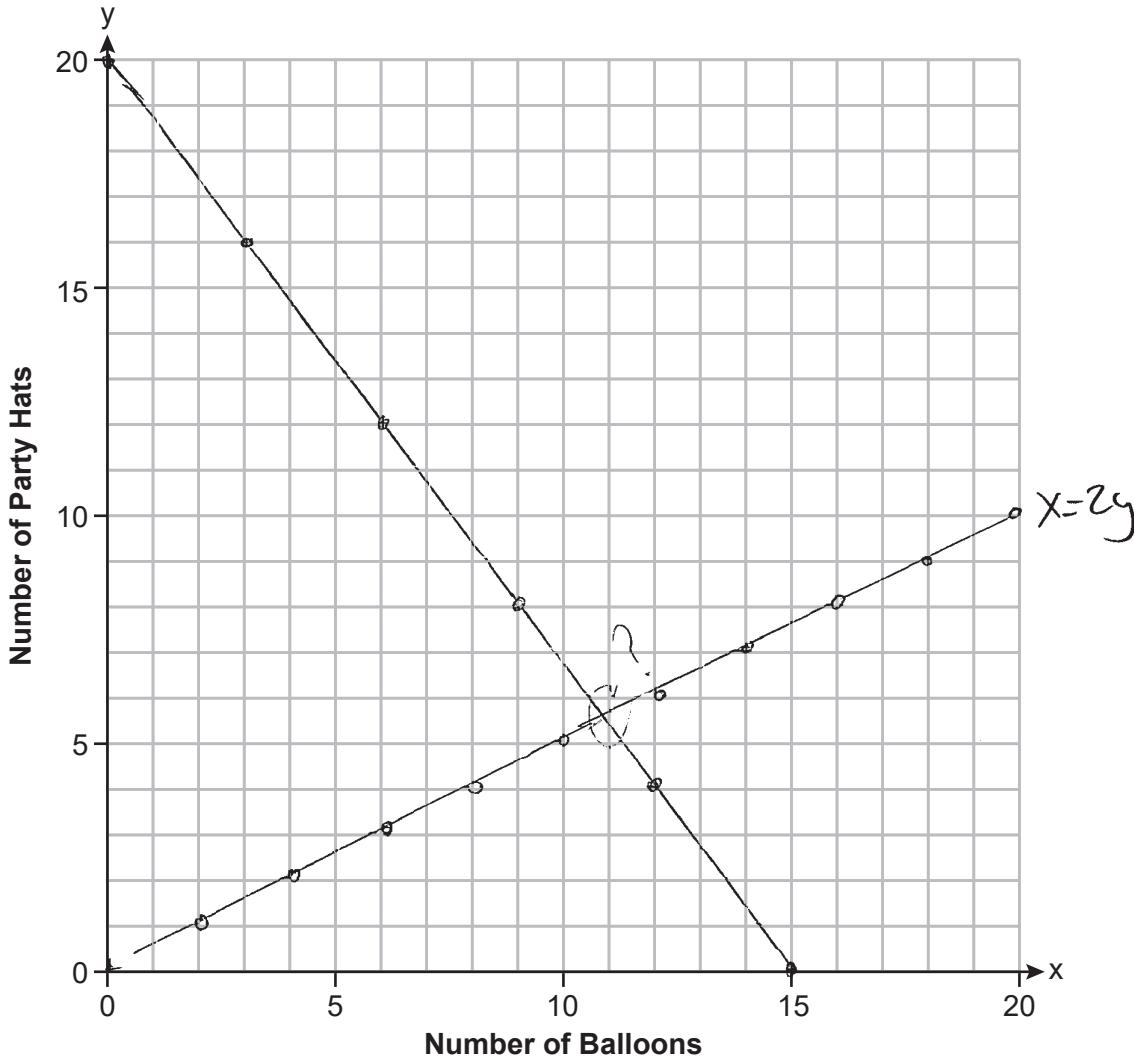
Question 35 is continued on the next page.

Score 4: The student wrote one equation incorrectly and stated an incorrect point of intersection.

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

$$(11, 6)$$

Explain what each coordinate means in the context of the problem.

\$30 will buy Anna 11 balloons
and 6 party hats.

Question 35

- 35 Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

Hab

$$2x + 1.50y = 30$$

$$y = 2x$$

$$y = -\frac{4}{3}x + 20$$

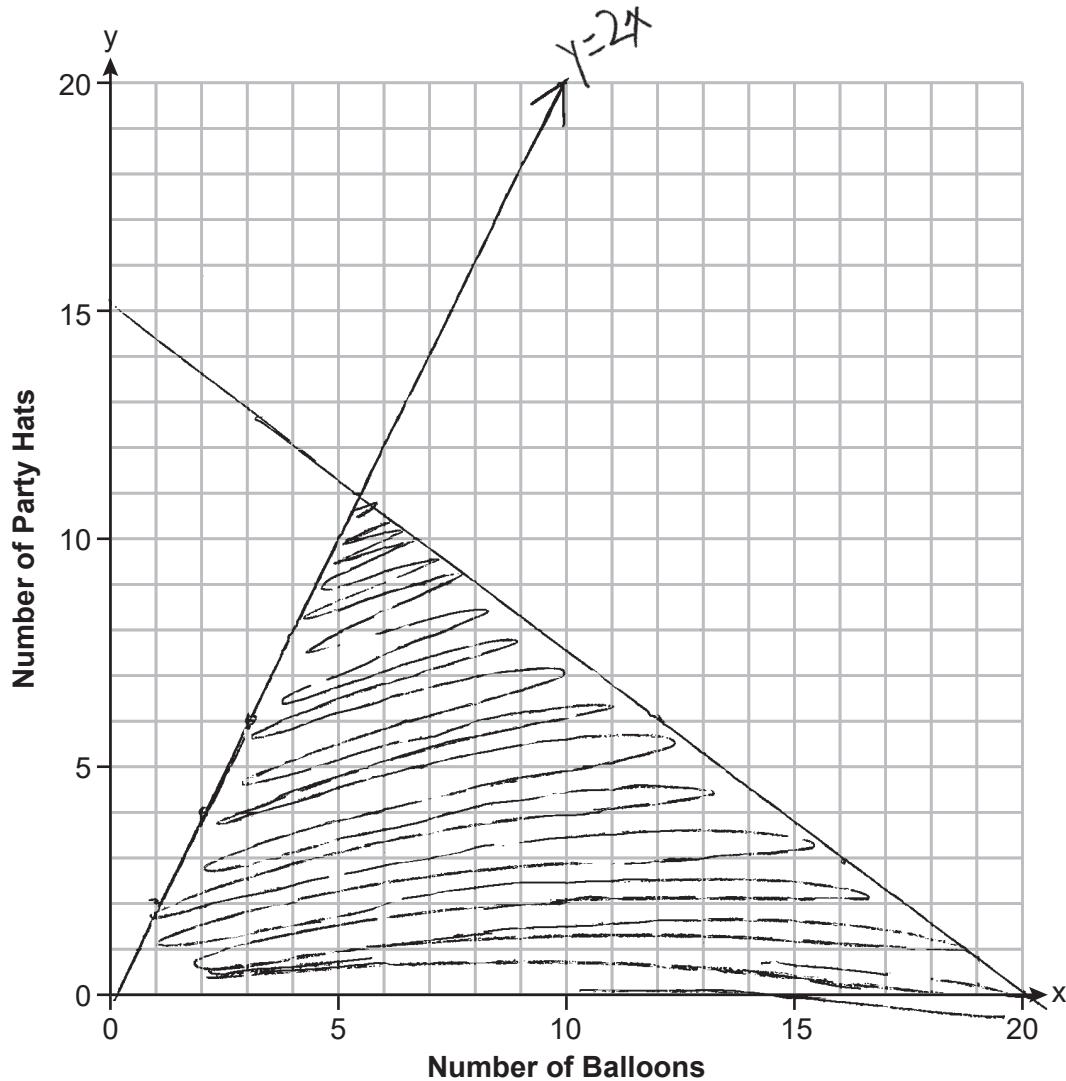
Question 35 is continued on the next page.

Score 3: The student wrote two correct equations and graphed and labeled $y = 2x$ correctly.

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

$$(11, 5.5)$$

Explain what each coordinate means in the context of the problem.

where is the max amount

Question 35

- 35 Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$\begin{array}{l} 2x + 1.50y = 30 \\ x + 2y = 30 \\ \hline -x \quad \quad \quad -x \\ y = 15 - x \end{array} \quad \begin{array}{l} 2x + 1.50y = 30 \\ \frac{1.50}{1.50} \\ 2x + y = 20 \\ -2x \quad \quad \quad -2x \\ y = 20 - 2x \end{array}$$

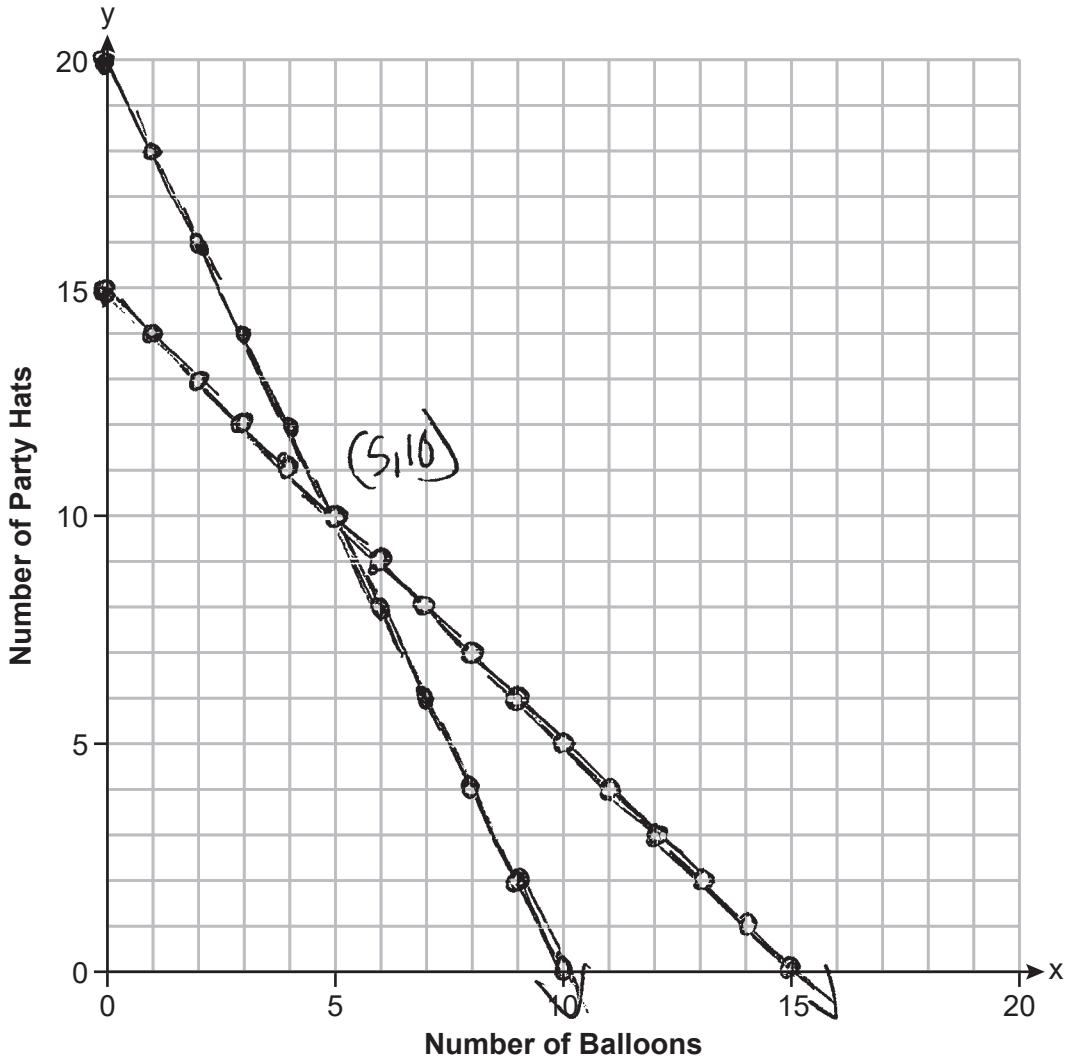
Question 35 is continued on the next page.

Score 2: The student wrote one correct equation and stated an appropriate point of intersection.

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

$$(5, 10)$$

Explain what each coordinate means in the context of the problem.

each coordinate is equal to
how many balloons there will
be when there is a certain number
of party hats and how many party
hats there will be when there is
a certain amount of balloons.

Question 35

- 35** Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$2x + 1.5y = 30 \quad y = -\frac{4}{3}x + 20$$
$$x + 2y =$$

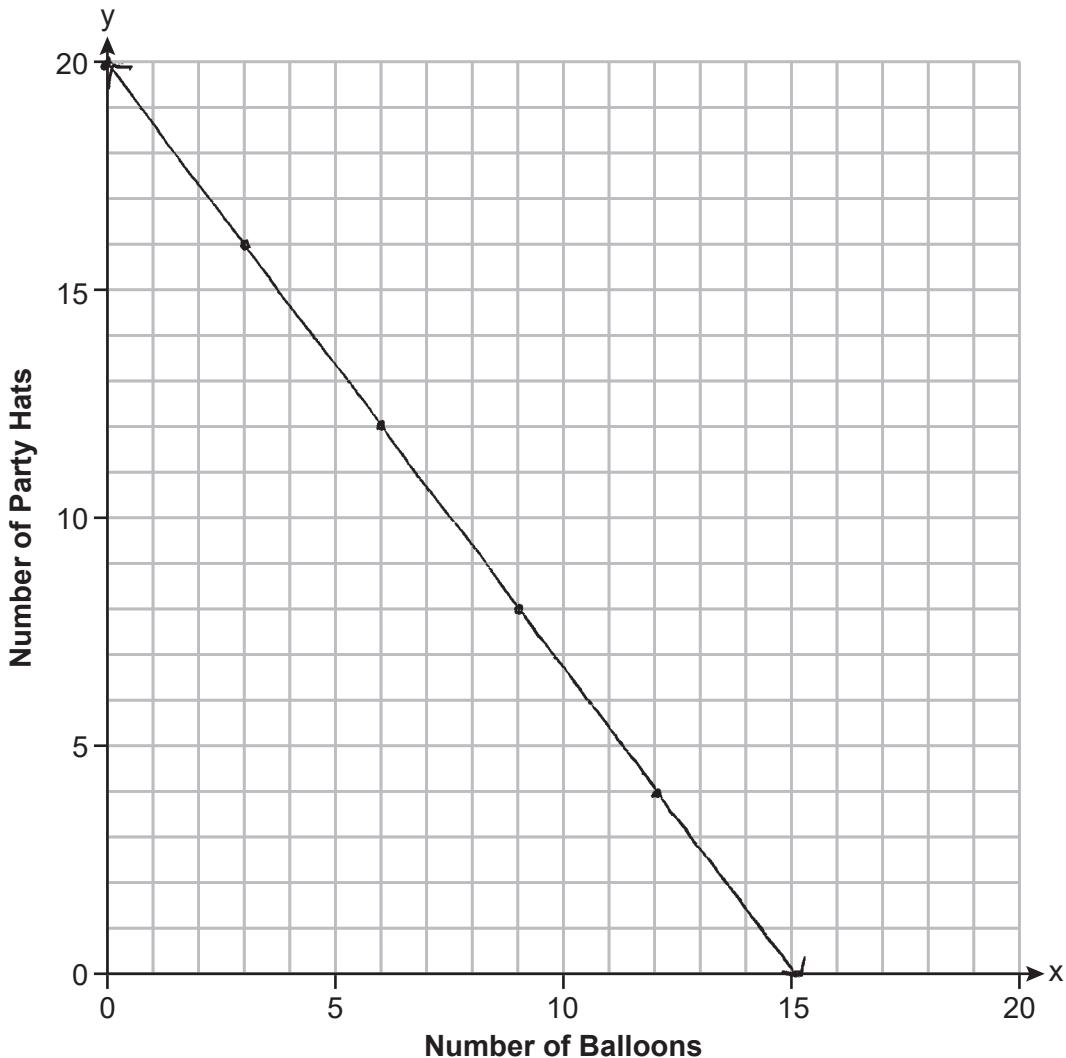
Question 35 is continued on the next page.

Score 2: The student wrote one equation and graphed it correctly.

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

Explain what each coordinate means in the context of the problem.

Question 35

- 35** Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$30 = 2x + 1.5y$$

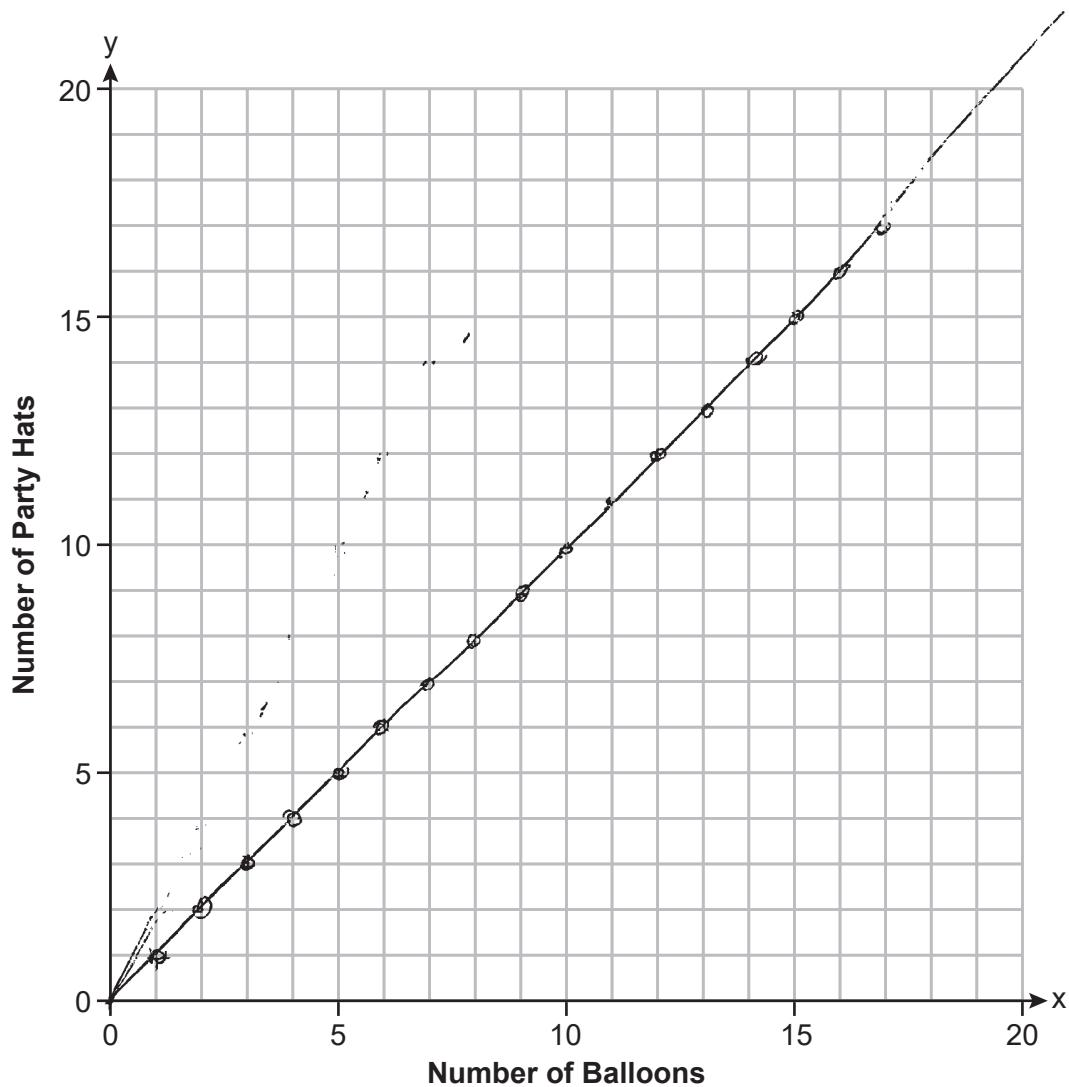
Question 35 is continued on the next page.

Score 1: The student wrote one equation correctly.

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

Explain what each coordinate means in the context of the problem.

Question 35

- 35** Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$30 \geq x + 2y \quad 30 \leq 2x + 1.5y$$

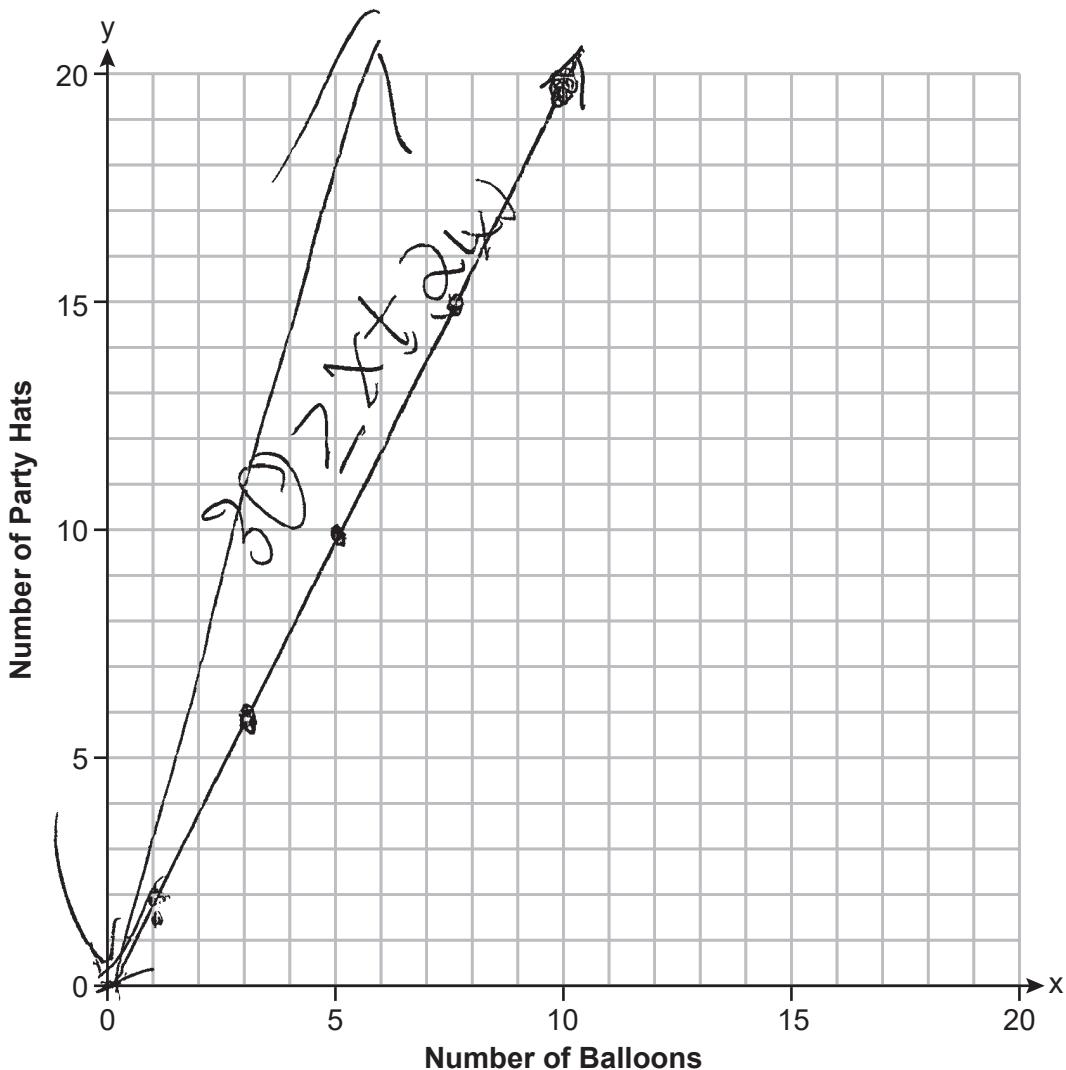
Question 35 is continued on the next page.

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

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

$$(1, 3) \quad (2, 6)$$

Explain what each coordinate means in the context of the problem.

They each
mean how
many of the balloons/
hats there are

Question 35

- 35 Anna plans to spend \$30 on balloons and party hats for her daughter's birthday party. Including tax, balloons cost \$2 each and party hats cost \$1.50 each. The number of party hats Anna needs is twice as many as the number of balloons.

If x represents the number of balloons and y represents the number of party hats, write a system of equations that can be used to represent this situation.

$$x = \text{balloons} \quad y = \text{hats}$$

$$30 = 2x + 1.5y^2$$

$$\begin{array}{r} 1.5y^2 = 30 - 2x \\ \hline 1.5 \quad 1.5 \quad 1.5 \\ \hline y^2 = 20 - 5x \end{array}$$

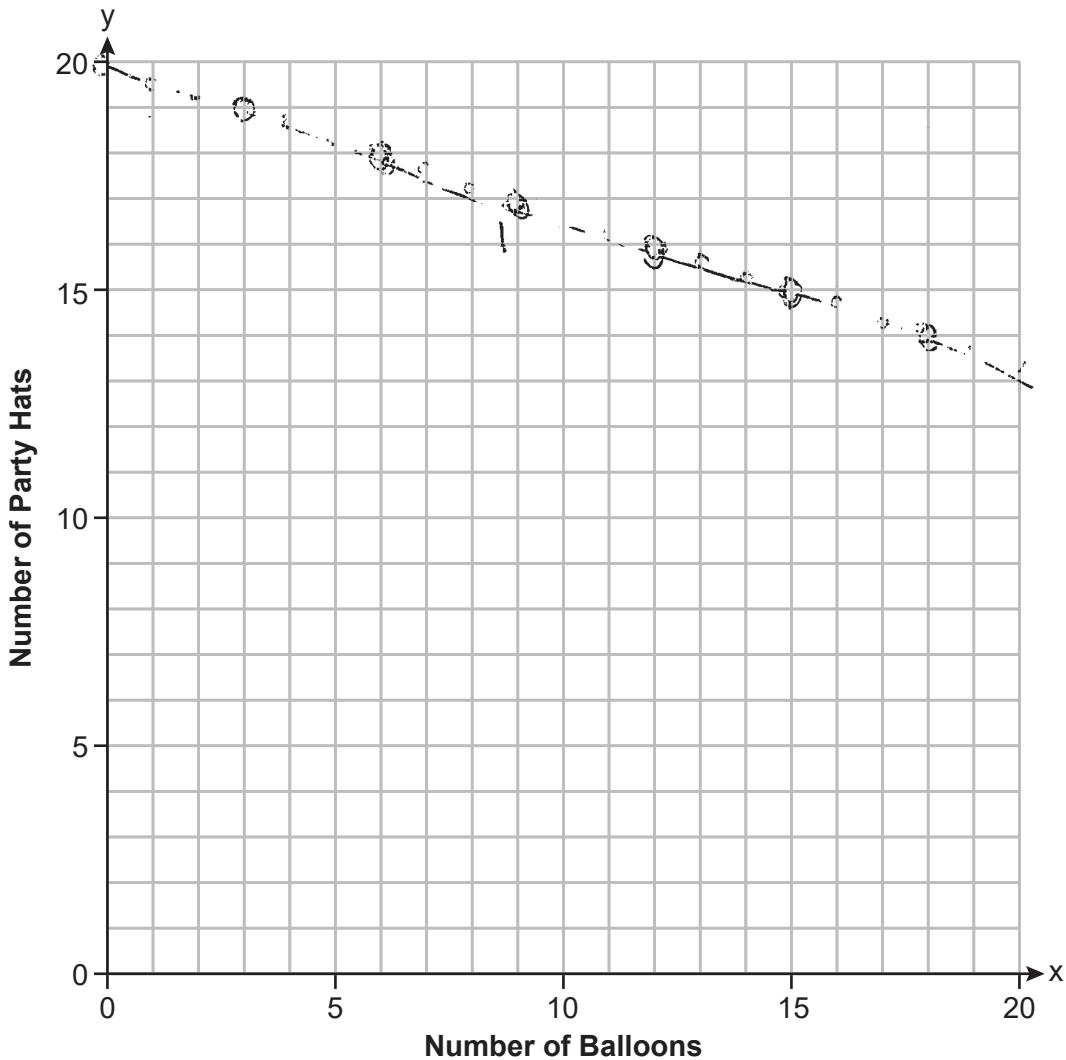
Question 35 is continued on the next page.

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

Question 35

Question 35 continued

Graph your system of equations on the set of axes below.



State the coordinates of the point of intersection of your lines.

Explain what each coordinate means in the context of the problem.

Each coordinate shows the relationship between the number of balloons vs the number of hats.