Name: _____   Date: _____

Learning Goal 6.2	Constructing and using the following forms of a linear equation: • Slope – Intercept Form $y = mx + b$, • Slope – Point Form $y - y_1 = m(x - x_1)$, and • General Form $Ax + By + C = 0$.

Warmup

1. Use the slope formula to find the slope of the line through each of the following pairs of points.

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

a. $M\ (\overset{1}{-22}, 56)$ and $N\ (\overset{2}{5}, 17)$ b. $R\ (\overset{2}{8}, 2)$ and $S\ (\overset{1}{-5}, -12)$

$= \dfrac{17 - \boxed{56}}{5 - (-22)}$ *coordinates should stack* $= \dfrac{2 - (-12)}{8 - (-5)}$

$= \dfrac{-39}{27}$ $= \dfrac{14}{13}$

2. Find the slope of a line that is parallel to the line through MN. $\underline{-\ ^{39}/_{27}}$
   ↰ *same slope*

3. Find the slope of a line that is perpendicular to the line through RS. $\underline{-13/14}$
   ↰ *negative reciprocal*

Developing Slope-Point Form

Draw a line though $(-6, -5)$ which has a slope of $\frac{3}{2}$
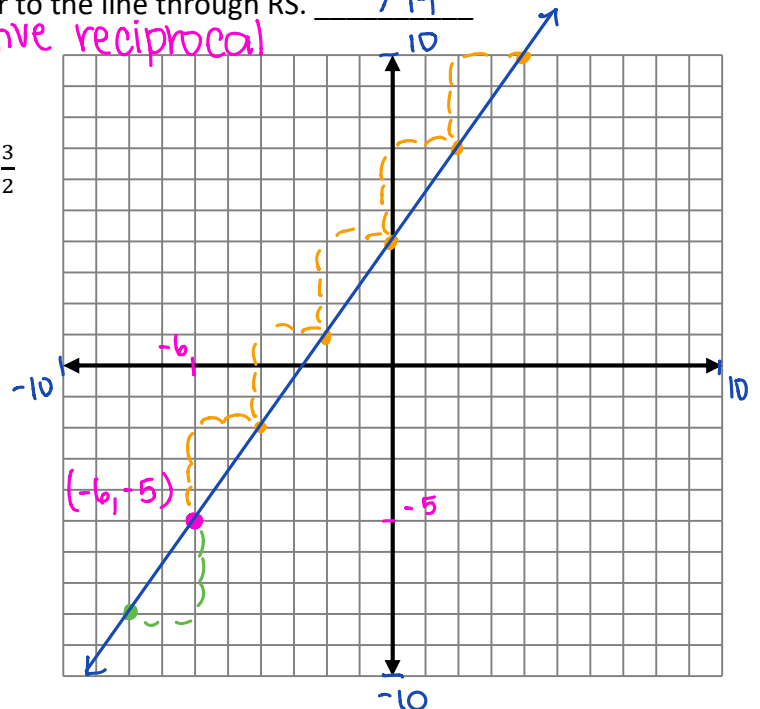
$\dfrac{\text{rise}}{\text{run}} = \dfrac{3}{2} = \dfrac{\overset{x_1,\ y_1}{-3}}{-2}$

Equation of a line in Slope-Point Form
$y - y_1 = m(x - x_1)$ $y - (-5) = \dfrac{3}{2}(x - (-6))$

$y + 5 = \dfrac{3}{2}(x + 6)$

Example Write the equation of the line on the graph in slope point form.   Convert your equation to slope intercept form.

$$\text{slope} = \frac{4}{2} = \frac{4}{2} = \frac{2}{1} = 2$$
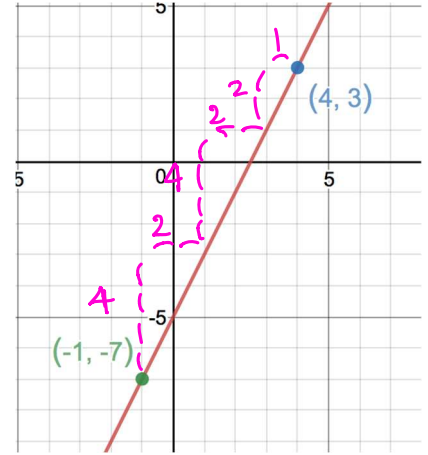
$$y - (-7) = 2(x - (-1))$$
$$y + 7 = 2(x + 1) \leftarrow \text{slope-point} \rightarrow$$
$$y + 7 = 2x + 2$$
$$ -7 -7$$

$$y - (3) = 2(x - (4))$$
$$y - 3 = 2(x - 4)$$
$$y - 3 = 2x - 8$$
$$ +3 +3$$

$$y = 2x - 5 \leftarrow \text{slope-intercept} \rightarrow y = 2x - 5$$

* so it doesn't matter which point you choose!

Example Describe the graph the linear relation given by the equation: $y - 1 = \frac{1}{2}(x + 4)$ then graph the equation.

a line with a slope of $\frac{1}{2}$ and goes through the point $(-4, 1)$

Write the equation of this line in slope-intercept form:

$$y - 1 = \frac{1}{2}(x + 4)$$
$$y - 1 = \frac{1}{2}x + 2$$
$$ +1 \phantom{= \frac{1}{2}x} +1$$
$$y = \frac{1}{2}x + 3$$

Find the x-intercept and y-intercept of the line.

y-int $(x = 0)$
$$y = \frac{1}{2}(0) + 3$$
$$y = 3 \qquad (0, 3)$$
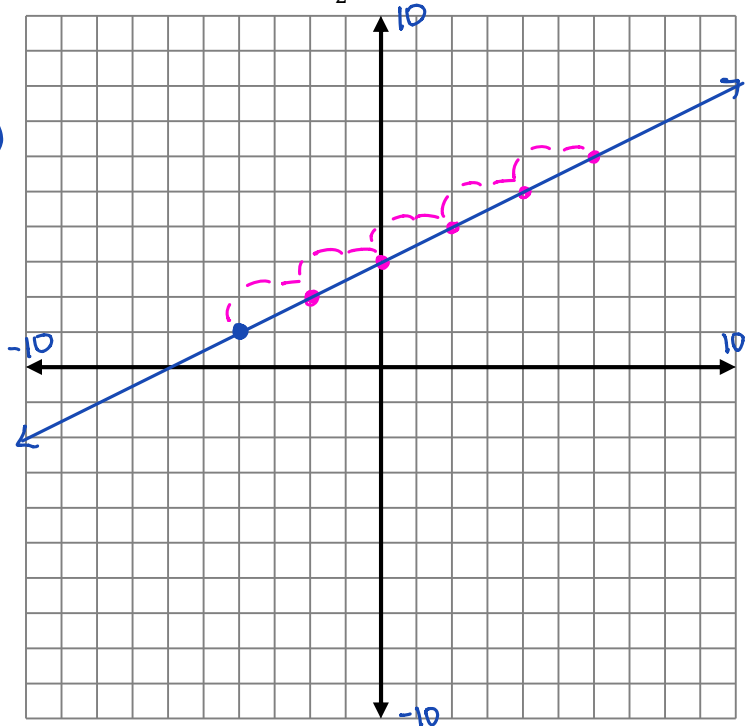
x- int $(y = 0)$
$$0 = \frac{1}{2}x + 3$$
$$-3 \phantom{= \frac{1}{2}x} -3$$
$$2 \times -3 = \frac{1}{2}x \times 2 \qquad (-6, 0)$$
$$-6 = x$$

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Example A line passes through the points (50, 80) and (3, -14). Find the equation of the line. Convert your equation to slope intercept form.

① $Slope = \dfrac{80 - (-14)}{50 - 3}$

$= \dfrac{94}{47}$

$= 2$

② $y + 14 = 2(x - 3)$

or

$y - 80 = 2(x - 50)$

③ $y - 80 = 2(x - 50)$

$y - 80 = 2x - 100$

$+80 \qquad +80$

$y = 2x - 20$

Example Find the equation of a line that passes through (8, 15) and is perpendicular to

$$y = \frac{4}{3}x - 6.$$

Convert your equation in slope-intercept form.

$perpendicular\ slope = -\dfrac{3}{4}$

$y - 15 = -\dfrac{3}{4}(x - 8)$

$y - 15 = -\dfrac{3}{4}(x - 8)$

$y - 15 = -\dfrac{3}{4}x + 6$

$+15 \qquad\qquad +15$

$y = -\dfrac{3}{4}x + 21$

Example Find the equation of a line that passes through (-6, -2) and is parallel to

$$y = \frac{x}{3}.$$

Convert your equation in slope-intercept form.

$parallel\ slope = \dfrac{1}{3}$

$y + 2 = \dfrac{1}{3}(x + 6)$

$y + 2 = \dfrac{1}{3}(x + 6)$

$y + 2 = \dfrac{1}{3}x + 2$

$-2 \qquad\qquad -2$

$y = \dfrac{1}{3}x$

So the original line went through (-6, -2).

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