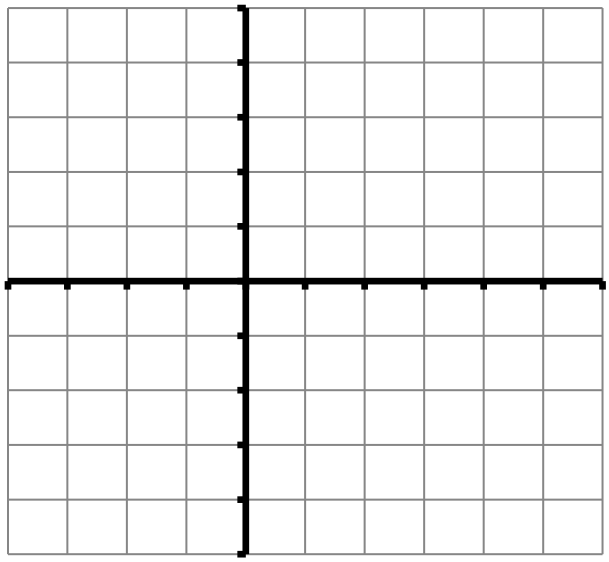
Slope-intercept form:

- $y = mx + b$
- a common way of writing the equation of a line that identifies the slope m and the y-intercept $(0, b)$
- the result of solving a linear equation for the variable y

To graph the equation of a line using slope-intercept form, start by plotting the y-intercept $(0, b)$. Then use the slope of the line to move up or down and left or right to plot a second point. Remember that when graphing a line, only two distinct points are needed.

Example 1: Write the following linear equation in slope intercept form, list the y-intercept and the slope of the line, then graph the line using the y-intercept and the slope (if possible).

$$-x + 3y = 6$$



Example 2: Write the following linear equation in slope intercept form, list the y-intercept and the slope of the line, then graph the line using the y-intercept and the slope (if possible).

$$3x - 7y = 3$$

$$-7y = -3x + 3$$

$$y = \frac{3}{7}x - \frac{3}{7}$$

Having a slope of $\frac{3}{7}$ means that we can start at any point on the graph and move up 3 units and to the right 7 units. However since our y-intercept is the point $\left(0, -\frac{3}{7}\right)$, we cannot use it as a starting point. Therefore we need to find a point that we can use as a starting point, and to do so, I'm going to find the x-intercept to see if it's useable:

$$3x - 7y = 3$$

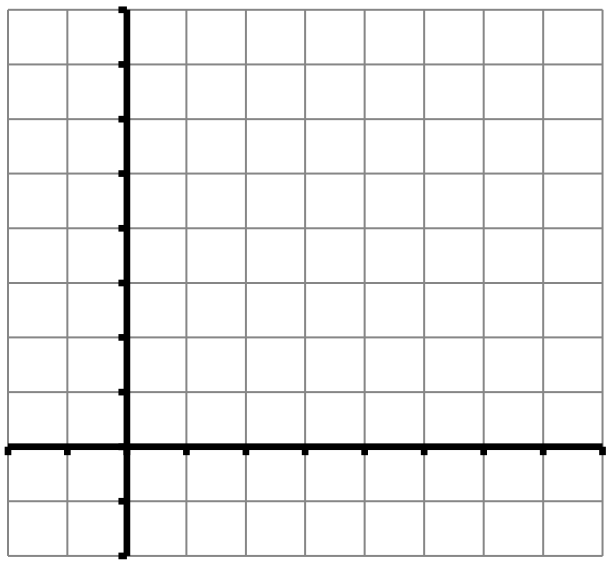
$$3x - 7(0) = 3$$

$$3x = 3$$

$$x = 1$$

$$(1, 0)$$

An x-intercept of $(1, 0)$ is a useable point, so I'll start by plotting the point $(1, 0)$, and then use the slope of $\frac{3}{7}$ to rise 3 units and run 7 units in order to get to my second point of $(8, 4)$.



Example 3: Write the following linear equation in slope intercept form, list the y-intercept and the slope of the line, then graph the line using the y-intercept and the slope (if possible).

$$7x - 3y = 4$$

$$-3y = -7x + 4$$

$$y = \frac{7}{3}x - \frac{4}{3}$$

It is okay for the slope to be a fractional value because the numerator simply tells us how far up or down we're going to move from one point to another, and the denominator tells us how far left or right we're going to move. However we need to have a point to start from. The y-intecept in this linear equation is $-\frac{4}{3}$, which is not an integer, so we can't graph it. So instead I'll find the x-intercept and try to use it.

x-intercept ($y = 0$):

$$7x - 0 = 4$$

$$7x = 4$$

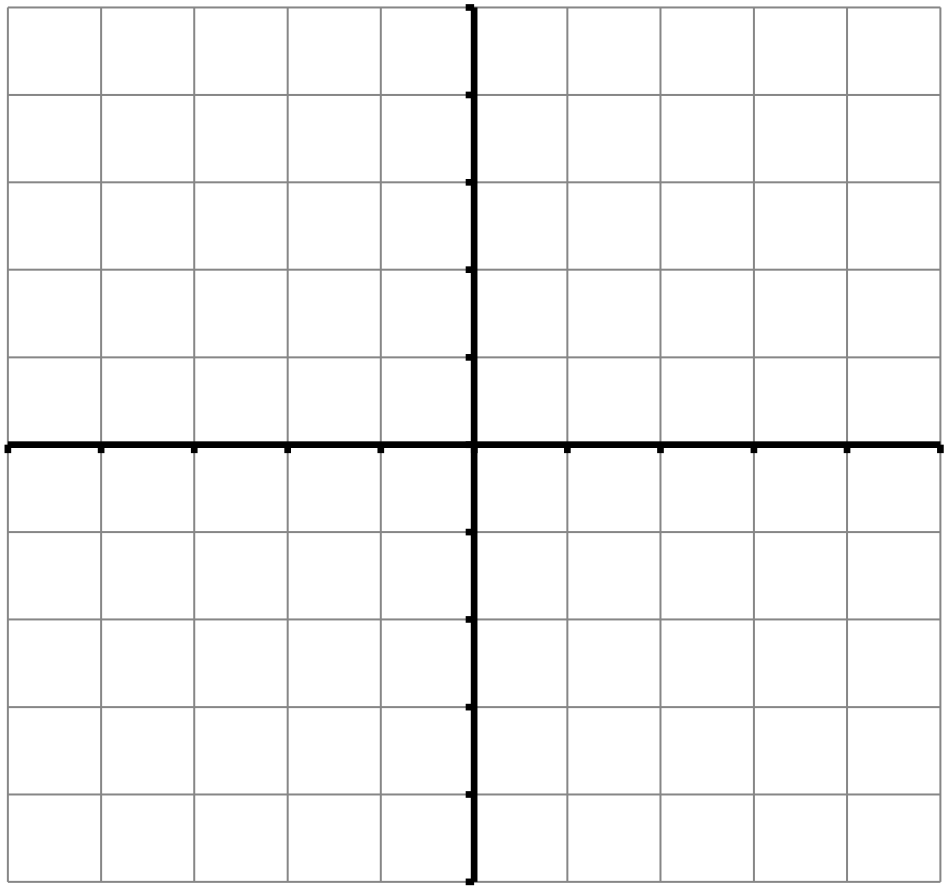
$$x = \frac{4}{7}$$

$$\left(\mathbf{\frac{4}{7}}, \mathbf{0}\right)$$

Since I can't use the x-intercept either, I'm going to have to find another point using an input/output table:

$$y = \frac{7}{3}x - \frac{4}{3}$$

Inputs	**Outputs**	**Ordered Pairs**
x	y	(x, y)
1	$y = \frac{7}{3}(1) - \frac{4}{3}$ $y = \frac{3}{3}$ $y = 1$	$(1, 1)$



<u>Again, keep in mind that any ordered pairs (intercepts included) must have integer coordinates in order to plot them.</u>