Linear Equations

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

subtract y's on top

subtract x's in same order on bottom

Ex. Find the slope of the line containing $(-2,5)$ and $(3,7)$.

x y

x y

$$\frac{5-7}{-2-3} = \frac{-2}{-5} = \boxed{\frac{2}{5}}$$

Ex. Find the slope of the line containing $(3, -4)$ and $(-2, 5)$.

$x \quad y \qquad\qquad x \quad y$

$$\frac{-4-5}{3-(-2)} = \frac{-9}{5}$$

Slope- Intercept Form:

$y = mx + b$

m* = *slope

b* = *the y-intercept

Ex. Find the slope of the line $y = 5x - 11$.

slope = 5

Ex. Find the slope of the line $3x - 4y = 5$.

$-3x \qquad -3x$

$-4y = -3x + 5$

$\frac{-4y}{-4} = \frac{-3x}{-4} + \frac{5}{-4}$

$y = \frac{3}{4}x - \frac{5}{4}$

slope = $\frac{3}{4}$

Point-Slope Form of a Line:

$$y - y_1 = m(x - x_1)$$

m* = *slope

(x_1, y_1) ***is a point on the line***

Ex. Write the equation of the line with slope $m = -\frac{2}{3}$ that passes through the point (6,8).

$$y - y_1 = m(x - x_1)$$

$$y - 8 = -\frac{2}{3}(x - 6)$$

Ex. Find the equation of the line containing $(\underset{x}{8},\underset{y}{2})$ and $(\underset{x}{3},\underset{y}{-1})$.

$$\text{slope} = \frac{-1-2}{3-8} = \frac{-3}{-5} = \frac{3}{5}$$

$(8, 2)$

$$y - y_1 = m(x - x_1)$$

$$\boxed{y - 2 = \frac{3}{5}(x - 8)}$$

Pract.

1. Find the slope of the line containing $(2,3)$ and $(5,1)$.

$x \quad y \qquad\qquad x \quad y$

$$\frac{1-3}{5-2} = \frac{-2}{3}$$

2. Find the equation of the line from Problem 1.

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

3. Find the equation of the line with slope $m = -3$ that passes through $(-1,7)$.

$$y-7 = -3(x-(-1))$$