

You can write an equation for a line if you know two points on the line.

**Step 1:** Use the two points to find the slope.

**Step 2:** Pick one of the points. Substitute the  $x$  and  $y$  from the point with  $m$  from the slope.

**Step 3:** Solve for  $b$ .

**Step 4:** Re-write the equation of the line using the known values for  $m$  and  $b$ .

**Example 1:** Write the equation of the line passing through the points.

a.  $A(2, -5)$  and  $B(-6, 11)$

b.  $A(6, 2)$  and  $B(4, 0)$

**Example 2:** Write the equation of the vertical or horizontal line passing through the points.

a.  $A(3, -2)$  and  $B(3, 4)$

b.  $A(6, 4)$  and  $B(-5, 4)$

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**Standard Form of a Linear Equation**

**$Ax + By = C$**

**$x$ -intercept** – Point where the graph crosses the  $x$ -axis. Substitute **0 in for  $y$**  and solve for  $x$ .

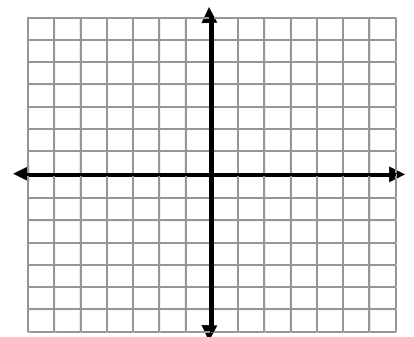
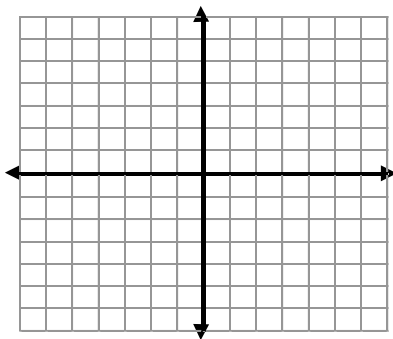
**$y$ -intercept** – Point where the graph crosses the  $y$ -axis. Substitute **0 in for  $x$**  and solve for  $y$ .

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**Example 3:** Graph each equation in standard form by finding the  $x$ -intercept and  $y$ -intercept.

a.  $2x - 4y = 8$

b.  $2y - x = 6$



You can change an equation from slope-intercept form to standard form. If the equation contains fractions or decimals, multiply by the denominator to write the equation using integers.

**Example 4:** Write the equation in standard form using integers.

a.  $y = \frac{3}{4}x + 2$

b.  $y = -\frac{1}{2}x + 9$

You can change an equation from standard form to slope-intercept form.

**Example 5:** Rewrite each equation in slope-intercept form.

a.  $2x + 3y = 9$

b.  $-5x - y = 15$

Suppose you know that a line passes through a point (3, 4) with a slope of 2. You can quickly write an equation of the line using the  $x$ - and  $y$ -coordinates of the point and using the slope.

$$\begin{array}{ccc} y - 4 = 2(x - 3) \\ \swarrow \quad \downarrow \quad \searrow \\ \text{y-coordinate} \quad \text{slope} \quad \text{x-coordinate} \end{array}$$

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### Point-Slope Form of a Linear Equation

$$y - y_1 = m(x - x_1)$$

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**Example 6:** Write the equation of each line in *point-slope form*.

a.  $m = -3$  passing through  $(-1, 7)$

b. passing through  $(-2, 1)$  and  $(3, -4)$

**Homework:** Day 8 Worksheet