6.3 Graphing Using Intercepts

What are the x and y intercepts of the following line:
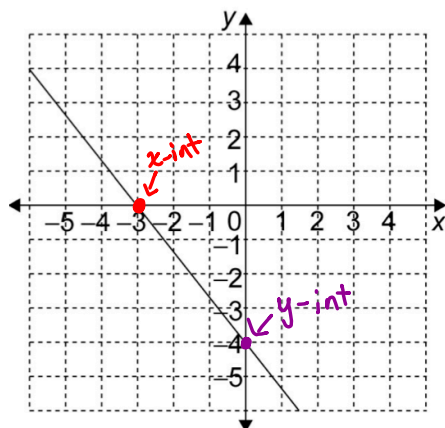
x-intercept:___(-3,0)___

y-intercept:___(0,-4)___

When a line is written in standard form, $Ax + By + C = 0$, or

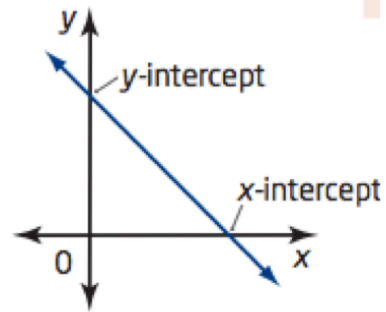the form $Ax + By = -C$, it is easy to graph the line using

___x and y-intercepts___.

The **x-intercept** is the x-coordinate of the point where the line crosses the x-axis.

At the x-intercept, $\underline{y = 0}$.

The **y-intercept** is the y-coordinate of the point where the line crosses the y-axis.

At the y-intercept, $\underline{x = 0}$.

Example 1:
Determine the intercepts for the line $2x - 3y - 6 = 0$ and use these points to graph the line.

To find the x-intercept, set $y = 0$ and solve:

$$2x - 3(0) - 6 = 0$$
$$2x - 6 = 0$$
$$\frac{2x}{2} = \frac{6}{2}$$
$$x = \frac{6}{2}$$
$$x = 3$$

$x\text{-int}: (3, 0)$

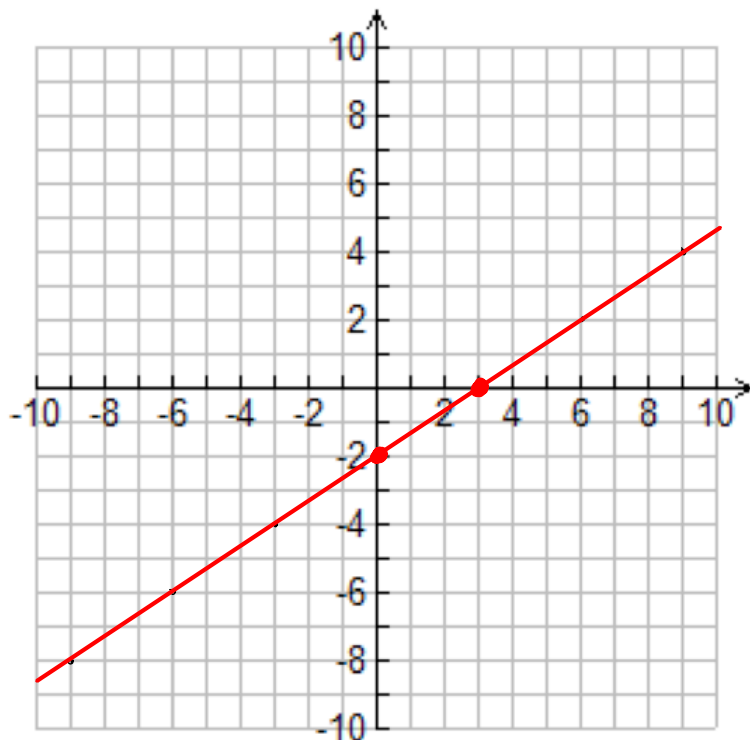**To find the y-intercept, set $x = 0$ and solve:**

$$2(0) - 3y - 6 = 0$$
$$-3y - 6 = 0$$
$$\frac{-3y}{-3} = \frac{6}{-3}$$
$$y = \frac{6}{-3}$$
$$y = -2$$

$y\text{-int}: (0, -2)$

Example 2:

Determine the intercepts for the line $2x - y = 7$ and use these points to graph the line.

To find the x-intercept, set $y=0$ and solve:

$$2x - 0 = 7$$

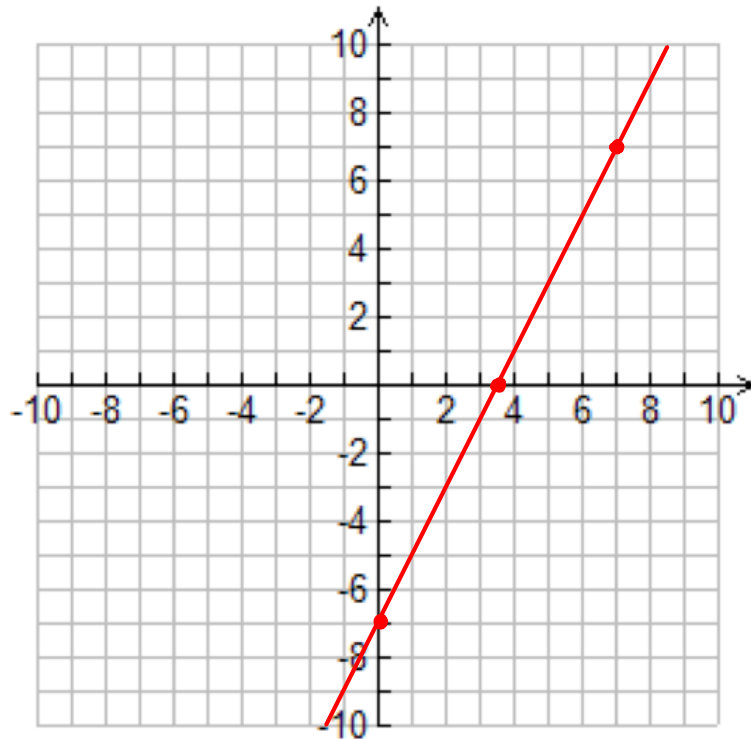$$2x = 7$$

$$x = \frac{7}{2}$$

$$x = 3.5$$

x-int: $(3.5, 0)$

To find the y-intercept, set $x = 0$ and solve:

$$2(0) - y = 7$$

$$-y = 7$$

$$y = -7$$

y-int: $(0, -7)$

Example 3:

a) Determine the intercepts for the line $5x - 6y + 30 = 0$.

$\underset{\sim\sim\sim}{x\text{-int}}$

$5x - 6(0) + 30 = 0$

$5x + 30 = 0$

$5x = -30$

$x = \dfrac{-30}{5}$

$x = -6$

$\underset{\sim\sim\sim}{y\text{-int}}$

$5(0) - 6y + 30 = 0$

$-6y + 30 = 0$

$-6y = -30$

$y = \dfrac{-30}{-6}$

$y = 5$

b) Use the intercepts to determine the slope of the line.

$\overset{x_1 \quad y_1}{\text{Point 1: } (-6, 0)}$

$\underset{x_2 \quad y_2}{\text{Point 2: } (0, 5)}$

Remember:

Slope $= \dfrac{y_2 - y_1}{x_2 - x_1}$

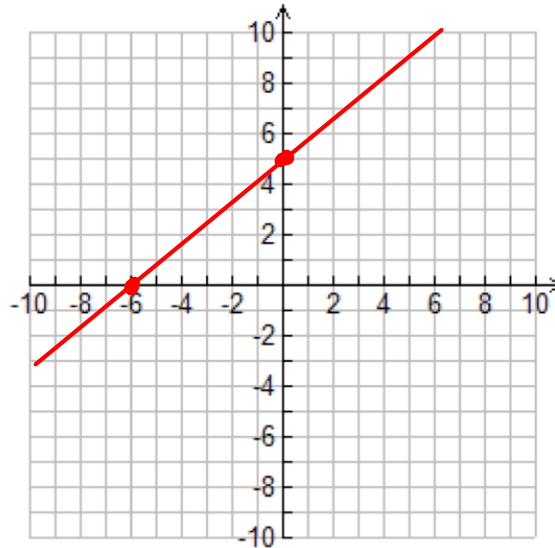$m = \dfrac{5 - 0}{0 - (-6)} = \dfrac{5}{6}$

c) Write the equation of the line

$m = \frac{5}{6}$

$b = 5$

$$y = \frac{5}{6}x + 5$$

d) Graph the line

Example 4: Determine the slope of the line whose x-intercept is -4 and y-intercept is -6.

Point 1: $(\overset{x_1}{-4}, \overset{y_1}{0})$

Point 2: $(\underset{x_2}{0}, \underset{y_2}{-6})$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - 0}{0 - (-4)} = \frac{-6}{4} = \frac{-3}{2}$

Consolidate:
State the steps needed to graph a line using the intercepts.

1) Solve for they y-intercept be setting $x = 0$

2) Solve for they x-intercept be setting $y = 0$

3) Plot the intercepts and draw a straight line through them