

**Unit 4 Day 1: Standard Form of a Linear Equation**

Focus Question: How can I write an equation when the two variables could both be independent?



A. The eighth graders at McKinley Middle School are selling t-shirts and caps to raise money for their end-of-year party. The profit from the fundraiser depends on the number of caps and the number of t-shirts sold.

1. How many variables are in the problem? What are they?

# of t-shirts sold  
# of caps sold  
Profit

3

2. What is/are the dependent variable(s)?

Profit  $Ax + By = C$

3. What is/are the independent variable(s)?

# of shirts sold  
# of caps sold

4. Find the profit if the students sell each of the following:

a. 15 shirts and 10 caps  $15(5) + 10(10) = \$175$   
 $75 + 100 =$

b. 12 shirts and 20 caps  $12(5) + 20(10) = \$260$

c.  $s$  shirts and  $c$  caps  $s \cdot 5 + c(10) = P$

$5s + 10c = P$

5. The students need \$600 for their end of year party.

a. What equation will you be trying to solve?

$5s + 10c = 600$

b. Find four solution pairs for shirt and cap sales that will allow the students to make a profit of exactly \$600.

<p>Random choice little work</p> <p><math>5(100) + 10(10)</math> <math>500 + 100 = 600</math></p> <p>100 shirts &amp; 10 caps</p>	<p>Random little thinking</p> <p><math>5(2) + 10(59)</math> <math>10 + 590 = 600</math></p> <p>2 shirts &amp; 59 caps</p>	<p>choice thinking</p> <p><math>5(40) + 10(40)</math> <math>200 + 400 = 600</math></p> <p>40 shirts &amp; 40 caps</p>	<p>thinking choice</p> <p><math>5(20) + 10(50)</math> <math>100 + 500 = 600</math></p> <p>20 shirts &amp; 50 caps</p>
---	---	---	---

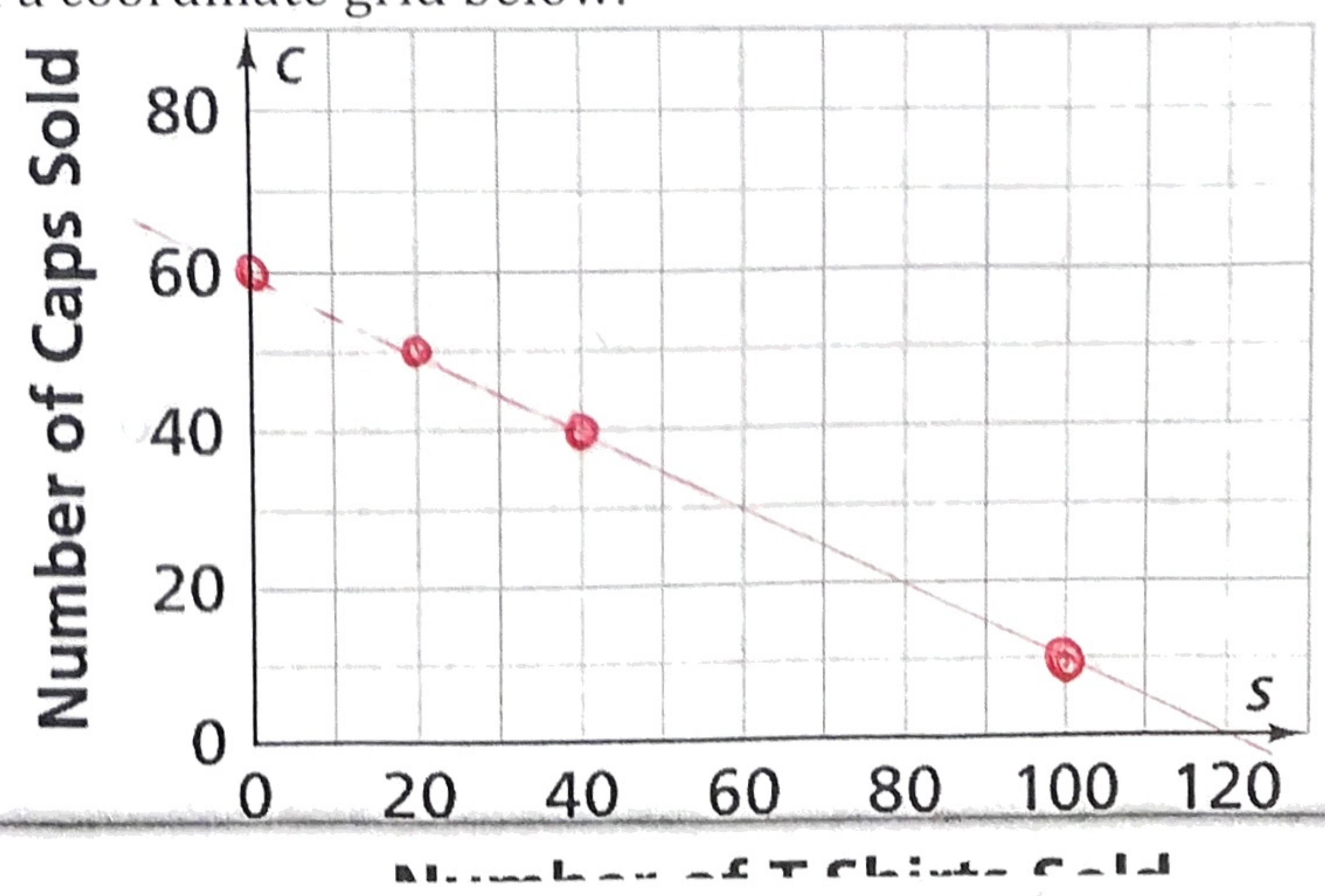
6. Each answer from part (4) can be written as an ordered pair of numbers  $(s, c)$ . List your ordered pairs below and then plot the ordered pairs on a coordinate grid below.

$(100, 10)$   $(40, 40)$

$(20, 50)$   $(0, 60)$

7. Is the graph a linear function? Explain.

Yes the correlation is perfect!  
 $r = -1$





all you have to do to graph

B. For the equation  $4x - 8y = 16$  complete the following:

1. Find the x intercept.  $\leftarrow$  happens when  $y=0$

$$4x - 8(0) = 16$$

$$\frac{4x}{4} = \frac{16}{4} \quad x = 4 \quad (4, 0)$$

2. Find the y intercept.  $\leftarrow$  when  $x=0$

$$4(0) - 8y = 16$$

$$\frac{-8y}{-8} = \frac{16}{-8} \quad y = -2 \quad (0, -2)$$

3. Find another point on the line.

Random choice  $x=1$   
then think  $(1, -3/2)$

$$4(1) - 8y = 16 \quad -8y = 12$$

$$\frac{-8y}{-8} = \frac{12}{-8} \quad y = -\frac{3}{2}$$

4. Graph your 3 points. What type of correlation is shown?

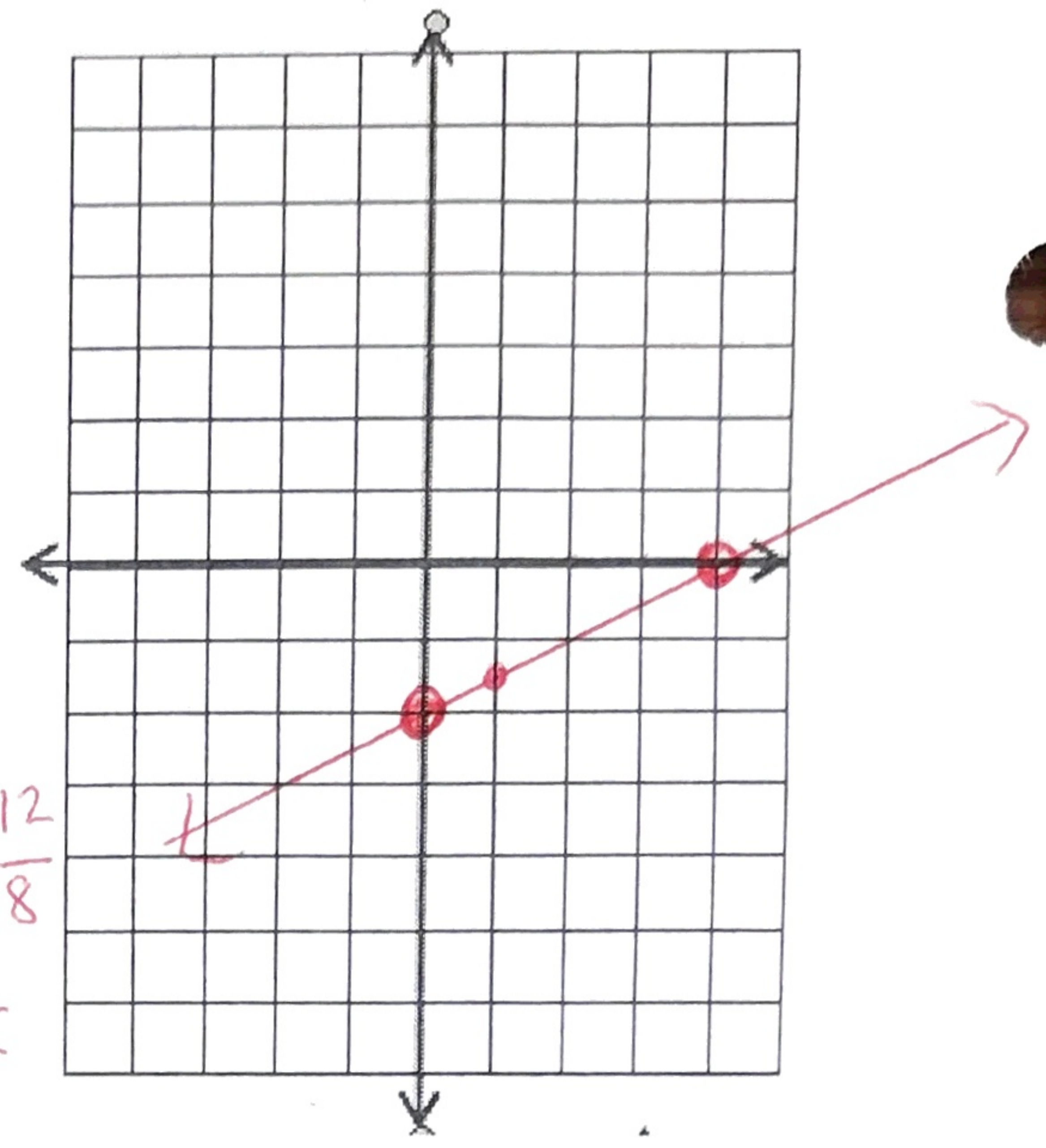
Perfect linear

5. Change the equation to slope intercept form.

$$4x - 8y = 16$$

$$\frac{-8y}{-8} = \frac{-4x + 16}{-8}$$

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



C. The two equations we just looked at are in what is called standard form of a line. Standard form of a line is  $Ax + By = C$  where A, B, and C are all fixed integers. The variables (x and y) are on the same side of the equal sign. Tell if each equation below is in standard form. If not, explain why not.

1.  $3x - 4y = 10$

Yes!

2.  $4.5x + 2y = 6$

No! decimal

3.  $7y + 6x = -9$

Yes! or No! the x & y are switched

4.  $y = 4x + 2$

No! x & y on diff. sides

5.  $\frac{5}{2}x + 3y = 12$

Fraction No!

6.  $6x + 2y = -9$

Yes!

7.  $-2x + 3y = 24$

Yes! or No! standard form can't start w/ a neg.

8.  $13 = 5x - 4y$

Yes!

D. While it is not AS easy to graph from standard form as from slope intercept, it is still is fairly easy to do because the intercepts are very easy to find.

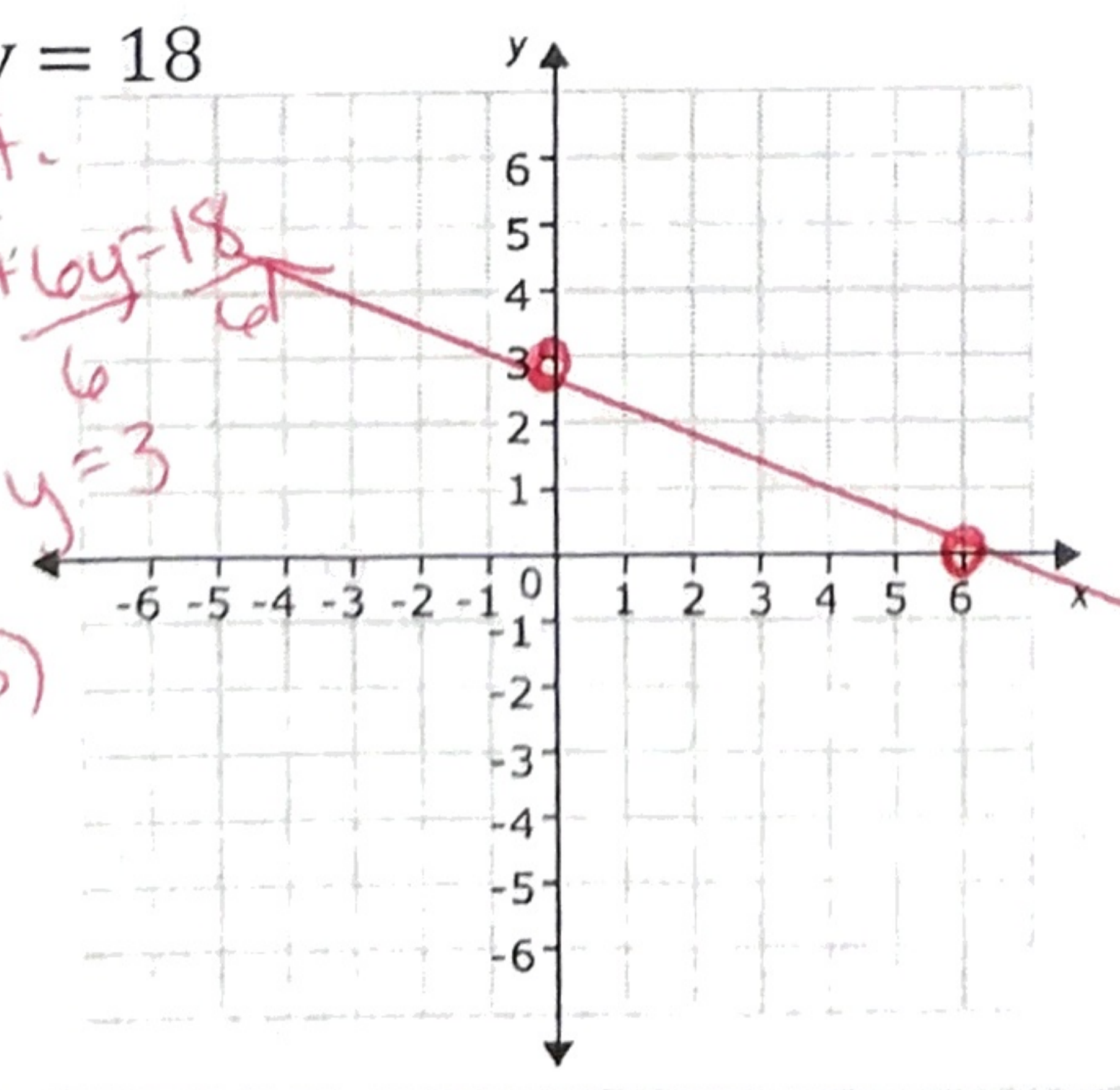
To find the x intercept, substitute  $y=0$  and solve.

To find the y intercept, substitute  $x=0$  and solve.

1. Graph  $3x + 6y = 18$

x int.  $\frac{3x}{3} + \frac{6(0)}{3} = \frac{18}{3}$   
 $x = 6$   
 $(6, 0)$

y int.  $3(0) + \frac{6y}{6} = \frac{18}{6}$   
 $y = 3$   
 $(0, 3)$



2. Graph  $4x - 3y = -12$

x int  $\frac{4x}{4} - \frac{3(0)}{4} = \frac{-12}{4}$   
 $x = -3$   
 $(-3, 0)$

y int.  $4(0) - \frac{3y}{-3} = \frac{-12}{-3}$   
 $y = 4$   
 $(0, 4)$

