

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

Point-Slope Form of a linear equation:

$$y - y_1 = m(x - x_1) \quad (x_1, y_1) \\ m = \text{slope}$$

Example 1: Write an equation in point-slope form of the line with the following:

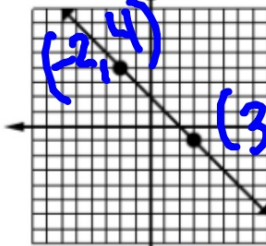
a) slope = $\frac{1}{2}$, has point (4, 2)

$$m \quad (x_1, y_1) \\ y - 2 = \frac{1}{2}(x - 4)$$

b) through points (3, -2) and (1, -3)

$$m = \frac{-3 - (-2)}{1 - 3} = \frac{-1}{-2} = \frac{1}{2} \quad y + 3 = \frac{1}{2}(x) \\ y - (-3) = \frac{1}{2}(x - 1)$$

c)



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

d) through points (-1, -2) and (2, 4)

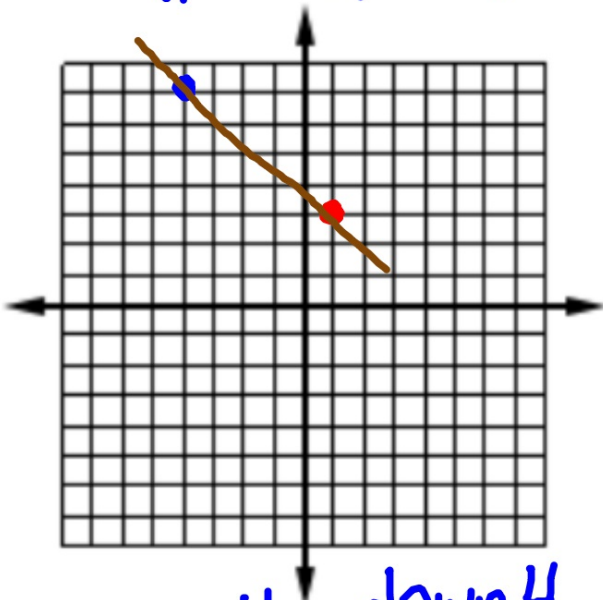
$$m = \frac{-1 - 4}{3 - (-2)} = \frac{-5}{5} = -1$$

$$y + 2 = 2(x + 1) \\ y - 4 = 2(x - 2)$$

$$m = \frac{4 - (-2)}{2 - (-1)} = \frac{6}{3} = 2$$

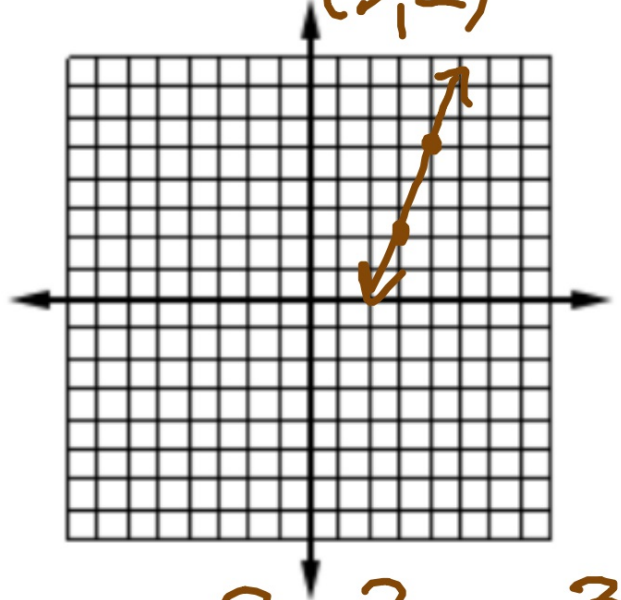
Example 2: Graph the following lines:

a) $y - 7 = -\frac{4}{5}(x + 4)$ $(-4, 7)$
 $-y_1$ $-x_1$



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

b) $y - 2 = 3(x - 3)$ $(3, 2)$



$$m = 3 = \frac{3}{1} = \frac{\text{up } 3}{\text{right } 1}$$

Example 3: Rewrite the following equations in slope intercept form:

a) $y+1 = -\frac{1}{3}(x-9)$

$$y = mx + b$$

b) $y-10 = 3\left(x + \frac{2}{3}\right)$

$$y+1 = -\frac{1}{3}x + 3$$

$$\boxed{y = -\frac{1}{3}x + 2}$$

$$y = 3x + 12$$

Summary: