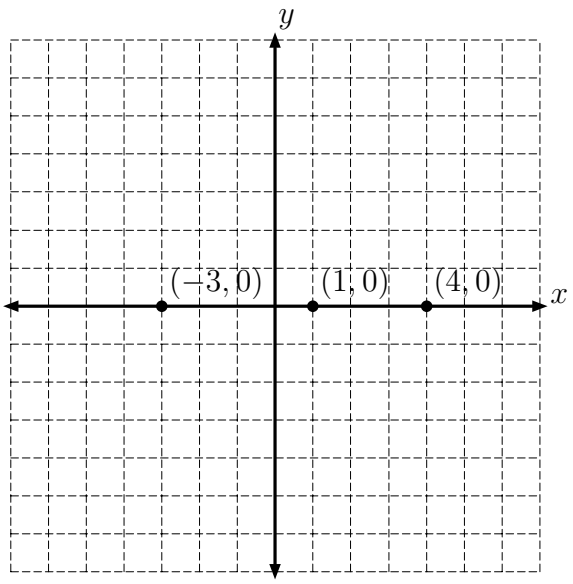
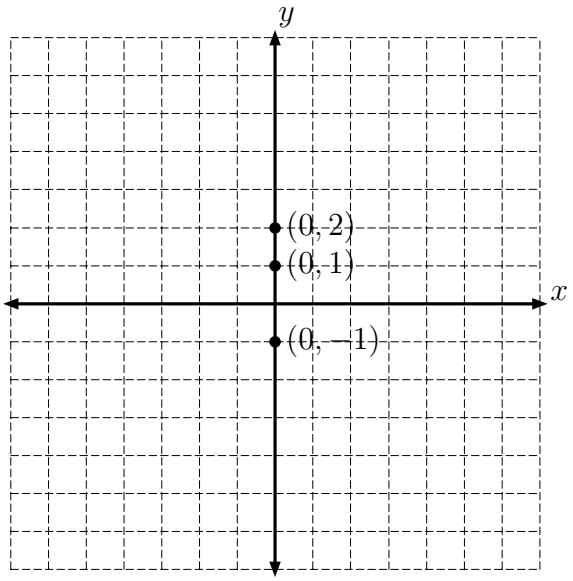
WILLIAM D. LAW, JR. LEARNING COMMONS

Finding x and y Intercepts

The *x*-intercept is the point at which a graph crosses the *x*-axis. As the *y* value is zero anywhere along the *x*-axis, the *x*-intercept is an ordered pair of numbers where the *y* value is always zero. The points (–3, 0), (1, 0), (4, 0) are all examples of points on the *x*-axis.



The *y*-intercept is the point at which a graph crosses the *y*-axis. As the *x* value is zero anywhere along the *y*-axis, the *y*-intercept is an ordered pair of numbers where the *x* value is always zero. The points (0, 1), (0, –1), and (0, 2) are all examples of points on the *y*-axis.



It is possible to graph the equation of a line by finding the *x*- and *y*-intercepts.

EXAMPLE: We will graph the equation $3x + 2y = 12$ by finding the x- and y-intercepts.

1. To find the x-intercept, let $y = 0$ and solve for x.

$$\begin{aligned} 3x + 2y &= 12 \\ 3x + 2(0) &= 12 \\ 3x &= 12 \\ x &= 4 \end{aligned}$$

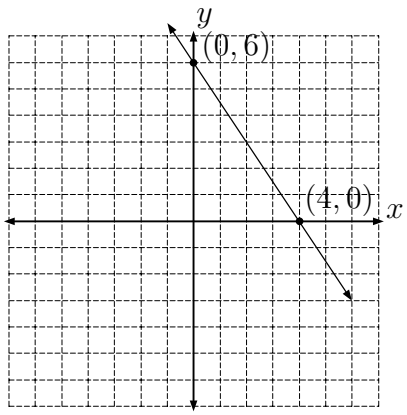
The x-intercept is the ordered pair (4, 0).

2. To find the y-intercept, let $x = 0$ and solve for y.

$$\begin{aligned} 3x + 2y &= 12 \\ 3(0) + 2y &= 12 \\ 2y &= 12 \\ y &= 6 \end{aligned}$$

The y-intercept is the ordered pair (0, 6).

3. Graph the ordered pairs and draw the line.



EXAMPLE: Find the x- and y-intercepts of $y = 2x + 6$ and graph.

1. Find the x-intercept. (y will be 0)

$$\begin{aligned} y &= 2x + 6 \\ 0 &= 2x + 6 \\ -6 &= 2x \\ -3 &= x \end{aligned}$$

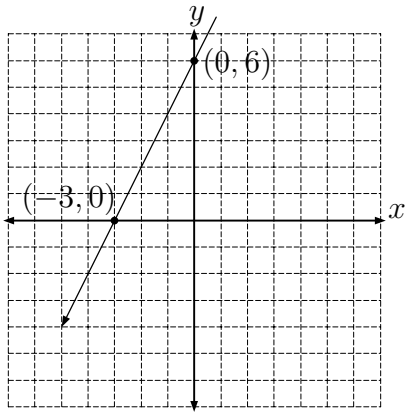
The x-intercept is (–3, 0).

2. Find the y-intercept. (x will be 0)

$$\begin{aligned} y &= 2x + 6 \\ y &= 2(0) + 6 \\ y &= 6 \end{aligned}$$

The y-intercept is (0, 6).

3. Graph the intercepts and draw the line.



EXAMPLE: Find the x- and y-intercepts of $3x + 4y = 0$ and graph.

1. Find the x-intercept (set $y = 0$)

$$\begin{aligned} 3x + 4y &= 0 \\ 3x + 4(0) &= 0 \\ 3x &= 0 \\ x &= 0 \end{aligned}$$

The x-intercept is (0, 0).

2. Find the y-intercept (set $x = 0$)

$$\begin{aligned} 3x + 4y &= 0 \\ 3(0) + 4y &= 0 \\ 4y &= 0 \\ y &= 0 \end{aligned}$$

The y-intercept is (0, 0).

NOTE that the x- and y-intercept are <u>both</u> at the point (0, 0). This means that the line goes through the origin. We will need to find another point in order to graph. Pick a value for x and solve for y.

Let's see what happens if we let $x = 4$ after writing the equation in the $y = mx + b$ form. (See handout #43)

Solve for y:

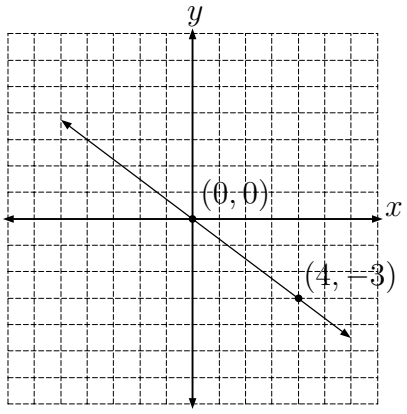
$$\begin{aligned} 3x + 4y &= 0 \\ 4y &= -3x + 0 \\ \frac{4y}{4} &= \frac{-3x}{4} \\ y &= -\frac{3}{4}x \end{aligned}$$

Now let $x = 4$:

$$\begin{aligned} y &= -\frac{3}{4}(4) \\ y &= -3 \end{aligned}$$

The point (4, –3) is a solution of $3x + 4y = 0$

3. Graph the x- and y-intercept and the point (4, –3), and then draw the line.

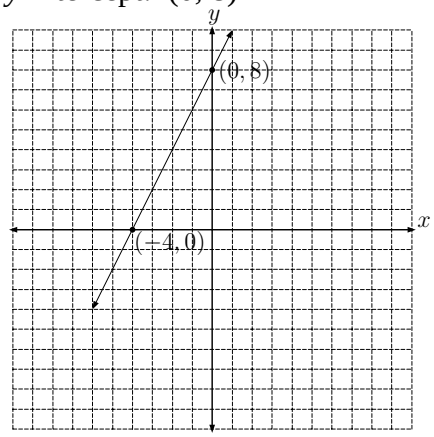


EXERCISES: Find the *x*- and *y*-intercepts of the following equations and graph the line of each equation.

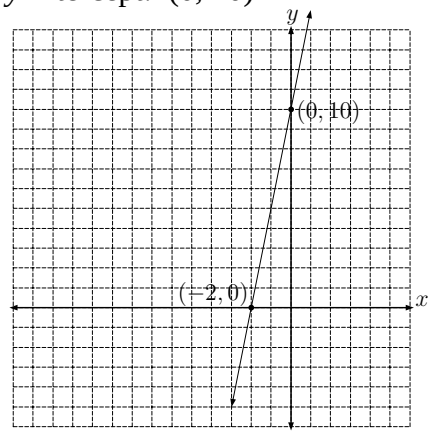
a. $y = 2x + 8$ b. $y = 5x + 10$ c. $x - 3y = 6$
d. $3x - 4y = 12$ e. $2x - 4y = 8$ f. $2x + 3y = 0$

KEY:

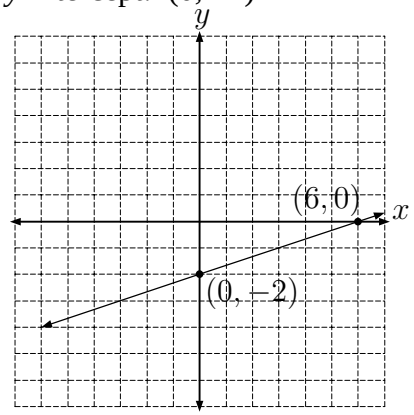
a. *x*-intercept: (–4, 0)
y-intercept: (0, 8)



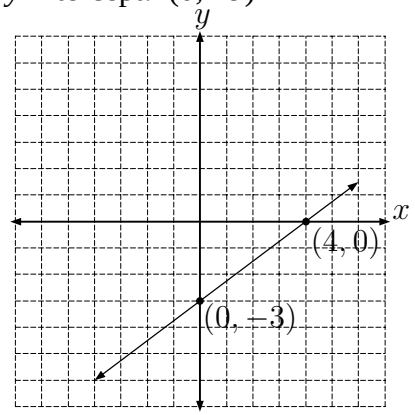
b. *x*-intercept: (–2, 0)
y-intercept: (0, 10)



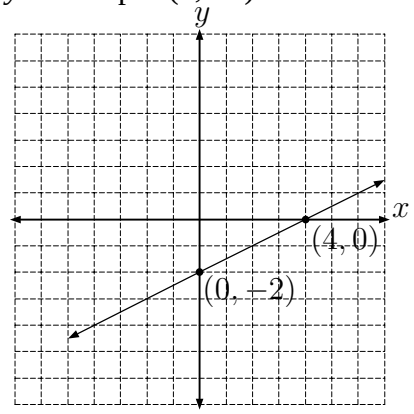
c. *x*-intercept: (6, 0)
y-intercept: (0, –2)



d. *x*-intercept: (4, 0)
y-intercept: (0, –3)



e. *x*-intercept: (4, 0)
y-intercept: (0, –2)



f. *x*-intercept: (0, 0)
y-intercept: (0, 0)

You will need another point to complete the graph.