The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I (Common Core)

Tuesday, June 3, 2014 — 9:15 a.m.

MODEL RESPONSE SET

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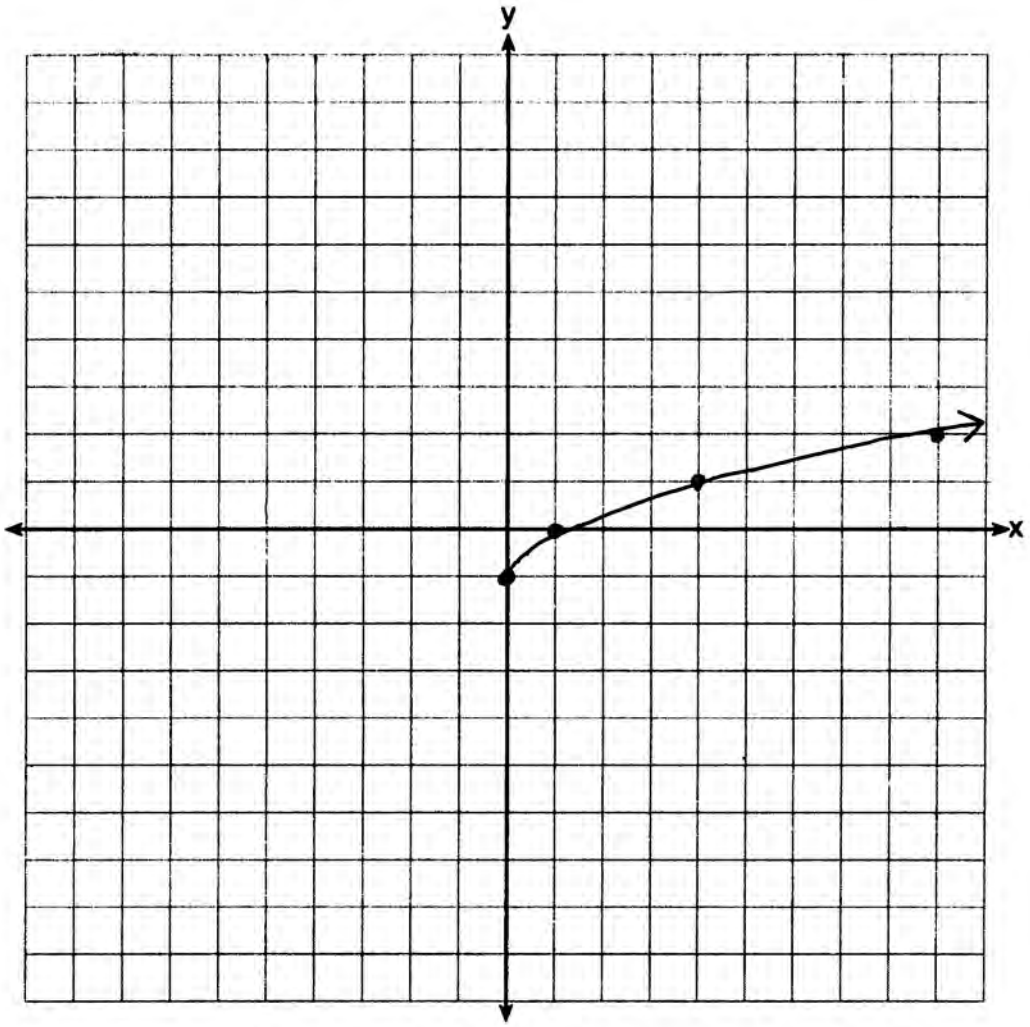
Question 25

25 Draw the graph of $y = \sqrt{x} - 1$ on the set of axes below.

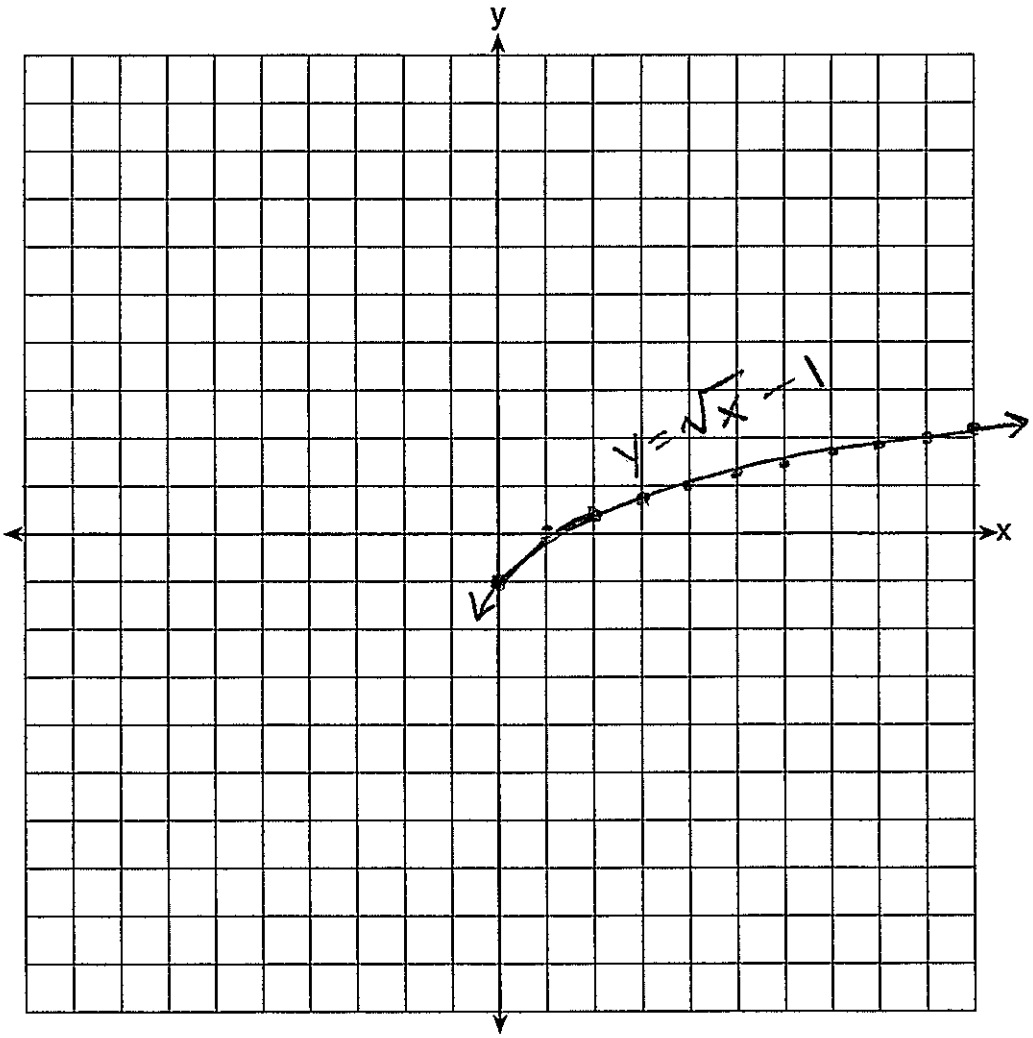


x	y
0	-1
1	0
4	1
9	2

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

Question 25

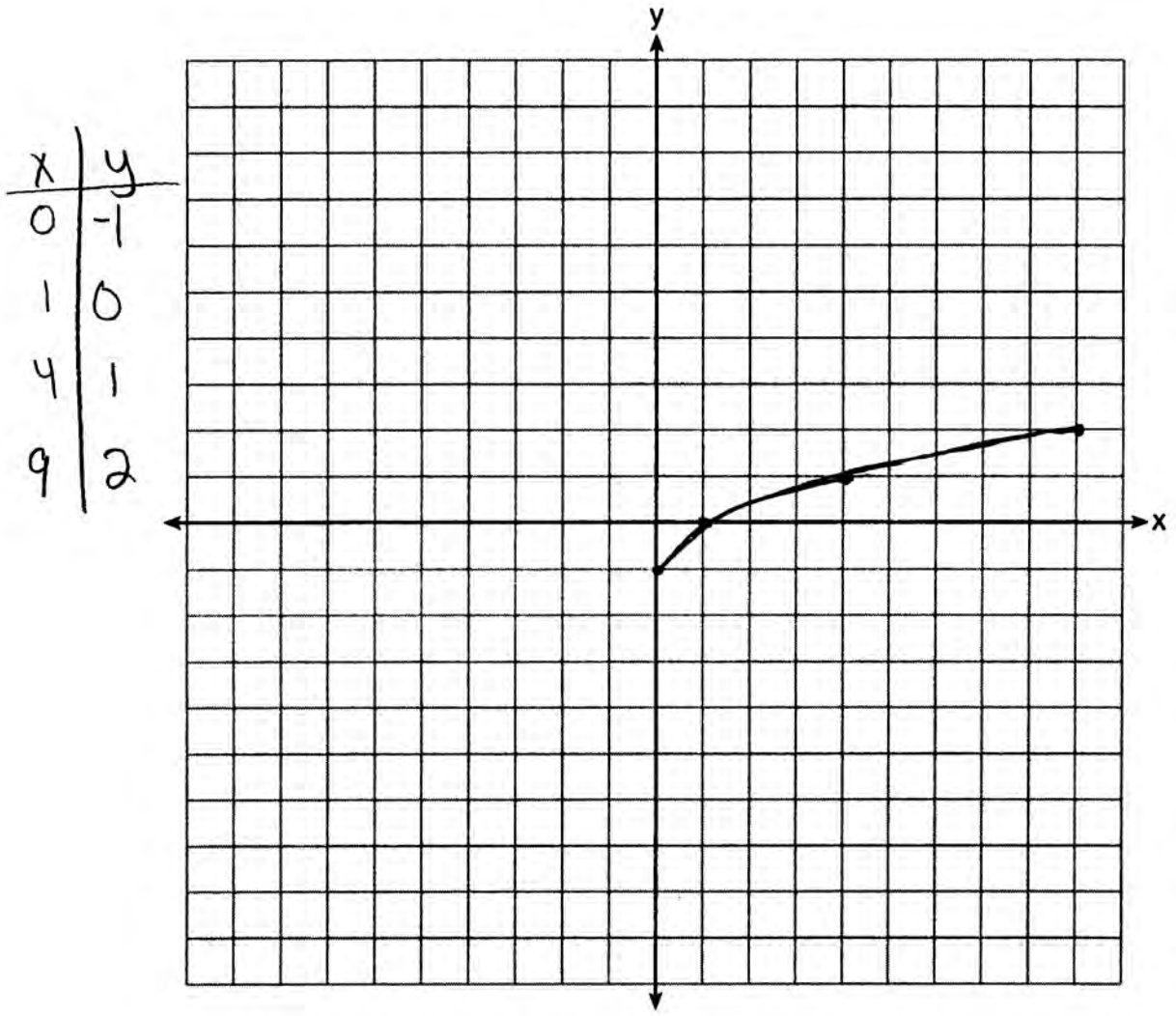
25 Draw the graph of $y = \sqrt{x} - 1$ on the set of axes below.



Score 1: The student made one error by extending the graph beyond the point $(0,-1)$.

Question 25

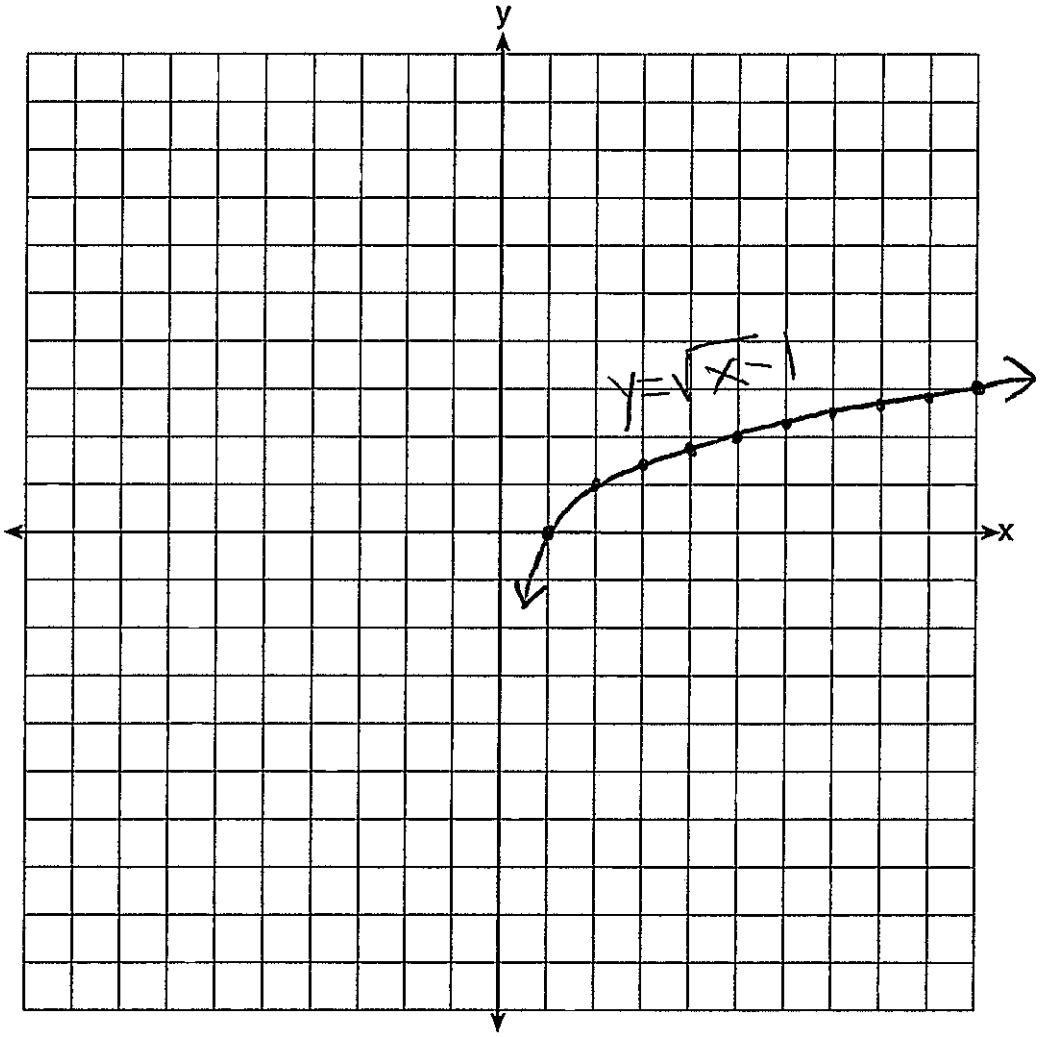
25 Draw the graph of $y = \sqrt{x} - 1$ on the set of axes below.



Score 1: The student made one graphing error by not extending the graph beyond the point (9,2).

Question 25

25 Draw the graph of $y = \sqrt{x} - 1$ on the set of axes below.

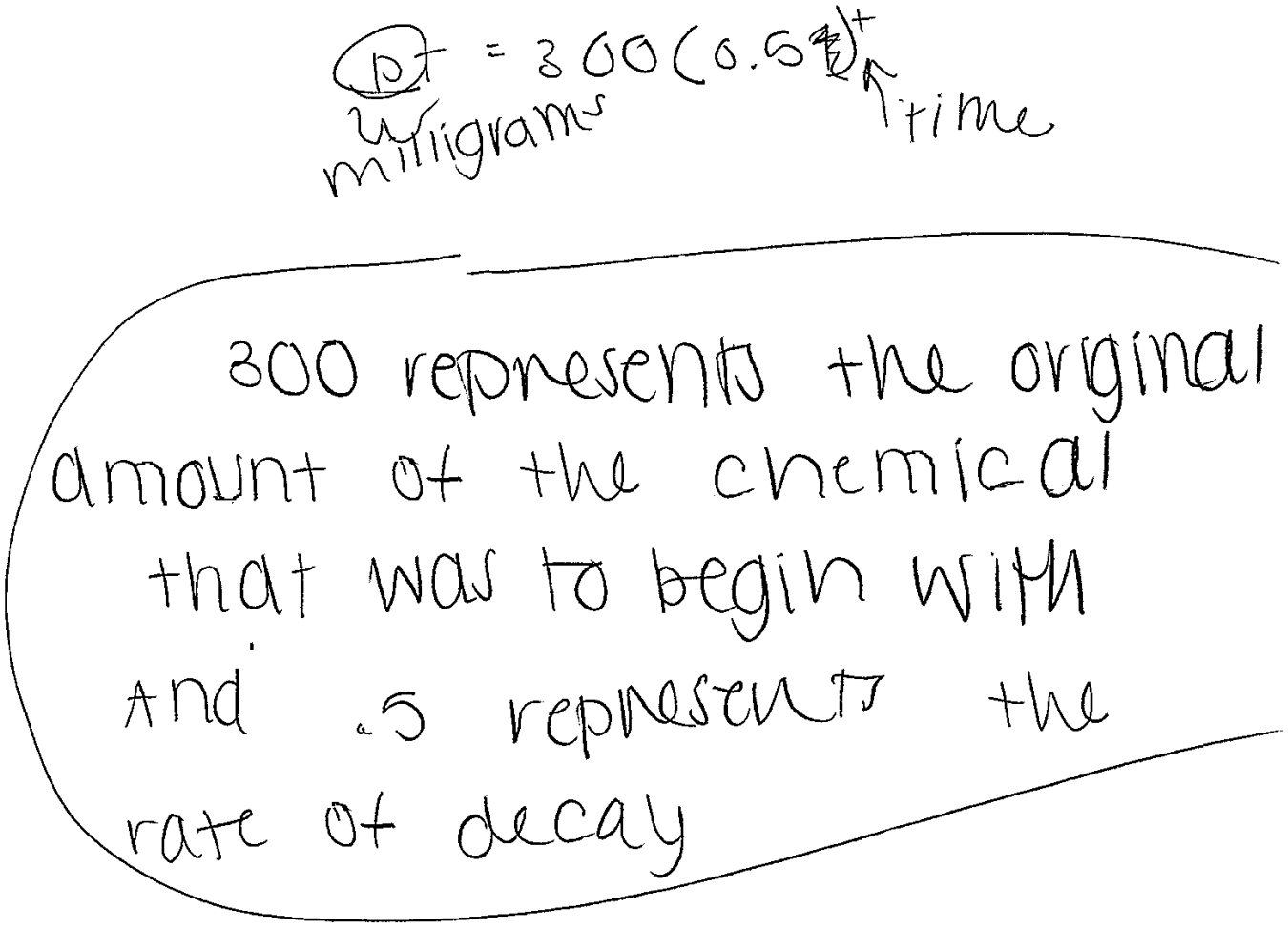


x	y
1	0
2	1
3	1.4142
4	1.7321
5	2
6	2.2361
7	2.4495
8	2.6458
9	2.8284
10	3

Score 0: The student made two errors by graphing $y = \sqrt{x-1}$ and by extending the graph beyond the point (1,0).

Question 26

26 The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.5)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.



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

Question 26

26 The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.5)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.

(300) is the number at which
It starts at

(.5) is the percent or rate the
number (300) goes up by.

Score 1: The student gave a correct explanation for 300, but the explanation for 0.5 is incorrect.

Question 26

26 The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.5)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.

t= time in years

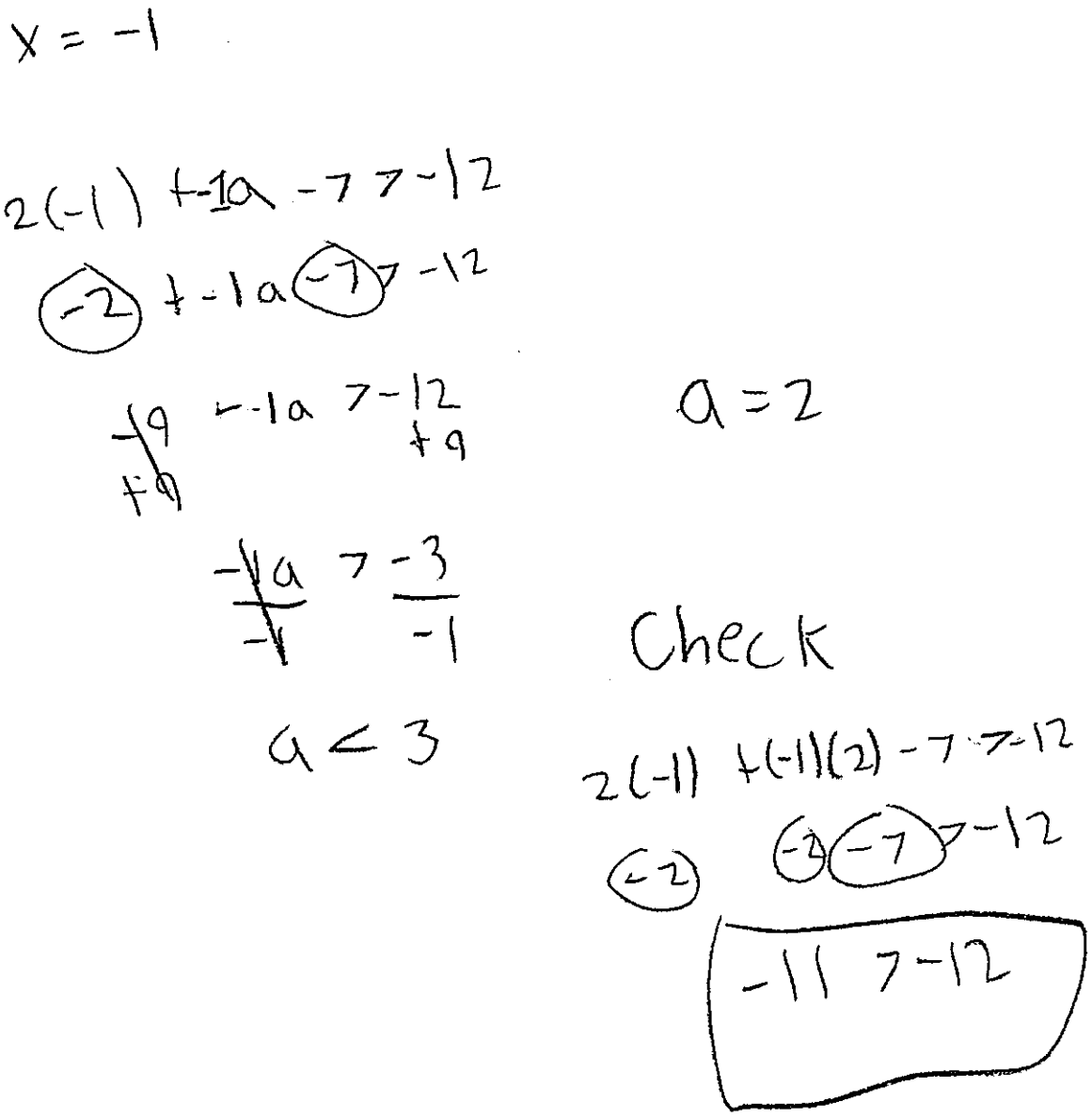
p= milligrams

0.5 represents the milligrams and 300 represents the time in years

Score 0: The student's response was completely incorrect.

Question 27

27 Given $2x + ax - 7 > -12$, determine the largest integer value of a when $x = -1$.



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

Question 27

27 Given $2x + ax - 7 > -12$, determine the largest integer value of a when $x = -1$.

$x = -1$

$2x + ax - 7 > -12$

$2(-1) + a(-1) - 7 > -12$

$-2 + -a - 7 > -12$

$-9 + -a > -12$

$+9 \quad +9$

$-a > -3$

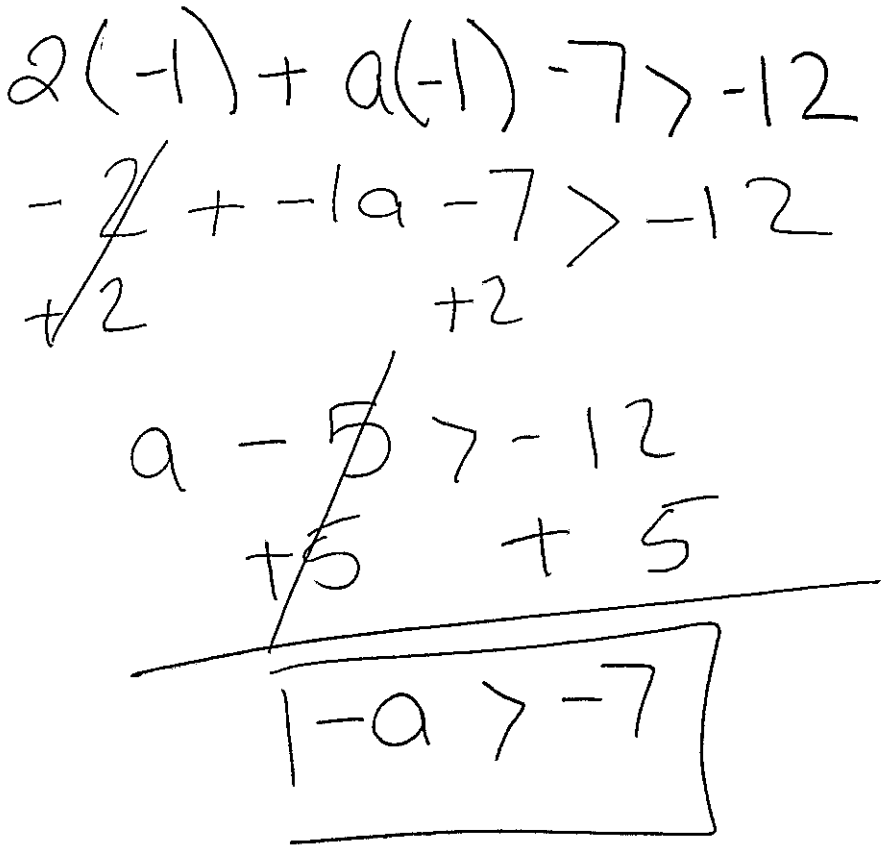
$\frac{-a}{-1} < \frac{-3}{-1}$

$a < 3$

Score 1: The student made one error by not following through with the inequality sign.

Question 27

27 Given $2x + ax - 7 > -12$, determine the largest integer value of a when $x = -1$.



Score 0: The student made two conceptual errors by adding 2 to the same side of the inequality twice and not stating the largest integer.

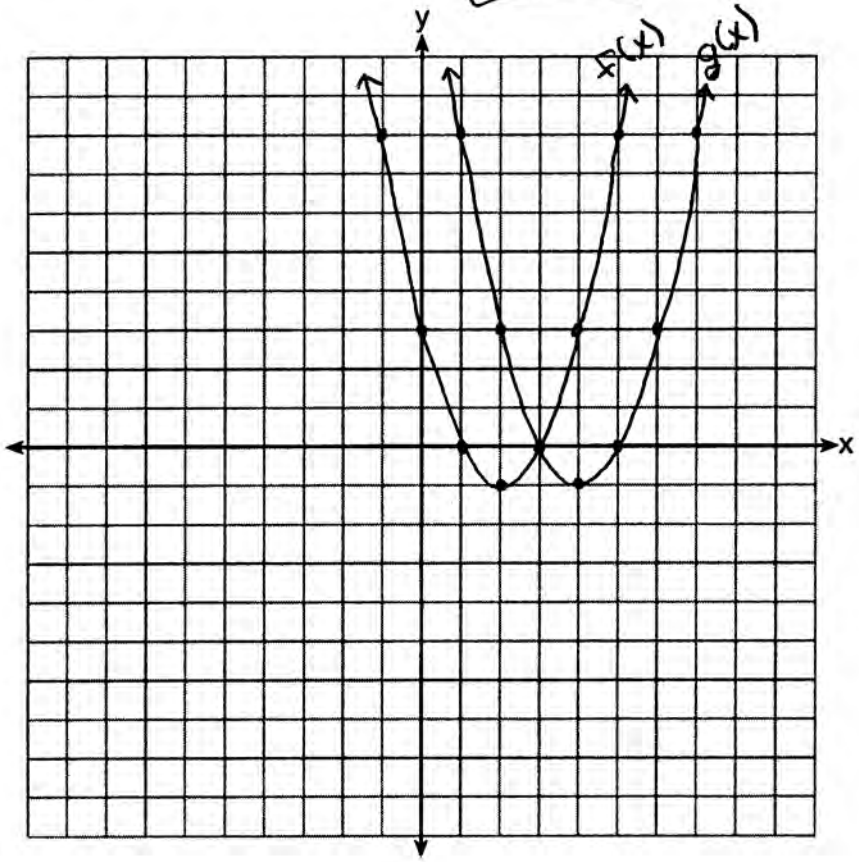
Question 28

28 The vertex of the parabola represented by $f(x) = x^2 - 4x + 3$ has coordinates $(2,-1)$. Find the coordinates of the vertex of the parabola defined by $g(x) = f(x - 2)$. Explain how you arrived at your answer.

[The use of the set of axes below is optional.]

I graphed f(x) then g(x) which is $(x-2)^2 - 4(x-2) + 3$

(4, -1)



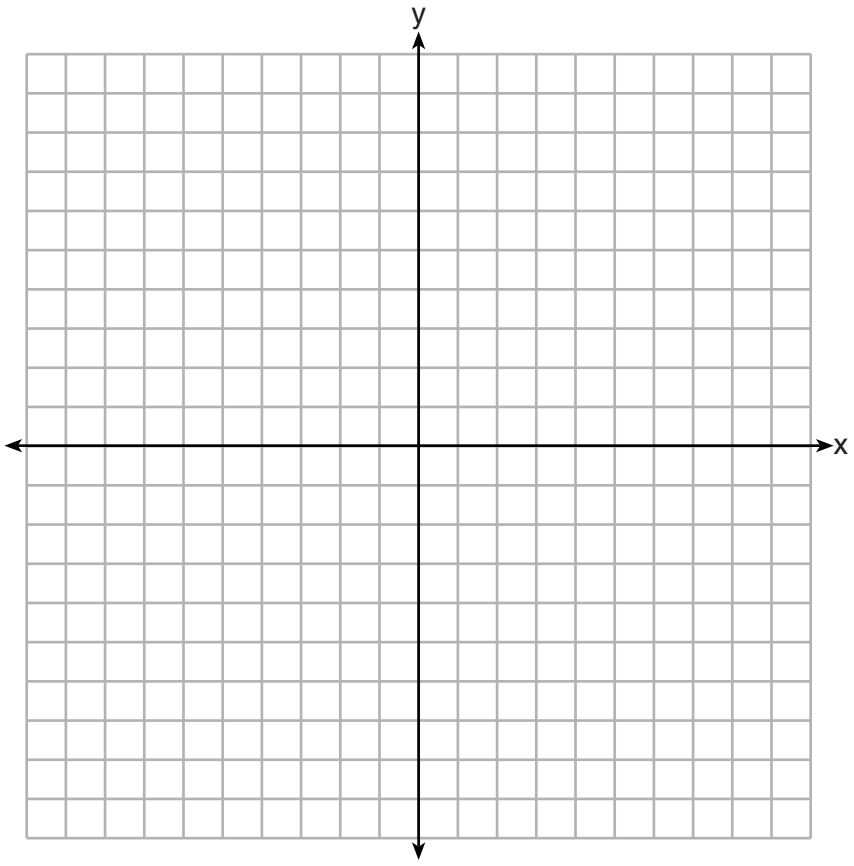
Score 2: The student has a complete and correct response.

Question 28

28 The vertex of the parabola represented by $f(x) = x^2 - 4x + 3$ has coordinates $(2,-1)$. Find the coordinates of the vertex of the parabola defined by $g(x) = f(x - 2)$. Explain how you arrived at your answer.

[The use of the set of axes below is optional.]

(4,-1) g(x) is a shift of 2 units right



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

Question 28

28 The vertex of the parabola represented by $f(x) = x^2 - 4x + 3$ has coordinates $(2,-1)$. Find the coordinates of the vertex of the parabola defined by $g(x) = f(x - 2)$. Explain how you arrived at your answer.

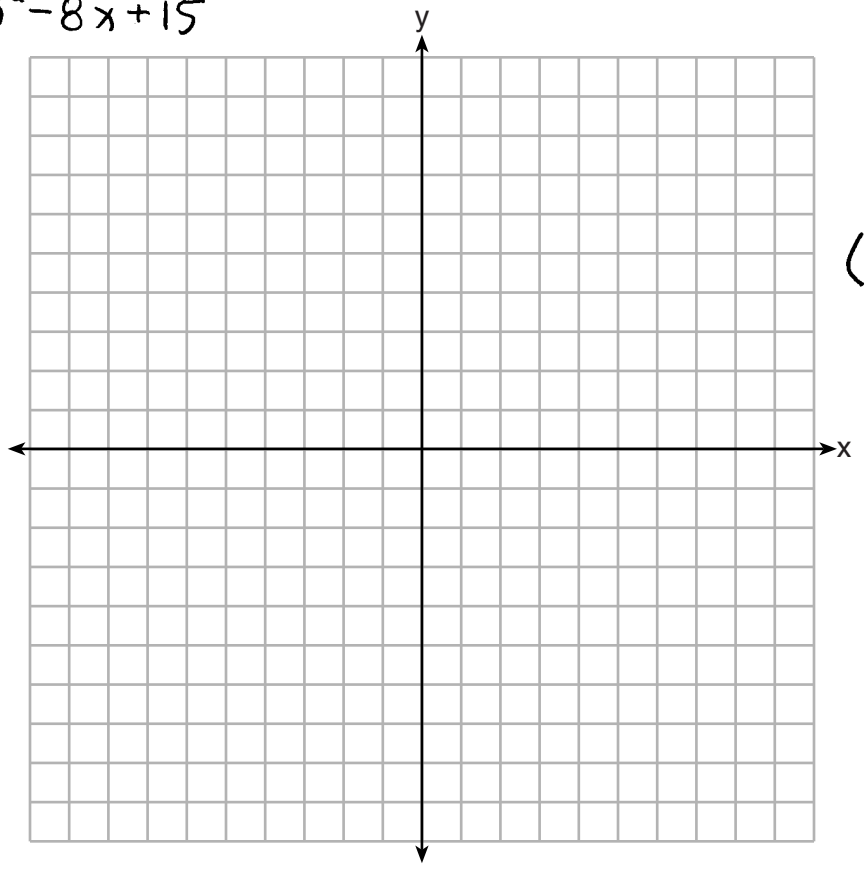
[The use of the set of axes below is optional.]

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

$x^2-4x+4-4x+8+3$

$x^2-8x+15$

$x = \frac{8}{2(1)} \rightarrow 4$



$y = -1$

$(4,-1)$

Score 1: The student did not provide an explanation.

Question 28

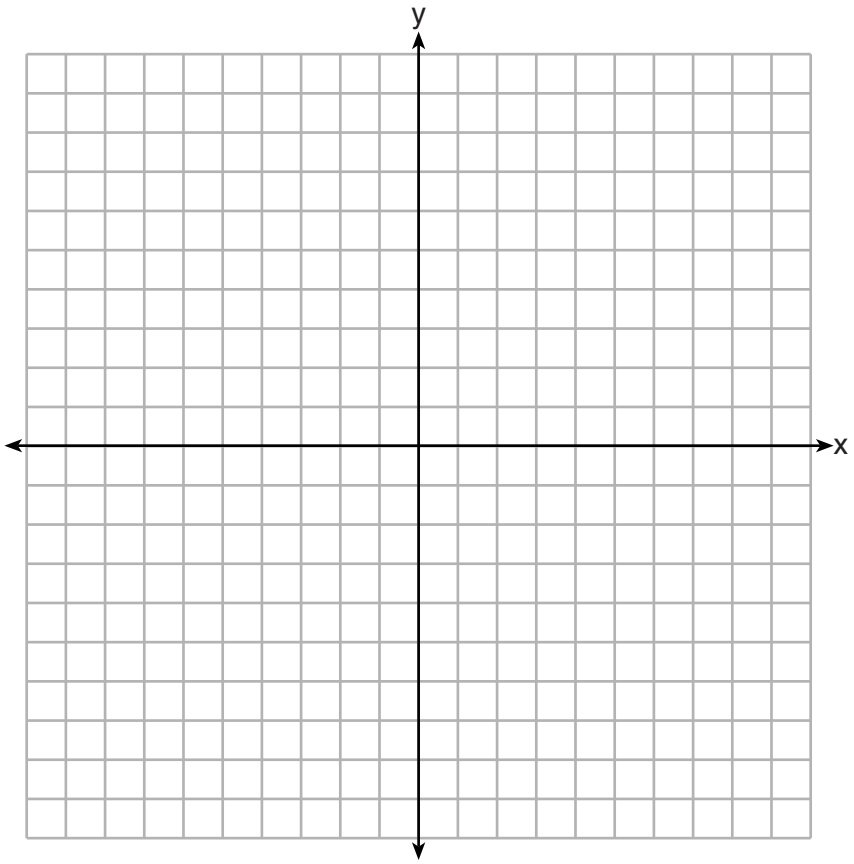
28 The vertex of the parabola represented by $f(x) = x^2 - 4x + 3$ has coordinates $(2,-1)$. Find the coordinates of the vertex of the parabola defined by $g(x) = f(x - 2)$. Explain how you arrived at your answer.

[The use of the set of axes below is optional.]

New Vertex (4,1)

shift of two units

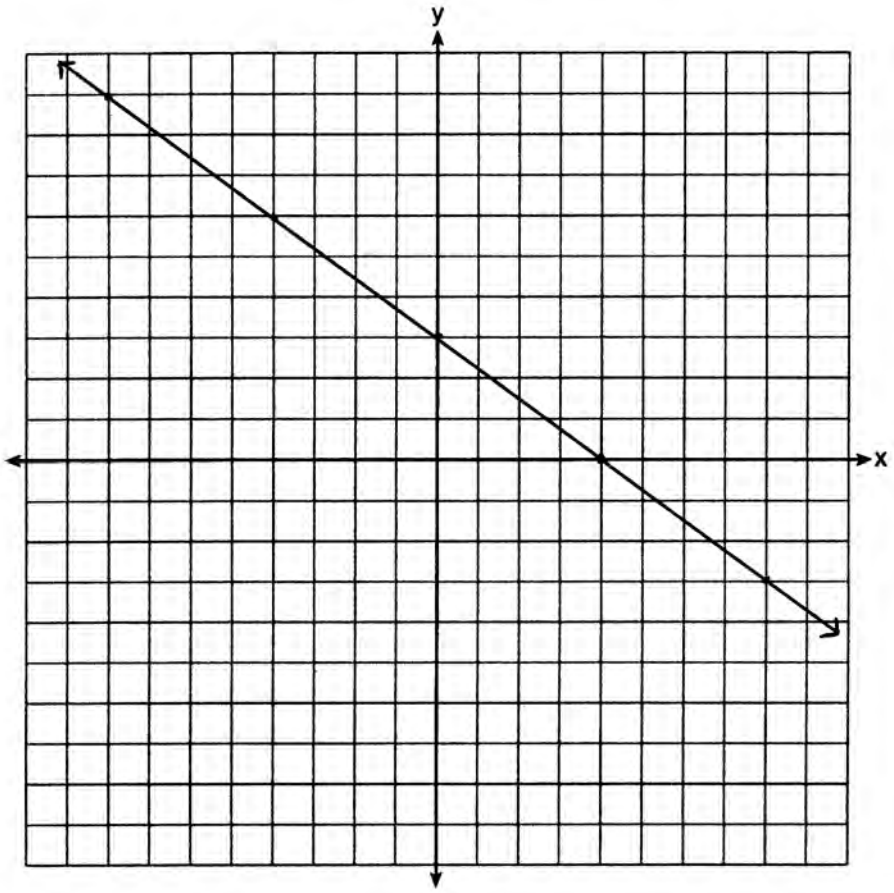
(2,-1)
+2 +2



Score 0: The student made one conceptual error by adding 2 to both the x- and y-values of the vertex, and the explanation is incomplete because the direction is not indicated.

Question 29

29 On the set of axes below, draw the graph of the equation $y = -\frac{3}{4}x + 3$.



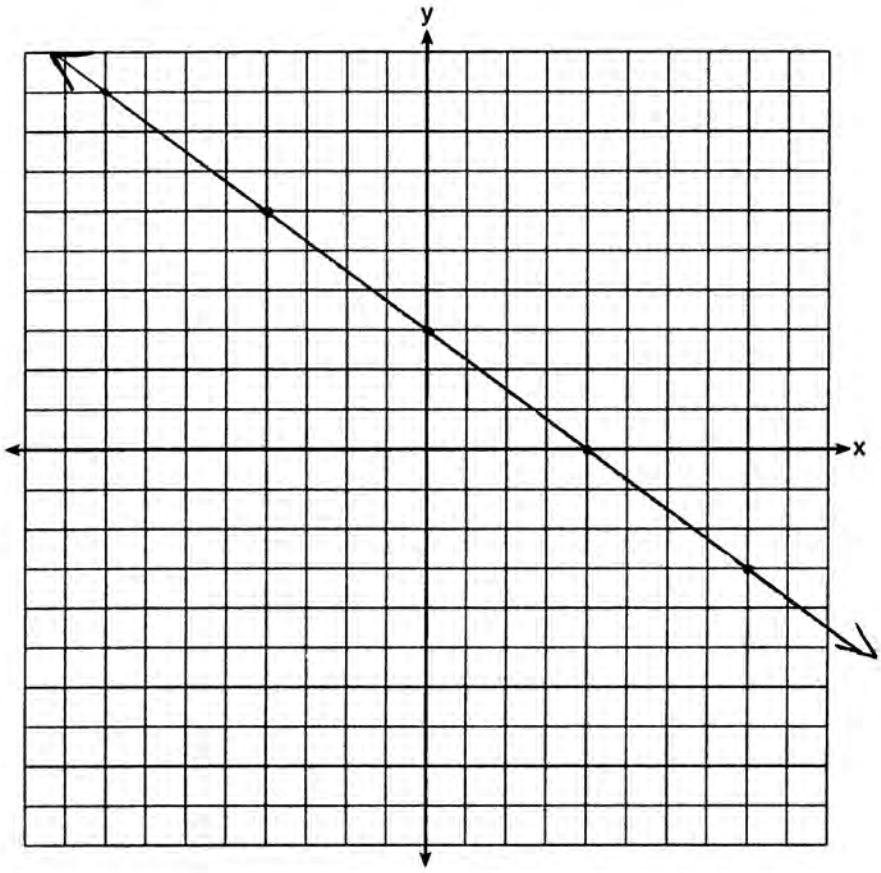
Is the point (3,2) a solution to the equation? Explain your answer based on the graph drawn.

No, it doesn't fall on the graph

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

Question 29

29 On the set of axes below, draw the graph of the equation $y = -\frac{3}{4}x + 3$.



Is the point (3,2) a solution to the equation? Explain your answer based on the graph drawn.

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

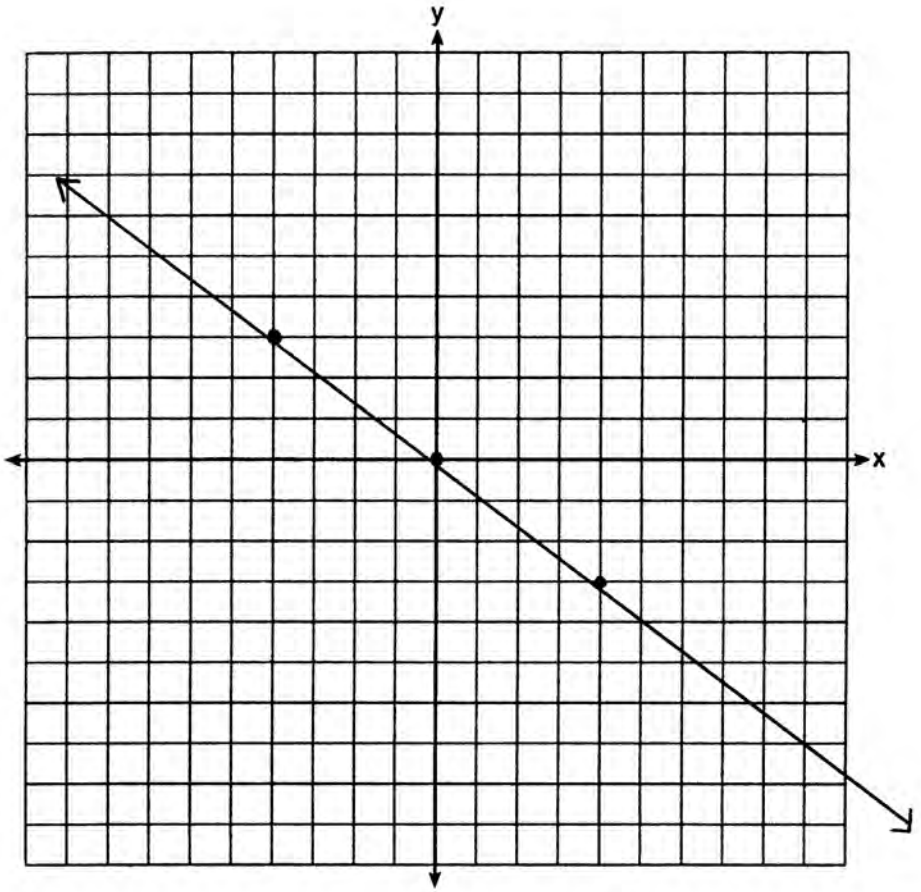
$-2.25+3=2$

$.75 \neq 2$ No, its not a solution

Score 1: A correct graph is drawn, but the explanation is not based on the graph.

Question 29

29 On the set of axes below, draw the graph of the equation $y = -\frac{3}{4}x + 3$.



Is the point (3,2) a solution to the equation? Explain your answer based on the graph drawn.

$2 = -\frac{3}{4} \cdot 3 + 3$

$2 \stackrel{?}{=} -\frac{9}{4} + 3$

$2 \stackrel{?}{=} -\frac{27}{12} + \frac{36}{12}$

$2 \stackrel{?}{=} \frac{9}{12}$

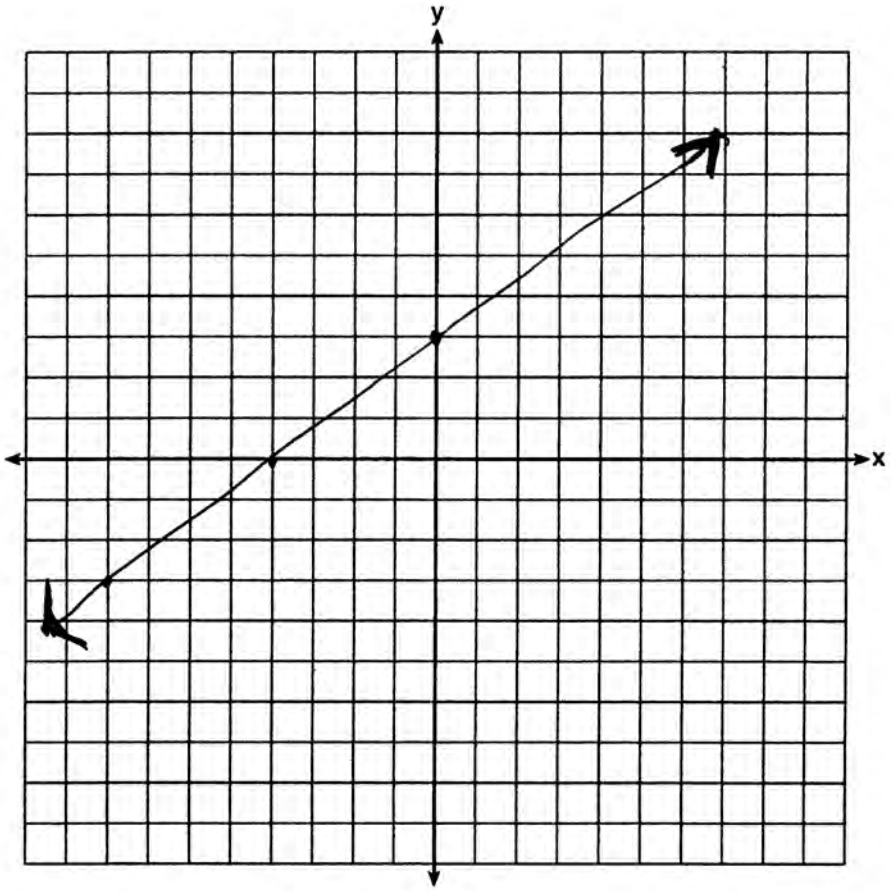
NO.

The point is not a solution.

Score 0: The student drew an incorrect graph and did not give an explanation based on the graph.

Question 29

29 On the set of axes below, draw the graph of the equation $y = -\frac{3}{4}x + 3$.



Is the point (3,2) a solution to the equation? Explain your answer based on the graph drawn.

It could be if you plug it in and it works.

Score 0: The student's graph was incorrect, "no" is not stated, and the explanation is incomplete.

Question 30

30 The function f has a domain of {1, 3, 5, 7} and a range of {2, 4, 6}.

Could f be represented by {(1,2), (3,4), (5,6), (7,2)}? Yes

Justify your answer.

Yes It can because in a function all numbers in the domain must lead to a self-specific number in the range, meaning one number in the domain cannot have two different numbers in the range,

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

Question 30

30 The function f has a domain of {1, 3, 5, 7} and a range of {2, 4, 6}.

Could f be represented by {(1,2), (3,4), (5,6), (7,2)}?

Justify your answer.

f(x) = {(1,2), (3,4), (5,6), (7,2) isn't correct because 2 is repeated in the y twice. This means that it's not a function.

Score 1: The student made one conceptual error by misinterpreting the definition of a function.

Question 30

30 The function f has a domain of {1, 3, 5, 7} and a range of {2, 4, 6}.

Could f be represented by {(1,2), (3,4), (5,6), (7,2)}?

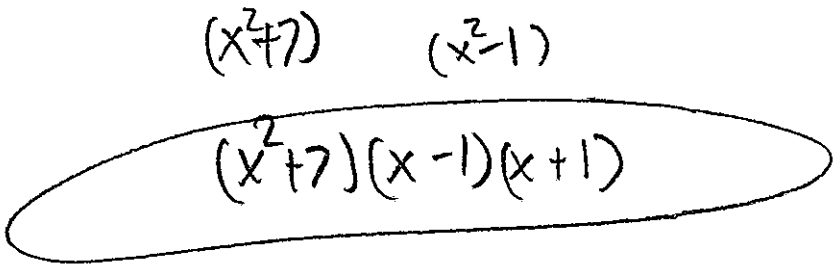
Justify your answer.

Yes.

Score 0: The student wrote "yes" but a complete justification was not provided.

Question 31

31 Factor the expression $x^4 + 6x^2 - 7$ completely.



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

Question 31

31 Factor the expression $x^4 + 6x^2 - 7$ completely.

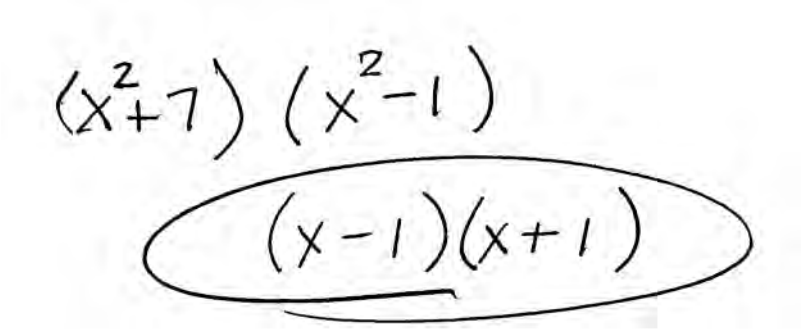
$x^2(x^2 + 6x - 7)$

$x^2(x-1)(x+7)$

Score 1: The student made an error by factoring out x^2 incorrectly.

Question 31

31 Factor the expression $x^4 + 6x^2 - 7$ completely.



Score 1: The student made one error by not including the factor $(x^2 + 7)$ in the final answer.

Question 31

31 Factor the expression $x^4 + 6x^2 - 7$ completely.

$x^4 + 6x^2 - 7$

$x^2(x^2 - 6)(x + 7)$

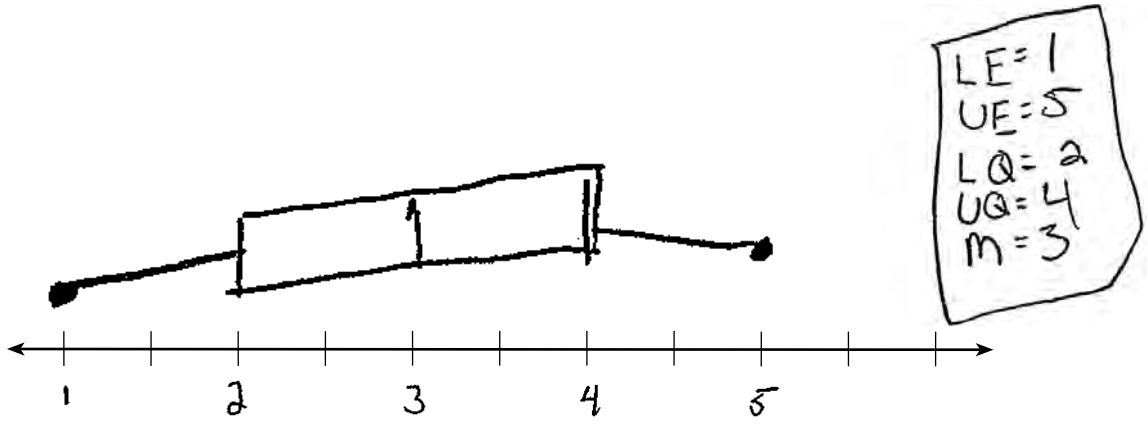
Score 0: The student's response is completely incorrect.

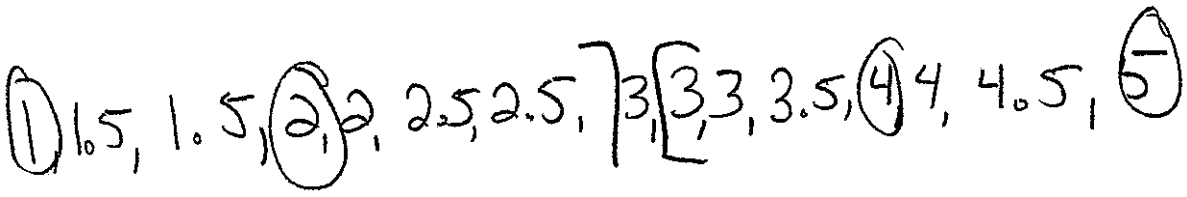
Question 32

32 Robin collected data on the number of hours she watched television on Sunday through Thursday nights for a period of 3 weeks. The data are shown in the table below.

	Sun	Mon	Tues	Wed	Thurs
Week 1	4	3	3.5	2	2
Week 2	4.5	5	2.5	3	1.5
Week 3	4	3	1	1.5	2.5

Using an appropriate scale on the number line below, construct a box plot for the 15 values.





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

Question 32

32 Robin collected data on the number of hours she watched television on Sunday through Thursday nights for a period of 3 weeks. The data are shown in the table below.

	Sun	Mon	Tues	Wed	Thurs
Week 1	4	3	3.5	2	2
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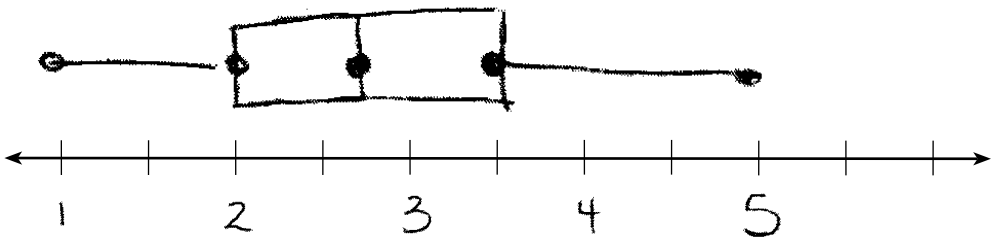
Using an appropriate scale on the number line below, construct a box plot for the 15 values.



min 1

$Q_1 = 2$

med = 2.75

$Q_3 = 3.5$

max = 5

Score 1: The student drew an appropriate plot based on an incorrect data set.

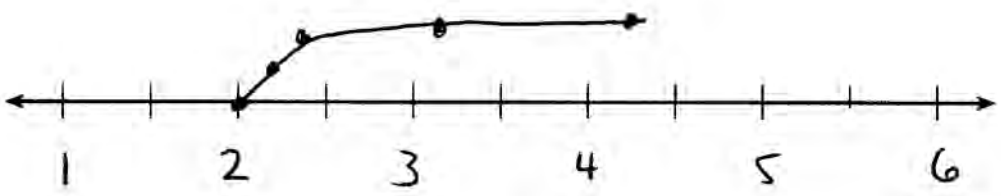
Question 32

32 Robin collected data on the number of hours she watched television on Sunday through Thursday nights for a period of 3 weeks. The data are shown in the table below.

	Sun	Mon	Tues	Wed	Thurs
Week 1	4	3	3.5	2	2
Week 2	4.5	5	2.5	3	1.5
Week 3	4	3	1	1.5	2.5

2.5 11 7 6.5 6

Using an appropriate scale on the number line below, construct a box plot for the 15 values.



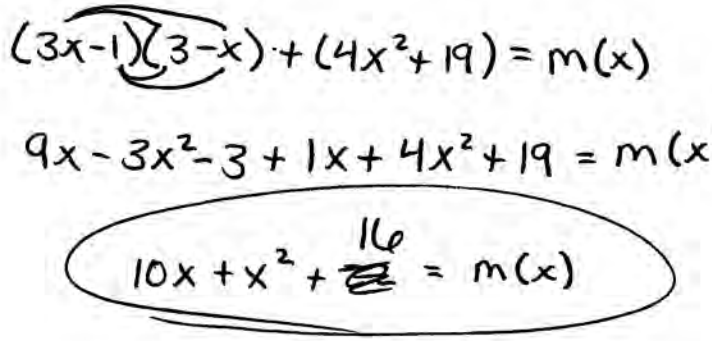
$\frac{12.5}{3} = 4.1\overline{6}$ $\frac{7}{3} = 2.\overline{3}$ $\frac{6}{3} = 2$

$\frac{11}{3} = 3.\overline{6}$ $\frac{6.5}{3} = 2.1\overline{6}$

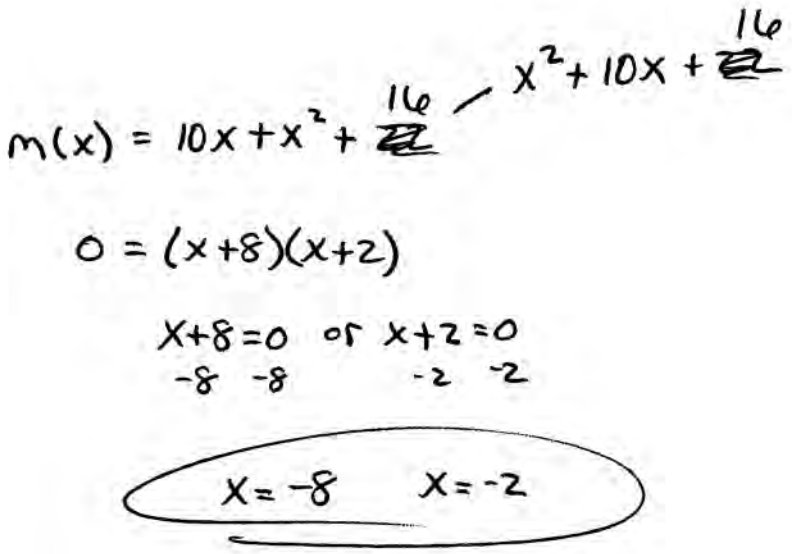
Score 0: The student's response is completely irrelevant.

Question 33

33 Write an equation that defines $m(x)$ as a trinomial where $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$.



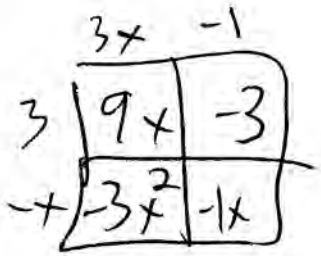
Solve for x when $m(x) = 0$.



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

Question 33

33 Write an equation that defines $m(x)$ as a trinomial where $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$.



$(3x-1)(3-x)+4x^2+19$

$(-3x^2+10x-3)+(4x^2+19)$

$x^2+10x+16$

Solve for x when $m(x) = 0$.

$x^2+10x+16=0$

$(x+8)(x+2)$

$x+8=0$ $\quad x+2=0$

$-8\ -8$ $\quad -2\ -2$

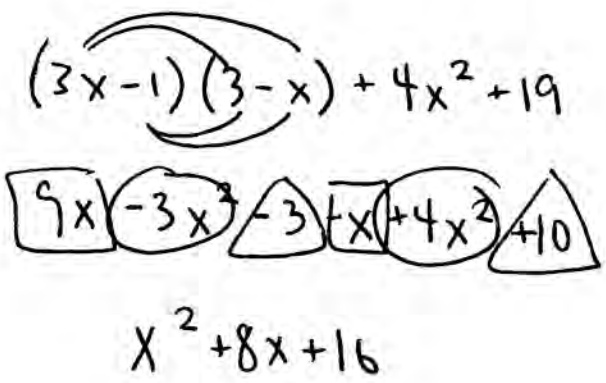
$x=-8$ $\quad x=-2$

$x=-8, -2$

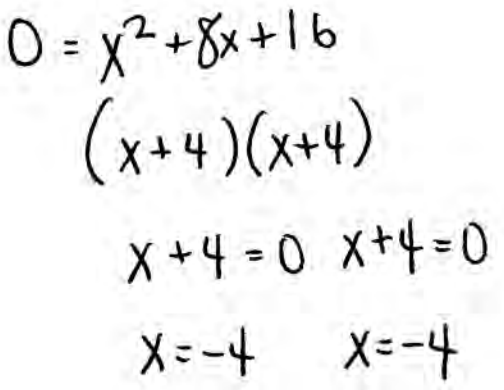
Score 3: The student wrote an appropriate expression instead of an equation.

Question 33

33 Write an equation that defines $m(x)$ as a trinomial where $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$.



Solve for x when $m(x) = 0$.



Score 2: The student wrote an incorrect trinomial expression, but solved it appropriately.

Question 33

33 Write an equation that defines $m(x)$ as a trinomial where $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$.

3 3 3 3 3 3 3 3 3 3

$3x - 1 \cdot 3 - x + 4x^2 + 19$

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

$M(x) = x^2 + 10x + 19$

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

$10x - 3x^2 - 3 + 4x^2 + 19$

Solve for x when $m(x) = 0$.

$M(x) = x^2 + 10x + 19$

$M(x) = (x \quad)(x \quad)$

Score 1: The student showed appropriate work to find $m(x)$, but made one computational error. No further correct work is shown.

Question 33

33 Write an equation that defines $m(x)$ as a trinomial where $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$.

$3x - 1 + 3 - x + 4x^2 + 19$

$3x - 2 - 2 + 4x^2 + 19$

$3x - 4 + 4x^2 + 19$

$-19 \qquad +19$

$3x + 15 + 4x^2$

Solve for x when $m(x) = 0$.

$3(0) - 15 + 4x^2$

$0 - 15 + 42$

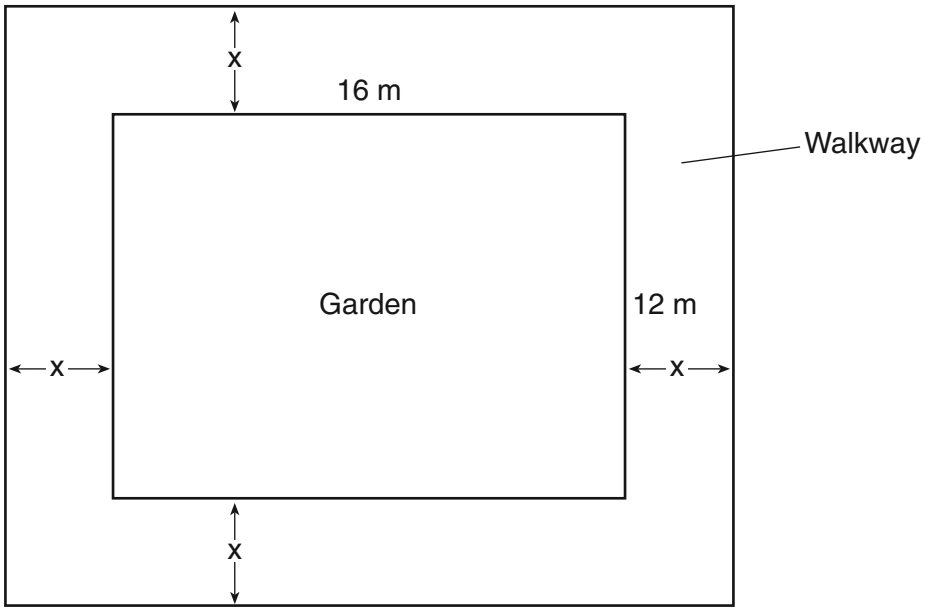
$-15 \quad -15$

$0 = 1$

Score 0: The student's response is completely incorrect.

Question 34

34 A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of x meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



Write an equation that can be used to find x, the width of the walkway.

$(2x+16)(2x+12)=396$

Describe how your equation models the situation.

It is the length plus the walkway x width plus the walkway

Determine and state the width of the walkway, in meters.

$(2x+16)(2x+12)=396$

$4x^2+32x+24x+192=396$

$4x^2+56x-204=0$

$x^2+14x-51=0$

$(x+17)(x-3)=0$

$x+17=0 \quad x-3=0$

$x=-17, 3$

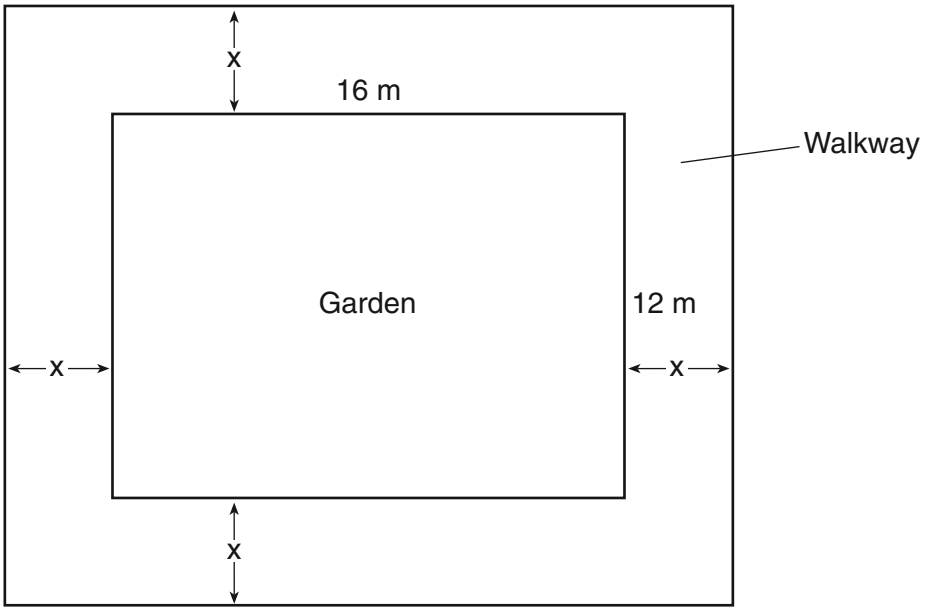
3 meters

The width of the walkway is 3 meters

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

Question 34

34 A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of x meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



Write an equation that can be used to find x, the width of the walkway.

$(2x+16)(2x+12) = 396$

Describe how your equation models the situation.

The area is the length x width including the walkway. around the garden.

Determine and state the width of the walkway, in meters.

$4x^2+24x+32x+192=396$

$4x^2+56x+192=396$

$4x^2+56x-204=0$

$x^2+14x-51=0$

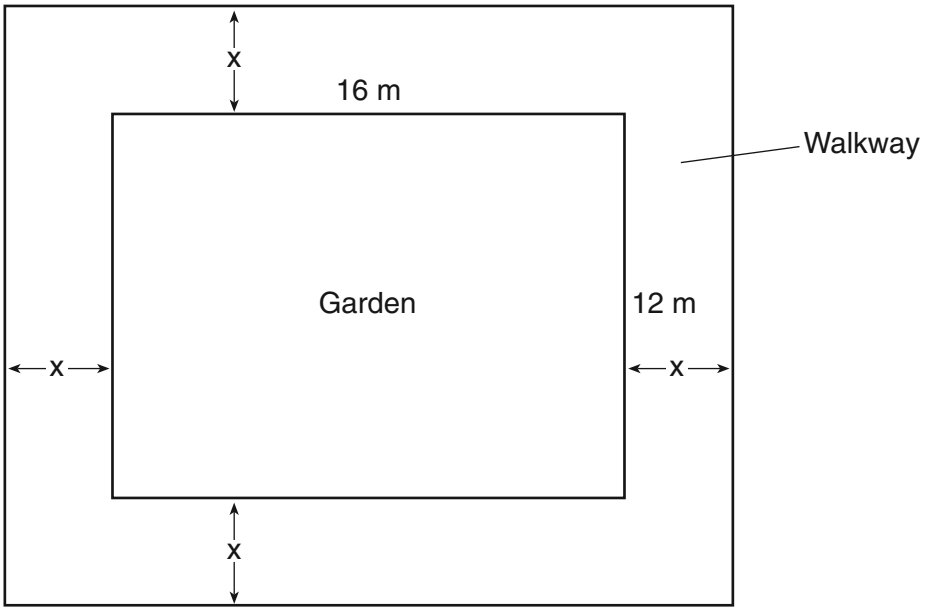
$(x-17)(x+3)=0$

$x=17$ $x=-3$

Score 3: The student wrote the correct equation and an appropriate description, but made one factoring error.

Question 34

34 A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of x meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



Write an equation that can be used to find x, the width of the walkway.

$(2x+16)(2x+12)=396$

Describe how your equation models the situation.

It shows the total area of the walkway and the garden.

Determine and state the width of the walkway, in meters.

$4x^2+24x+32x+192=396$

$4x^2+56x+192=396$

$-396 \quad -396$

$4x^2+56x-204=0$

$x^2+14x-204=0$

$(x-17)(x+12)=0$

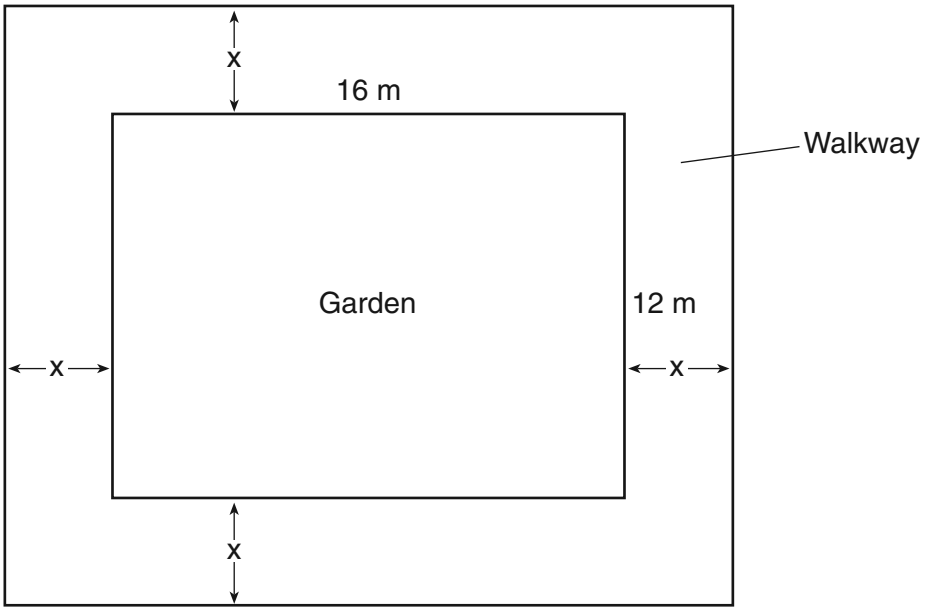
$x=17 \quad x=-12$

$x=17$ meters

Score 2: The student made one computational error when dividing by 4 and one factoring error.

Question 34

34 A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of x meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



Write an equation that can be used to find x, the width of the walkway.

$(16+x+x)(12+x+x)=396$

Describe how your equation models the situation.

The length times the width of a rectangle gives you the area.

Determine and state the width of the walkway, in meters.

$(16+2x)(12+2x)=396$

$16+24x+2x=396$

$16+26x=396$

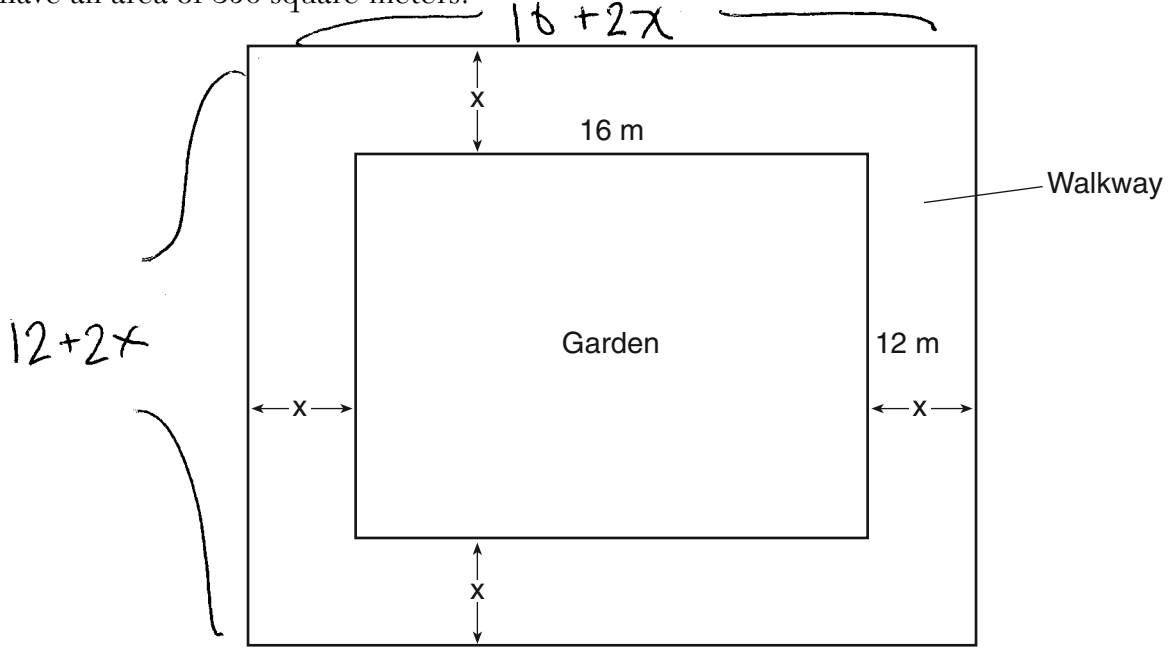
$26x=380$

$x=14.62$ m

Score 1: The student made one conceptual error in solving the equation and gave an incomplete description by not including the walkway.

Question 34

34 A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of x meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



Write an equation that can be used to find x, the width of the walkway.

$(12 + 2x) \times (16 + 2x) = 284$

Describe how your equation models the situation.

Length × Width

Determine and state the width of the walkway, in meters.

$192 + 24x + 32x + 4x = 284$

$192 + 60x = 284$

$60x = 92$

$x = 1.5\overline{3}$

Score 0: The student's response is completely incorrect.

Question 35

35 Caitlin has a movie rental card worth \$175. After she rents the first movie, the card's value is \$172.25. After she rents the second movie, its value is \$169.50. After she rents the third movie, the card is worth \$166.75.

Assuming the pattern continues, write an equation to define $A(n)$, the amount of money on the rental card after n rentals.

$A(n) = 175 - 2.75n$

Caitlin rents a movie every Friday night. How many weeks in a row can she afford to rent a movie, using her rental card only? Explain how you arrived at your answer.

$0 = 175 - 2.75n$

$2.75n = 175$

$n = 63.6\overline{3}$

She can watch for 63 weeks because at the 64th week she won't have enough money to rent a movie.

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

Question 35

35 Caitlin has a movie rental card worth \$175. After she rents the first movie, the card's value is \$172.25. After she rents the second movie, its value is \$169.50. After she rents the third movie, the card is worth \$166.75.

Assuming the pattern continues, write an equation to define $A(n)$, the amount of money on the rental card after n rentals.

$A(n) = 175 - 2.75n$

Caitlin rents a movie every Friday night. How many weeks in a row can she afford to rent a movie, using her rental card only? Explain how you arrived at your answer.

$0 = 175 - 2.75n$

$-175 = -2.75n$

$63.6363 = n$

She can watch movies for 64 weeks. I found my answer because I rounded the number of weeks that I found.

Score 3: The student made an error by stating the incorrect number of weeks.

Question 35

35 Caitlin has a movie rental card worth \$175. After she rents the first movie, the card's value is \$172.25. After she rents the second movie, its value is \$169.50. After she rents the third movie, the card is worth \$166.75.

Assuming the pattern continues, write an equation to define $A(n)$, the amount of money on the rental card after n rentals.

$175 - 2.75n$

Caitlin rents a movie every Friday night. How many weeks in a row can she afford to rent a movie, using her rental card only? Explain how you arrived at your answer.

$0 = 175 - 2.75n$

$2.75n = 175$

$n = 63.\overline{63}$

64 weeks because I rounded up

Score 2: The student wrote an appropriate expression instead of an equation and made one rounding error.

Question 35

35 Caitlin has a movie rental card worth \$175. After she rents the first movie, the card's value is \$172.25. After she rents the second movie, its value is \$169.50. After she rents the third movie, the card is worth \$166.75.

Assuming the pattern continues, write an equation to define $A(n)$, the amount of money on the rental card after n rentals.

175, 172.25, 169.50, 166.75

−2.75 −2.75 −2.75

$a_n = a_1 + (n-1)d$

$a_n = 175 + (n-1)\,2.75$

Caitlin rents a movie every Friday night. How many weeks in a row can she afford to rent a movie, using her rental card only? Explain how you arrived at your answer.

$0 = 175 + 2.75n - 2.75$

$5.5n = 175$

$n = 31.8$

32 weeks because that is when the card will not have any money.

Score 1: The student made an error in the equation and one computational error in solving the equation. The student stated an incorrect number of weeks.

Question 35

35 Caitlin has a movie rental card worth \$175. After she rents the first movie, the card's value is \$172.25. After she rents the second movie, its value is \$169.50. After she rents the third movie, the card is worth \$166.75.

Assuming the pattern continues, write an equation to define $A(n)$, the amount of money on the rental card after n rentals.

175-n

Caitlin rents a movie every Friday night. How many weeks in a row can she afford to rent a movie, using her rental card only? Explain how you arrived at your answer.

175-2.25=172.25

2.25
x 10
22.5

2.25
x 78
175.5

78 weeks until the card runs out

Score 0: The student's response is completely incorrect.

Question 36

36 An animal shelter spends $2.35 per day to care for each cat and $5.50 per day to care for each dog. Pat noticed that the shelter spent $89.50 caring for cats and dogs on Wednesday.

Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday.

$2.35c + 5.50d = 89.50$

Pat said that there might have been 8 cats and 14 dogs at the shelter on Wednesday. Are Pat's numbers possible? Use your equation to justify your answer.

$2.35 \cdot 8 = 18.8$

$5.50 \cdot 14 = 77$

$18.8 + 77 = 95.8$ so it isn't true

Later, Pat found a record showing that there were a total of 22 cats and dogs at the shelter on Wednesday. How many cats were at the shelter on Wednesday?

$2.35c + 5.50d = 89.50$

$-2.35(c + d = 22)$

$-2.35c - 2.35d = -51.70$

$3.15d = 37.8$

$d = 12$

$c + d = 22$

$c + 12 = 22$

$c = 10$

10 cats

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

Question 36

36 An animal shelter spends $2.35 per day to care for each cat and $5.50 per day to care for each dog. Pat noticed that the shelter spent $89.50 caring for cats and dogs on Wednesday.

Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday.

$2.35x + 5.50y = 89.50$

Pat said that there might have been 8 cats and 14 dogs at the shelter on Wednesday. Are Pat's numbers possible? Use your equation to justify your answer.

$2.35(8) + 5.50(14) = 89.50$

$18.8 + 77 = 89.50$ X

8 and 14 can't work.

Later, Pat found a record showing that there were a total of 22 cats and dogs at the shelter on Wednesday. How many cats were at the shelter on Wednesday?

$2.35x + 5.50y = 89.50$ $x + y = 22$

$y = 22 - x$

$2.35x + 5.50(22 - x) = 22$

$2.35x + 121 - 5.50x = 22$

$-3.15x = -99$

$x = 31.4$

about 31 cats

Score 3: The student showed appropriate work, but wrote 22 instead of 89.50.

Question 36

36 An animal shelter spends \$2.35 per day to care for each cat and \$5.50 per day to care for each dog. Pat noticed that the shelter spent \$89.50 caring for cats and dogs on Wednesday.

Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday.

$2.35x + 5.50y = \$89.50$

Pat said that there might have been 8 cats and 14 dogs at the shelter on Wednesday. Are Pat's numbers possible? Use your equation to justify your answer.

89.50
−77
12.5
−18.8
−6.3 NO, Prices can't be negative

Later, Pat found a record showing that there were a total of 22 cats and dogs at the shelter on Wednesday. How many cats were at the shelter on Wednesday?

$x + y = 22$

$2.35x + 5.50y = 89.50$

$3.35x + 6.50y = 111.5$

Score 2: The student showed a correct equation, stated "no" and wrote a correct justification, but no further correct work was shown.

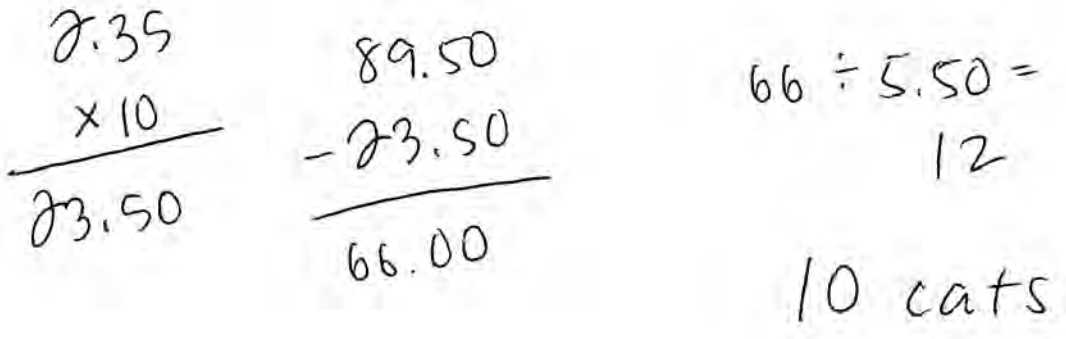
Question 36

36 An animal shelter spends $2.35 per day to care for each cat and $5.50 per day to care for each dog. Pat noticed that the shelter spent $89.50 caring for cats and dogs on Wednesday.

Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday.

Pat said that there might have been 8 cats and 14 dogs at the shelter on Wednesday. Are Pat's numbers possible? Use your equation to justify your answer.

Later, Pat found a record showing that there were a total of 22 cats and dogs at the shelter on Wednesday. How many cats were at the shelter on Wednesday?



Score 1: The student wrote 10 cats, but appropriate work was not shown.

Question 36

36 An animal shelter spends $2.35 per day to care for each cat and $5.50 per day to care for each dog. Pat noticed that the shelter spent $89.50 caring for cats and dogs on Wednesday.

Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday.

2.35
5.50 = $89.50

Pat said that there might have been 8 cats and 14 dogs at the shelter on Wednesday. Are Pat's numbers possible? Use your equation to justify your answer.

2.35 · 14 = 32.9
5.50 · 8 = 44
can't be true

Later, Pat found a record showing that there were a total of 22 cats and dogs at the shelter on Wednesday. How many cats were at the shelter on Wednesday?

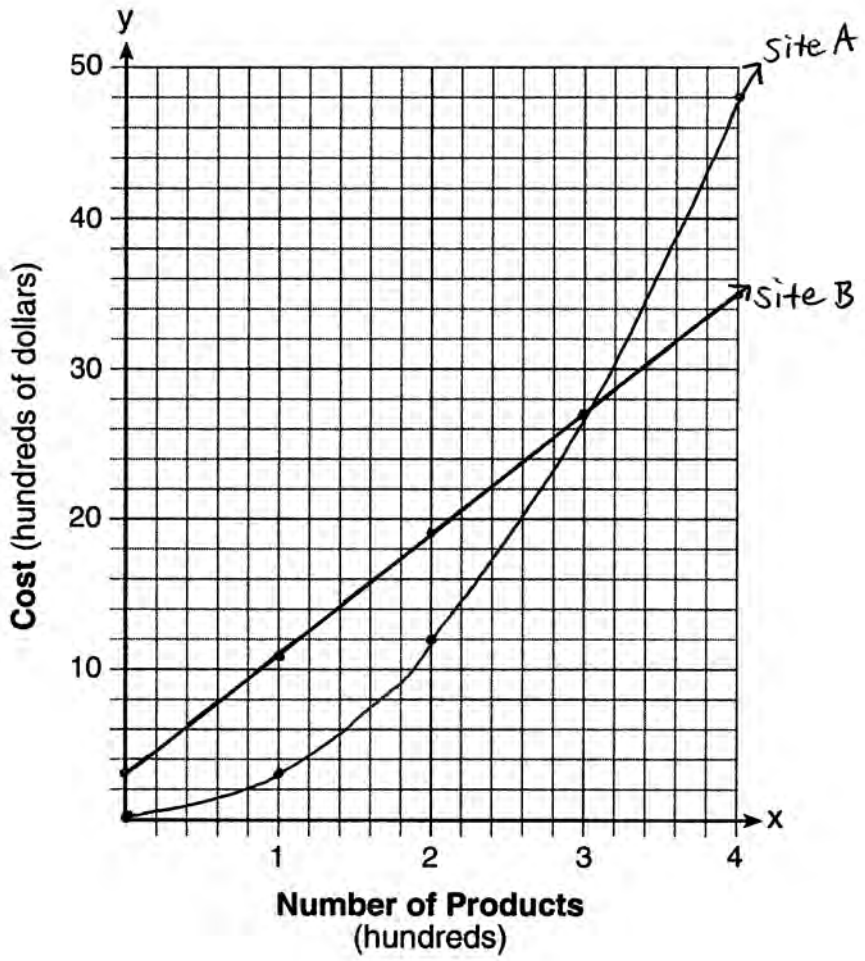
11 cats
11 dogs

Score 0: The student's responses are completely incorrect.

Question 37

37 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.

Graph the production cost functions on the set of axes below and label them site A and site B.



Question 37 is continued on the next page.

Question 37 continued

State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer.

X=3 that is where the two graphs cross each other

If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

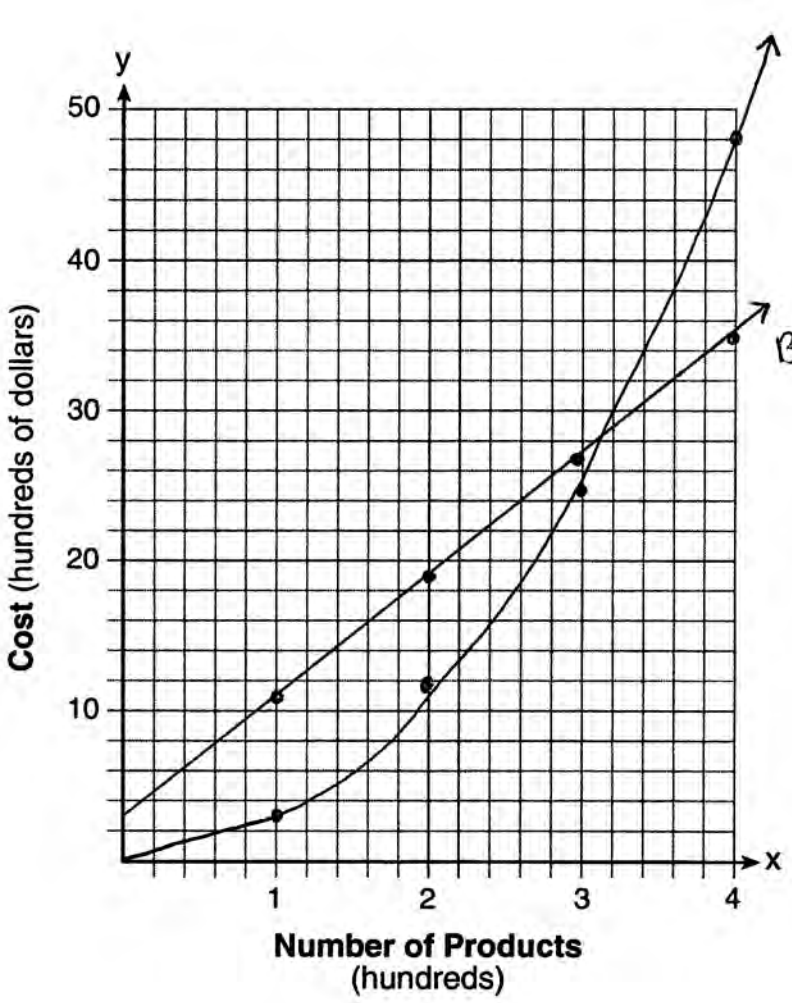
they should use site A because it costs less. At 200 on the graph, site A is less than site B.

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

Question 37

37 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.

Graph the production cost functions on the set of axes below and label them site A and site B.



$3x^2$

1	3
2	12
3	27
4	48

$8x + 3$

1	11
2	19
3	27
4	35

Question 37 is continued on the next page.

Question 37 continued

State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer.

3. The tables meet at (3, 27) so thats when they are equal.

If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

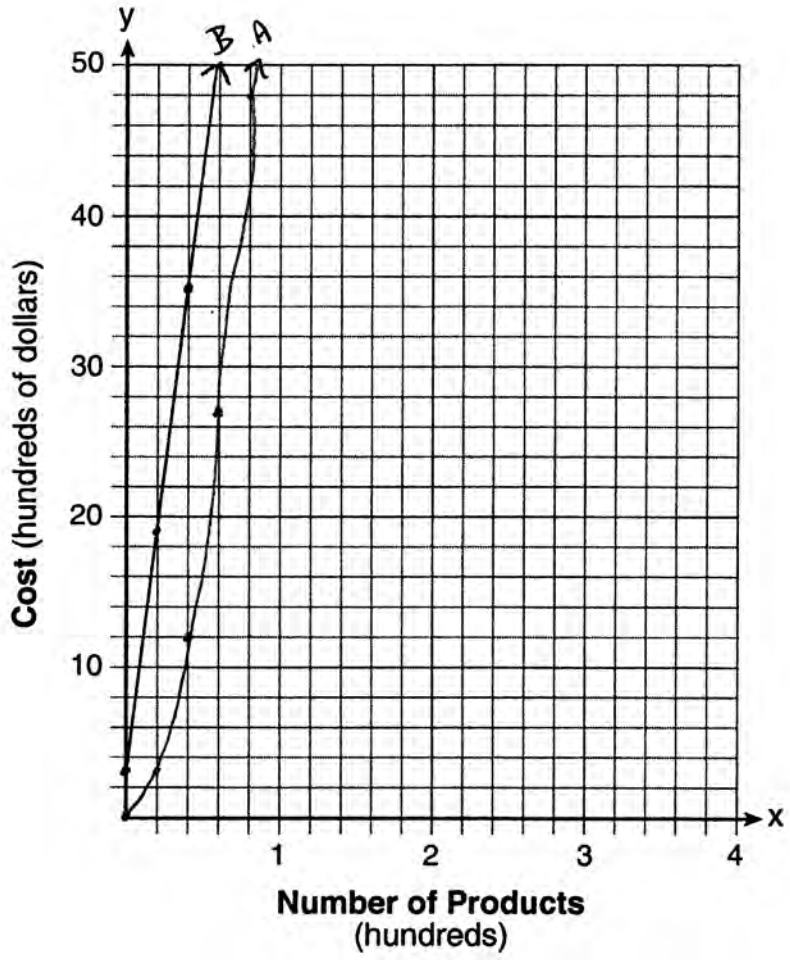
B is higher on the graph at 200, so A would be cheaper to use.

Score 5: The student made one graphing error at $x = 3$.

Question 37

37 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.

Graph the production cost functions on the set of axes below and label them site A and site B.



Question 37 is continued on the next page.

Question 37 continued

State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer.

Since the graphs don't cross, the costs aren't equal.

If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

Site A would be cheaper because the point is less than site B so site A would have lower costs.

Score 4: The student made a conceptual error when graphing, but had an appropriate response and explanation based on the graph. The student stated site *A* and gave an appropriate explanation.

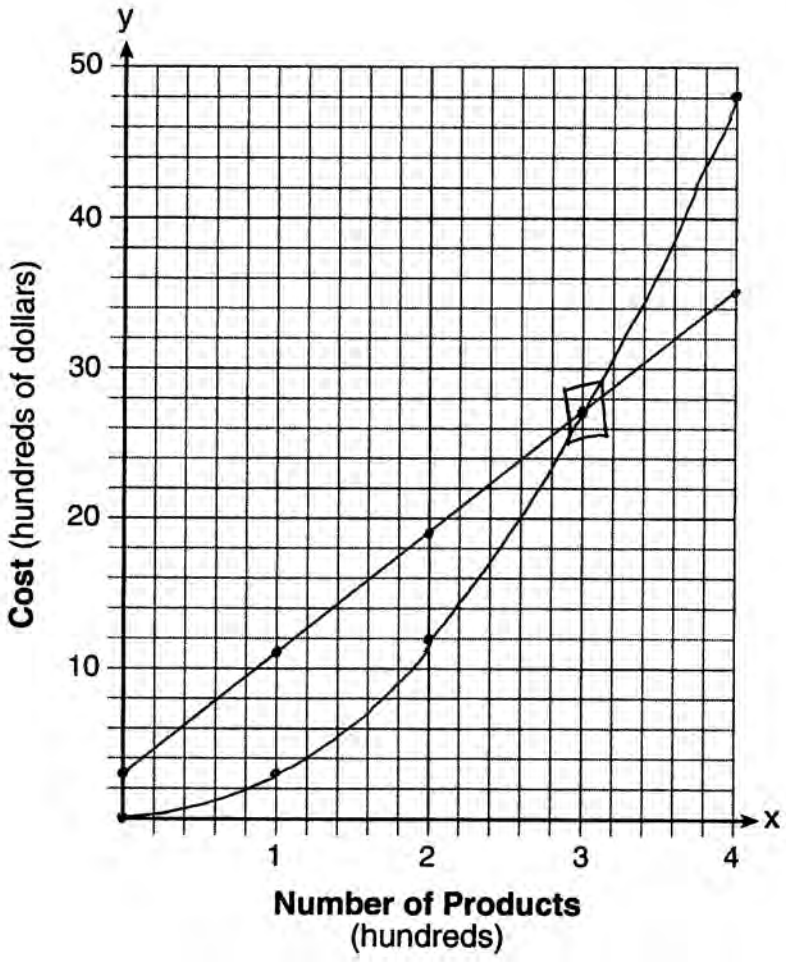
Question 37

37 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.

Graph the production cost functions on the set of axes below and label them site A and site B.

$y = 3x^2$

x	y
0	0
1	3
2	12
3	27
4	48



$y = 8x + 3$

x	y
0	3
1	11
2	19
3	27
4	35

Question 37 is continued on the next page.

Question 37 continued

State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer.

$3x^2 = 8x + 3$

$3x^2 - 8x - 3 = 0$

$(3x - 3)(x + 1) = 0$

$x = 1 \quad x = -1$

If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

They should use site A. It will be cheaper to make products.

Score 3: The student graphed both functions correctly but did not label the graphs. The student set the equations equal, but made a factoring error and did not include an explanation. The student stated site *A* and gave a correct justification.

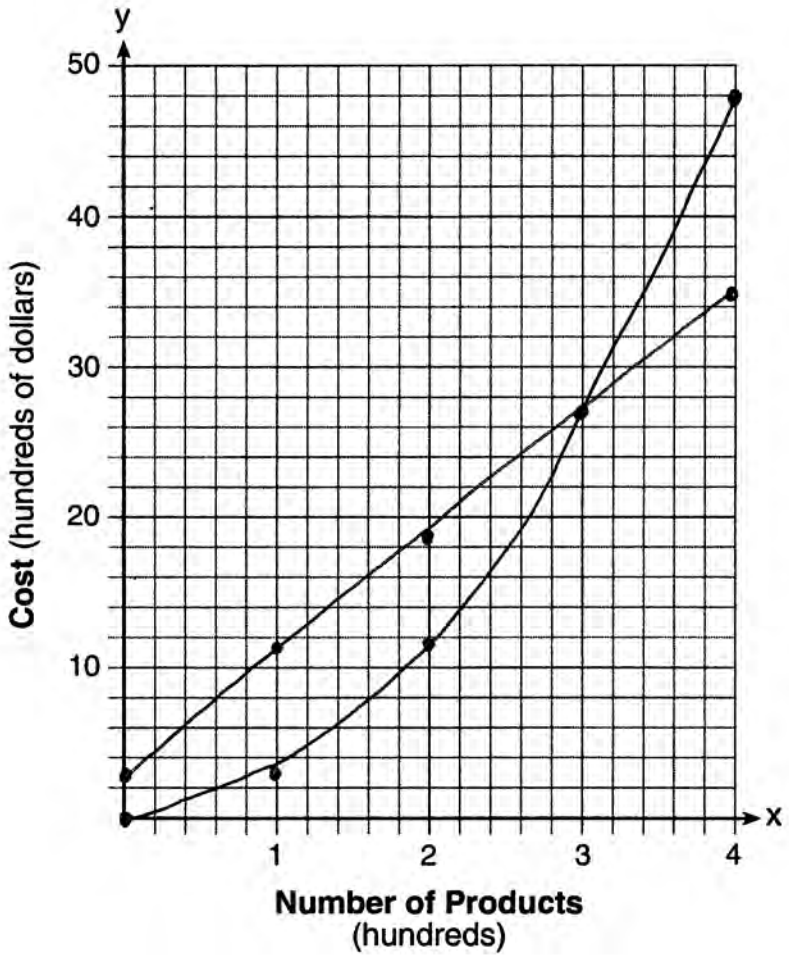
Question 37

37 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.

Graph the production cost functions on the set of axes below and label them site A and site B.

$y = 3x^2$

x	y
0	0
1	3
2	12
3	27
4	48



$y = 8x + 3$

x	y
0	3
1	11
2	19
3	27
4	35

Question 37 is continued on the next page.

Question 37 continued

State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer.

300

If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

$A(x) = 3x^2$

$= 3(200)^2 = 3(40000)$

$= 120000$

$B(x) = 8(200) + 3$

$= 1600 + 3$

$= 1603$

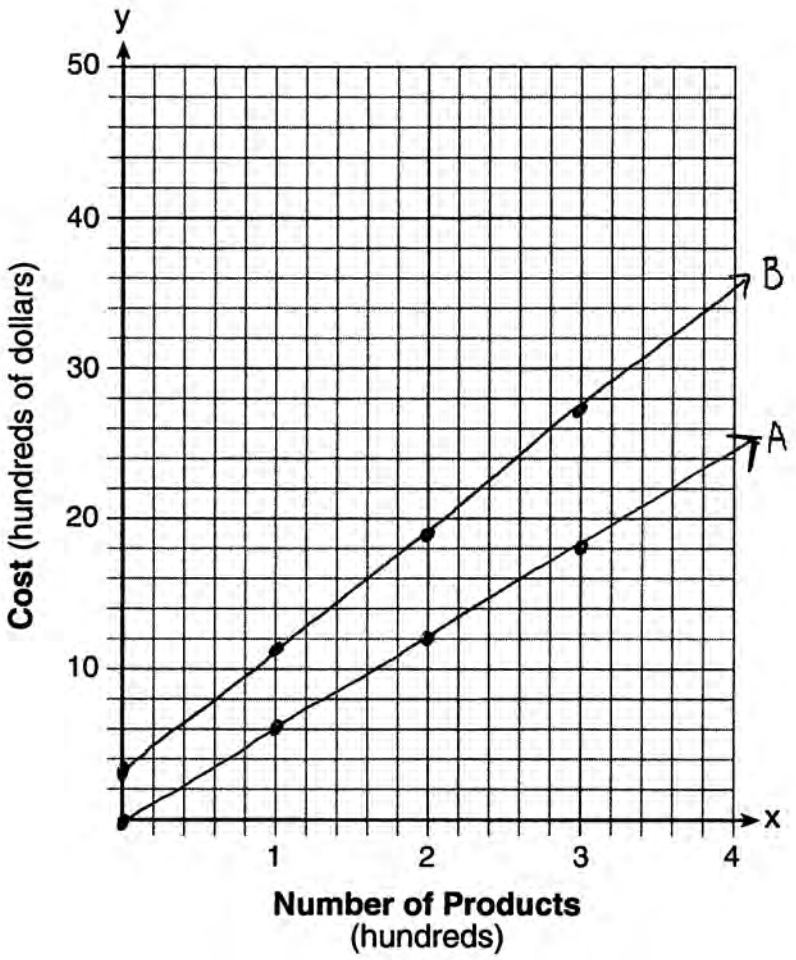
Site B is cheaper.

Score 2: The student graphed both functions correctly but did not label the graphs. The student stated 300 but did not provide an explanation. The student made an error by using 200 instead of 2 but stated site B based on the work shown.

Question 37

37 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.

Graph the production cost functions on the set of axes below and label them site A and site B.



Question 37 is continued on the next page.

Question 37 continued

State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer.

The costs are equal because the slopes are the same.

If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

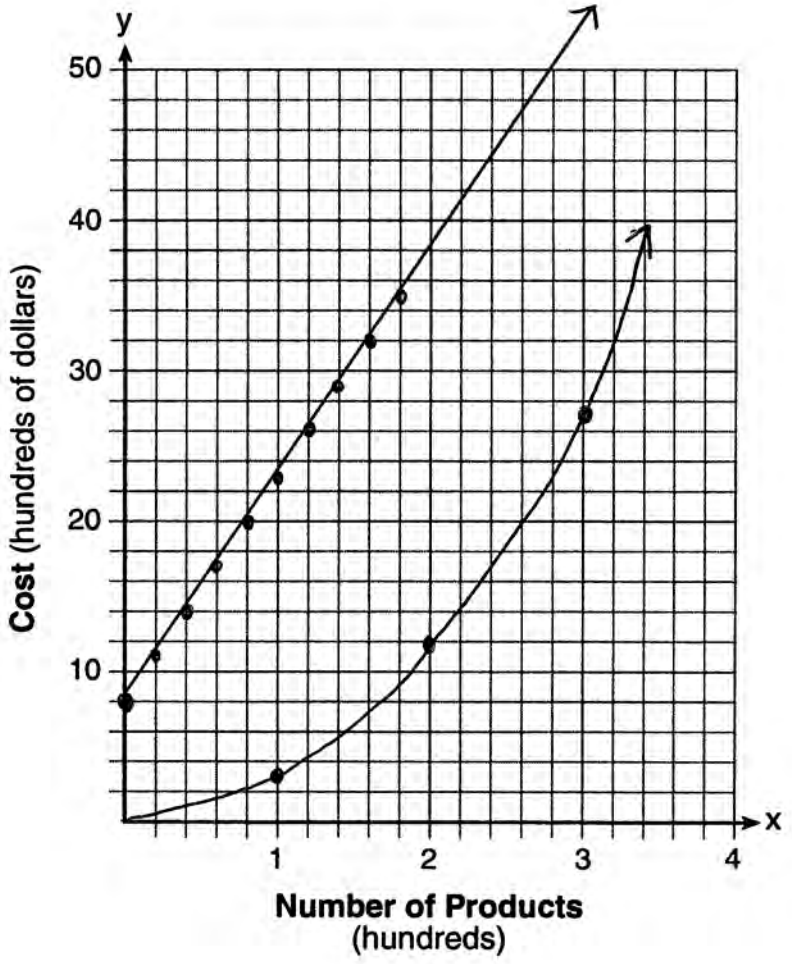
Site A has higher costs at 2 than B.

Score 1: The student graphed and labeled one function correctly. No further correct work was shown.

Question 37

37 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.

Graph the production cost functions on the set of axes below and label them site A and site B.



Question 37 is continued on the next page.

Question 37 continued

State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer.

Graphs will cross at 6.

If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

site B

Score 0: The student graphed one function correctly, but did not label either graph. No further correct work was shown.