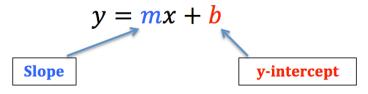
# **6.6 Equation of a Line Given Two Points**

**Remember:** You can write the equation of a line once you know the slope and y-intercept.



# DO IT NOW!

**Instructions:** Write the equation of the following lines:

a) Line with a slope of  $\frac{3}{5}$  that passes through the point B(-5, 4).

$$y = mx + b$$
  
 $4 = (\frac{3}{5})(-5) + b$ 

 $y = \frac{3}{5}x + 7$ 

**b)** Line that is parallel to the line y = 2x - 7 and passes through the point  $(\frac{1}{2}, -\frac{3}{2})$ .

$$y = 2x - 5$$

c) Line that is perpendicular to the line 2x - 2y + 4 = 0 and passes through the point (-2, 5).

**Today's Lesson:** Find the equation of a line given two points on the line.

What do you need to write the equation of a line?

If you are not given the slope of a line, how can you find it?

$$M = \frac{y_2 - y_1}{x_2 - x_1}$$

How can you find the y-intercept?

**Example 1:** Determine the equation of a line that passes through the points M(4, -3) and N(2, 5).

Step 1: Calculate the slope

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-3)}{2 - 4} = \frac{8}{-2} = -4$$

Step 2: Find the y-intercept

$$y = mx + b$$
  
 $5 = (-4)(x) + b$   
 $5 = -8 + b$   
 $5 + 8 = b$   
 $6 = 13$ 

Note: to find the yintercept you can use any point that is on the line for your x and y values.

Step 3: Write the equation of the line

$$y = -4x + 13$$

**Example 2:** Determine the equation of a line that passes through the points P(0, 4) and Q(7, 0).

Step 1: Calculate the slope

$$M = \frac{y_{a} - y_{1}}{x_{a} - x_{1}}$$

$$= \frac{0 - 4}{7 - 0}$$

$$= \frac{-4}{7}$$

Step 2: Find the y-intercept

$$y = nx + b$$
  
 $4 = (-\frac{4}{7})(0) + b$   
 $4 = b$ 

Step 3: Write the equation of the line

$$y = -\frac{4}{7}\chi + 4$$

**Example 3:** Determine the equation of a line that passes through the points A(-4, 2) and B(8, 11).  $\frac{\chi_1}{\chi_1} \frac{y_1}{y_2} \frac{y_2}{y_2}$ 

#### Step 1: Calculate the slope

$$M = \frac{y_{2} - y_{1}}{x_{2} - x_{1}}$$

$$= \frac{11 - 2}{8 - (-4)}$$

$$= \frac{9}{12}$$

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

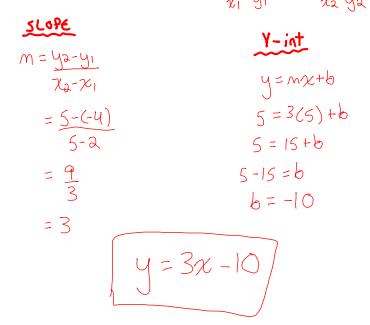
## Step 2: Find the y-intercept

$$y = mx + b$$
  
 $2 = (\frac{3}{4})(-4) + b$   
 $2 = -\frac{12}{4} + b$   
 $2 = -3 + b$   
 $2 + 3 = b$   
 $6 = 5$ 

# Step 3: Write the equation of the line

$$y = \frac{3}{4}x + 5$$

# **Example 4:** On your own determine the equation of the line that passes through the points A(2,-4) and B(5,5)



#### Example 5:

a) An appliance repair company charges \$205 for a repair that takes 3 hours. The same company charges \$505 for a repair that takes 8 hours. Determine an equation that represents the cost of a repair based on the number of hours that the repair takes.

**Hint:** you can write two coordinate points with the information given. (ind. variable, dep. variable)

Point 1: (
$$\frac{x}{3}$$
,  $\frac{x}{3}$ )

Point 2: ( $\frac{x}{3}$ ,  $\frac{x}{3}$ )

Point 3: ( $\frac{x}{3}$ ,  $\frac{x}{3}$ )

Point 3: ( $\frac{x}{3}$ ,  $\frac{x}{3}$ )

 $\frac{x_{3}-y_{1}}{x_{3}-x_{1}}$ 
 $\frac{x_{3}-y_{2}}{x_{3}-x_{1}}$ 
 $\frac{x_{3}-x_{1}}{x_{3}-x_{2}}$ 
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$$y = 60x + 25$$
 or  $cost = 60 (hours) + 25$ 

**b)** What is the cost of a repair that takes 7 hours?  $\chi$ 

c) If a repair costs \$385, how many hours does it take?

$$y = 60x + 35$$
 $385 = 60x + 35$ 
 $385 = 60x$ 
 $360 = 60x$ 
 $60 = 20$ 
 $2 = 60$ 
 $2 = 20$ 
 $2 = 60$ 



## Consolidate:

To write the equation of a line you need the \_\_\_\_\_ and \_\_\_\_ and \_\_\_\_\_ and \_\_\_\_\_.

If you are not given the slope you can find it if you have 2 points on the line by using the

Formula:  $M = \frac{y_2 - y_1}{x_1 - x_2}$