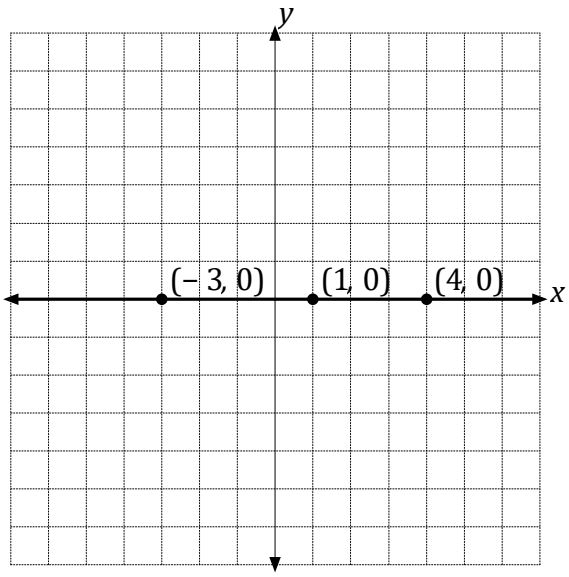
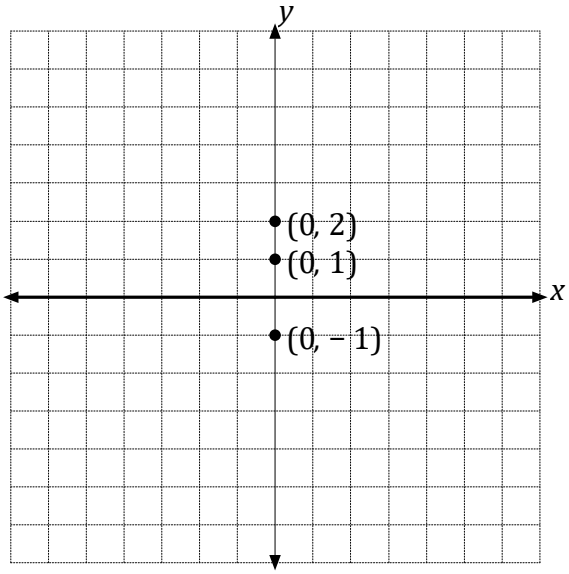
Finding x and y Intercepts

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.

$$3x + = 2y\ 12$$
$$3x + 2(0)\ 1 = 2$$
$$3x = 12\ x =$$
$$4$$

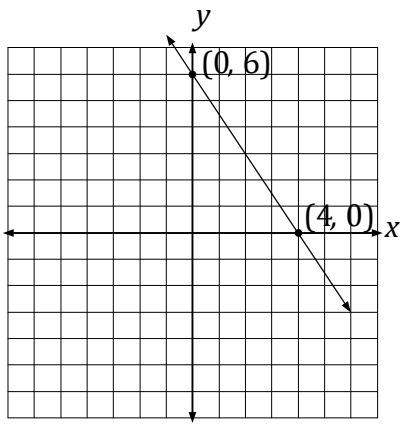
The x-intercept is the ordered pair (4, 0).

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

$$3x + 2y = 12$$
$$3(0) + 2y = 12$$
$$2y = 12$$
$$y = 6$$

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)

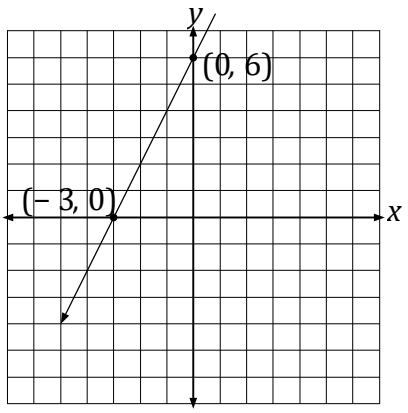
$$y = +2x\ 6$$
$$0 = +2x\ 6$$
$$- = 62x$$
$$- = 3\ x$$

x-intercept is $(-3, 0)$.

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

$$y = 2x + 6$$
$$y = 2(0) +$$
$$6\ y = 6$$

The y-intercept is (0, 6). The



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 $y = 0$)

$$3x + 4y = 0$$
$$3x + 4(0) = 0$$
$$3x = 0$$
$$x = 0$$

The x-intercept is (0, 0).

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

$$3x + 4y = 0$$
$$3(0) + 4y = 0$$
$$4y = 0$$
$$y = 0$$

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:

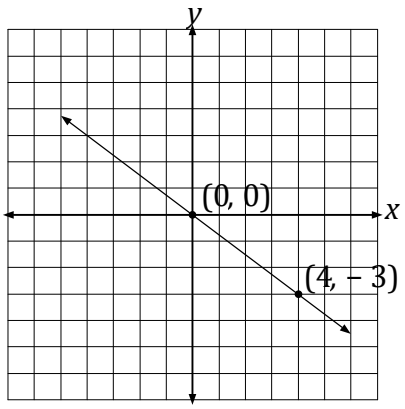
$$3x + 4y = 0$$
$$4y = -3x + 0$$
$$\frac{4y}{4} = \frac{-3x}{4}$$
$$y = -\frac{3}{4}x$$

Now let $x = 4$:

$$0 = 3y - (4)$$
$$y = -3$$

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.

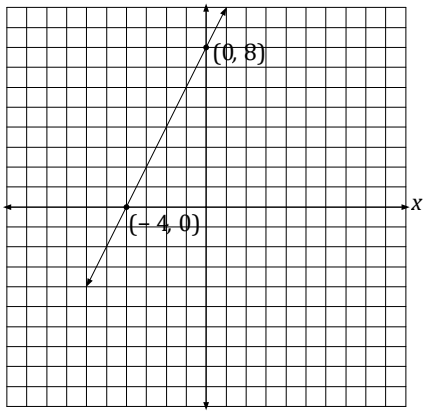


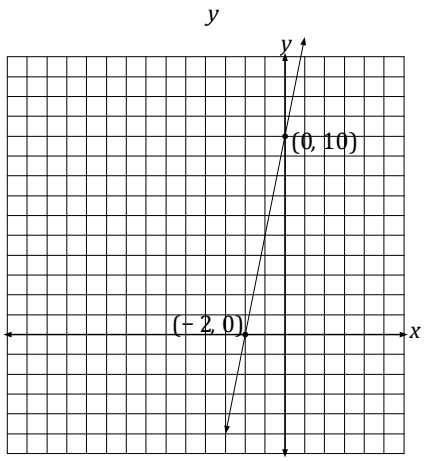
EXERCISES: Find the x- and y-intercepts of the following equations and graph the line of each equation.

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: $(-4, 0)$ b. x-intercept: $(-2, 0)$

y-intercept: $(0, 8)$ y-intercept: $(0, 10)$





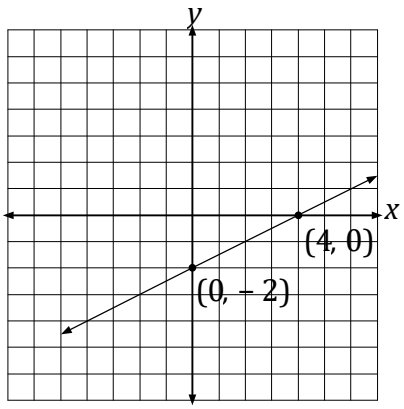
c. x-intercept: $(6, 0)$ y-intercept: $(0, -2)$

y

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

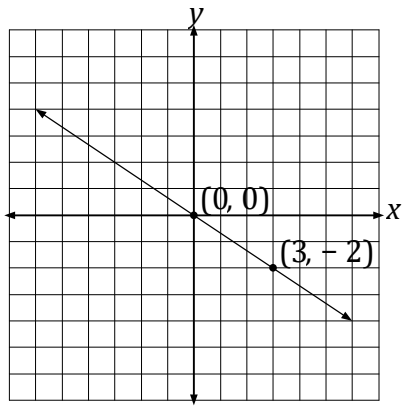
y

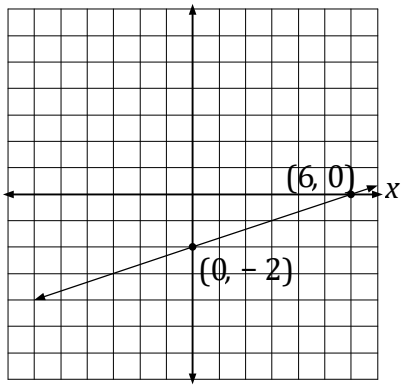
e. x-intercept: $(4, 0)$ y-intercept: $(0, -2)$

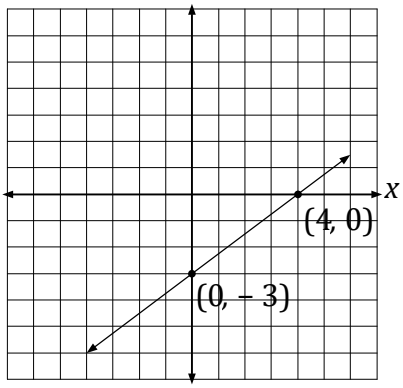


f. x-intercept: $(0, 0)$
y-intercept: $(0, 0)$

You will need another point to complete the graph.




(6, 0)
x
(0, − 2)


x
(4, 0)
(0, − 3)