

Slope

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\begin{matrix} (3, 2) & (-5, 12) \\ x_1 & y_1 & x_2 & y_2 \end{matrix}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{12 - 2}{-5 - 3} = \frac{10 \div 2}{-8 \div 2} = -\frac{5}{4}$$

$$-\frac{5}{4} = \frac{\text{down } 5}{4 \text{ right}}$$

$$\begin{matrix} \downarrow \\ (-4, 3) & (2, -9) \end{matrix}$$

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-9 - 3}{2 - (-4)} = \frac{-9 - 3}{2 + 4} = \frac{-12}{6} = \boxed{-2}$$

slope-intercept
 \downarrow \downarrow
 m b

form
 $y = m x + b$

$$m = \text{slope} = \frac{3}{2}$$

$$y\text{-int} = b = 6$$

$$y = \frac{3}{2}x + 6$$

$$\text{slope} = -\frac{8}{9}$$

$$y\text{-int} = -3$$

$$y = -\frac{8}{9}x - 3$$

$(-1, 7)$ $(3, -5)$ Find the equation for the line that goes through the following points.

1.) Find slope.

$$\text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5 - 7}{3 - (-1)} = \frac{-5 - 7}{3 + 1} = \frac{-12}{4} = \boxed{-3}$$

$$\boxed{m = -3}$$

2.) Use slope and a point to find b

$$y = mx + b$$

↓ ↓ ↓

$$-5 = (-3)(3) + b$$

$$-5 = -9 + b$$

+9 +9

$$\boxed{4 = b}$$

$(3, -5)$

$$\boxed{x = 3} \quad \boxed{y = -5}$$

3.) Plug into $y = mx + b$

$$\boxed{y = -3x + 4}$$

$(-2, 9)$ $(6, 5)$ Find the equation.

1.) Find the slope

$$\text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 9}{6 - (-2)} = \frac{5 - 9}{6 + 2} = \frac{-4}{8} = \left(-\frac{1}{2}\right)$$

$$m = -\frac{1}{2}$$

2.) Find b

$$y = mx + b$$

$$(6, 5) \quad x = 6 \quad y = 5$$

$$5 = \left(-\frac{1}{2}\right)(6) + b$$

$$5 = -3 + b$$

$$b = 8$$

3.) $y = mx + b$

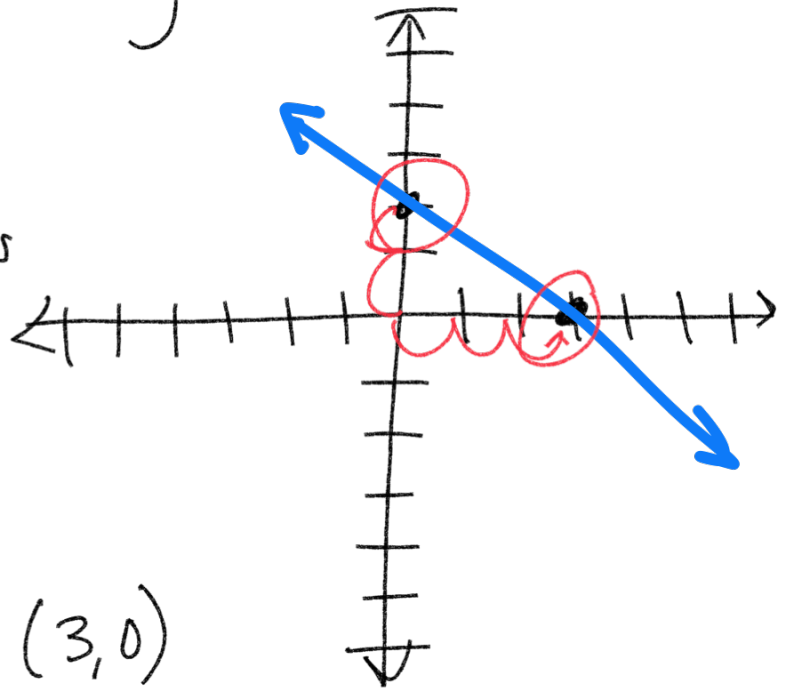
$$y = -\frac{1}{2}x + 8$$

Standard Form

$$Ax + By = C$$

$$2x + 3y = 6$$

Graph the intercepts



~~$2x + 3y = 6$~~
 $\frac{3y}{3} = \frac{6-2x}{3}$
 $y = 2 - \frac{2}{3}x$
 $(0, 2)$

~~$2x + 3y = 6$~~
 $\frac{2x}{2} = \frac{6-3y}{2}$
 $x = 3 - \frac{3}{2}y$
 $(3, 0)$
 $\frac{2x}{2} = \frac{6}{2}$
 $x = 3$

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

slope-intercept $y = \left(\frac{-2}{3}\right)x + 2$
↑ slope ↑ y-int

$$2x - 8y = 16$$

$$\cancel{2x} - 8y = 16$$
$$X = 0 \quad \frac{-8y}{-8} = \frac{16}{-8}$$

$$y = -2$$

(0, -2)

$$2x - \cancel{8y} = 16 \quad (8, 0)$$

$$y = 0 \quad \frac{2x}{2} = \frac{16}{2}$$

$$x = 8$$

