

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

ALGEBRA I

Wednesday, January 25, 2023 — 1:15 to 4:15 p.m.,

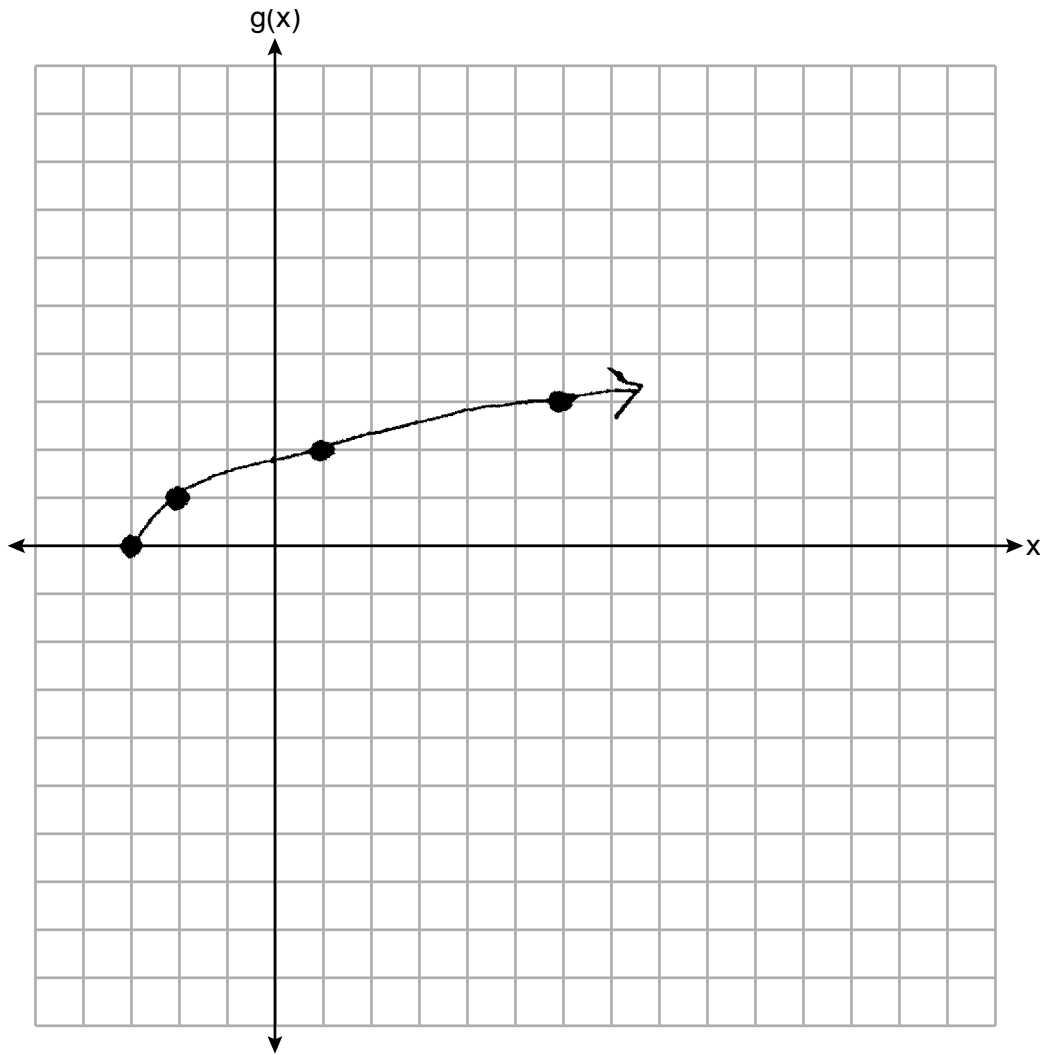
MODEL RESPONSE SET

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Question 25

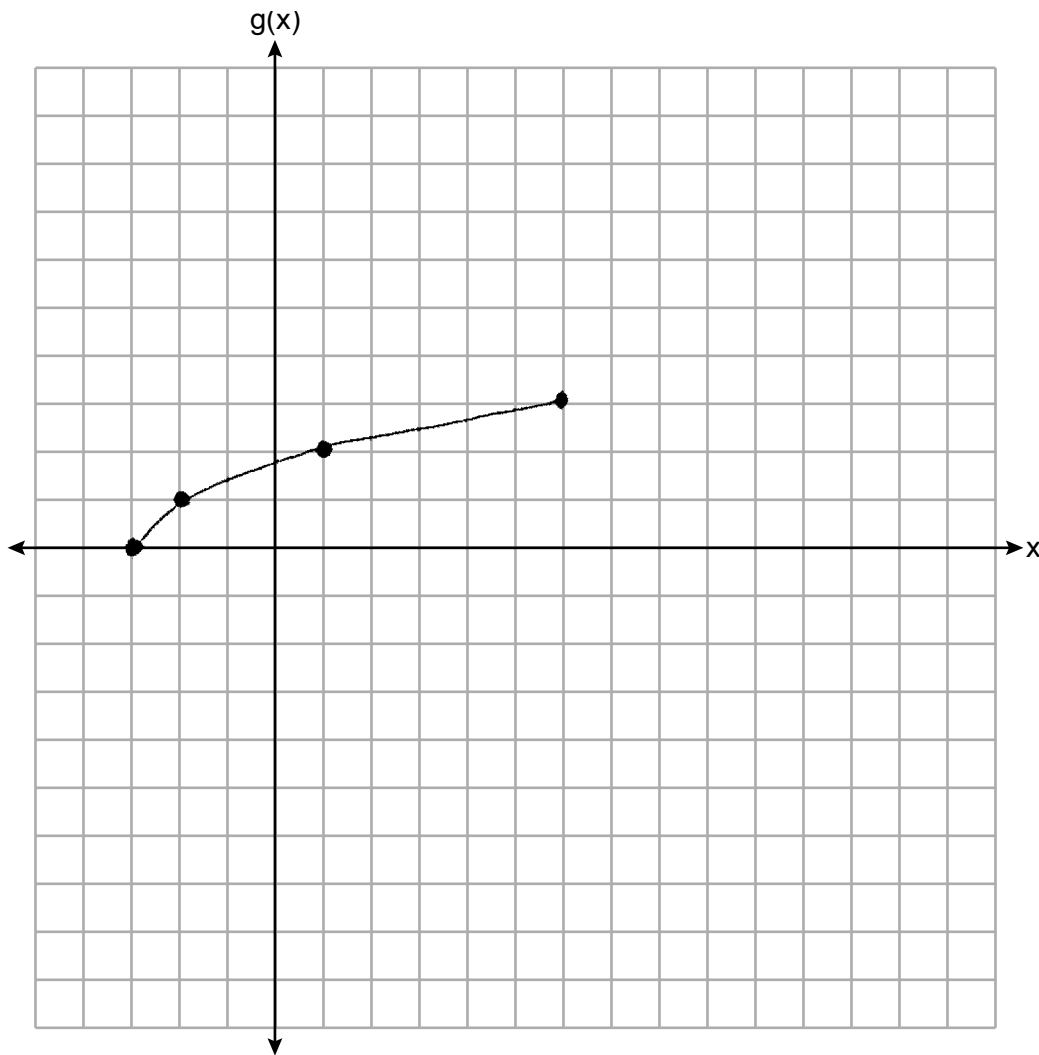
25 Graph the function $g(x) = \sqrt{x+3}$ on the set of axes below.



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

Question 25

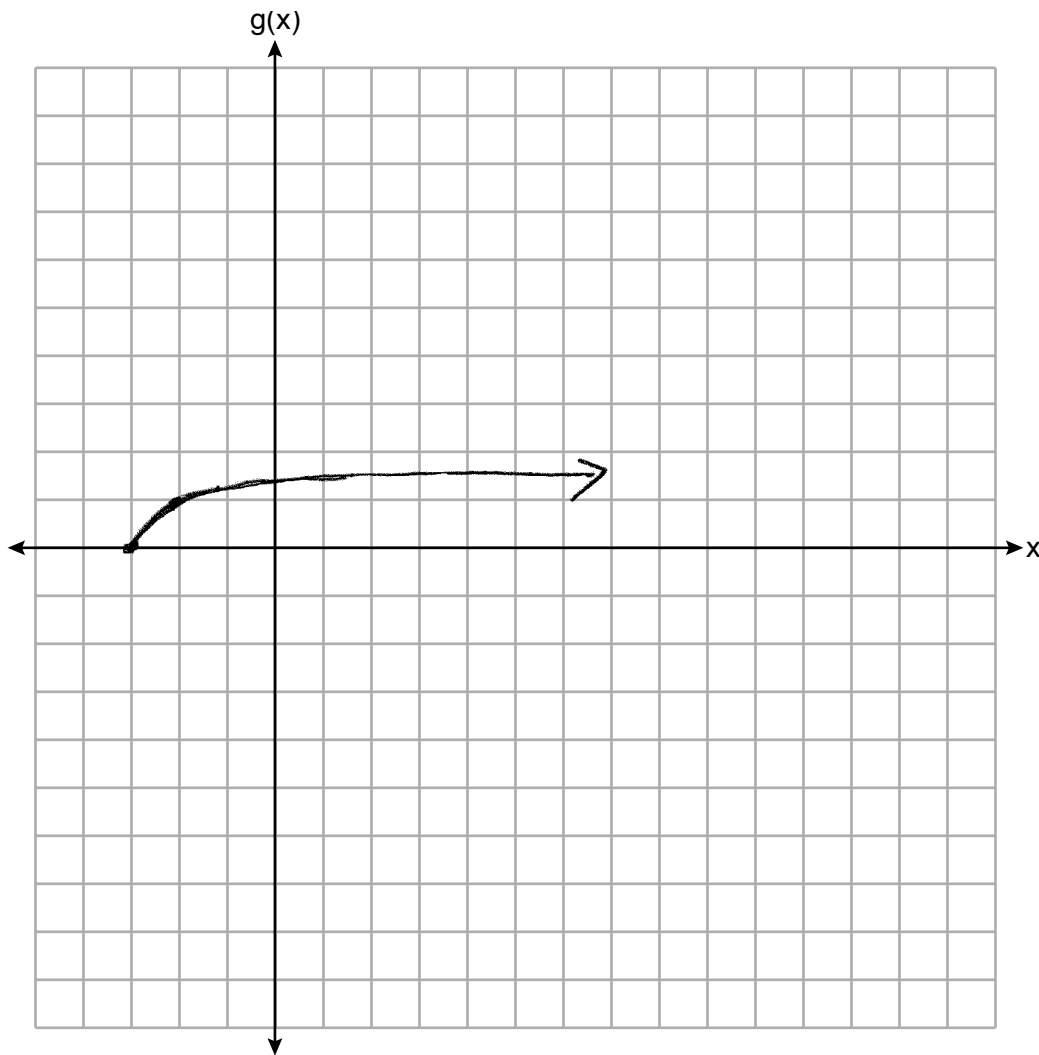
25 Graph the function $g(x) = \sqrt{x+3}$ on the set of axes below.



Score 1: The student graphed the equation over the interval $-3 \leq x \leq 6$.

Question 25

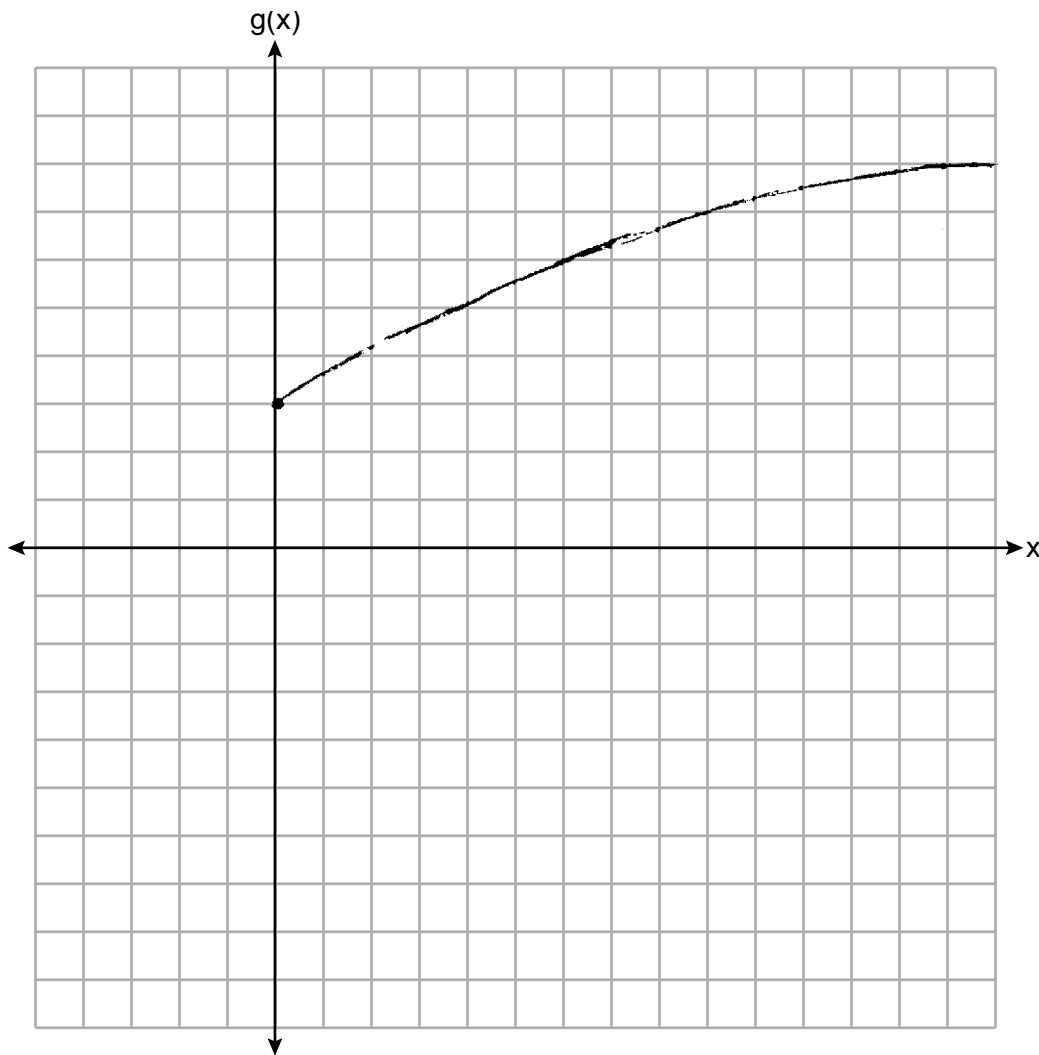
25 Graph the function $g(x) = \sqrt{x+3}$ on the set of axes below.



Score 1: The student only graphed two points correctly.

Question 25

25 Graph the function $g(x) = \sqrt{x+3}$ on the set of axes below.



Score 0: The student attempted to graph $g(x) = \sqrt{x} + 3$, but made graphing errors.

Question 26

26 The sixth-grade classes at West Road Elementary School were asked to vote on the location of their class trip. The results are shown in the table below.

	Playland	Splashdown	Fun Central
Boys	38	53	25
Girls	39	46	37

$$\frac{46}{122} \times 100$$

Determine, to the *nearest percent*, the percentage of girls who voted for Splashdown.

$$38\%$$

$$37\%$$

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

Question 26

26 The sixth-grade classes at West Road Elementary School were asked to vote on the location of their class trip. The results are shown in the table below.

	Playland	Splashdown	Fun Central
Boys	38	53	25
Girls	39	46	37

Determine, to the *nearest percent*, the percentage of girls who voted for Splashdown.

$$\frac{46}{37 + 39} = \frac{46}{122}$$

$$\frac{46}{122}$$

Score 1: The student expressed the answer as a fraction instead of a percentage.

Question 26

26 The sixth-grade classes at West Road Elementary School were asked to vote on the location of their class trip. The results are shown in the table below.

	Playland	Splashdown	Fun Central
Boys	38	53	25
Girls	39	46	37

Determine, to the *nearest percent*, the percentage of girls who voted for Splashdown.

$$38 + 39 + 53 + 46 + 25 + 37 = \underline{238}$$

$$\frac{46}{238} \times \frac{x}{100}$$

$$\frac{238x}{238} = \frac{4600}{238}$$

$$x \approx 19.$$

19% of the girls
voted for splashdown

Score 1: The student gave a percent for girls who chose Splashdown over the total number of students.

Question 26

26 The sixth-grade classes at West Road Elementary School were asked to vote on the location of their class trip. The results are shown in the table below.

	Playland	Splashdown	Fun Central
Boys	38	53	25
Girls	39	46	37

Determine, to the *nearest percent*, the percentage of girls who voted for Splashdown.

$$38 + 39 + 53 + 46 + 25 + 37 = 238$$
$$\frac{46}{238} = .1932 \approx 19.32 \approx 19.3\%$$

Score 0: The student used the wrong denominator and made a rounding error.

Question 27

27 Solve the inequality $-\frac{2}{3}x + 6 > -12$ algebraically for x .

$$-\frac{2}{3}x + 6 > -12$$

$\quad -6 \quad -6$

$$-\frac{2}{3}x > -18$$

$\frac{-2}{-2} \quad \frac{-18}{-2}$

$$x < 27$$

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

Question 27

27 Solve the inequality $-\frac{2}{3}x + 6 > -12$ algebraically for x .

$$\begin{array}{r} -\frac{2}{3}x + 6 > -12 \\ -6 \quad -6 \\ \hline -\frac{2}{3}x > -18 \\ \hline \frac{-2}{3} \quad \frac{-2}{3} \\ \hline x > 27 \end{array}$$

Score 1: The student did not use the correct inequality symbol.

Question 27

27 Solve the inequality $-\frac{2}{3}x + 6 > -12$ algebraically for x .

$$\begin{array}{r} -6 \quad -6 \\ -\frac{2}{3}x > -18 \\ \cdot 3 \qquad \cdot 3 \\ \hline -2x > 54 \\ \frac{-2x}{-2} > \frac{54}{-2} \\ \boxed{x < -27} \end{array}$$

Score 1: The student made one computational error.

Question 27

27 Solve the inequality $-\frac{2}{3}x + 6 > -12$ algebraically for x .

$$-\frac{2}{3}x + 6 > -12$$

$$-\frac{2}{3}x > -18$$

$$x < 26.87$$

Score 1: The student divided by -0.67 instead of $-\frac{2}{3}$.

Question 27

27 Solve the inequality $-\frac{2}{3}x + 6 > -12$ algebraically for x .

$$\begin{aligned} -\frac{2}{3}x + 6 &> -12 \\ -2x + 18 &> -12 \\ \frac{-18}{-2} &\quad \frac{-18}{-2} \\ \frac{-2x}{-2} &> \frac{-30}{-2} \\ x &> 15 \end{aligned}$$

$$x > 15$$

Score 0: The student did not multiply both sides of the inequality by 3 and did not have the correct inequality symbol.

Question 27

27 Solve the inequality $-\frac{2}{3}x + 6 > -12$ algebraically for x .

$$\begin{array}{r} -\frac{2}{3}x + 6 > -12 \\ \quad \quad \quad -6 \quad -6 \end{array}$$

$$\begin{array}{r} -\frac{2}{3}x > -18 \\ \hline -\frac{2}{3}x > -18 \\ \hline \frac{-2}{3} & \frac{-2}{3} \end{array}$$

$$x = 3$$

Score 0: The student made multiple errors.

Question 28

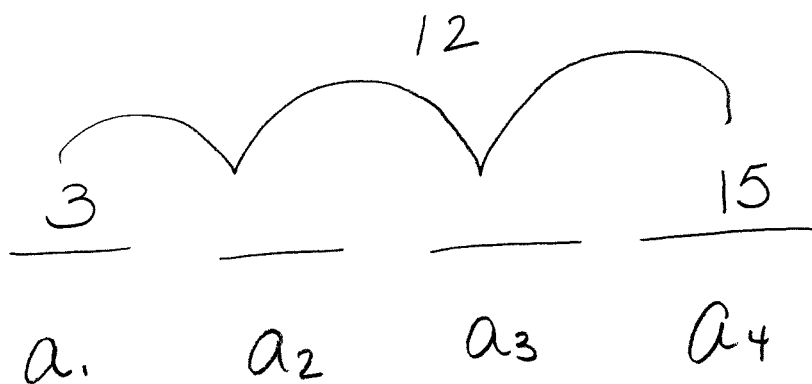
28 Determine the common difference of the arithmetic sequence in which $a_1 = 3$ and $a_4 = 15$.

$$\begin{array}{c} +3 \left\langle \begin{array}{c|c} 1 & 3 \\ 4 & 15 \end{array} \right\rangle +12 \end{array} \quad \frac{12}{3} = 4$$

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

Question 28

28 Determine the common difference of the arithmetic sequence in which $a_1 = 3$ and $a_4 = 15$.



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

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

Question 28

28 Determine the common difference of the arithmetic sequence in which $a_1 = 3$ and $a_4 = 15$.

$$a_1 = 3 \quad a_n = a_{n-1} + 4$$

4

Score 1: The student stated 4, but did not show work.

Question 28

28 Determine the common difference of the arithmetic sequence in which $a_1 = 3$ and $a_4 = 15$.

$$a_n = 3 + (15-1)(d)$$
$$= 17$$

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

Question 29

29 Given: $A = \sqrt{363}$ and $B = \sqrt{27}$

Explain why $A + B$ is irrational.

$A + B$ is irrational because $\sqrt{363} \approx 19.052558\dots$
and $\sqrt{27} \approx 5.1961524\dots$ an irrational number added
to an irrational number will always be irrational.
Both terms neither terminate, nor repeat.

Explain why $A \cdot B$ is rational.

AB is rational because $\sqrt{363} \cdot \sqrt{27} = 99$, which
is a whole number; all whole numbers are
rational numbers

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

Question 29

29 Given: $A = \sqrt{363}$ and $B = \sqrt{27}$

Explain why $A + B$ is irrational.

because irrational + irrational =
irrational

Explain why $A \cdot B$ is rational. when you multiply $\sqrt{363} \times \sqrt{27}$ you
get 99 which is a rational number

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

Question 29

29 Given: $A = \sqrt{363}$ and $B = \sqrt{27}$

Explain why $A + B$ is irrational.

The sum is a non-repeating and non-terminating decimal.

Explain why $A \cdot B$ is rational.

Score 1: The student gave only one correct explanation.

Question 29

29 Given: $A = \sqrt{363}$ and $B = \sqrt{27}$

Explain why $A + B$ is irrational.

$A+B$ is Irrational
because when you
add them it doesn't
give you a whole
number it gives you
a decimal.

Explain why $A \cdot B$ is rational.

$\sqrt{363} \sqrt{27} = 99$
 AB is rational because
if you solve AB it
gives you a whole
number.

Score 1: The student gave a correct explanation for $A \cdot B$ and an incomplete explanation for $A + B$.

Question 29

29 Given: $A = \sqrt{363}$ and $B = \sqrt{27}$

Explain why $A + B$ is irrational.

It's not rational because square roots aren't rational.

Explain why $A \cdot B$ is rational.

AB is rational because the answer is a decimal. And decimals are rational.

Score 0: The student did not write correct explanations.

Question 30

30 Use the quadratic formula to solve $x^2 - 4x + 1 = 0$ for x .

Round the solutions to the *nearest hundredth*.

$$\frac{-b \pm \sqrt{b^2 - 4(a)(c)}}{2(a)}$$

$$a = 1$$

$$\frac{4 \pm \sqrt{16 - 4(1)(1)}}{2}$$

$$b = -4$$

$$\frac{4 \pm \sqrt{16 - 4}}{2}$$

$$c = 1$$

$$\frac{4 + 3.46}{2}$$

$$3.73 \text{ and}$$

$$\frac{4 - 3.46}{2}$$

$$0.27$$

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

Question 30

30 Use the quadratic formula to solve $x^2 - 4x + 1 = 0$ for x .

Round the solutions to the *nearest hundredth*.

$$x^2 - 4x + 1 = 0$$

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

$$x = 3.73$$

$$x = 0.27$$

$$\{0.27, 3.73\}$$

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

Question 30

30 Use the quadratic formula to solve $x^2 - 4x + 1 = 0$ for x .

Round the solutions to the *nearest hundredth*.

$$a=1 \quad b=-4 \quad c=1$$

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

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

$$x = \frac{4 \pm \sqrt{-20}}{2}$$

no real roots

Score 1: The student made one computational error.

Question 30

30 Use the quadratic formula to solve $x^2 - 4x + 1 = 0$ for x .

Round the solutions to the *nearest hundredth*.

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

$$\{5.46, -1.46\}$$

$$\frac{4 \pm \sqrt{16 - 4}}{2}$$

$$2 \pm 2\sqrt{3}$$

$$\frac{4 \pm \sqrt{12}}{2}$$

$$\frac{\sqrt{4} \cdot \sqrt{3}}{2}$$

Score 1: The student found $\frac{4 \pm \sqrt{12}}{2}$, but no further correct work was shown.

Question 30

30 Use the quadratic formula to solve $x^2 - 4x + 1 = 0$ for x .

Round the solutions to the *nearest hundredth*.

$$x^2 - 4x + 1 = 0$$

$$x^2 - 4x + 4 - 4 + 1 = 0$$

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

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

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

$$x = 2 \pm \sqrt{3}$$

Score 0: The student did not use the quadratic formula and did not write the solutions as decimals.

Question 30

30 Use the quadratic formula to solve $x^2 - 4x + 1 = 0$ for x .

Round the solutions to the *nearest hundredth*.

$$\begin{array}{l} x^2 - 4x + 1 \\ (x + 2)(x - 2) \\ \left. \begin{array}{l} x + 2 = 0 \\ -2 - 2 \end{array} \right\} \left. \begin{array}{l} x - 2 = 0 \\ +2 + 2 \end{array} \right\} \\ \boxed{x = -2} \quad \boxed{x = 2} \end{array}$$

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

Question 31

31 Factor completely:

$$4x^3 - 49x$$

$$X(4x^2 - 49)$$

$$X(2x - 7)(2x + 7)$$

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

Question 31

31 Factor completely:

$$4x^3 - 49x$$

$$x(4x^2 - 49)$$

Score 1: The student did not factor the expression completely.

Question 31

31 Factor completely:

$$4x^3 - 49x$$

$$4x^3 - 49x$$

$$x(4x^2 - 49) \quad \text{GCF}$$

$$x(x+7)(x-7)$$

$$\text{(check: } x(x+7)(x-7)$$

$$x^2 + \cancel{7x} - \cancel{7x} - 49$$

$$x(x^2 - 49)$$

$$x^3 - 49x$$

Score 1: The student found $x(4x^2 - 49)$, but no further correct work was shown.

Question 31

31 Factor completely:

$$4x^3 - 49x$$

$$4(x^3 - 12.25x)$$
$$4(x^2 + 6.125)(x + 6.125)$$

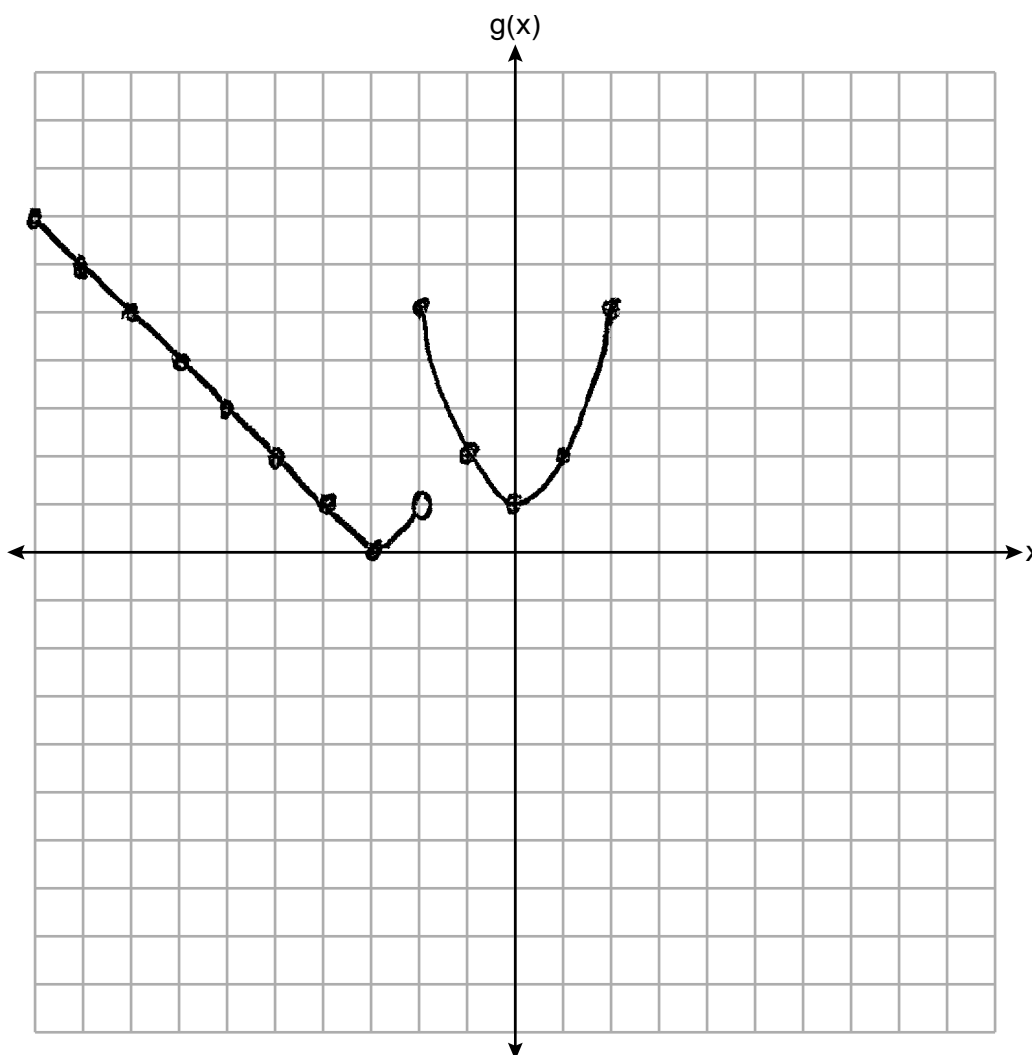
Score 0: The student gave an incorrect response.

Question 32

32 The function g is defined as

$$g(x) = \begin{cases} |x + 3|, & x < -2 \\ x^2 + 1, & -2 \leq x \leq 2 \end{cases}$$

On the set of axes below, graph $g(x)$.



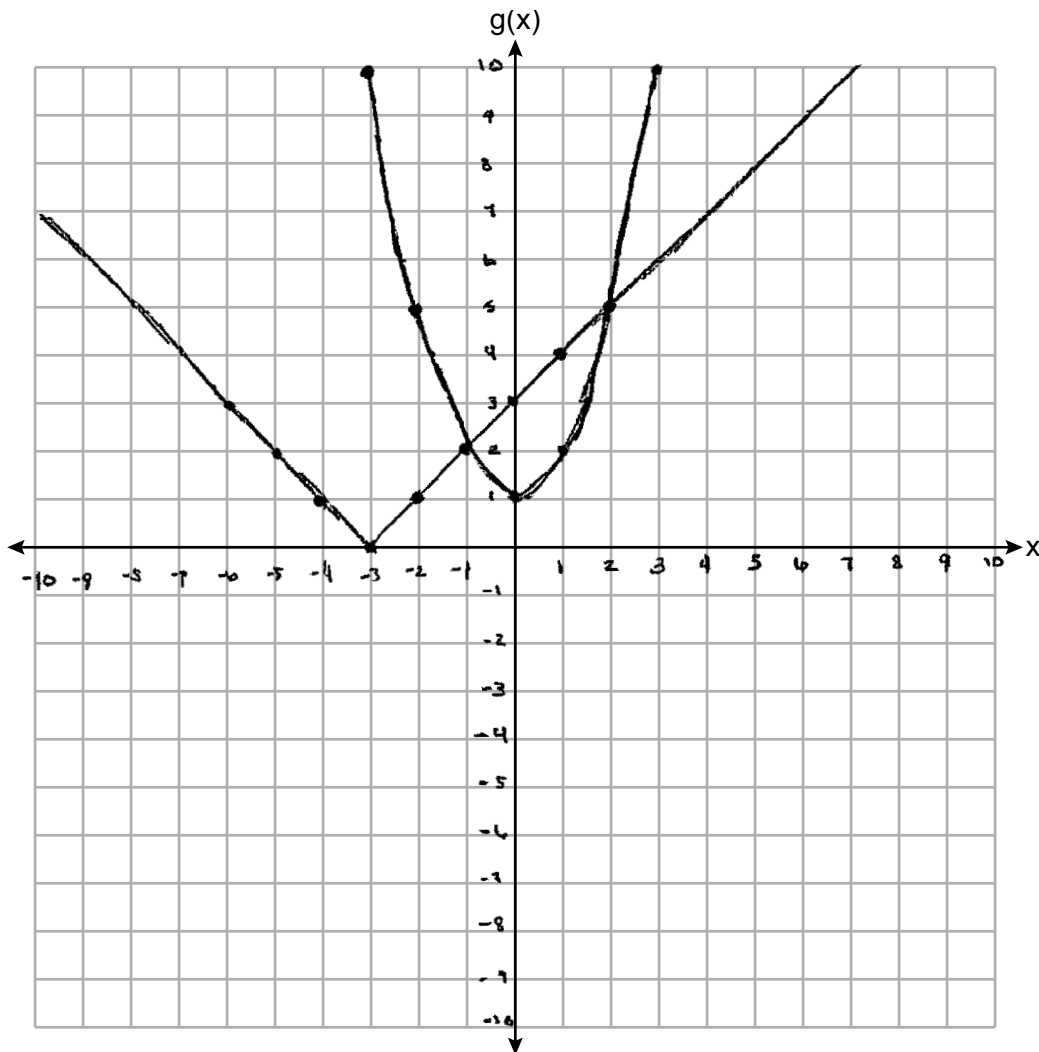
Score 2: The student gave a complete and correct response.

Question 32

32 The function g is defined as

$$g(x) = \begin{cases} |x + 3|, & x < -2 \\ x^2 + 1, & -2 \leq x \leq 2 \end{cases}$$

On the set of axes below, graph $g(x)$.



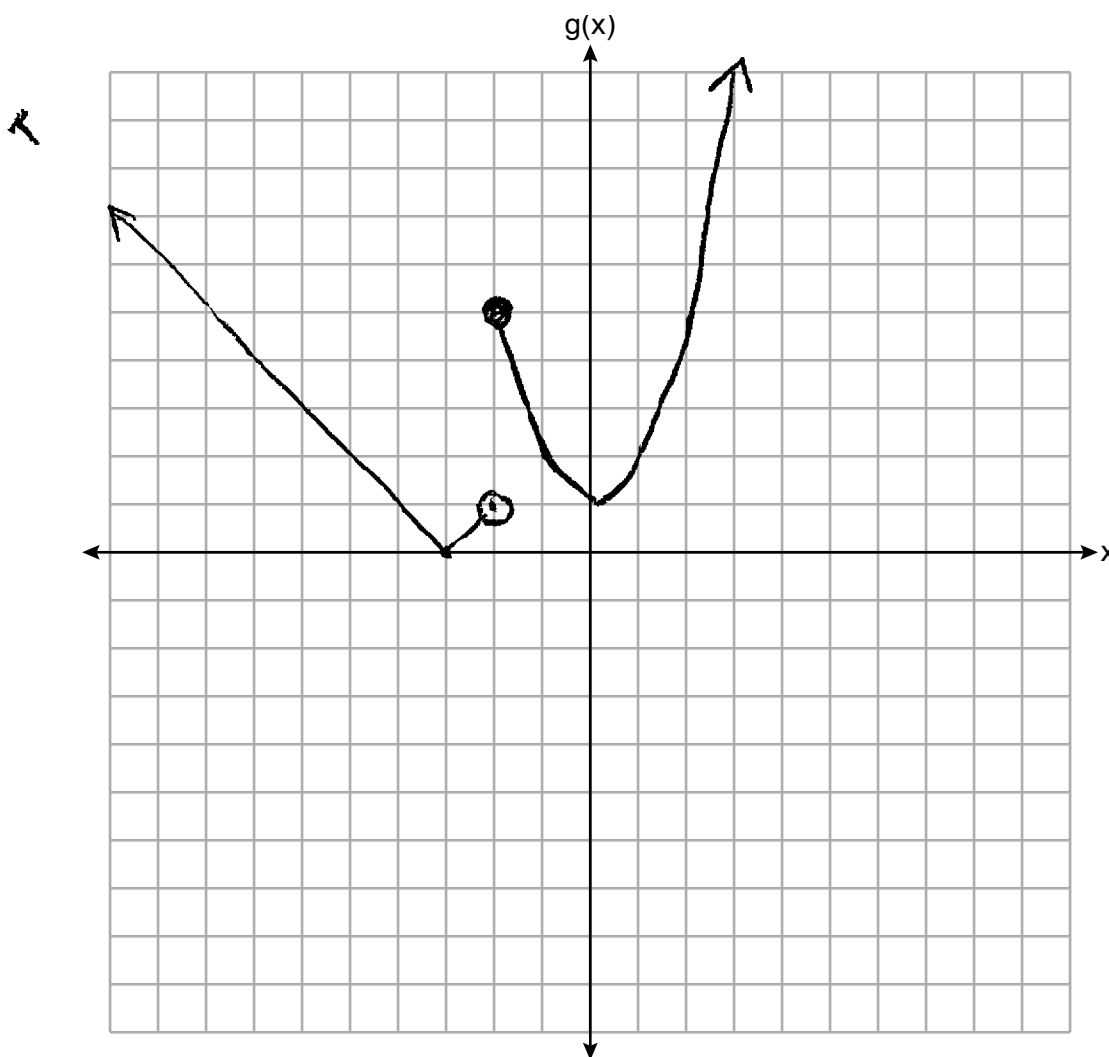
Score 1: The student graphed both equations, but did not use the given domains.

Question 32

32 The function g is defined as

$$g(x) = \begin{cases} |x + 3|, & x < -2 \\ x^2 + 1, & -2 \leq x \leq 2 \end{cases}$$

On the set of axes below, graph $g(x)$.



Score 1: The student made one graphing error.

Question 32

32 The function g is defined as

$$x+3 \mid$$

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

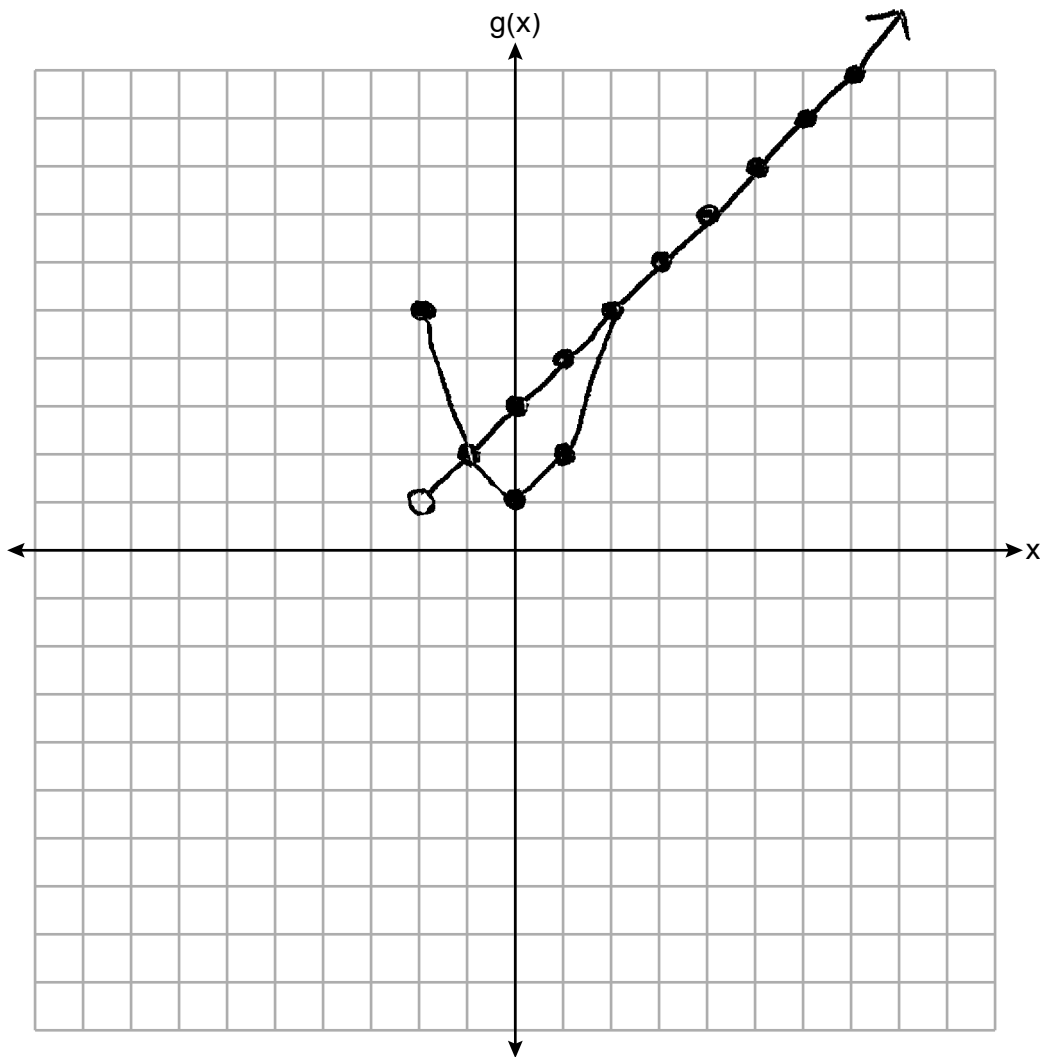
↓

$$x^2+1 \mid$$

x	y
-2	5
-1	2
0	1
1	2
2	5

$$g(x) = \begin{cases} |x + 3|, & x < -2 \\ x^2 + 1, & -2 \leq x \leq 2 \end{cases}$$

On the set of axes below, graph $g(x)$.



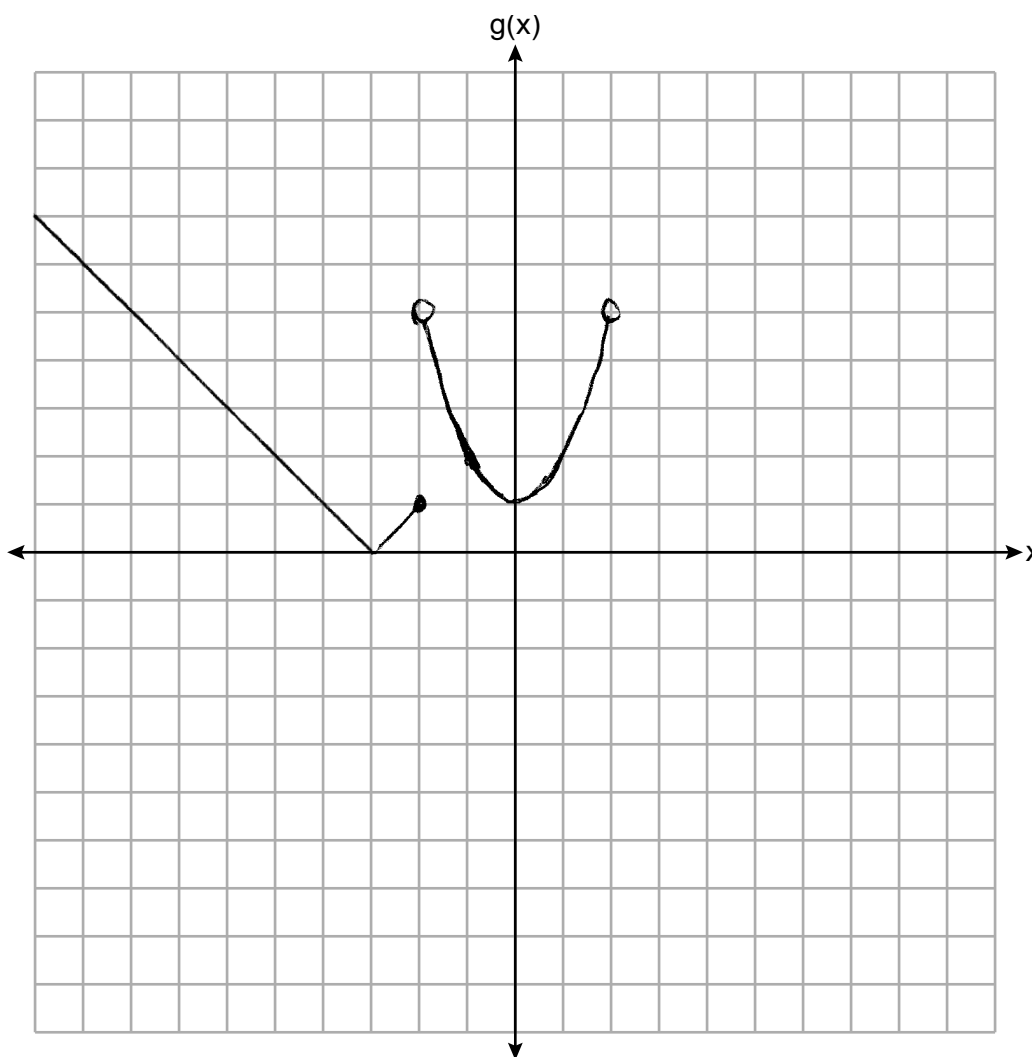
Score 1: The student graphed $g(x) = x^2 + 1$ over its given domain, but no further correct work was shown.

Question 32

32 The function g is defined as

$$g(x) = \begin{cases} |x + 3|, & x < -2 \\ x^2 + 1, & -2 \leq x \leq 2 \end{cases}$$

On the set of axes below, graph $g(x)$.



Score 1: The student graphed the end points of both functions incorrectly.

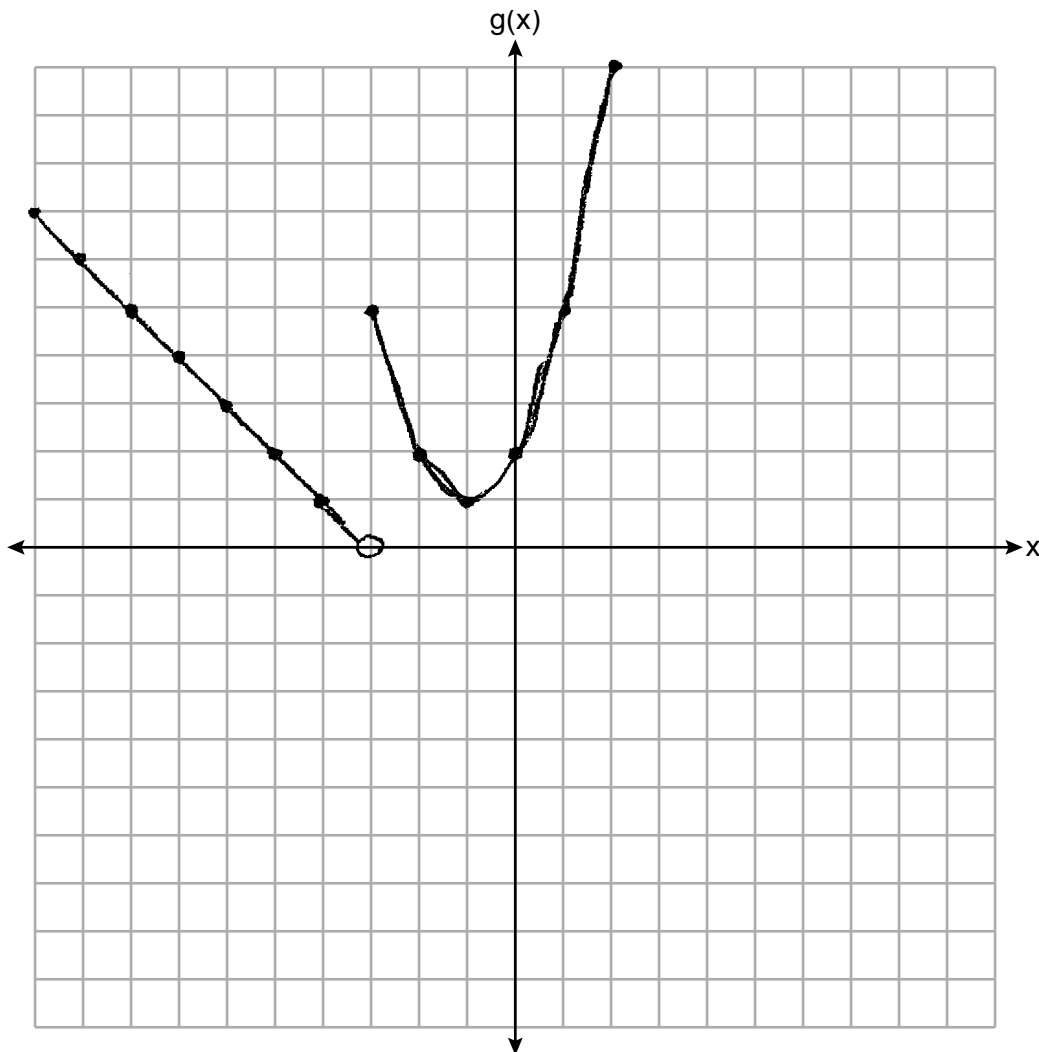
Question 32

32 The function g is defined as

$$g(x) = \begin{cases} |x + 3|, & x < -2 \\ x^2 + 1, & -2 \leq x \leq 2 \end{cases}$$

On the set of axes below, graph $g(x)$.

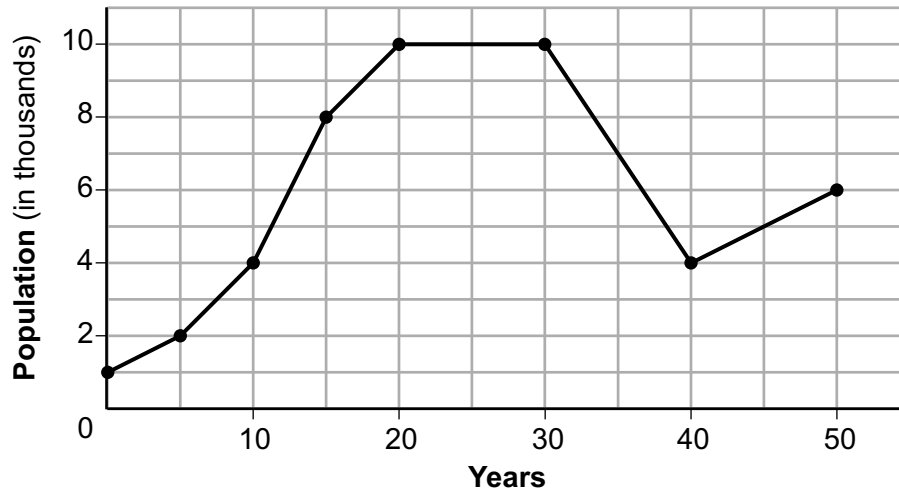
↑
Piecewise function.



Score 0: The student made multiple graphing errors.

Question 33

33 Anessa is studying the changes in population in a town. The graph below shows the population over 50 years.



State the entire interval during which the population remained constant.

20-30 Years

State the maximum population of the town over the 50-year period.

10,000

Determine the average rate of change from year 30 to year 40.

-600

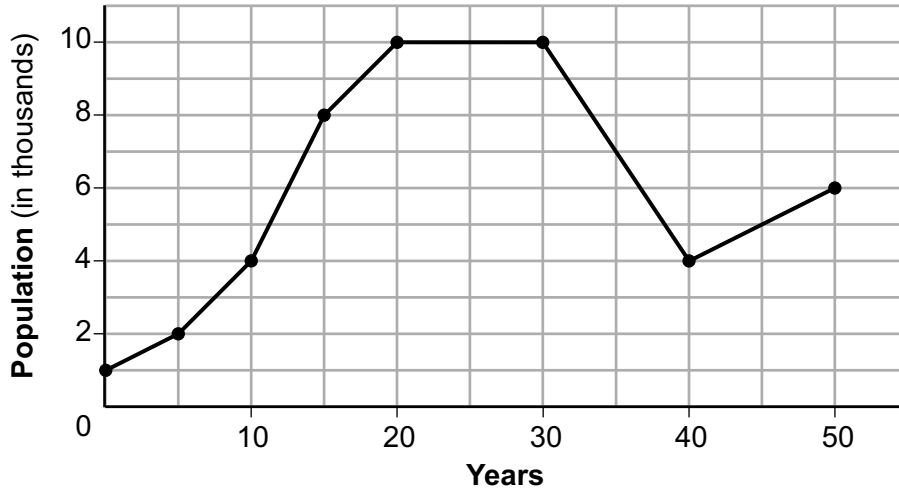
Explain what your average rate of change means from year 30 to year 40 in the context of the problem.

The population decreases by 600 people every 1 year.

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

Question 33

33 Anessa is studying the changes in population in a town. The graph below shows the population over 50 years.



State the entire interval during which the population remained constant.

20-30 years.

State the maximum population of the town over the 50-year period.

10,000

Determine the average rate of change from year 30 to year 40.

$$\frac{4,000 - 10,000}{10} \quad \boxed{m = -600}$$

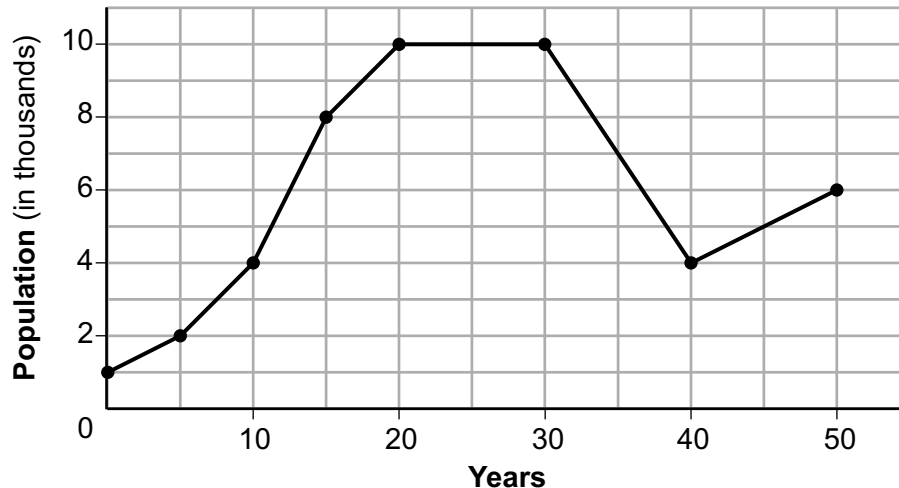
Explain what your average rate of change means from year 30 to year 40 in the context of the problem.

the change of the population in years

Score 3: The student wrote an incomplete explanation.

Question 33

33 Anessa is studying the changes in population in a town. The graph below shows the population over 50 years.



State the entire interval during which the population remained constant.

$$[20, 30]$$

State the maximum population of the town over the 50-year period.

$$10,000$$

Determine the average rate of change from year 30 to year 40.

$$\frac{4000 - 10,000}{10} = \frac{-6000}{10} = -600$$

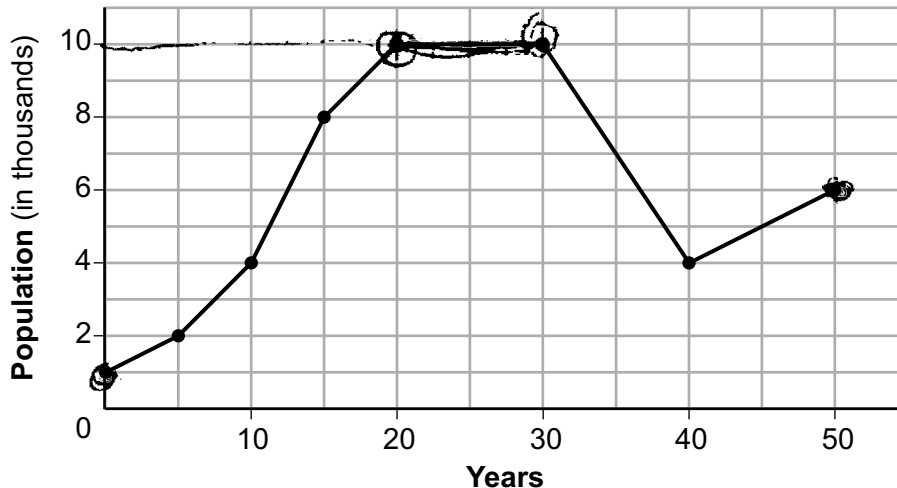
Explain what your average rate of change means from year 30 to year 40 in the context of the problem.

Each year between year 30 to year 40 the population went down by 600

Score 3: The student found an incorrect rate of change.

Question 33

33 Anessa is studying the changes in population in a town. The graph below shows the population over 50 years.



State the entire interval during which the population remained constant.

The interval during which the population was constant was between the years of 20 to 30.

State the maximum population of the town over the 50-year period.

The maximum population was 10,000 people.

Determine the average rate of change from year 30 to year 40.

The average rate of change would be 12.

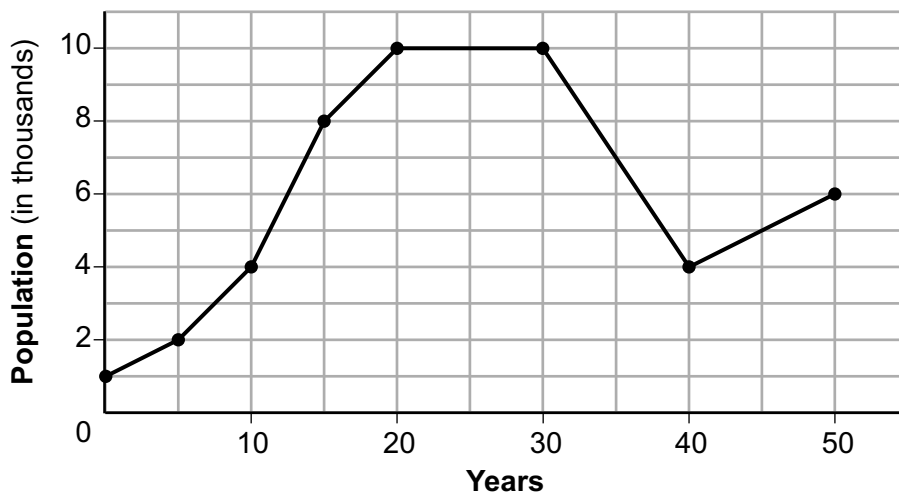
Explain what your average rate of change means from year 30 to year 40 in the context of the problem.

This is explaining/showing the increase or decrease that the town is having of their population over time.

Score 2: The student stated the correct interval and maximum population, but no further correct work was shown.

Question 33

33 Anessa is studying the changes in population in a town. The graph below shows the population over 50 years.



State the entire interval during which the population remained constant.

20 $\leq t \leq 30$

State the maximum population of the town over the 50-year period.

10,000 people

Determine the average rate of change from year 30 to year 40.

$$\frac{(30, 10) - (40, 4)}{30 - 40} = \frac{10 - 4}{-10} = \frac{6}{-10} = -0.6 = -\frac{3}{5}$$

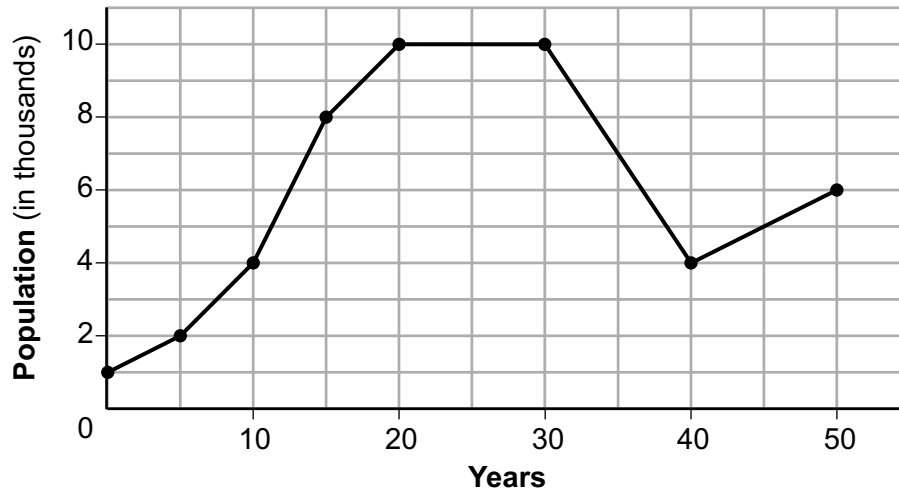
Explain what your average rate of change means from year 30 to year 40 in the context of the problem.

it means that in the years 30-40 on the graph it decreased

Score 2: The student stated the correct interval and maximum population, but no further correct work was shown.

Question 33

33 Anessa is studying the changes in population in a town. The graph below shows the population over 50 years.



State the entire interval during which the population remained constant.

$$20 \leq x \leq 30$$

State the maximum population of the town over the 50-year period.

$$10$$

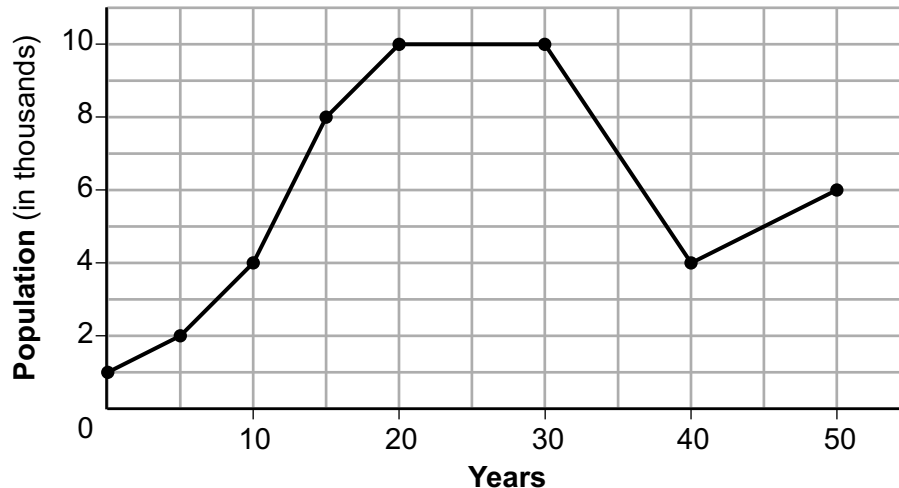
Determine the average rate of change from year 30 to year 40.

Explain what your average rate of change means from year 30 to year 40 in the context of the problem.

Score 1: The student stated the correct interval, but no further correct work was shown.

Question 33

33 Anessa is studying the changes in population in a town. The graph below shows the population over 50 years.



State the entire interval during which the population remained constant.

Population, 10,000

State the maximum population of the town over the 50-year period.

50 year period, 10,000

Determine the average rate of change from year 30 to year 40.

Rate of change for year 30 to year 40, (2.5)

Explain what your average rate of change means from year 30 to year 40 in the context of the problem.

This means the changes in population in a town.

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

Question 34

34 The table below shows the number of math classes missed during a school year for nine students, and their final exam scores.

Number of Classes Missed (x)	2	10	3	22	15	2	20	18	9
Final Exam Score (y)	99	72	90	35	60	80	40	43	75

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = -2.81x + 97.55$$

State the correlation coefficient for your linear regression. Round your answer to the *nearest hundredth*.

~~$$r = -0.78$$~~

$$r = -.97$$

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

the relationship between # of classes missed and final exam score is negative and strong

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

Question 34

34 The table below shows the number of math classes missed during a school year for nine students, and their final exam scores.

Number of Classes Missed (x)	2	10	3	22	15	2	20	18	9
Final Exam Score (y)	99	72	90	35	60	80	40	43	75

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$-2.81x + 97.55$$

State the correlation coefficient for your linear regression. Round your answer to the *nearest hundredth*.

$$-0.97$$

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

it has a strong negative relationship.

Score 3: The student wrote an expression instead of an equation.

Question 34

34 The table below shows the number of math classes missed during a school year for nine students, and their final exam scores.

Number of Classes Missed (x)	2	10	3	22	15	2	20	18	9
Final Exam Score (y)	99	72	90	35	60	80	40	43	75

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = ax + b$$

$$a = -2.415129151$$

$$b = 95.78659287$$

$$r = -.8696647403$$

$$y = -2.42x + 95.79$$

State the correlation coefficient for your linear regression. Round your answer to the *nearest hundredth*.

$$r = -0.87$$

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

Strong

Score 3: The student made a data entry error, but showed the full display of the calculator and gave an appropriate response based on the display.

Question 34

34 The table below shows the number of math classes missed during a school year for nine students, and their final exam scores.

Number of Classes Missed (x)	2	10	3	22	15	2	20	18	9
Final Exam Score (y)	99	72	90	35	60	80	40	43	75

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = -2.81 + 97.55x$$

State the correlation coefficient for your linear regression. Round your answer to the *nearest hundredth*.

$$r = -0.97$$

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

It indicates
the change

Score 2: The student did not write x in the equation and did not state strong.

Question 34

34 The table below shows the number of math classes missed during a school year for nine students, and their final exam scores.

Number of Classes Missed (x)	2	10	3	22	15	2	20	18	9
Final Exam Score (y)	99	72	90	35	60	80	40	43	75

$$y = mx + b$$

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = -2.81x + 97.56$$

State the correlation coefficient for your linear regression. Round your answer to the *nearest hundredth*.

$$\text{correlation} = \text{coefficient} =$$

$$.94$$

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

That around .94 is the number that is added for each class ~~es~~ has a miss.

Score 1: The student made a rounding error in the regression equation, and no further correct work was shown.

Question 34

34 The table below shows the number of math classes missed during a school year for nine students, and their final exam scores.

Number of Classes Missed (x)	2	10	3	22	15	2	20	18	9
Final Exam Score (y)	99	72	90	35	60	80	40	43	75

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

State the correlation coefficient for your linear regression. Round your answer to the *nearest hundredth*.

$-.91$

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

Strong

Score 1: The student wrote an appropriate indication based an incorrect correlation coefficient.

Question 34

34 The table below shows the number of math classes missed during a school year for nine students, and their final exam scores.

Number of Classes Missed (x)	2	10	3	22	15	2	20	18	9
Final Exam Score (y)	99	72	90	35	60	80	40	43	75

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$\Delta y = (99) - (72) = 27$$

$$\Delta x = (2) - (10) = -8$$

$$= \frac{27}{-8} = 3.375 \rightarrow 3.38x$$

$$y = mx + b$$

$$(72) = (10)(3.38) + b$$

$$72 = 33.8 + b \rightarrow 38.2 = b$$

$$= 33.8 - 33.8$$

$$y = 3.38x + 38.2$$

State the correlation coefficient for your linear regression. Round your answer to the *nearest hundredth*.

3.38

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

The correlation coefficient indicates the amount that the final exam score decreases for each number of class missed.

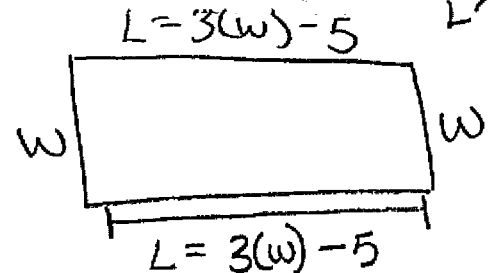
Score 0: The student did not show enough correct work to receive any credit.

Question 35

35 A fence was installed around the edge of a rectangular garden. The length, l , of the fence was 5 feet less than 3 times its width, w . The amount of fencing used was 90 feet.

Write a system of equations or write an equation using one variable that models this situation.

$$3(w) - 5 + 3(w) - 5 + 2w = 90 \text{ ft.}$$



Determine algebraically the dimensions, in feet, of the garden.

$$3(w) - 5 + 3(w) - 5 + 2w = 90 \text{ ft.}$$

$$\boxed{3w} - \boxed{5} + \boxed{3w} - \boxed{5} + \boxed{2w} = 90$$

$$8w - 10 = 90$$

$$\frac{8w}{8} = \frac{100}{8}$$

$$\boxed{w = 12.5 \text{ ft.}}$$

$$L = 3(12.5) - 5$$

$$\boxed{L = 32.5 \text{ ft.}}$$

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

Question 35

35 A fence was installed around the edge of a rectangular garden. The length, l , of the fence was 5 feet less than 3 times its width, w . The amount of fencing used was 90 feet.

Write a system of equations or write an equation using one variable that models this situation.

Determine algebraically the dimensions, in feet, of the garden.

$$2(3w - 5) + 2w = 90$$

$$\text{width} = 12.5 \text{ feet}$$

$$\text{length} = 32.5 \text{ feet}$$

$$6w - 10 + 2w = 90$$

$$\begin{array}{r} 8w - 10 = 90 \\ +10 \quad +10 \\ \hline 8w = 100 \\ \frac{8w}{8} = \frac{100}{8} \end{array}$$

$$w = 12.5$$

$$3(12.5) - 5 = 32.5$$

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

Question 35

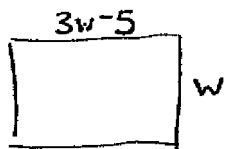
35 A fence was installed around the edge of a rectangular garden. The length, l , of the fence was 5 feet less than 3 times its width, w . The amount of fencing used was 90 feet.

Write a system of equations or write an equation using one variable that models this situation.

$$l = 3w - 5$$

$$90 = l + w$$

Determine algebraically the dimensions, in feet, of the garden.



$$90 = (3w - 5) + w$$

$$90 = 4w - 5$$

$+5$ $+5$

$$\frac{95}{4} = \frac{4w}{4}$$

$$23.75 = w$$

width = 23.75 feet
length = 66.25 feet

Score 3: The student wrote only one equation in the system correctly, but solved the system appropriately.

Question 35

35 A fence was installed around the edge of a rectangular garden. The length, l , of the fence was 5 feet less than 3 times its width, w . The amount of fencing used was 90 feet.

Write a system of equations or write an equation using one variable that models this situation.

$$\begin{aligned} l + l &= \text{length} \\ \text{let } w &= \text{width} \end{aligned} \qquad \begin{aligned} 3w - 5 &= l \\ 2l + 2w &= 90 \end{aligned}$$

Determine algebraically the dimensions, in feet, of the garden.

$$\begin{aligned} -2(3w - 5 &= l) \\ -6w + 10 &= -2l \\ 3(2l + 2w &= 90) \\ 6l + 6w &= 180 \\ -6l & \qquad \qquad -6l \\ \hline 6w &= 180 - 6l \\ -180 & -180 \\ \hline 6w - 180 &= -6l \\ -6w + 10 &= -2l \\ \hline -170 &= -8l \\ -8 & \qquad -8 \\ \hline l &= 21.25 \end{aligned}$$

$$\begin{aligned} 3w - 5 &= l \\ 3w - 5 &= 21.25 \\ +5 & \qquad +5 \\ \hline 3w &= 26.25 \\ \frac{3w}{3} &= \frac{26.25}{3} \\ w &= 8.75 \end{aligned}$$

Score 3: The student made one computational error.

Question 35

35 A fence was installed around the edge of a rectangular garden. The length, l , of the fence was 5 feet less than 3 times its width, w . The amount of fencing used was 90 feet.

Write a system of equations or write an equation using one variable that models this situation.

$$\begin{aligned}l + w &= 90 \\ l &= 3w - 5\end{aligned}$$

Determine algebraically the dimensions, in feet, of the garden.

$$\begin{aligned}3w - 5 + w &= 90 \\ 4w - 5 &= 90 \\ \quad \quad \quad +5 \quad \quad +5 \\ \hline 4w &= 95 \\ \frac{4w}{4} &= \frac{95}{4} \\ w &= 23.75\end{aligned}$$

Score 2: The student wrote only one equation correctly and solved the system appropriately, but found only one dimension.

Question 35

35 A fence was installed around the edge of a rectangular garden. The length, l , of the fence was 5 feet less than 3 times its width, w . The amount of fencing used was 90 feet.

Write a system of equations or write an equation using one variable that models this situation.

$$l = 3w - 5$$
$$w(3w - 5) = 90$$

Determine algebraically the dimensions, in feet, of the garden.

$$l = 3w - 5$$
$$w(3w - 5) = 90$$
$$3(3w^2 - 5w = 90)$$
$$5(3w - 5 = l)$$
$$9w^2 - 15w = 180$$
$$-5l + 15w = 25$$
$$9w^2 - 5l = 155$$

Score 1: The student wrote only one equation correctly.

Question 35

35 A fence was installed around the edge of a rectangular garden. The length, l , of the fence was 5 feet less than 3 times its width, w . The amount of fencing used was 90 feet.

Write a system of equations or write an equation using one variable that models this situation.

$$3(w-5)=90$$

Determine algebraically the dimensions, in feet, of the garden.

$$\begin{array}{r} 3(w-5)=90 \\ 3w-15=90 \\ \quad +15 \quad +15 \\ \hline 3w=105 \\ \frac{3w}{3}=\frac{105}{3} \\ w=35 \end{array}$$

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

Question 36

36 Given:

$$0 < -2(0) - 4$$

$$0 < 0 - 4$$

$$0 < -4$$

NO

$$3y - 9 \leq 12$$

$$y < -2x - 4$$

dotted

$$\frac{3y}{3} \leq \frac{21}{3}$$

$$y \leq 7$$

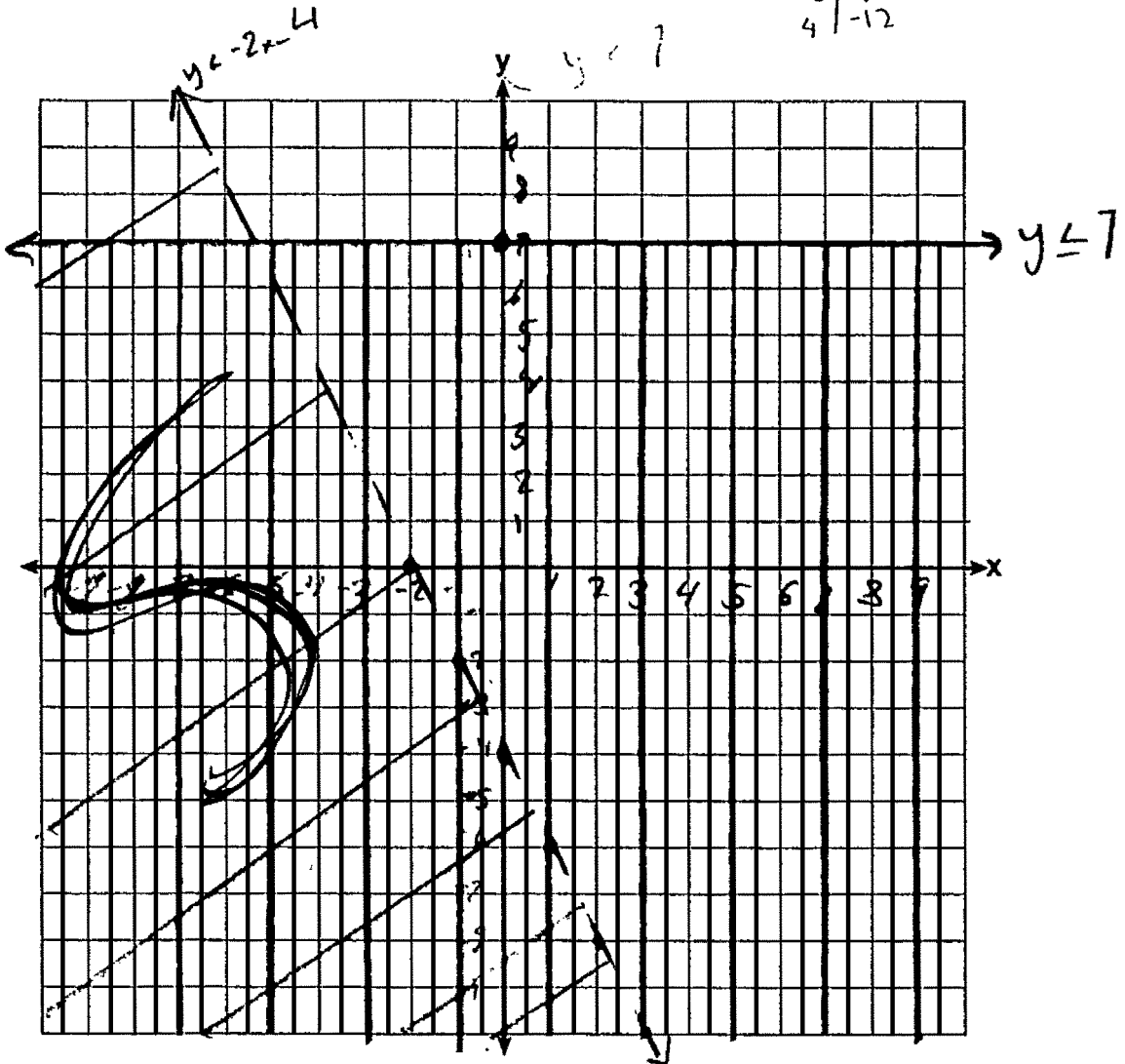
solid

x	y
1	7
2	7
3	7
4	7

x	y
0	-4
1	-6
2	-8
3	-10
4	-12

$0 \leq 7$
Yes

Graph the system of inequalities on the set of axes below.



State the coordinates of a point that satisfies both inequalities. Justify your answer.

The coordinates $(-2, -4)$ are in the solution set

$$-4 \leq 7$$

Yes

$$-4 < -2(-2) - 4$$

$$-4 < 4 - 4$$

$$-4 < 0$$

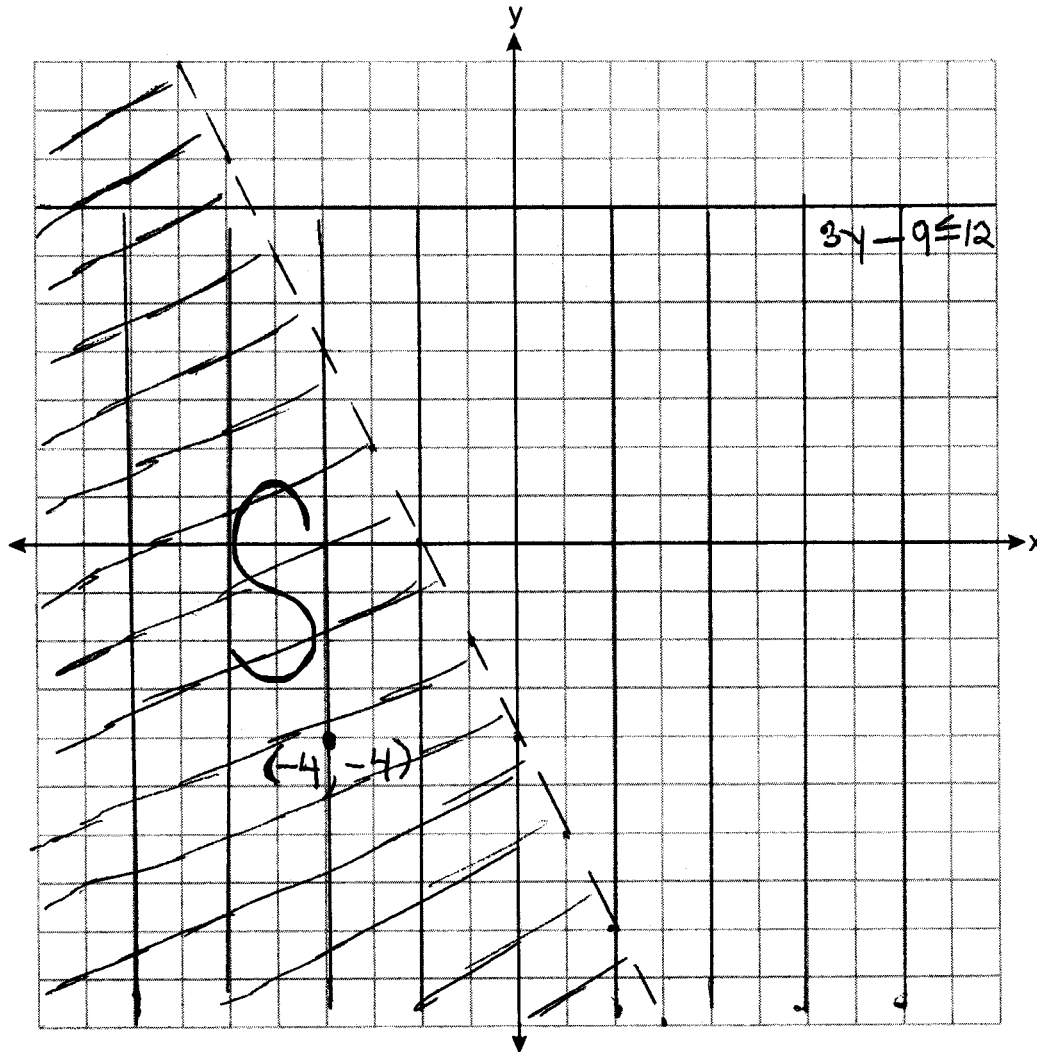
Yes

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

Question 36

36 Given: $3y - 9 \leq 12$
 $y < -2x - 4$

Graph the system of inequalities on the set of axes below.



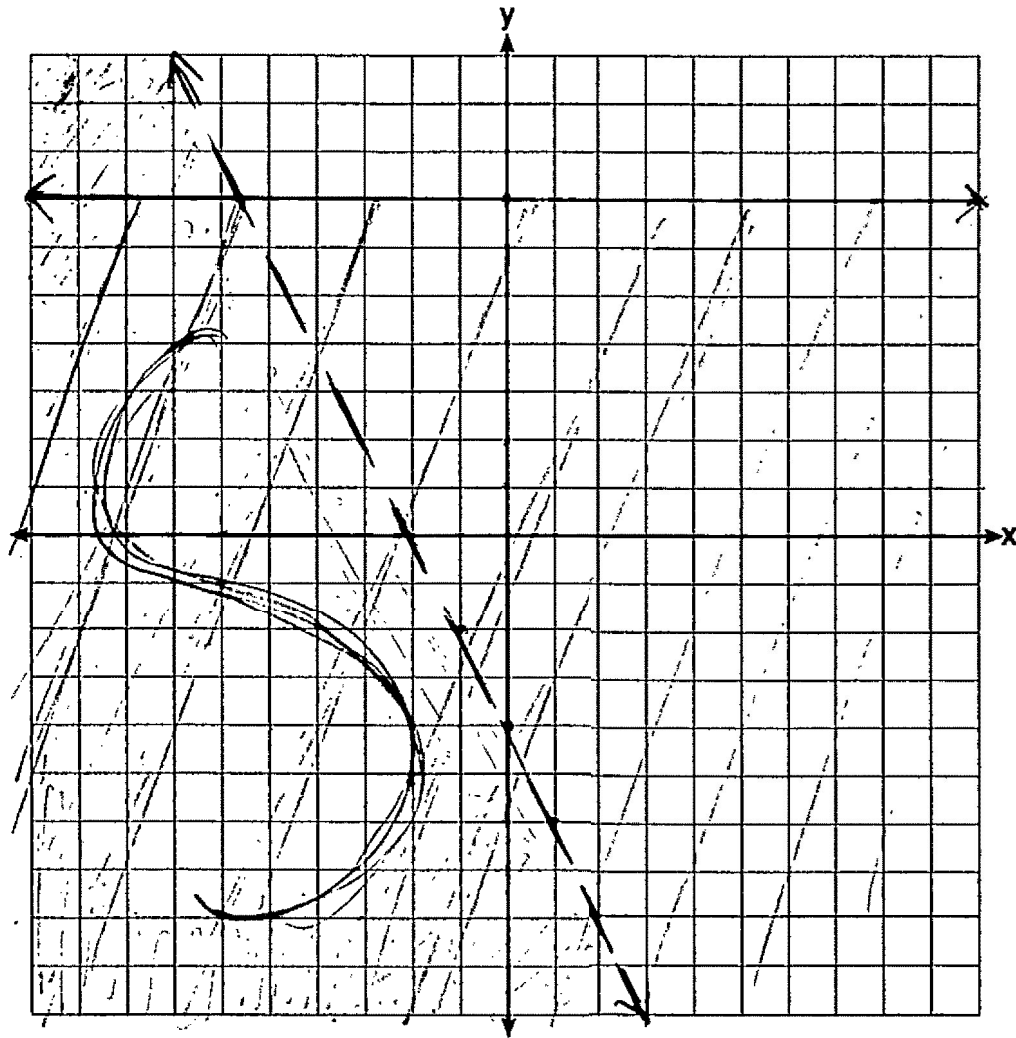
State the coordinates of a point that satisfies both inequalities. Justify your answer.

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

Question 36

36 Given: $3y - 9 \leq 12$
 $y < -2x - 4$

Graph the system of inequalities on the set of axes below.



State the coordinates of a point that satisfies both inequalities. Justify your answer.

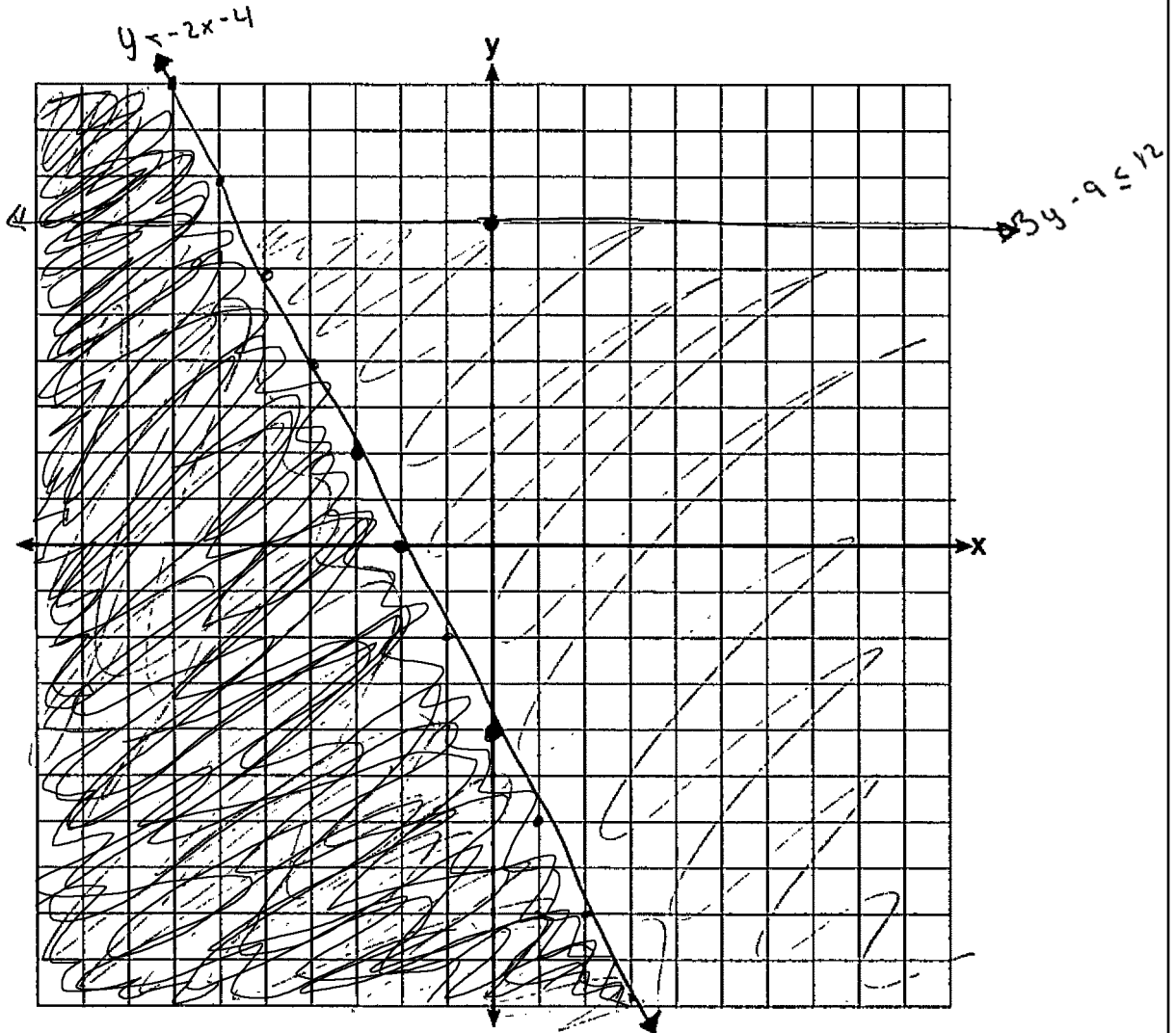
$(-7, 1)$ is a point which satisfies both inequalities because it lies in the solution set on the graph.

Score 3: The student did not label one of the inequalities.

Question 36

36 Given: $3y - 9 \leq 12$
 $y < -2x - 4$

Graph the system of inequalities on the set of axes below.



State the coordinates of a point that satisfies both inequalities. Justify your answer.

$(-4, -2)$ because if you plug it in to $y < -2x - 4$ you get 4 and 4 is greater than -2

Score 2: The student only graphed one inequality correctly and did not write a complete justification.

Question 36

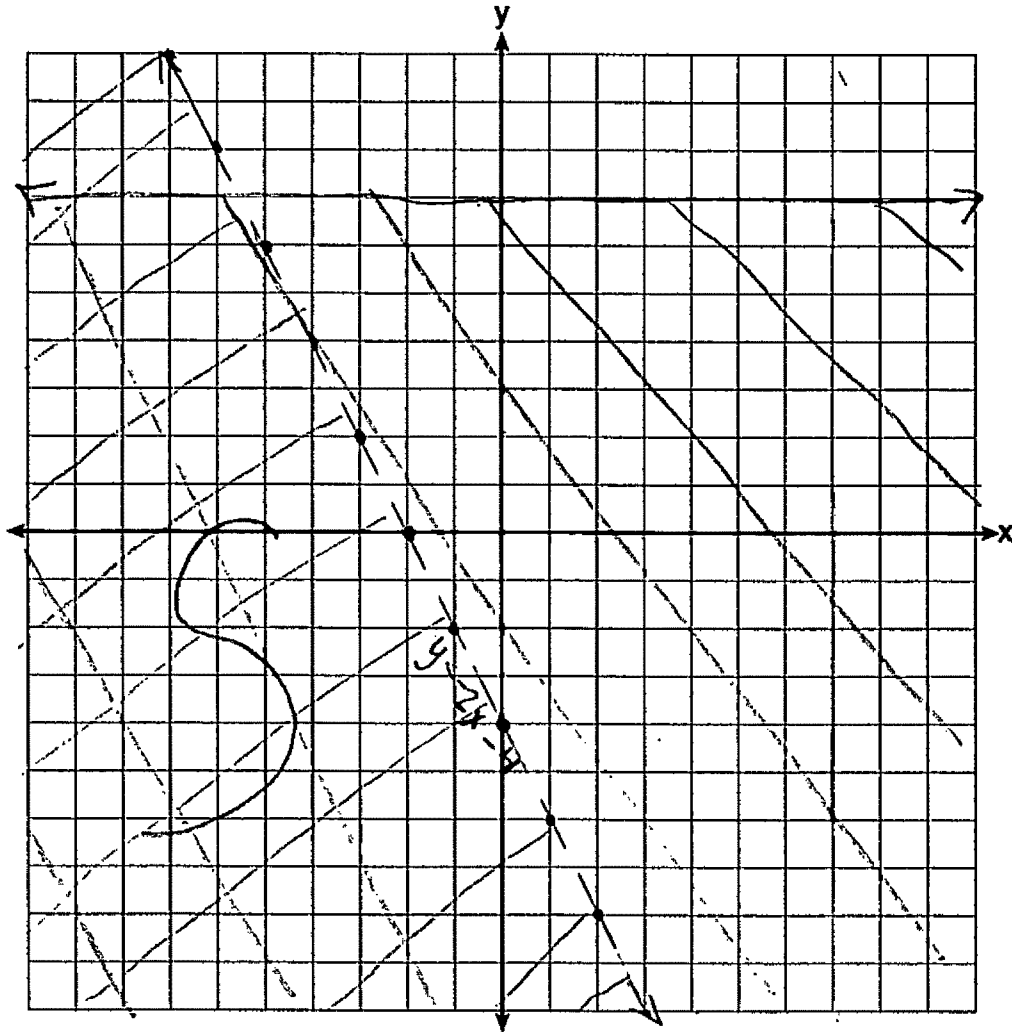
36 Given:

$$3y - 9 \leq 12$$

$$y < -2x - 4$$

$$\begin{array}{r} 3y - 9 \leq 12 \\ +9 \quad +9 \\ \hline 3y \leq 21 \\ \hline y \leq 7 \end{array}$$

Graph the system of inequalities on the set of axes below.



State the coordinates of a point that satisfies both inequalities. Justify your answer.

Score 2: The student graphed both inequalities correctly, but no further correct work was shown.

Question 36

36 Given:

$$3y - 9 \leq 12$$

$$y < -2x - 4$$

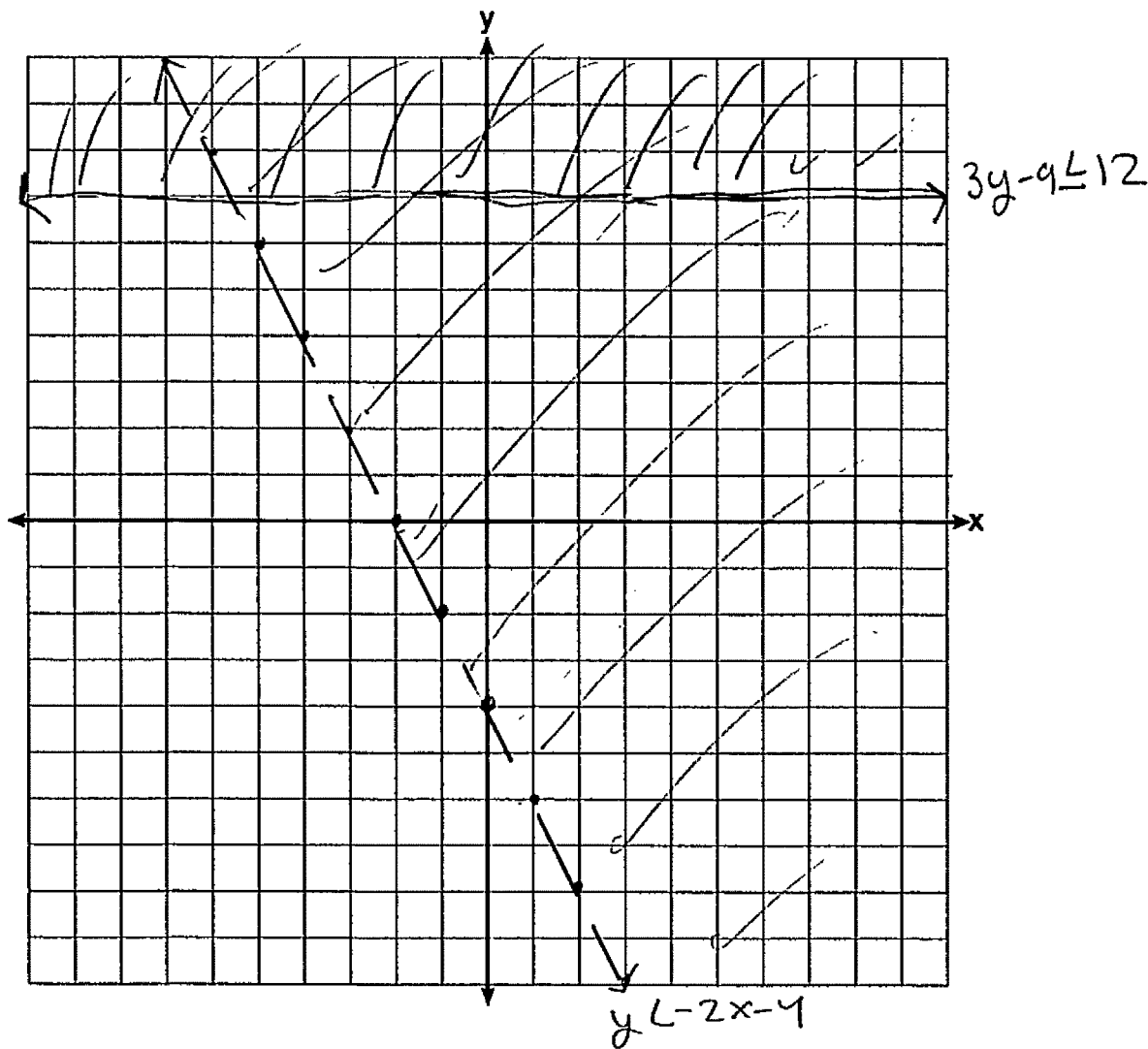
$$3y - 9 \leq 12$$

$$+9 \quad +9$$

$$\frac{3y}{3} \leq \frac{21}{3}$$

$$y \leq 7$$

Graph the system of inequalities on the set of axes below.



State the coordinates of a point that satisfies both inequalities. Justify your answer.

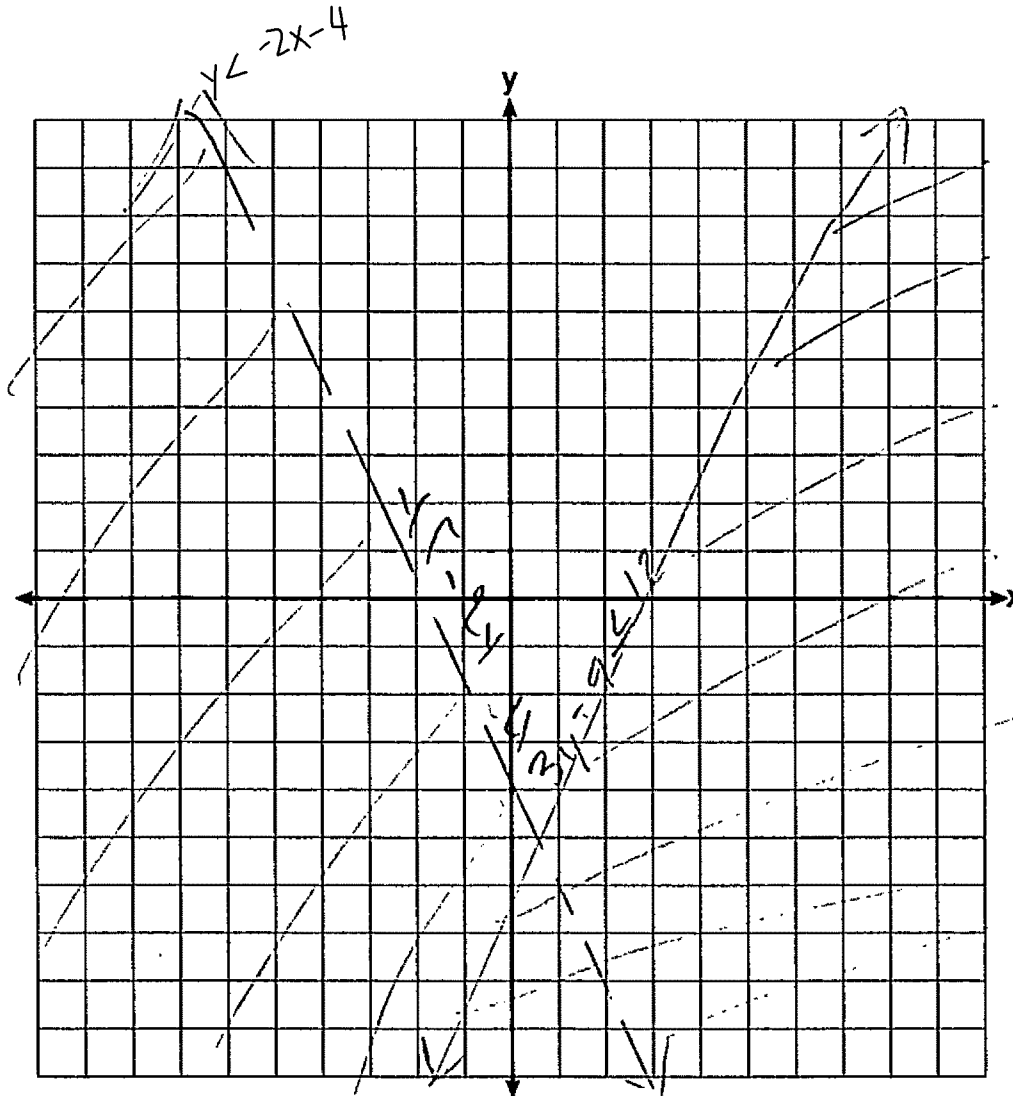
$(8, 2)$

Score 1: The student made the same shading error in both inequalities, and no further correct work was shown.

Question 36

36 Given: $3y - 9 \leq 12$
 $y < -2x - 4$

Graph the system of inequalities on the set of axes below.



State the coordinates of a point that satisfies both inequalities. Justify your answer.

Score 1: The student graphed and labeled one inequality correctly, but no further correct work was shown.

Question 36

36 Given:

$$3y - 9 \leq 12$$

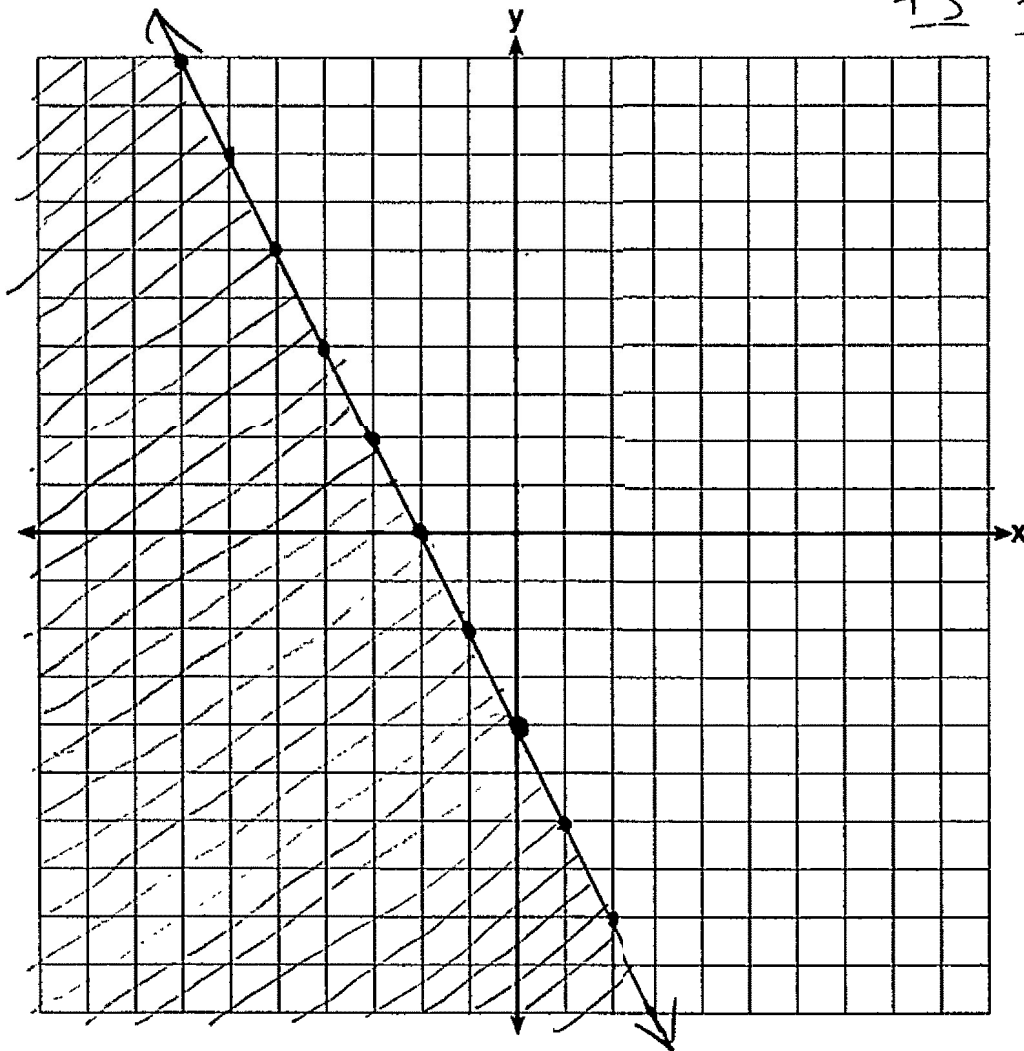
$$y < -2x - 4$$

$$\frac{3y - 9}{3} \leq \frac{12}{3}$$

$$y - 3 \leq 4$$
$$\underline{+3} \quad \underline{+3}$$

$$y \leq 7$$

Graph the system of inequalities on the set of axes below.



State the coordinates of a point that satisfies both inequalities. Justify your answer.

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

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x$$

Write an equation to model the distance Ella traveled.

$$y = 6x + 30$$

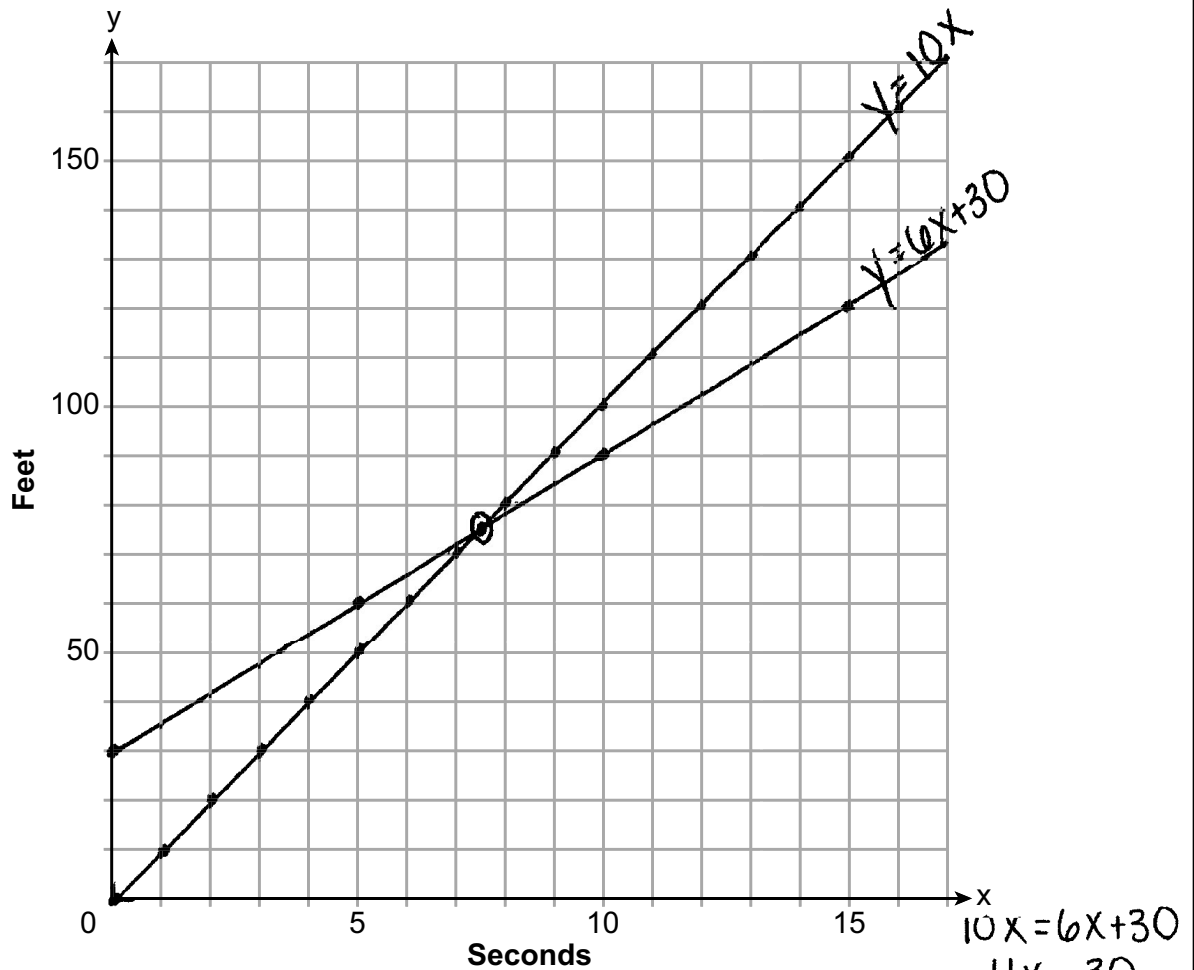
Question 37 is continued on the next page.

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

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

Aidan catches Ella after 7.5 seconds.

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x$$

Write an equation to model the distance Ella traveled.

$$y = 6x + 30$$

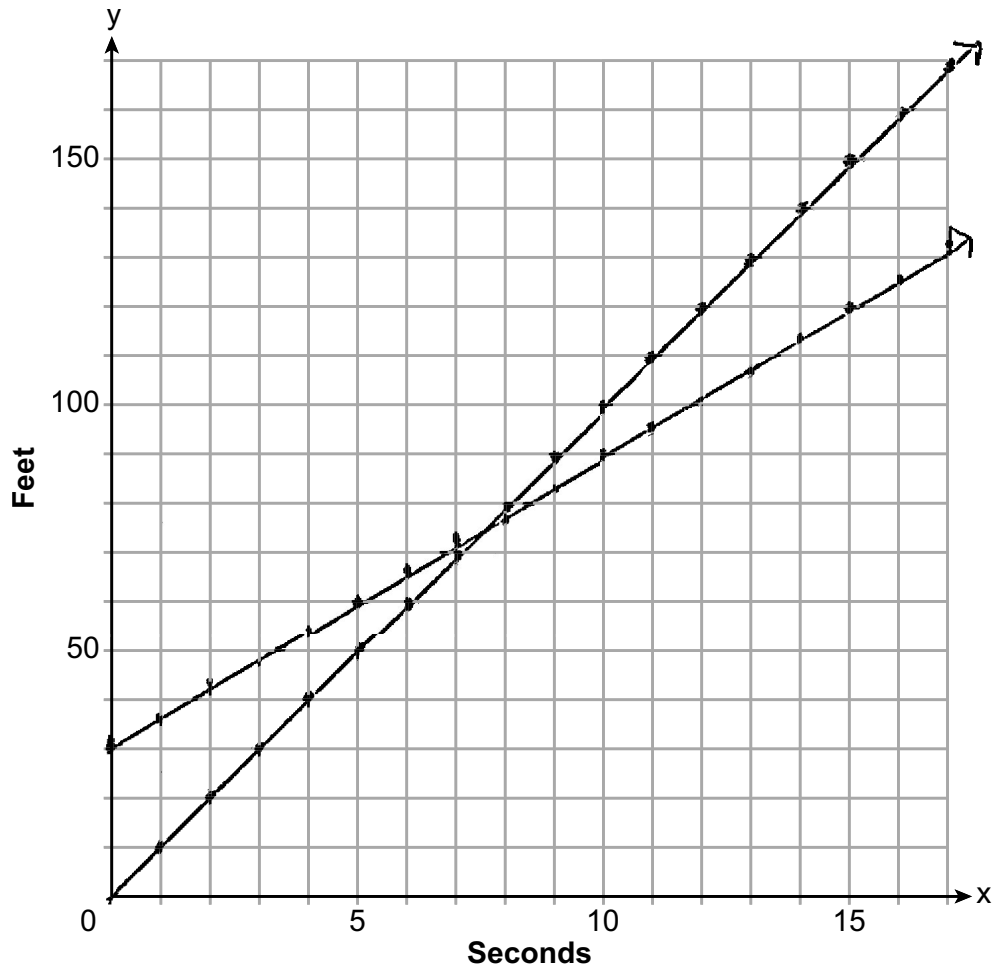
Question 37 is continued on the next page.

Score 5: The student did not label at least one of the lines.

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

$$\begin{array}{r} 10x = 6x + 30 \\ -6x \quad -6x \\ \hline 4x = 30 \end{array}$$

$$\begin{array}{r} 4x = 30 \\ \frac{4x}{4} = \frac{30}{4} \\ x = 7.5 \end{array}$$

It takes 7.5 seconds for Aidan to catch up to Ella because when you put the equations equal to each other you get 7.5 as your answer

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x$$

Write an equation to model the distance Ella traveled.

$$y = 6x + 30$$

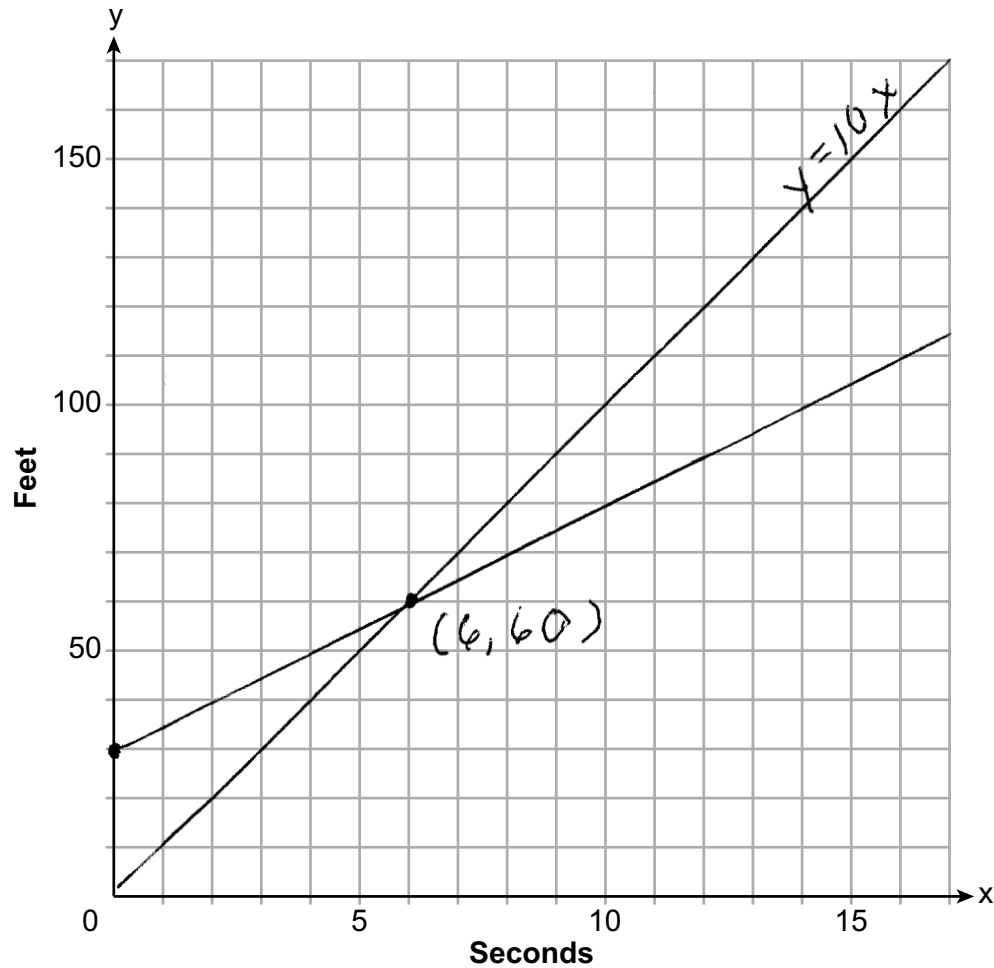
Question 37 is continued on the next page.

Score 5: The student wrote two correct equations but graphed one incorrectly. They found an appropriate point of intersection and justified their answer.

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

6 seconds because that is where the lines cross

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x$$

Write an equation to model the distance Ella traveled.

$$y = 6x + 30$$

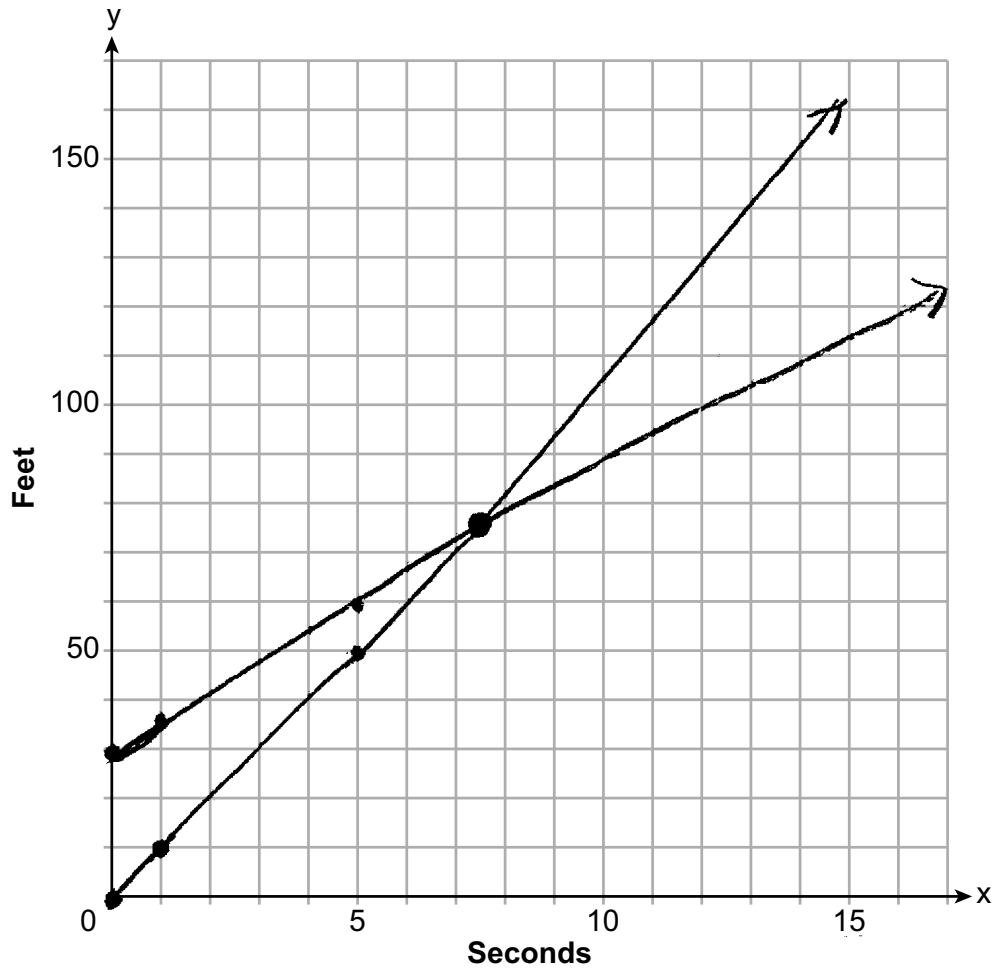
Question 37 is continued on the next page.

Score 4: The student did not label at least one of the lines and did not give a justification.

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

7.5 seconds

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x$$

Write an equation to model the distance Ella traveled.

$$y = 6x + 30$$

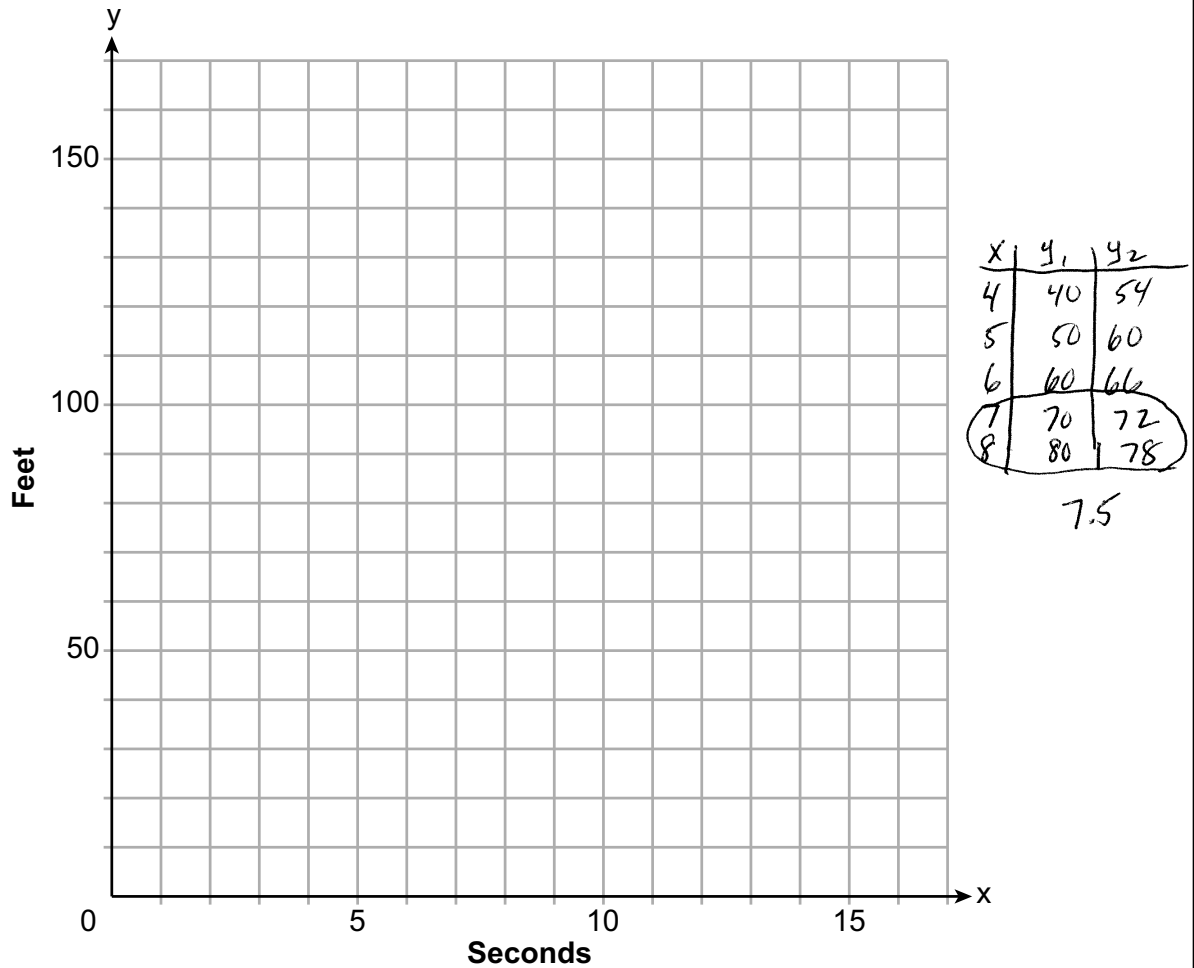
Question 37 is continued on the next page.

Score 4: The student did not graph the equations.

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

7.5

Aidan $y = 10(7.5) = 75$

Ella $y = 6(7.5) + 30 = 75$

At 7.5 feet ~~she~~ he ~~passes her~~ catches up to Ella.

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x - 30$$

Write an equation to model the distance Ella traveled.

$$y = 6x$$

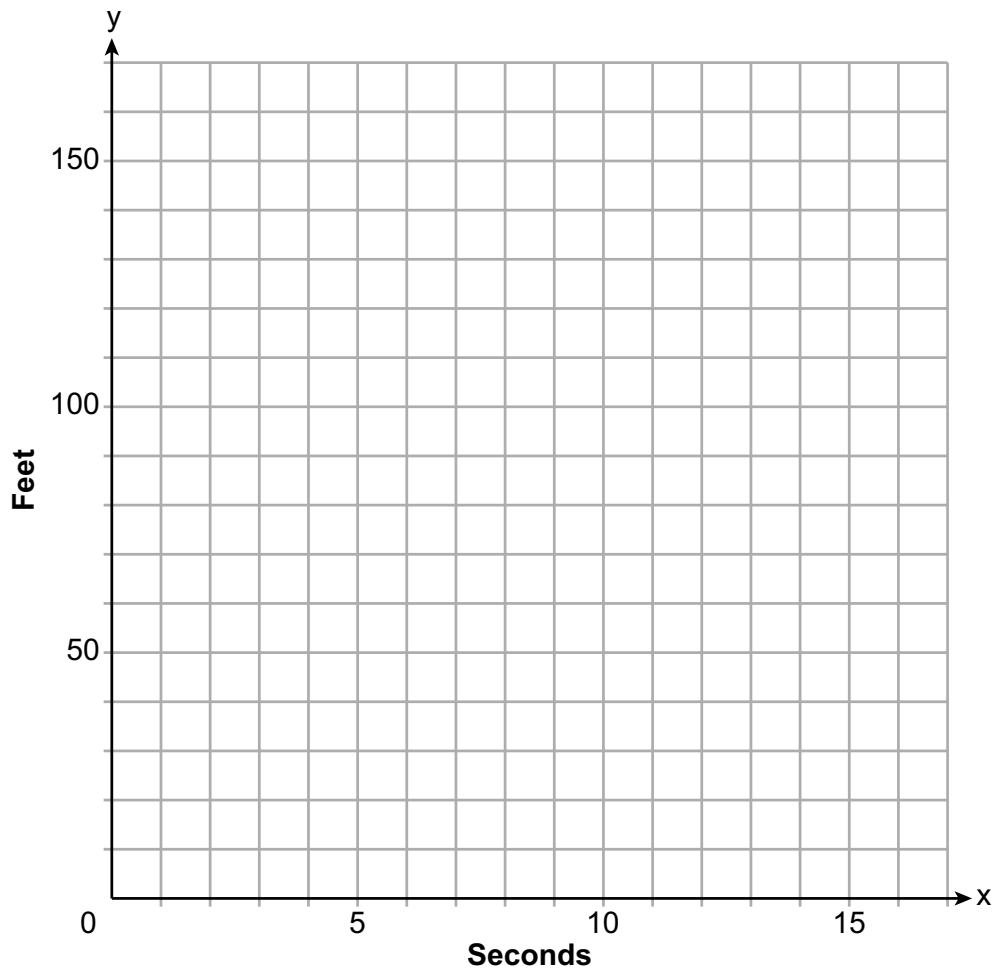
Question 37 is continued on the next page.

Score 4: The student wrote two correct equations and justified 7.5.

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

$$\begin{aligned}10x - 30 &= 6x \\4x &= 30 \\x &= 7.5\end{aligned}$$

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x$$

Write an equation to model the distance Ella traveled.

$$y = 6x + 30$$

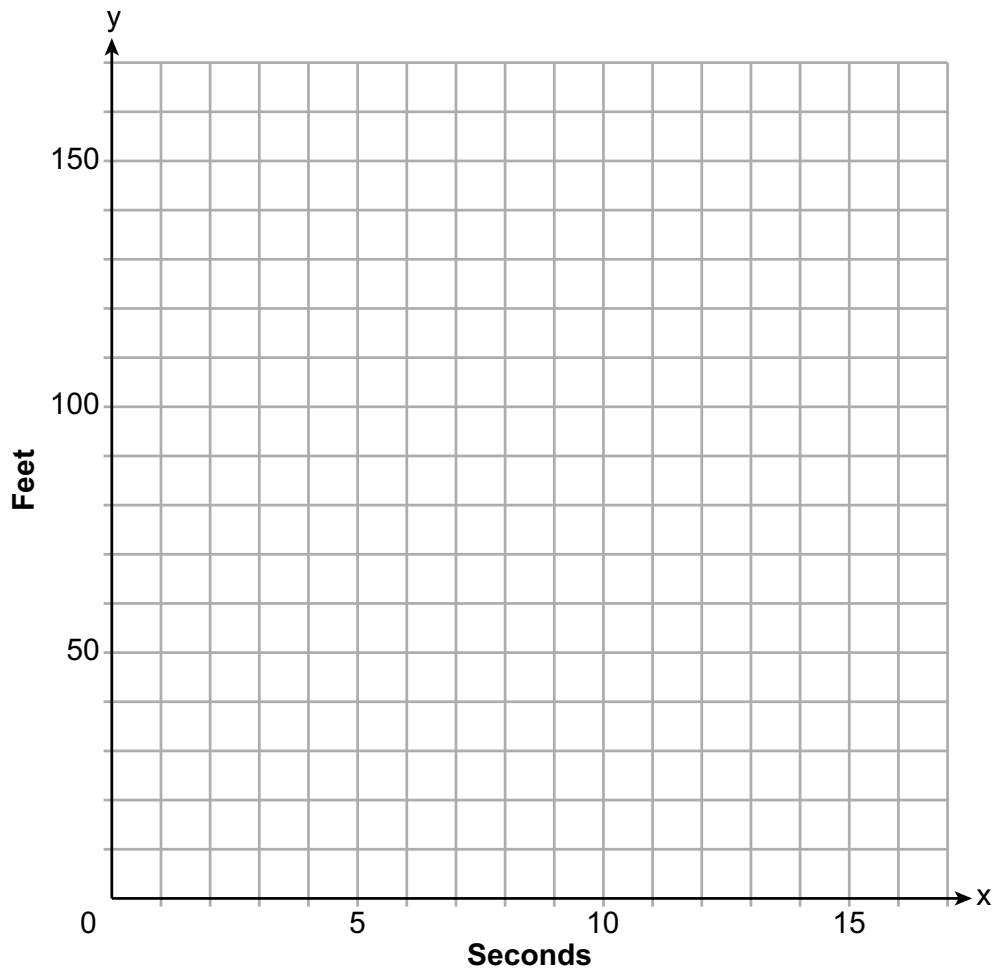
Question 37 is continued on the next page.

Score 3: The student wrote two correct equations and stated the correct number of seconds.

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

$$y = 10x \quad 6x + 30 = y$$

$$7.5$$

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x$$

Write an equation to model the distance Ella traveled.

$$y = 6x + 30$$

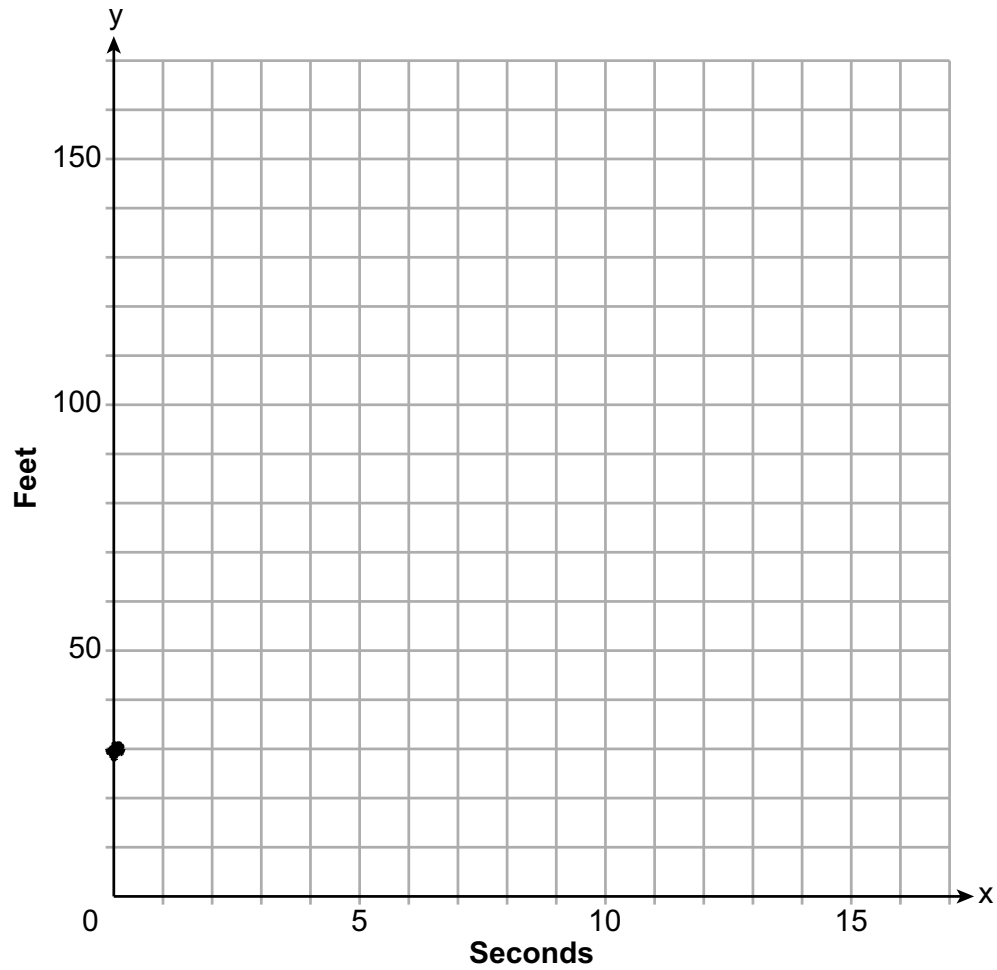
Question 37 is continued on the next page.

Score 2: The student wrote the correct equations for Aidan and Ella.

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$y = 10x - 30$$

Write an equation to model the distance Ella traveled.

$$y = 6x + 30$$

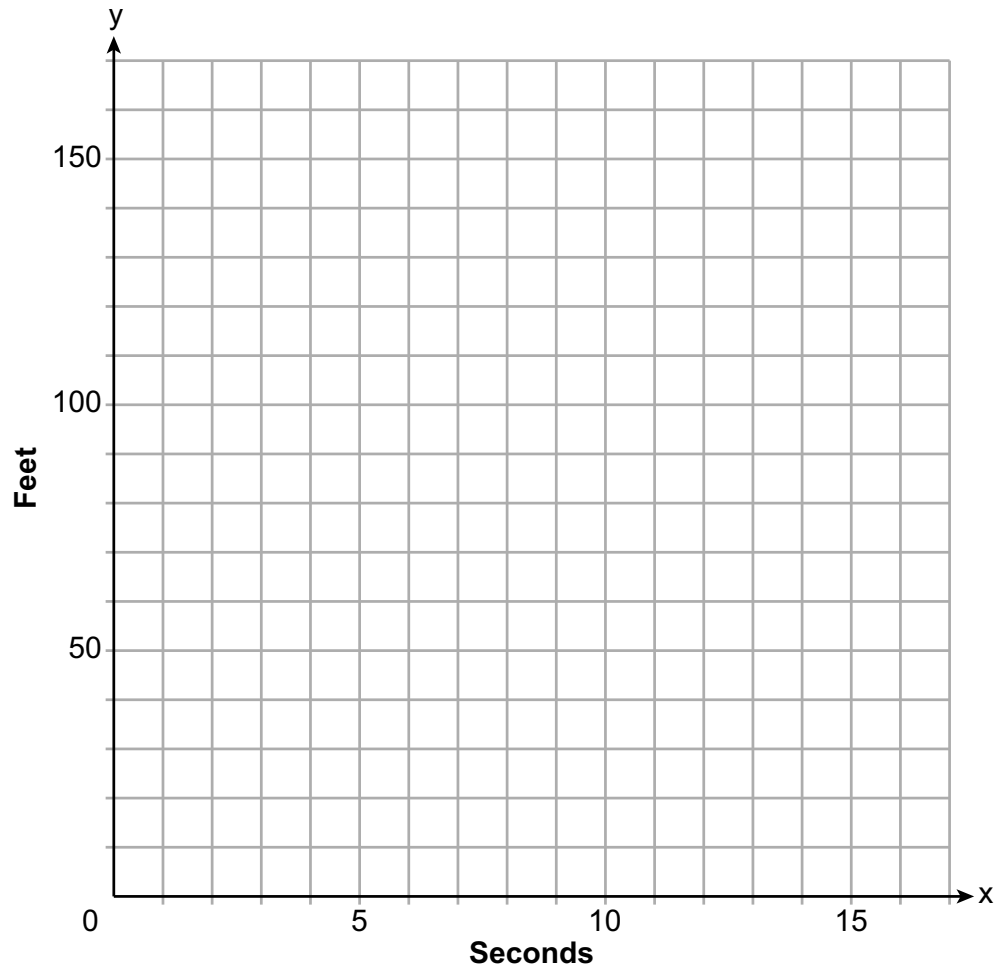
Question 37 is continued on the next page.

Score 1: The student only wrote the correct equation for Ella.

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

Question 37

37 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line.

Let y represent the distance from the starting line and x represent the time elapsed, in seconds.

Write an equation to model the distance Aidan traveled.

$$10x$$

Write an equation to model the distance Ella traveled.

~~$$y = 6x$$~~

$$y = 6x - 30$$

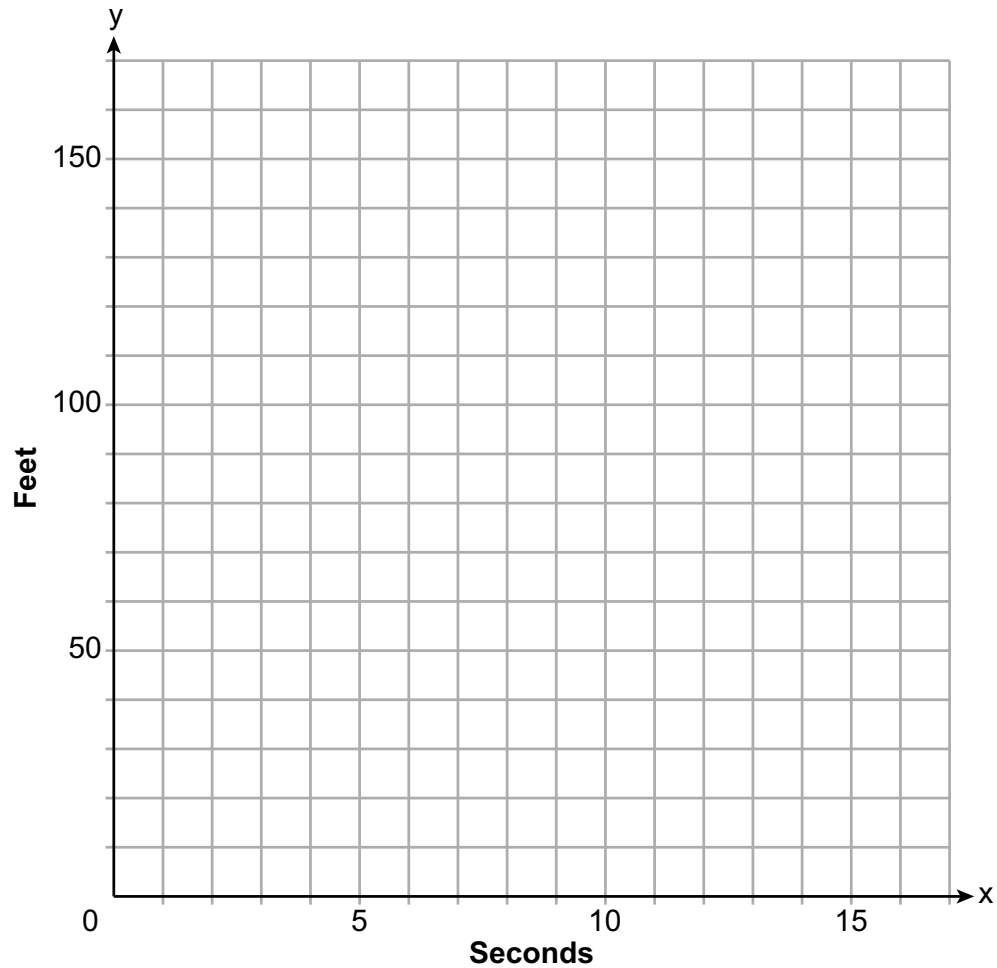
Question 37 is continued on the next page.

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

Question 37

Question 37 continued

On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.