

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

# ALGEBRA I

Tuesday, August 13, 2019 — 8:30 to 11:30 a.m.

## MODEL RESPONSE SET

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Question 25

25 If  $g(x) = -4x^2 - 3x + 2$ , determine  $g(-2)$ .

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

x	y
-3	-25
-2	-8
-1	1
0	2
1	-5
2	-20
3	-43

-8

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

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**Question 25**

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25 If  $g(x) = -4x^2 - 3x + 2$ , determine  $g(-2)$ .

$$-4(-2)^2 - 3(-2) + 2 = -8$$

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

Question 25

25 If  $g(x) = -4x^2 - 3x + 2$ , determine  $g(-2)$ .

$$\begin{aligned}g(-2) &= -4(-2)^2 - 3(-2) + 2 \\g(-2) &= 8^2 - 3(-2) + 2 \\g(-2) &= 64 + 6 + 2 \\g(-2) &= 64 + 8 \\g(-2) &= 72\end{aligned}$$

**Score 1:** The student made an error when simplifying  $-4(-2)^2$ .

Question 25

25 If  $g(x) = -4x^2 - 3x + 2$ , determine  $g(-2)$ .

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

$$-8^2 - 3(-2) + 2$$

$$-64 - 6 + 2$$

$$-68$$

**Score 0:** The student made more than one computational error.

Question 25

25 If  $g(x) = -4x^2 - 3x + 2$ , determine  $g(-2)$ .

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

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

$$y = \frac{3 \pm \sqrt{41}}{-8}$$

$$y = \frac{3 + \sqrt{41}}{-8}$$

$$y = \frac{3 - \sqrt{41}}{-8}$$

$$y = -1.2$$

$$y = .43$$

**Score 0:** The student gave a completely irrelevant response.

Question 26

26 A student is in the process of solving an equation. The original equation and the first step are shown below.

Original:  $3a + 6 = 2 - 5a + 7$

Step one:  $3a + 6 = 2 + 7 - 5a$

Which property did the student use for the first step? Explain why this property is correct.

Commutative property of addition -  
because they  
just switched  
the two numbers  
(-5a and 7)  
which is ok

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

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**Question 26**

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**26** A student is in the process of solving an equation. The original equation and the first step are shown below.

Original:  $3a + 6 = 2 - 5a + 7$

Step one:  $3a + 6 = 2 + 7 - 5a$

Which property did the student use for the first step? Explain why this property is correct.

The student chose Commutative Property.

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**Score 1:** The student did not give an explanation.



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**Question 26**

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**26** A student is in the process of solving an equation. The original equation and the first step are shown below.

$$\begin{array}{l} \text{Original: } 3a + 6 = 2 - 5a + 7 \\ \text{Step one: } 3a + 6 = 2 + 7 - 5a \end{array}$$

Which property did the student use for the first step? Explain why this property is correct.

The student used commutative property. You can move part of the equation.

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**Score 1:** The student gave an incorrect explanation.

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**Question 26**

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**26** A student is in the process of solving an equation. The original equation and the first step are shown below.

Original:  $3a + 6 = 2 - 5a + 7$

Step one:  $3a + 6 = 2 + 7 - 5a$

Which property did the student use for the first step? Explain why this property is correct.

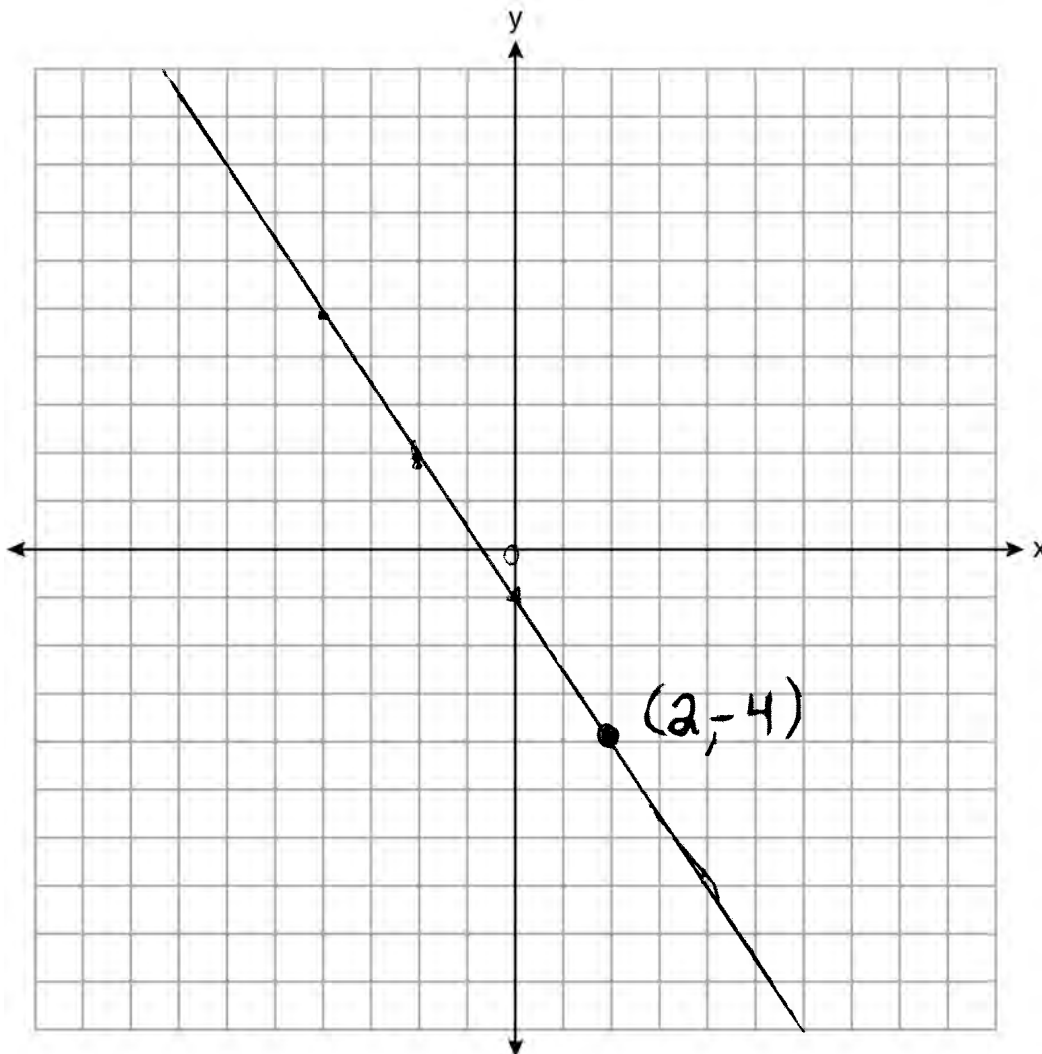
The student uses the additive property.  
they just switched things around

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**Score 0:** The student gave a completely incorrect response.

Question 27

27 On the set of axes below, graph the line whose equation is  $2y = -3x - 2$ .



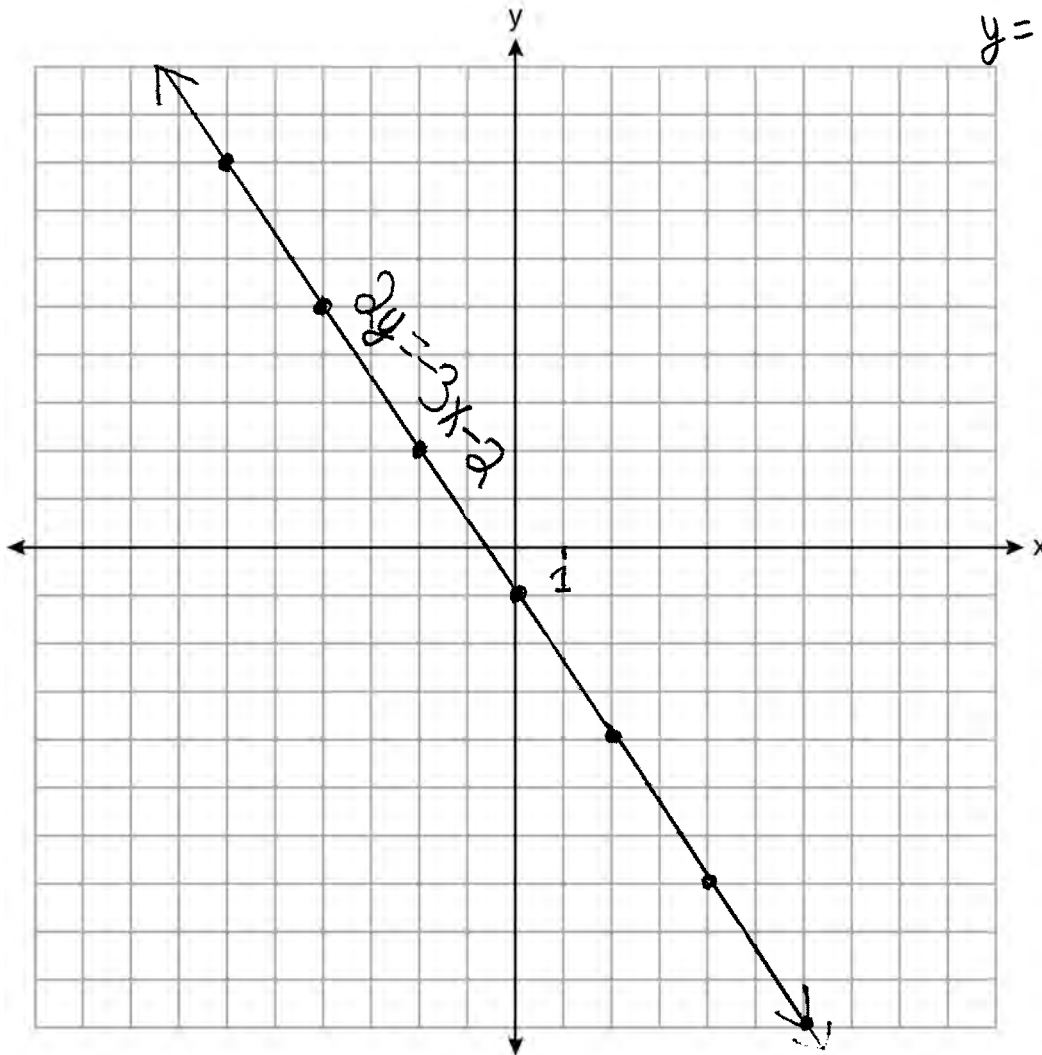
This linear equation contains the point  $(2, k)$ . State the value of  $k$ .  $-4$

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

Question 27

27 On the set of axes below, graph the line whose equation is  $2y = -3x - 2$ .

$$2y = -3x - 2$$
$$y = -\frac{3}{2}x - 1$$



This linear equation contains the point  $(2, k)$ . State the value of  $k$ .

$$(2, k) \quad k = -4$$

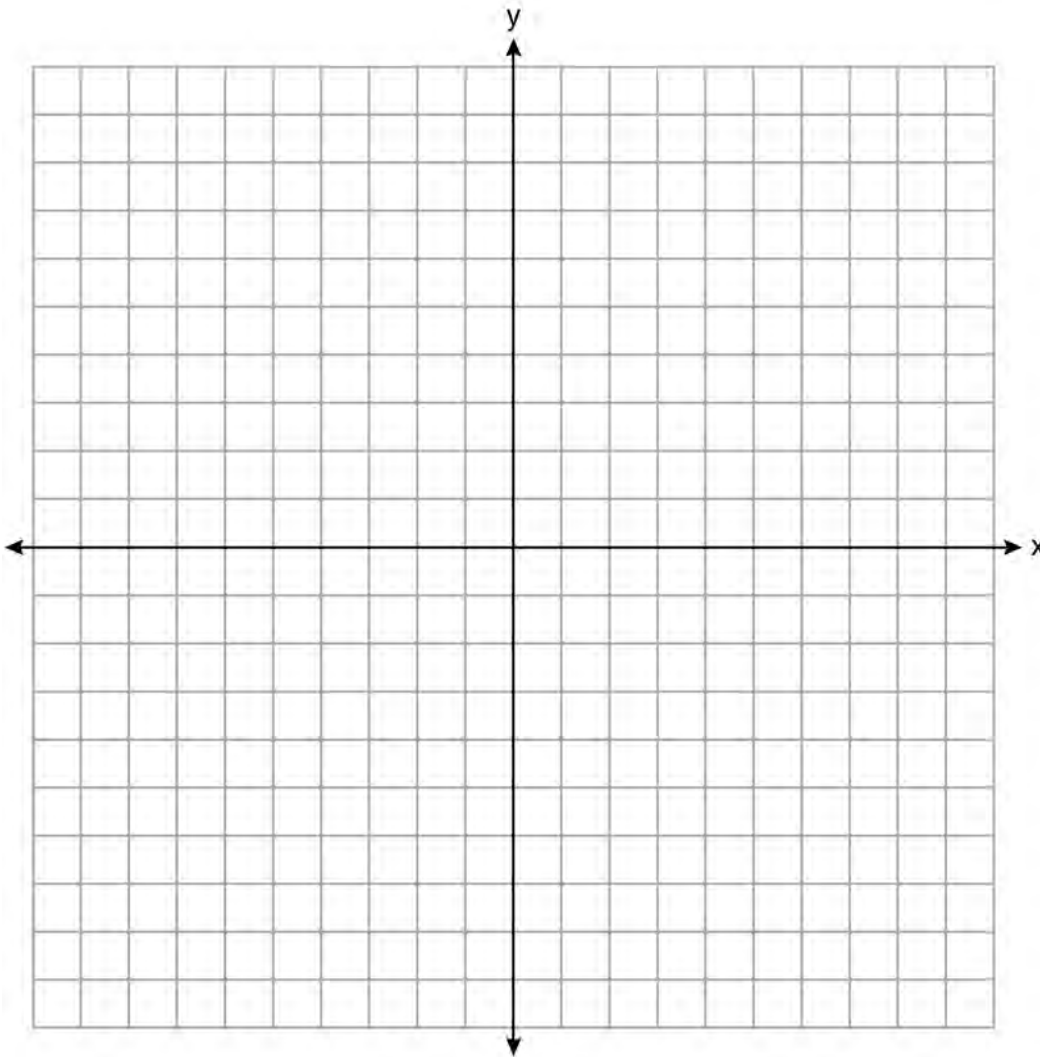
$$2(-4) = -3(2) - 2$$

$$-8 = -8$$

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

**Question 27**

27 On the set of axes below, graph the line whose equation is  $2y = -3x - 2$ .



This linear equation contains the point  $(2,k)$ . State the value of  $k$ .

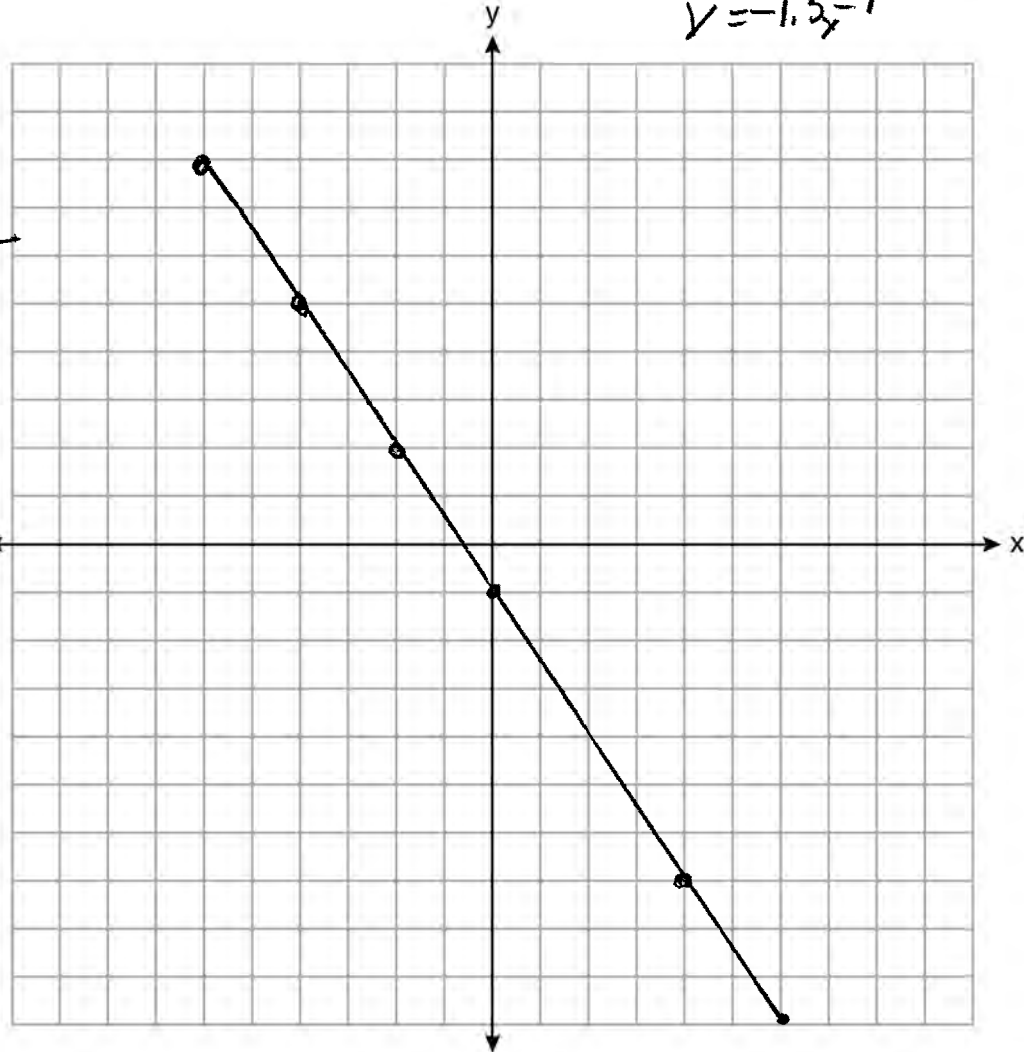
$$\begin{aligned} 2y &= -3x - 2 & 2k &= -6 - 2 \\ 2 \cdot k &= -3 \cdot 2 - 2 & 2k &= -8 \\ & & k &= -4 \end{aligned}$$

**Score 1:** The student did not graph the equation.

Question 27

27 On the set of axes below, graph the line whose equation is  $\frac{2y}{2} = \frac{-3x}{2} - \frac{2}{2}$   
 $y = -1.5x - 1$

x	y
-6	8
-4	5
-2	2
0	-1
2	-4
4	-7
6	-10



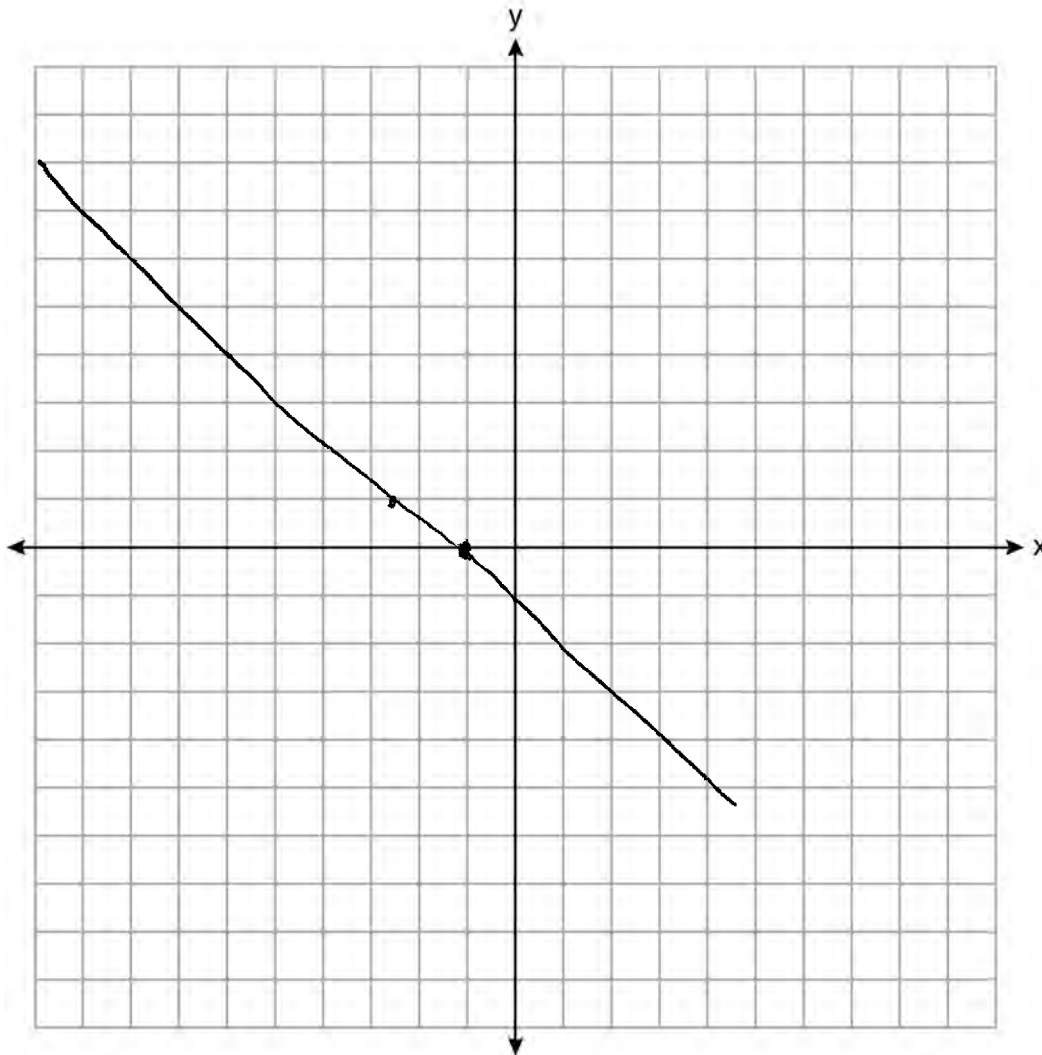
This linear equation contains the point (2,k). State the value of k.

$$k = -4$$

**Score 1:** The student made a graphing error by not having an arrow at the end or using the full display of the given set of axes.

Question 27

27 On the set of axes below, graph the line whose equation is  $\frac{2y}{2} = \frac{-3x - 2}{2}$



This linear equation contains the point  $(2,k)$ . State the value of  $k$ .

-4

**Score 0:** The student graphed the line incorrectly and showed no work to find  $-4$ .

Question 28

28 The formula  $a = \frac{v_f - v_i}{t}$  is used to calculate acceleration as the change in velocity over the period of time.

Solve the formula for the final velocity,  $v_f$ , in terms of initial velocity,  $v_i$ , acceleration,  $a$ , and time,  $t$ .

$$t(a) = \left( \frac{v_f - v_i}{t} \right) t$$
$$at = v_f - v_i$$
$$+v_i \quad +v_i$$

---

$$at + v_i = v_f$$

$$v_f = at + v_i$$

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



Question 28

28 The formula  $a = \frac{v_f - v_i}{t}$  is used to calculate acceleration as the change in velocity over the period of time.

Solve the formula for the final velocity,  $v_f$ , in terms of initial velocity,  $v_i$ , acceleration,  $a$ , and time,  $t$ .

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

$$ta = v_f - v_i$$

$$v_f = ta + v_i$$

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

$$ta = v_f - v_i$$

$$ta - v_f = -v_i$$

$$-ta + v_f = v_i$$

$$v_i = v_f - ta$$

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

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

$$ta = \frac{v_f - v_i}{a}$$

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

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

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**Question 28**

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28 The formula  $a = \frac{v_f - v_i}{t}$  is used to calculate acceleration as the change in velocity over the period of time.

Solve the formula for the final velocity,  $v_f$ , in terms of initial velocity,  $v_i$ , acceleration,  $a$ , and time,  $t$ .

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

$$+a = \frac{v_f - v_i}{t} \cdot t$$
$$\frac{+a}{a} = \frac{v_f - v_i}{a}$$
$$t = \frac{v_f - v_i}{a}$$

**Score 1:** The student solved the equation for  $t$  instead of  $v_f$ .

**Question 28**

28 The formula  $a = \frac{v_f - v_i}{t}$  is used to calculate acceleration as the change in velocity over the period of time.

Solve the formula for the final velocity,  $v_f$ , in terms of initial velocity,  $v_i$ , acceleration,  $a$ , and time,  $t$ .

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

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

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

**Score 0:** The student made more than one error.

Question 29

29 Solve  $\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$  for  $x$ .

$$\frac{1}{3} < \frac{1}{5}x - \frac{1}{3}$$

$$\frac{2}{3} < \frac{1}{5}x$$

$$\frac{10}{3} < x$$

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

Question 29

29 Solve  $\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$  for  $x$ .

$$15 \left( \frac{3}{5}x + \frac{1}{3} \right) < \left( \frac{4}{5}x - \frac{1}{3} \right) 15$$

$$9x + 5 < 12x - 5$$

+5                      +5

$$9x + 10 < 12x$$

-9x                      -9x

$$\frac{10 < 3x}{3 \quad 3}$$

$$\boxed{\frac{1}{3} < x \text{ or } \frac{10}{3} < x}$$

$$\frac{15}{1} \times \frac{3}{5} = \frac{45}{5}$$

$$\frac{15}{1} \times \frac{1}{3} = \frac{15}{3}$$

$$\frac{15}{1} \times \frac{4}{5} = \frac{60}{5}$$

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

Question 29

29 Solve  $\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$  for  $x$ .

$$\begin{aligned} \frac{3}{5}x + \frac{1}{3} &< \frac{4}{5}x - \frac{1}{3} \\ \frac{3}{5}x - \frac{1}{5}x &< \frac{4}{5}x - \frac{1}{3} - \frac{1}{3} \\ \frac{2}{5}x &< \frac{4}{5}x - \frac{2}{3} \\ \frac{2}{5}x - \frac{4}{5}x &< -\frac{2}{3} \\ -\frac{2}{5}x &< -\frac{2}{3} \\ x &< \frac{10}{3} \end{aligned}$$

**Score 1:** The student did not switch the inequality symbol when dividing by  $-\frac{1}{5}$ .

Question 29

29 Solve  $\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$  for  $x$ .

$$\frac{3}{5}x < \frac{4}{5}x - \frac{1}{3} - \frac{1}{3}$$

$$\frac{3}{5}x < \frac{4}{5}x - .67$$
$$-\frac{4}{5}x \quad -\frac{4}{5}x$$

$$\frac{-\cancel{.2}x}{-\cancel{.2}} < \frac{-.67}{-.2}$$

$$x > 3.35$$

**Score 1:** The student made an error by rounding  $-\frac{2}{3}$ .

Question 29

29 Solve  $\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$  for  $x$ .

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

$$-\frac{\frac{2}{3}}{\frac{2}{5}} < \frac{\frac{2}{5}x}{\frac{2}{5}}$$

$$\frac{1}{15} < x$$



$$x > \frac{1}{15}$$

**Score 0:** The student made more than one computational error.



Question 30

30 Is the product of two irrational numbers always irrational? Justify your answer.

The product of two irrational numbers is *only* sometimes irrational. It is possible that two irrational #s will form a rational #

$$\text{Ex } \sqrt{5} \times \sqrt{2} = \sqrt{10} = \text{irrational}$$

$$\sqrt{8} \times \sqrt{2} = \sqrt{16} = \textcircled{4} \text{ rational}$$

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

Question 30

30 Is the product of two irrational numbers always irrational? Justify your answer.

No, it's not  
 $\sqrt{2}$  = irrational number  
 $\sqrt{2} \times \sqrt{2} = \sqrt{4} = 2$   
 $2$  = rational number

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

Question 30

30 Is the product of two irrational numbers always irrational? Justify your answer.

The product of two irrational numbers is sometimes irrational, because it depends on what type of irrational numbers.

**Score 1:** The student gave an incomplete justification.

Question 30

30 Is the product of two irrational numbers always irrational? Justify your answer.

$$\begin{array}{c} I \\ \sqrt{15} \end{array} \cdot \begin{array}{c} I \\ \sqrt{11} \end{array} = \begin{array}{c} I \\ \sqrt{165} \end{array}$$

$$\begin{array}{c} I \\ \sqrt{2} \end{array} \cdot \begin{array}{c} I \\ \sqrt{3} \end{array} = \begin{array}{c} I \\ \sqrt{6} \end{array}$$

$$\begin{array}{c} I \\ \sqrt{5} \end{array} \cdot \begin{array}{c} I \\ \sqrt{7} \end{array} = \begin{array}{c} I \\ \sqrt{35} \end{array}$$

$$\begin{array}{c} I \\ \sqrt{6} \end{array} \cdot \begin{array}{c} I \\ \sqrt{13} \end{array} = \begin{array}{c} I \\ \sqrt{78} \end{array}$$

$$\begin{array}{c} I \\ \sqrt{33} \end{array} \cdot \begin{array}{c} I \\ \sqrt{10} \end{array} = \begin{array}{c} I \\ \sqrt{330} \end{array} \quad \text{Yes, because}$$

every time I multiplied  
I by I, I got an I.

**Score 1:** The student gave an appropriate answer based upon their multiple examples.

Question 30

30 Is the product of two irrational numbers always irrational? Justify your answer.

No because, if you do a negative irrational number multiplied by another negative irrational number it'll give you a positive rational number.

$$\begin{aligned} \text{Ex: } -3 \times -3 &= 9 \\ -7 \times -7 &= 49 \\ -7 \times -3 &= 21 \end{aligned}$$

**Score 0:** The student gave a completely incorrect response.

Question 31

31 Solve  $6x^2 - 42 = 0$  for the exact values of  $x$ .

$$\begin{aligned} & \frac{+42}{+42} \frac{+42}{+42} \\ & \frac{6x^2}{6} = \frac{42}{6} \\ & \sqrt{x^2} = \sqrt{7} \\ & x = \pm\sqrt{7} \end{aligned}$$

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

Question 31

31 Solve  $6x^2 - 42 = 0$  for the exact values of  $x$ .

$$6x^2 - 42 = 0$$

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

$$\frac{0 \pm \sqrt{0 - 4(6)(-42)}}{2(6)} \rightarrow \frac{0 \pm \sqrt{1008}}{12}$$

$$\frac{\sqrt{1008}}{12}$$

$$0 + \frac{\sqrt{1008}}{12} = 2.645751311$$

$$0 - \frac{\sqrt{1008}}{12} = -2.645751311$$

$$\boxed{\begin{array}{l} x = +2.645751311 \\ x = -2.645751311 \end{array}}$$

**Score 1:** The student expressed the answers as decimals using the full display of the calculator.

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**Question 31**

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31 Solve  $6x^2 - 42 = 0$  for the exact values of  $x$ .

$$6x^2 = 42$$

$$x^2 = 7$$

$$x = \pm \sqrt{7}$$

$$x = \pm 2.65$$

**Score 1:** The student stated  $\pm\sqrt{7}$ , but expressed the answer as a rounded decimal.



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**Question 31**

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31 Solve  $6x^2 - 42 = 0$  for the exact values of  $x$ .

$$6x^2 - 42 = 0$$

$$\frac{6x^2}{6} = \frac{42}{6}$$

$$x^2 = 7$$

$$x = \sqrt{7}$$

**Score 1:** The student gave only the positive value of  $x$ .

Question 31

31 Solve  $6x^2 - 42 = 0$  for the exact values of  $x$ .

$$6x^2 = 42$$

$$\sqrt{x^2} = \sqrt{7}$$

$$x = 2.6$$

**Score 0:** The student only stated one solution and expressed the answer as a rounded decimal.

Question 31

31 Solve  $6x^2 - 42 = 0$  for the exact values of  $x$ .

$$6x^2 - 42 = 0$$
$$+42$$

$$\sqrt{6x^2} = \sqrt{42}$$

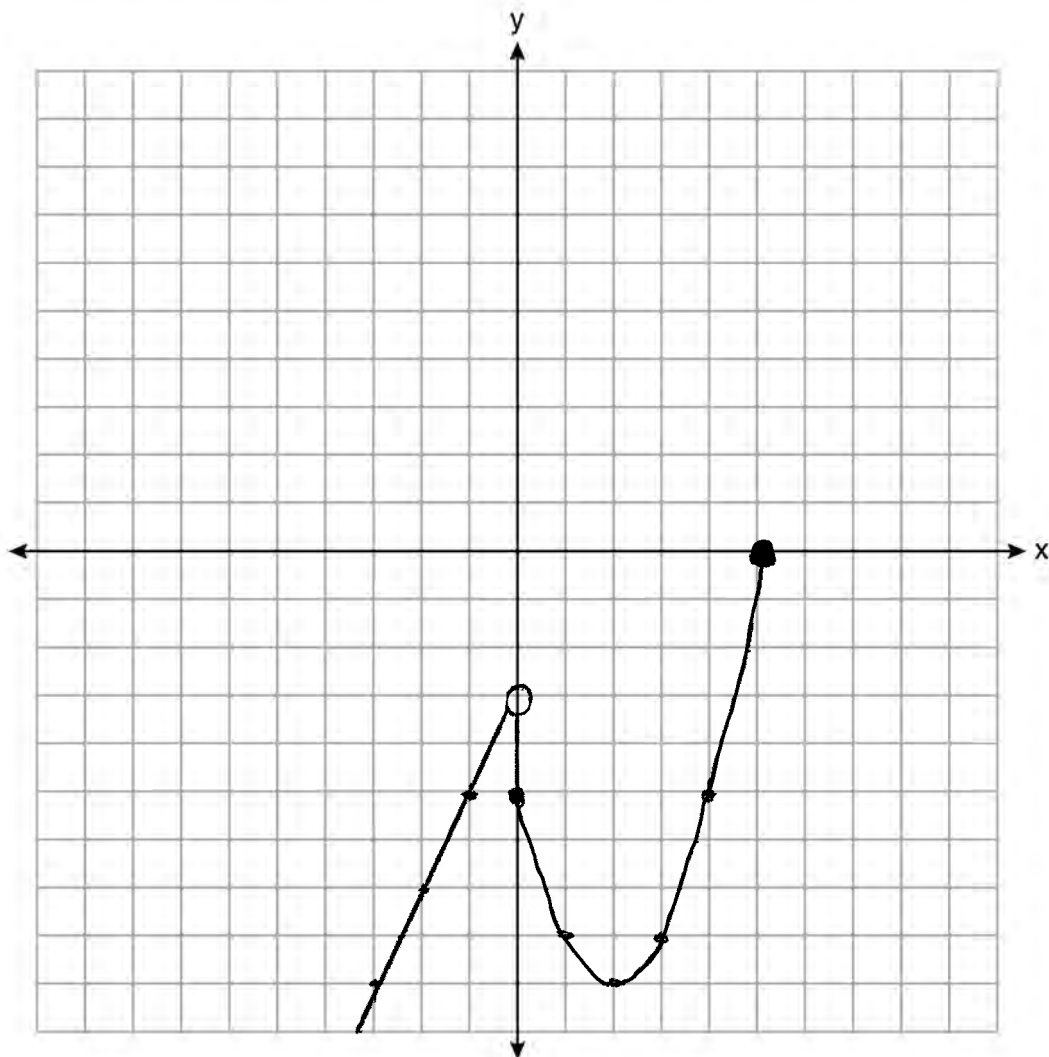
$$\frac{2.45x}{2.45} = \frac{6.48}{2.45}$$

$$x = 2.644897959$$

**Score 0:** The student made multiple errors.

Question 32

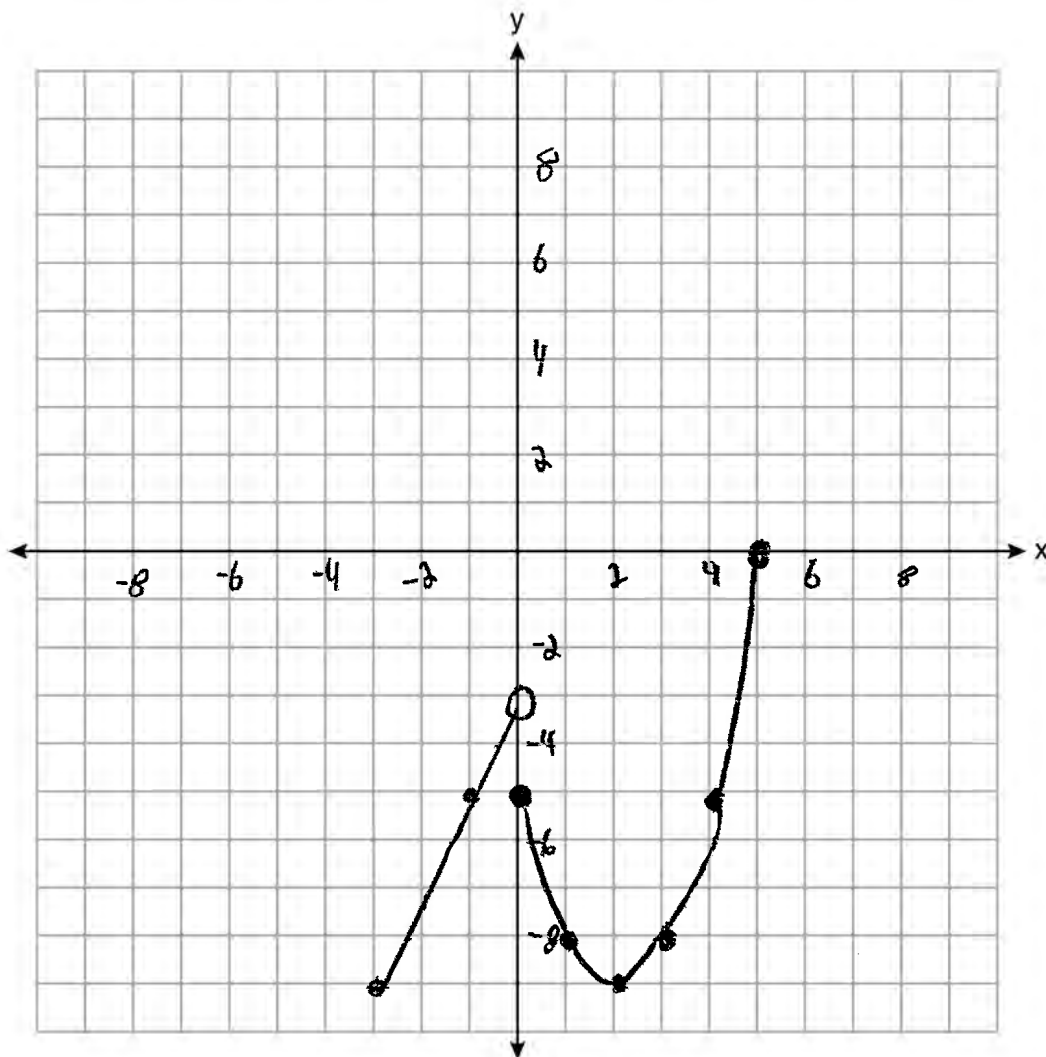
32 Graph the function:  $h(x) = \begin{cases} 2x - 3, & x < 0 \\ x^2 - 4x - 5, & 0 \leq x \leq 5 \end{cases}$



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

Question 32

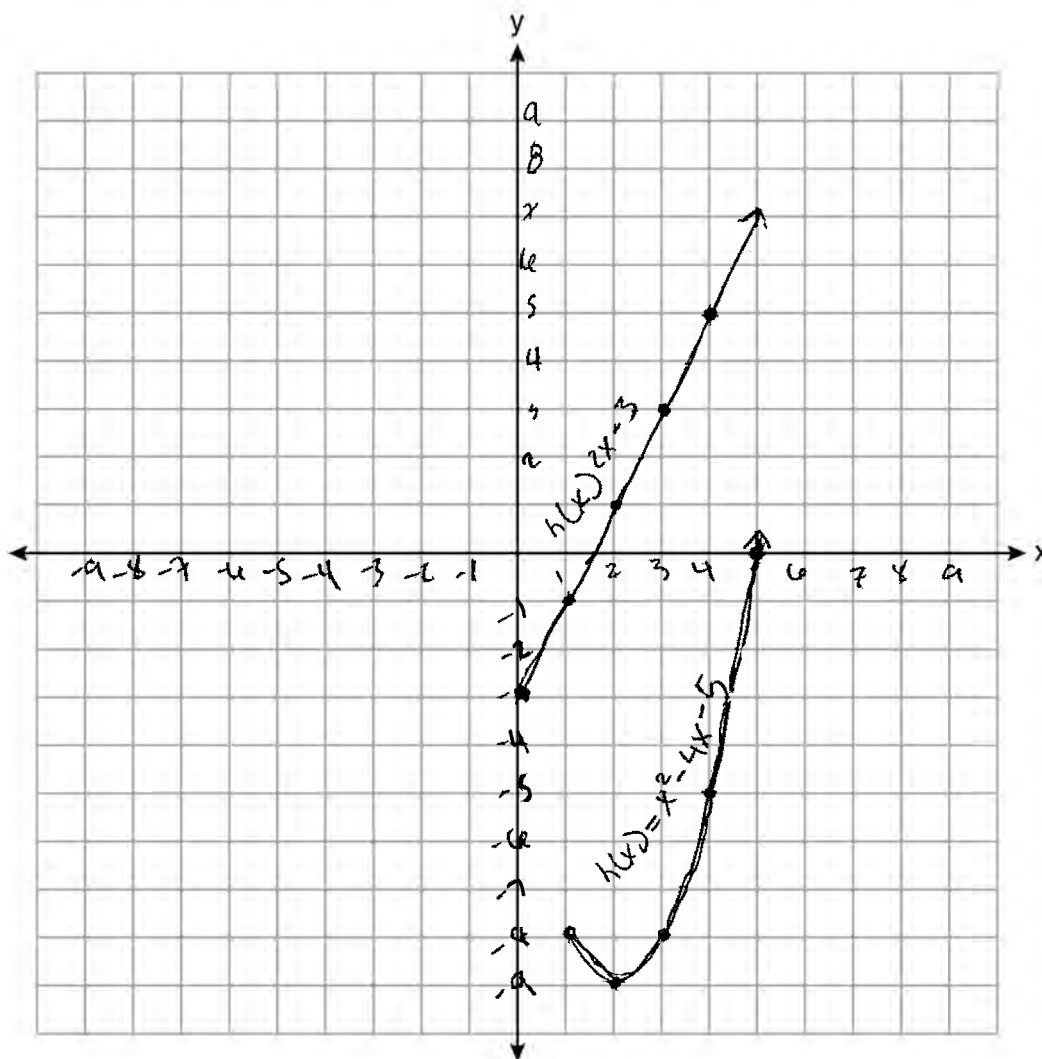
32 Graph the function:  $h(x) = \begin{cases} 2x - 3, & x < 0 \\ x^2 - 4x - 5, & 0 \leq x \leq 5 \end{cases}$



**Score 1:** The student graphed  $h(x) = 2x - 3$  over the interval  $-3 \leq x < 0$ .

Question 32

32 Graph the function: 
$$h(x) = \begin{cases} 2x - 3, & x < 0 \\ x^2 - 4x - 5, & 0 \leq x \leq 5 \end{cases}$$



**Score 0:** The student graphed  $h(x) = 2x - 3$  for  $x \geq 0$  and  $h(x) = x^2 - 4x - 5$  for  $x \geq 1$ .

Question 33

33 On the set of axes below, graph the following system of inequalities:

$$2x + y \geq 8$$

$$-2x \quad -2x$$

$$2x + y \geq 8$$

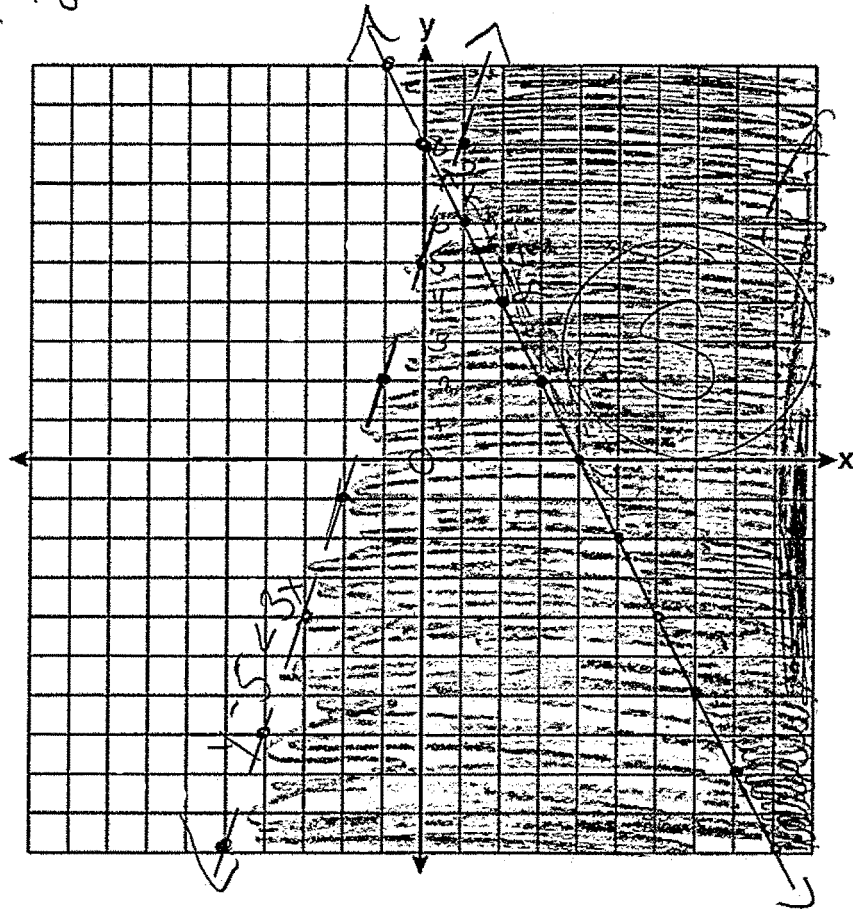
$$y - 5 < 3x$$

$$y - 5 < 3x$$

$$+5 \quad +5$$

$$y < 3x + 5$$

$$y \geq 2x + 8$$



Determine if the point (1,8) is in the solution set. Explain your answer.

It is not a point in the solution set because it only fits one inequality. The point (1, 8) does not fit on the second inequality because it is on the dotted line that does not include the point as a solution.

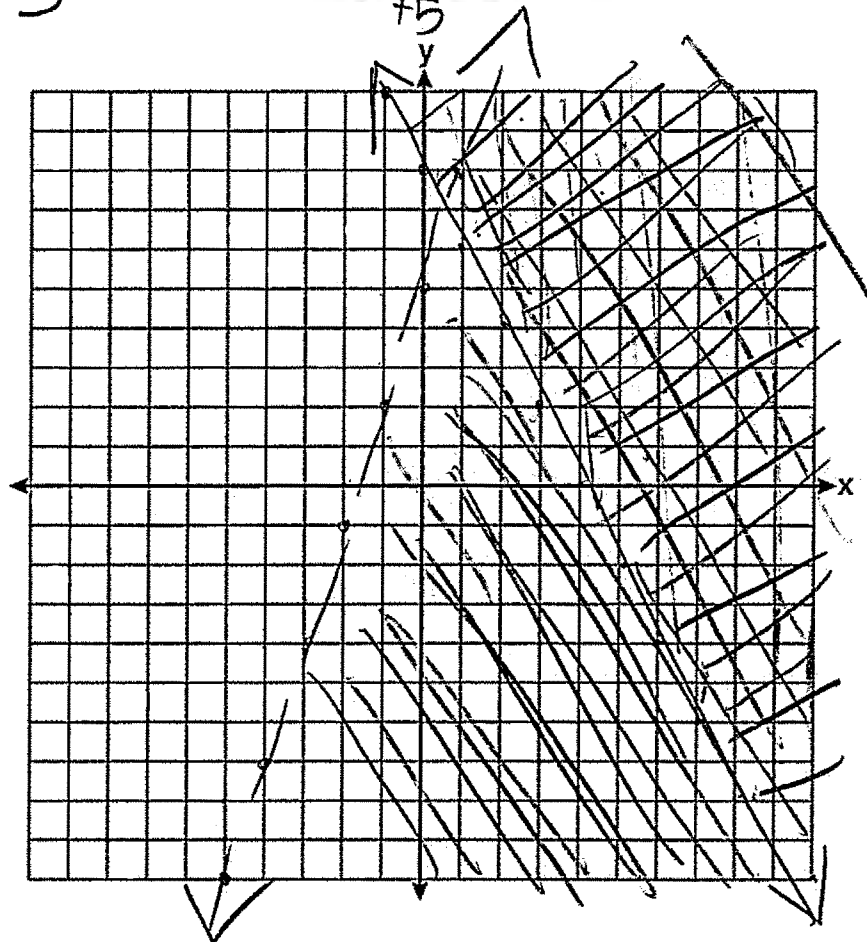
**Score 4:** The student gave a complete and correct response.

Question 33

33 On the set of axes below, graph the following system of inequalities:

$$y \geq -2x + 8$$
$$y < 3x + 5$$

$$-\frac{2x}{y} + \frac{y}{5} \geq 8$$
$$\frac{y}{5} < 3x$$



Determine if the point (1,8) is in the solution set. Explain your answer.

No, because it lies on a less than line. Less than lines do not include the points on said line

Score 3: The student did not label either inequality on the graph.

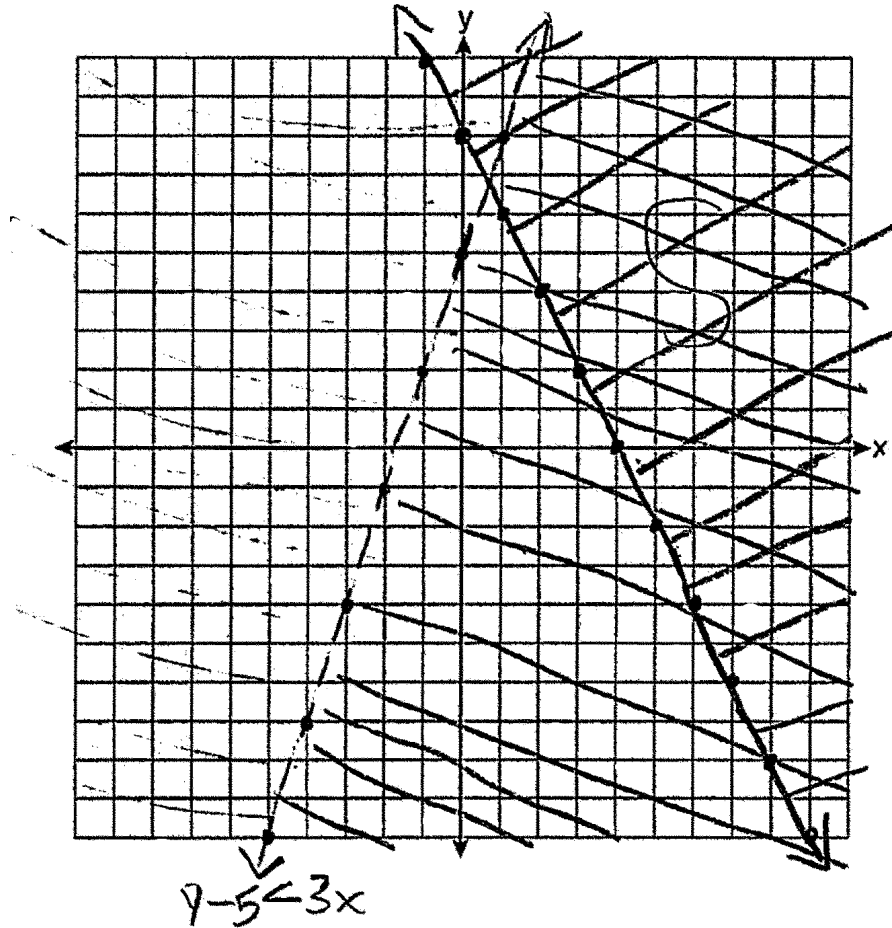


Question 33

33 On the set of axes below, graph the following system of inequalities:

$$2x + y \geq 8$$

$$y - 5 < 3x$$



Determine if the point (1,8) is in the solution set. Explain your answer.

$$\begin{aligned} 2 + 8 &\geq 8 \\ 10 &\geq 8 \checkmark \end{aligned}$$

$$\begin{aligned} 8 - 5 &< 3(1) \\ 3 &< 3 \end{aligned}$$

No

Score 3: The student gave a justification, not an explanation.

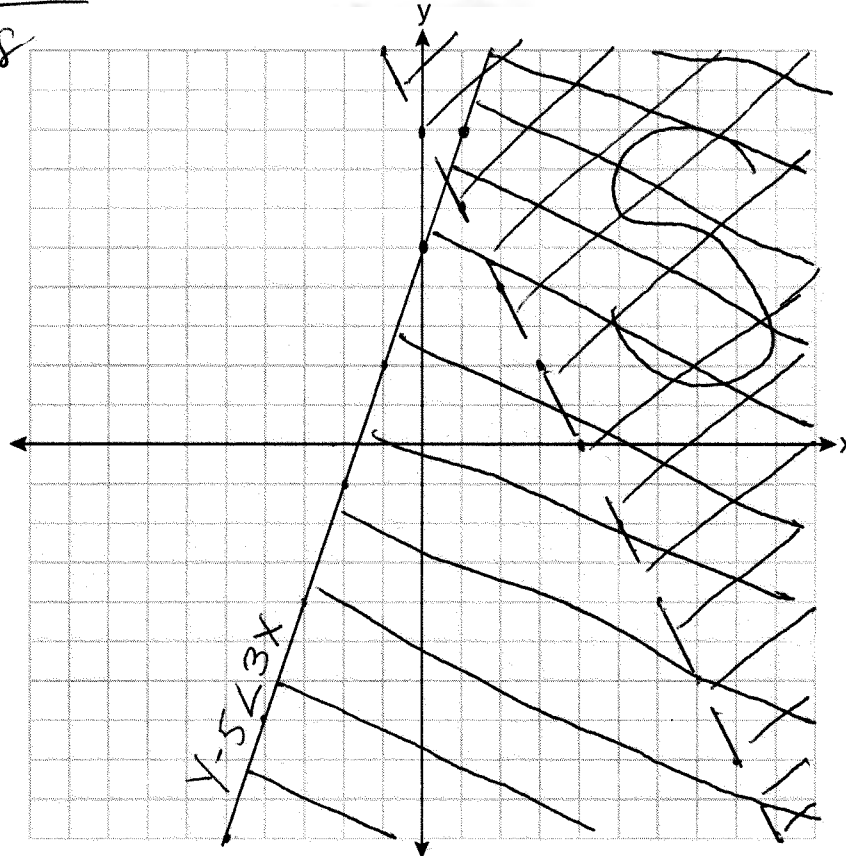
Question 33

33 On the set of axes below, graph the following system of inequalities:

$$\begin{array}{r} 2x + y \geq 8 \\ -2x \quad -2x \\ \hline y \geq -2x + 8 \end{array}$$

$$\begin{array}{r} 2x + y \geq 8 \\ y - 5 < 3x \end{array}$$

$$\begin{array}{r} x - 5 < 3x \\ +5 \quad +5 \\ \hline y < 3x + 5 \end{array}$$



Determine if the point (1,8) is in the solution set. Explain your answer.

Yes, (1,8) lies on the solid line and is in the solution set "S"

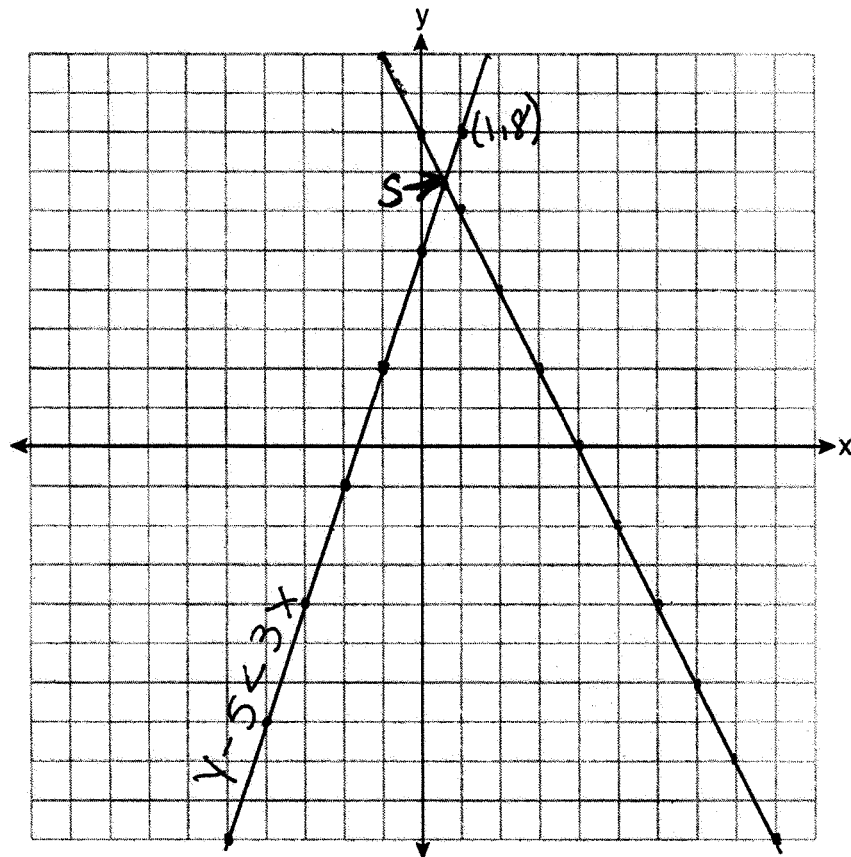
**Score 3:** The student made a graphing error by switching solid and dashed lines, but gave an appropriate explanation.

Question 33

33 On the set of axes below, graph the following system of inequalities:

$$2x + y \geq 8$$

$$y - 5 < 3x$$



Determine if the point  $(1, 8)$  is in the solution set. Explain your answer.

$(1, 8)$  is not a solution because the lines do not cross at  $(1, 8)$  on the graph.

**Score 3:** The student graphed  $2x + y = 8$  and  $y - 5 = 3x$  correctly and gave an appropriate determination and explanation.

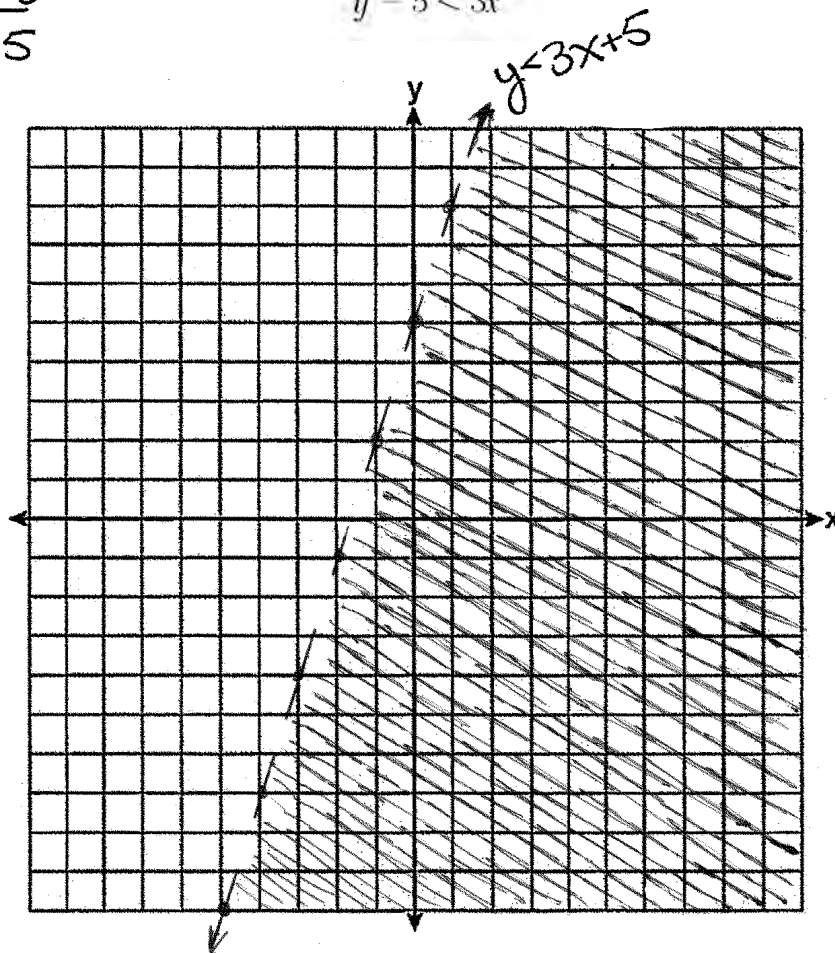
Question 33

33 On the set of axes below, graph the following system of inequalities:

$$\begin{array}{r} y - 5 < 3x \\ \underline{+5} \quad \underline{+5} \\ y < 3x + 5 \end{array}$$

$$\begin{array}{r} 2x + y \geq 8 \\ y - 5 < 3x \end{array}$$

x	y
3	4
0	8
14	14



Determine if the point (1,8) is in the solution set. Explain your answer.

No, the point (1,8) is exactly on the line.

**Score 2:** The student graphed  $y - 5 < 3x$  correctly, but wrote an incomplete explanation.

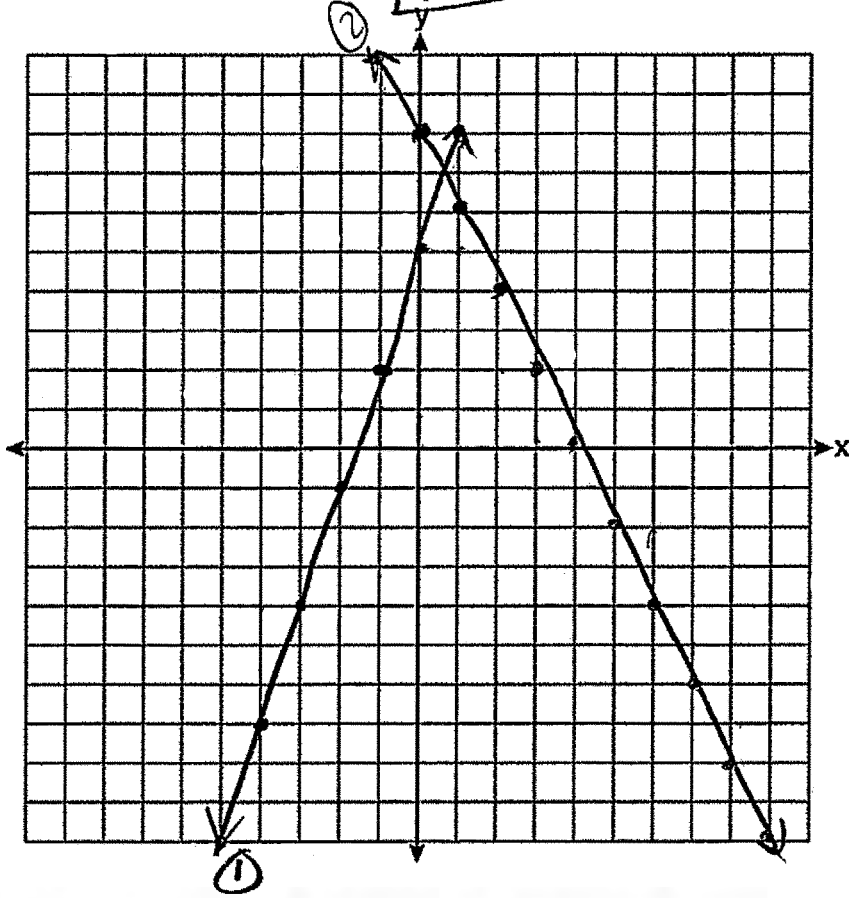
Question 33

33 On the set of axes below, graph the following system of inequalities:

$$\begin{array}{r} 2x + y \geq 8 \\ -2x - 5 < 3x \\ +5 \quad +5 \end{array}$$

$$y \geq 8 - 2x \quad (2)$$

$$y < 5 + 3x \quad (1)$$



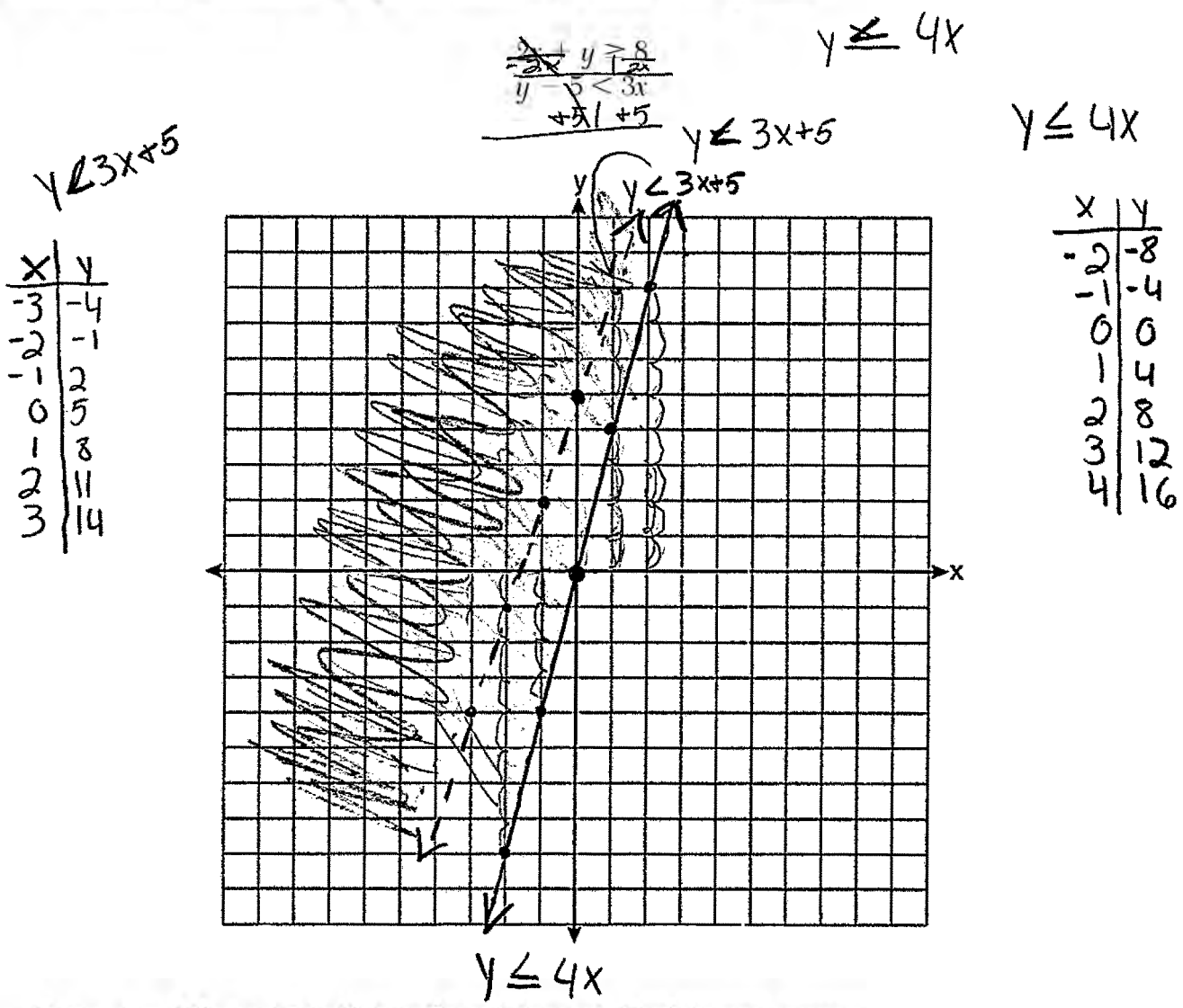
Determine if the point (1,8) is in the solution set. Explain your answer.

(1,8) is not in the solution set.

**Score 1:** The student graphed  $2x + y = 8$  and  $y - 5 = 3x$  correctly, but did not write an explanation.

Question 33

33 On the set of axes below, graph the following system of inequalities:



Determine if the point (1,8) is in the solution set. Explain your answer.

Yes. The point (1,8) is in the shaded area

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

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**Question 34**

---

**34** On the day Alexander was born, his father invested \$5000 in an account with a 1.2% annual growth rate. Write a function,  $A(t)$ , that represents the value of this investment  $t$  years after Alexander's birth.

$$A(t) = 5000(1 + 0.012)^t$$

Determine, to the *nearest dollar*, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

$$5000(1.012)^{32} - 5000(1.012)^{17}$$

\$1200

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

Question 34

34 On the day Alexander was born, his father invested \$5000 in an account with a 1.2% annual growth rate. Write a function,  $A(t)$ , that represents the value of this investment  $t$  years after Alexander's birth.

$$A(t) = 5000(1 + .012)^t$$

Determine, to the nearest dollar, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

$$17 : 5000(1 + .012)^{17} = 6124$$
$$32 : 5000(1 + .012)^{32} = 7324$$

At 32 years old he will be \$1200 dollars more than when he would be 17.

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



Question 34

34 On the day Alexander was born, his father invested \$5000 in an account with a 1.2% annual growth rate. Write a function,  $A(t)$ , that represents the value of this investment  $t$  years after Alexander's birth.

$$A(t) = 5000(1 + .012)^t$$

Determine, to the nearest dollar, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

$$A(t) = 5000(1 + .012)^{17}$$

$$A(t) = 5000(1 + .012)^{32}$$

$$17 \text{ years} = \$6124.05$$

$$32 \text{ years} = \$7323.97$$

At the age of 32, Alexander will have \$1199.92 more than when he was 17.

**Score 3:** The student did not express their answer to the nearest dollar.

Question 34

34 On the day Alexander was born, his father invested \$5000 in an account with a 1.2% annual growth rate. Write a function,  $A(t)$ , that represents the value of this investment  $t$  years after Alexander's birth.

Determine, to the *nearest dollar*, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

$$5000(1+0.012)^t$$

17yrs = 6124  
32yrs = 7324

$$\begin{array}{r} 7324 \\ -6124 \\ \hline \end{array}$$

\$1200 more

**Score 3:** The student wrote an expression and used it to determine the correct difference.

Question 34

34 On the day Alexander was born, his father invested \$5000 in an account with a 1.2% annual growth rate. Write a function,  $A(t)$ , that represents the value of this investment  $t$  years after Alexander's birth.

$$A(t) = 5000(1 + 0.012)^t$$

Determine, to the *nearest dollar*, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

$$\begin{array}{r} 2 \cancel{1} 2 \\ 3 \cancel{2} \\ -17 \\ \hline 15 \end{array}$$

$$A(t) = 5000(1 + 0.012)^t$$

$$A(t) = 5000(1 + 0.012)^{15}$$

$$A(t) = 5979.67$$

or

$$5979.68$$

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

Question 34

34 On the day Alexander was born, his father invested \$5000 in an account with a 1.2% annual growth rate. Write a function,  $A(t)$ , that represents the value of this investment  $t$  years after Alexander's birth.

$$A(t) = 1.2t + \$5000$$

Determine, to the *nearest dollar*, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

$$A(t) = 1.2(32) + 5000 = \$5,038$$

$$A(t) = 1.2(17) + 5000 = 5020$$

**Score 1:** The student used an incorrect function to find the value at 32 and 17 years, but did not find the difference.

---

**Question 34**

---

**34** On the day Alexander was born, his father invested \$5000 in an account with a 1.2% annual growth rate. Write a function,  $A(t)$ , that represents the value of this investment  $t$  years after Alexander's birth.

$$5000 + 1.2t$$

Determine, to the *nearest dollar*, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

---

**Score 0:** The student did not show any correct work.

**Question 35**

- 35 Stephen collected data from a travel website. The data included a hotel's distance from Times Square in Manhattan and the cost of a room for one weekend night in August. A table containing these data appears below.

<b>Distance From Times Square</b> (city blocks) (x)	0	0	1	1	3	4	7	11	14	19
<b>Cost of a Room</b> (dollars) (y)	293	263	244	224	185	170	219	153	136	111

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

$$y = -7.76x + 246.34$$

State the correlation coefficient for this data set, to the *nearest hundredth*.

$$r = -0.88$$

Explain what the sign of the correlation coefficient suggests in the context of the problem.

The negative sign suggests a negative correlation. As the distance from Times Square increases, the cost of a room decreases.

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

**Question 35**

- 35 Stephen collected data from a travel website. The data included a hotel's distance from Times Square in Manhattan and the cost of a room for one weekend night in August. A table containing these data appears below.

<b>Distance From Times Square</b> (city blocks) (x)	0	0	1	1	3	4	7	11	14	19
<b>Cost of a Room</b> (dollars) (y)	293	263	244	224	185	170	219	153	136	111

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

$$y = -7.76x + 246.34$$

State the correlation coefficient for this data set, to the *nearest hundredth*.

$$r = -0.88$$

Explain what the sign of the correlation coefficient suggests in the context of the problem.

The sign of correlation suggests the strength of the like and if its positive or negative.  
This has a negative and strong fit

**Score 3:** The student did not explain the sign in the context of the problem.

**Question 35**

**35** Stephen collected data from a travel website. The data included a hotel's distance from Times Square in Manhattan and the cost of a room for one weekend night in August. A table containing these data appears below.

<b>Distance From Times Square</b> (city blocks) ( $x$ )	0	0	1	1	3	4	7	11	14	19
<b>Cost of a Room</b> (dollars) ( $y$ )	293	263	244	224	185	170	219	153	136	111

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

$$y = ax + b$$
$$a = -7.76$$
$$b = 246.34$$

State the correlation coefficient for this data set, to the *nearest hundredth*.

Explain what the sign of the correlation coefficient suggests in the context of the problem.

**Score 2:** The student wrote the linear regression formula and gave correct values for  $a$  and  $b$ .



**Question 35**

35 Stephen collected data from a travel website. The data included a hotel's distance from Times Square in Manhattan and the cost of a room for one weekend night in August. A table containing these data appears below.

<b>Distance From Times Square</b> (city blocks) (x)	0	0	1	1	3	4	7	11	14	19
<b>Cost of a Room</b> (dollars) (y)	293	263	244	224	185	170	219	153	136	111

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

$$ax + b$$
$$-7.76(x) + 246.34$$
$$r = -.88$$

State the correlation coefficient for this data set, to the *nearest hundredth*.

Explain what the sign of the correlation coefficient suggests in the context of the problem.

**Score 2:** The student wrote a correct expression and correlation coefficient.

**Question 35**

- 35 Stephen collected data from a travel website. The data included a hotel's distance from Times Square in Manhattan and the cost of a room for one weekend night in August. A table containing these data appears below.

<b>Distance From Times Square</b> (city blocks) (x)	0	0	1	1	3	4	7	11	14	19
<b>Cost of a Room</b> (dollars) (y)	293	263	244	224	185	170	219	153	136	111

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

$$y = ax + b$$
$$a = -9.5076\dots$$
$$a \approx -9.51$$
$$b = 243.04568\dots$$
$$b \approx 243.05$$

State the correlation coefficient for this data set, to the *nearest hundredth*.

$$r = -.764747\dots$$
$$r \approx -.76$$

Explain what the sign of the correlation coefficient suggests in the context of the problem.

The negative sign of the correlation coefficient suggests that the cost of a hotel room goes down the farther it is away from Times Square.

**Score 1:** The student wrote a correct explanation based on their correlation coefficient.

**Question 35**

35 Stephen collected data from a travel website. The data included a hotel's distance from Times Square in Manhattan and the cost of a room for one weekend night in August. A table containing these data appears below.

<b>Distance From Times Square</b> (city blocks) (x)	0	0	1	1	3	4	7	11	14	19
<b>Cost of a Room</b> (dollars) (y)	293	263	244	224	185	170	219	153	136	111

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

$$= 88$$

State the correlation coefficient for this data set, to the *nearest hundredth*.

$$-7.76$$

Explain what the sign of the correlation coefficient suggests in the context of the problem.

Idk

**Score 0:** The student gave a completely incorrect response.

**Question 36**

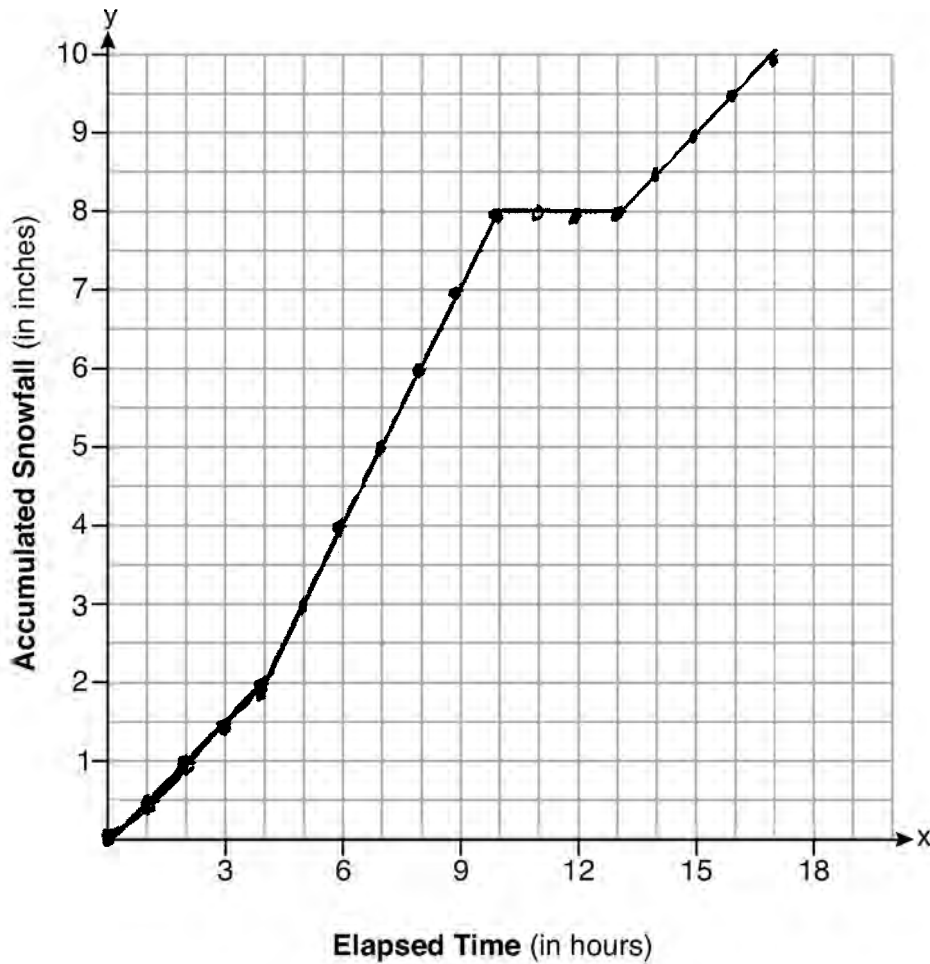
**36** A snowstorm started at midnight. For the first 4 hours, it snowed at an average rate of one-half inch per hour.

The snow then started to fall at an average rate of one inch per hour for the next 6 hours.

Then it stopped snowing for 3 hours.

Then it started snowing again at an average rate of one-half inch per hour for the next 4 hours until the storm was over.

On the set of axes below, graph the amount of snow accumulated over the time interval of the storm.



Determine the average rate of snowfall over the length of the storm. State the rate, to the *nearest hundredth of an inch per hour*.

17 hours       $\frac{10 \text{ inches}}{17 \text{ hours}} = .5882352941$       The average was .59

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

**Question 36**

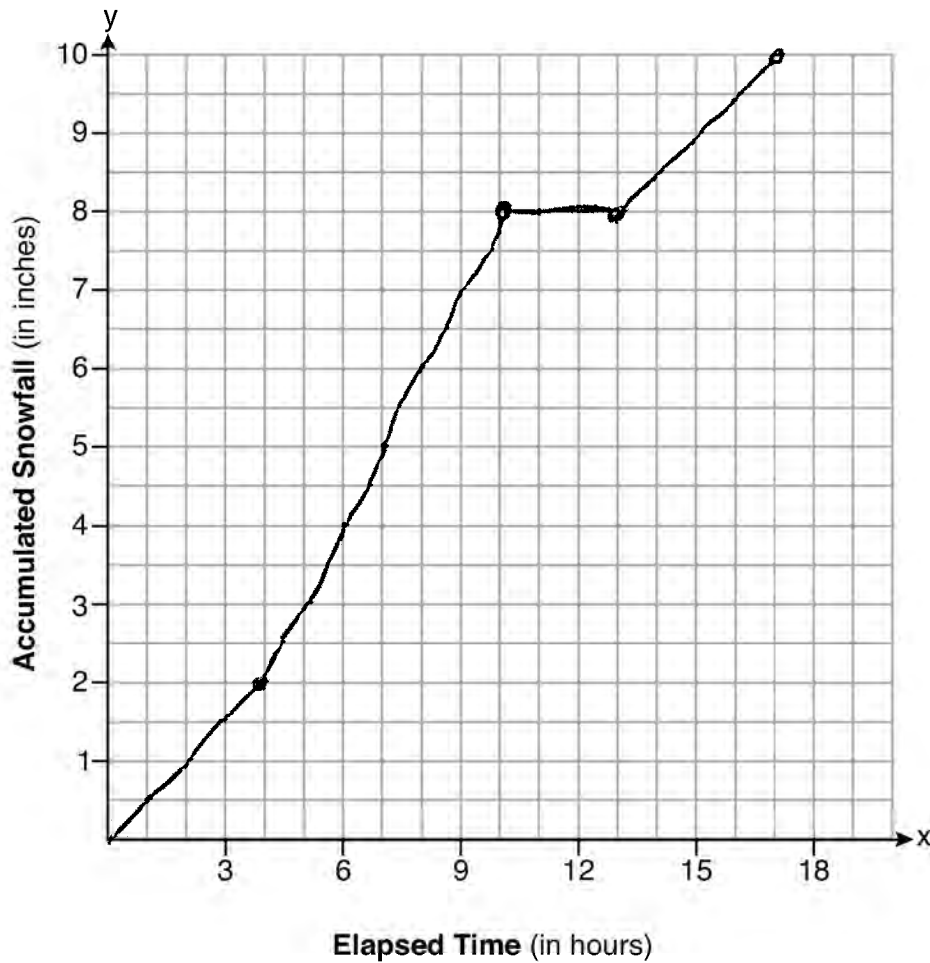
**36** A snowstorm started at midnight. For the first 4 hours, it snowed at an average rate of one-half inch per hour.

The snow then started to fall at an average rate of one inch per hour for the next 6 hours.

Then it stopped snowing for 3 hours.

Then it started snowing again at an average rate of one-half inch per hour for the next 4 hours until the storm was over.

On the set of axes below, graph the amount of snow accumulated over the time interval of the storm.



Determine the average rate of snowfall over the length of the storm. State the rate, to the nearest hundredth of an inch per hour.

*the average rate of snowfall  
 .60 of an inch per hour  
 I plug the info in my calc. and got this for the rate*

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

**Question 36**

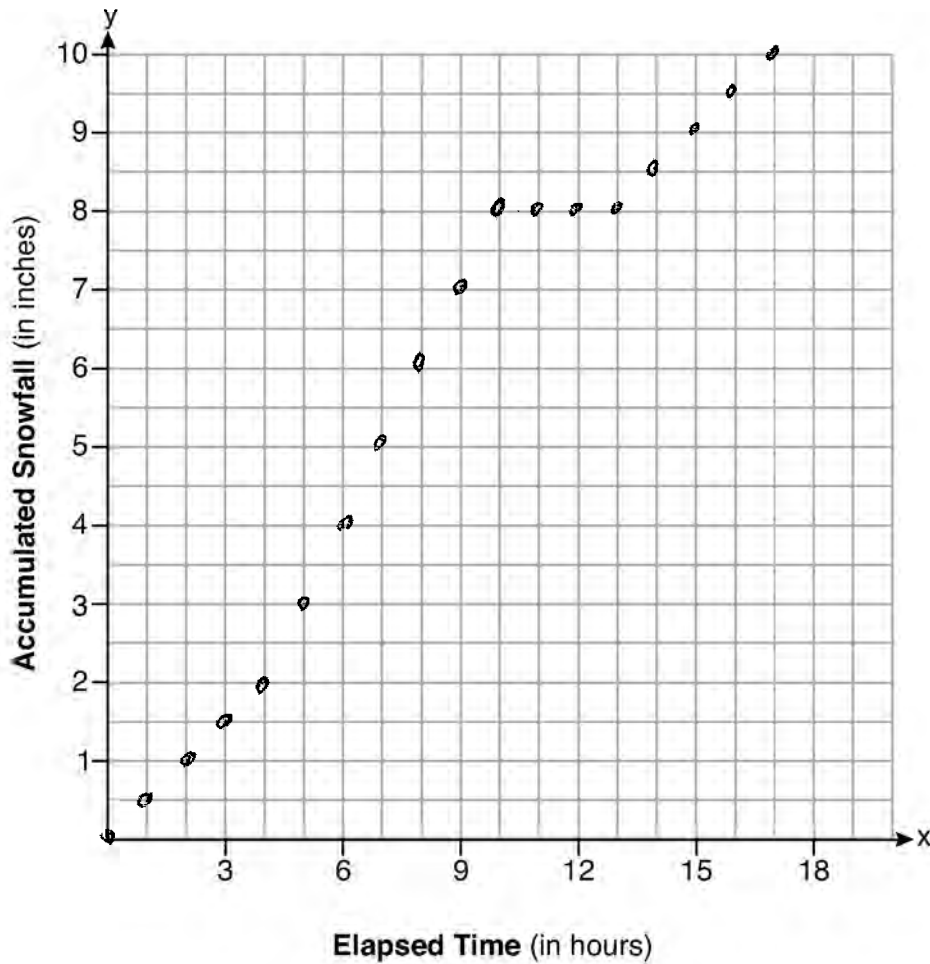
**36** A snowstorm started at midnight. For the first 4 hours, it snowed at an average rate of one-half inch per hour.

The snow then started to fall at an average rate of one inch per hour for the next 6 hours.

Then it stopped snowing for 3 hours.

Then it started snowing again at an average rate of one-half inch per hour for the next 4 hours until the storm was over.

On the set of axes below, graph the amount of snow accumulated over the time interval of the storm.



Determine the average rate of snowfall over the length of the storm. State the rate, to the *nearest hundredth of an inch per hour*.

**Score 2:** The student did not connect the points on the graph and did not state an average rate of snowfall.

**Question 36**

**36** A snowstorm started at midnight. For the first 4 hours, it snowed at an average rate of one-half inch per hour.

$2''$   $4 \text{ hr}$

The snow then started to fall at an average rate of one inch per hour for the next 6 hours.

Then it stopped snowing for 3 hours.

$6''$   $6 \text{ hr}$   
 $0''$   $3 \text{ hr}$

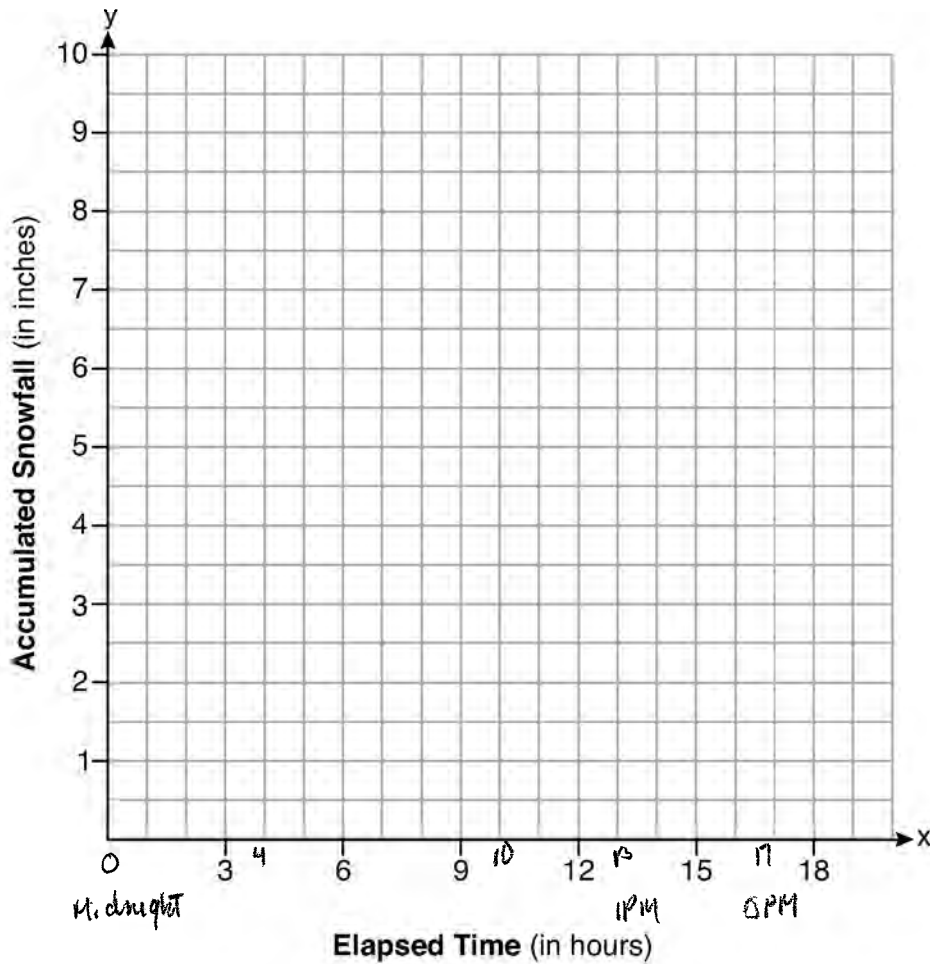
Then it started snowing again at an average rate of one-half inch per hour for the next 4 hours until the storm was over.

$2''$   $4 \text{ hr}$

On the set of axes below, graph the amount of snow accumulated over the time interval of the storm.

$\text{total } 10''$   $17 \text{ hr.}$

$$\frac{10}{17} = .59$$



Determine the average rate of snowfall over the length of the storm. State the rate, to the *nearest hundredth of an inch per hour*.

**Score 1:** The student stated a correct rate of change.

**Question 36**

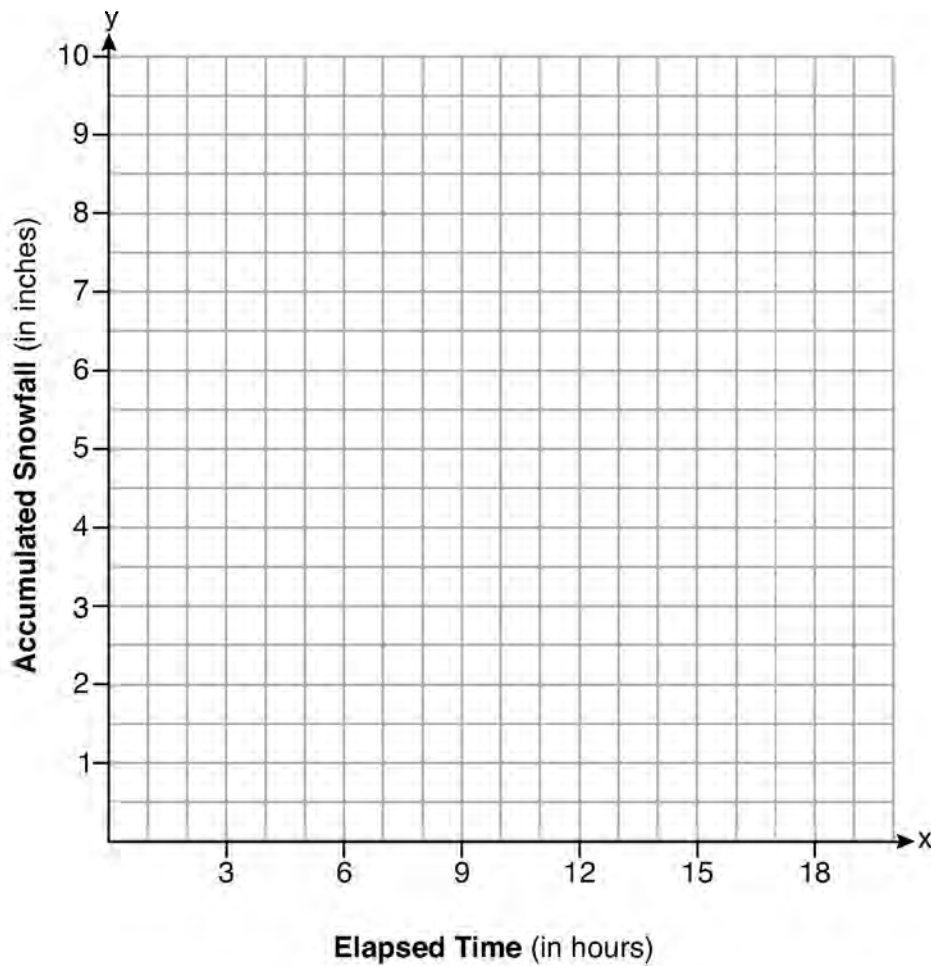
**36** A snowstorm started at midnight. For the first 4 hours, it snowed at an average rate of one-half inch per hour.

The snow then started to fall at an average rate of one inch per hour for the next 6 hours.

Then it stopped snowing for 3 hours.

Then it started snowing again at an average rate of one-half inch per hour for the next 4 hours until the storm was over.

On the set of axes below, graph the amount of snow accumulated over the time interval of the storm.



Determine the average rate of snowfall over the length of the storm. State the rate, to the *nearest hundredth of an inch per hour*.

$$\frac{1 \text{ hour}}{.5 \text{ inch}} = 2 \text{ inches per hr.}$$

**Score 0:** The student showed no correct work.



Question 37

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$3.75A + 2.50D = 35$$

$$A + D = 12$$

Determine algebraically how many of each type of chicken Allysa purchased.

$$\begin{array}{r} A + D = 12 \\ -D - D \\ \hline A = 12 - D \end{array}$$

$$\begin{array}{r} A + D = 12 \\ A + 8 = 12 \\ -8 - 8 \\ \hline A = 4 \end{array}$$

$$\begin{array}{r} 3.75A + 2.50D = 35 \\ 3.75(12 - D) + 2.50D = 35 \\ 45 - 3.75D + 2.50D = 35 \\ 45 - 1.25D = 35 \\ -45 \qquad \qquad -45 \\ \hline -1.25D = -10 \\ \div 1.25 \quad \div 1.25 \\ \hline 4 \text{ Americana} \quad D = 8 \\ 8 \text{ Delaware} \end{array}$$

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

$$\begin{array}{l} 4 \times 2 = 8 \text{ eggs for Americana} \\ 8 \times 1 = 8 \text{ each day for Delaware} \\ 8 \times 7 = 56 \text{ eggs each week} \\ 56 \times 2 = 112 \end{array}$$

$$\frac{112}{12} = 9.\overline{33}$$

$$9 \times 2.50 = 22.5$$

$$\$22.50$$

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

Question 37

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$3.75A + 2.50D = 35$$

$$A + D = 12$$

Determine algebraically how many of each type of chicken Allysa purchased.

? + ? = 12

4 - americana chickens    7    5

8 - delaware chickens    10    2

6    6

4    8

$$3.75(7) + 2.50(5) > 35$$

$$3.75(5) + 2.50(7) > 35$$

$$3.75(6) + 2.50(6) > 35$$

$$3.75(10) + 2.50(2) > 35$$

$$3.75(2) + 2.50(10) < 35$$

$$3.75(4) + 2.50(8) = 35$$

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

Americana -  $2 \times 4 \times 7 = 56$  eggs a week

Delaware -  $1 \times 8 \times 7 = 56$  eggs a week

$56 + 56 = 112$        $112 \div 12 = 9.\bar{3}$

# 22.50 dollars a week

Score 5: The student used a method other than algebraic to determine  $A = 4$  and  $D = 8$ .

Question 37

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$\begin{aligned} 35 &= 3.75A + 2.50D \\ 12 &= A + D \end{aligned}$$

Determine algebraically how many of each type of chicken Allysa purchased.

$$\begin{aligned} 35 &= 3.75A + 2.50D \\ 2.50(12 = A + D) & \\ \hline 3.75A + 2.50D &= 35 \\ -2.50A + 2.50D &= 30 \end{aligned}$$

$$\begin{array}{r} 1.25A = 5 \\ \hline 1.25 \quad 1.25 \end{array}$$

$$A = 4$$

$$\begin{aligned} 12 &= A + D \\ 12 &= 4 + D \\ \hline 8 &= D \end{aligned}$$

Allysa bought 4 Americana chickens, and 8 Delaware chickens.

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

Americana  
 $4(2) = 8$  eggs a day

Delaware  
 $8(1) = 8$  eggs a day  
 16 eggs a day  
 $7(16) = 112$  eggs / week

$9.3\bar{3}$  dozens a week  
 $9.3\bar{3}(2.50)$   
 $\$23.33$  per week

**Score 5:** The student found revenue for  $9\frac{1}{3}$  dozen eggs instead of 9 dozen.

Question 37

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$\begin{aligned} A + D &= 12 \\ 3.75A + 2.50D &= 35 \end{aligned}$$

Determine algebraically how many of each type of chicken Allysa purchased.

$$\begin{array}{r} 3.75A + 2.50D = 35 \\ -2.50D \phantom{= 35} \\ \hline 1.25A = 10 \\ \phantom{1.25A} \times 7 \\ \hline 8.75A = 70 \end{array}$$

$$\begin{array}{r} 3.75A + 2.50D = 35 \\ -26.25 \phantom{= 35} \\ \hline 8.75A = 8.75 \\ \phantom{8.75A} \div 8.75 \\ \hline A = 1 \end{array}$$

$$\begin{aligned} A &= 7 \\ D &= 8 \end{aligned}$$

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

$$\begin{aligned} 7(2) &= 14 \times 7 = 98 \\ 8(1) &= 8 \times 7 = 56 \end{aligned}$$

$$154 / 12 = 12.8\bar{3} \quad 12 \times 2.50 = \textcircled{30}$$

**Score 4:** The student wrote a correct system of equations and stated values for  $A = 7$  and  $D = 8$ , which they used to determine an appropriate amount of money.

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**Question 37**

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37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$3.75A + 2.50D = 35$$

$$A + D = 12$$

Determine algebraically how many of each type of chicken Allysa purchased.

$$A = 4, D = 8$$

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

**Score 3:** The student wrote a correct system of equations and stated  $A = 4$  and  $D = 8$ .

Question 37

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$3.75A + 2.50D = 35$$

Determine algebraically how many of each type of chicken Allysa purchased.

$$3.75(4) + 2.50(8) = 35$$

$$15 + 20 = 35$$

$$35 = 35$$

A	D
<del>4</del>	<del>8</del>
5	7
4	8

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

7 days  
 1 day  $\rightarrow 2 + 1 = 3$  eggs  
 2 day  $\rightarrow 4 + 2 = 6$  eggs

3 day  $\rightarrow 8 + 3 = 11$  eggs  
 4 day  $\rightarrow 16 + 4 = 19$  eggs  
 5 day  $\rightarrow 32 + 5 = 37$  eggs

2.50(4)  
 \$10  
 2.50(341)  
\$852.5

4103  
 12  
 ↓  
 341.9  
 341  
 dozens

Score 2: The student wrote one correct equation and stated  $A = 4$  and  $D = 8$ .

Question 37

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

Determine algebraically how many of each type of chicken Allysa purchased.

$$\$35 = 3.75A + 2.50D$$

$$\begin{array}{r} 12 = A + D \\ -D \end{array}$$

$$12 - D = A$$

Americanas      Delawares

$$(8, 4)$$

$$3.75(12 - D) + 2.50D = 35$$

$$-4.5D + 2.50D = 35$$

$$\underline{-4.5D = 35} \quad \underline{-2.50}$$

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

$$\$7.50 \text{ per week}$$

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

Question 37

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$3.75x + 2.50y = 35$$

$$x + y = 12$$

Determine algebraically how many of each type of chicken Allysa purchased.

$\begin{matrix} 20 \\ 15 \\ \hline \end{matrix}$ 
  
 $\downarrow$ 
  
 $3.75 \cdot 4 = 15$ 
  
 $2.50 \cdot 8 = 20$ 
  
 $\begin{matrix} 20 & 6 \\ +15 & +4 \\ \hline 35 & 12 \end{matrix}$ 
  
~~$3.75x + 2.50y = 35$ 
  
 $-3.75x$ 
  
 $\hline$ 
 $2.50y = 35 - 3.75x$ 
  
 $\frac{2.50y}{2.50} = \frac{35 - 3.75x}{2.50}$ 
  
 $y = 14 - 1.5x$ 
  
 $x = 4$ 
  
 $y = 8$~~

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

$12 \text{ chickens} = 12$ 
  
 $2.50(2)$ 
  
 $5$ 
  
 $2.50(2)$ 
  
 $2.50$ 
  
 $2.50$ 
  
 $2.50$ 
  
 $\rightarrow \$90 \text{ each week}$

**Score 2:** The student wrote an appropriate system of equations, but not in terms of  $A$  and  $D$ . The student stated appropriate values for their system.



**Question 37**

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$\begin{matrix} 3.75 & + & 2.50 \\ (A) & & (D) \end{matrix}$$

Determine algebraically how many of each type of chicken Allysa purchased.

$$\begin{matrix} \$ & 4 & \text{Americana} & & 8 & \text{Delaware} \\ & & \text{chickens} & & & \text{chickens} \end{matrix}$$

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

$$\begin{matrix} 2 \times 7 \\ 14 \times \$2.50 \end{matrix}$$

$$\begin{matrix} 1 \times 8 \\ 8 \times 2.5 \end{matrix}$$

Americana \$35.00 per week.

Delaware \$20.00 per week

$$\text{\$55.00 total}$$

**Score 1:** The student stated correct values for  $A$  and  $D$ .

Question 37

37 Allysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens,  $A$ , and the number of Delaware chickens,  $D$ , she purchased.

$$3.75x A = X$$

$$2.50x D = X$$

Determine algebraically how many of each type of chicken Allysa purchased.

3.75 = 1  
She can buy  
9 Americana  
chickens.

2.50 = 1  
She can buy  
14 Delaware  
chickens.

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allysa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

\$4 is what she  
will take in each week.

**Score 0:** The student showed no correct work.