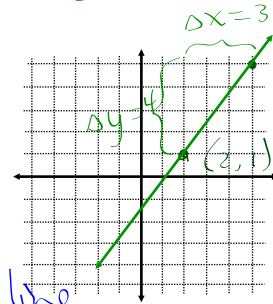


6.5 Point-Slope Form

Find the equation of the line that passes through $(2, 1)$ with $m = \frac{4}{3} = \frac{\Delta y}{\Delta x}$

$$y = mx + b$$



or use Point-Slope Form

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

where (x_1, y_1) is ^{any} point on the line

$$\therefore y - 1 = \frac{4}{3}(x - 2)$$

Ex. Identify the slope and a point on the following line: $y + 3 = -\frac{3}{5}(x - 2)$

$$m = -\frac{3}{5}$$

$$\left. \begin{array}{l} x_1 = 2 \\ y_1 = -3 \end{array} \right\} (2, -3)$$

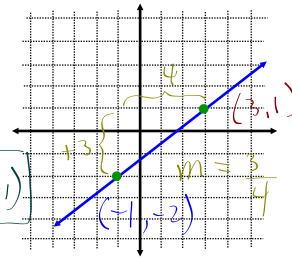
Note: the signs are always opposite

Ex. Write the equation of this line in point-slope form and in slope-intercept form.

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

$$y - (-2) = \frac{3}{4}(x - (-1)) \Rightarrow y + 2 = \frac{3}{4}(x + 1)$$

$$\text{or } y - 1 = \frac{3}{4}(x - 3)$$



$y = mx + b$... use $m = \frac{3}{4}$ and $(3, 1)$ to get b value
 \rightarrow so sub in $(3, 1)$ for x and y and solve for b .

$$y = mx + b$$

$$1 = \frac{3}{4}(3) + b$$

$$1 = \frac{9}{4} + b$$

$$1 - \frac{9}{4} = b$$

$$\frac{4}{4} - \frac{9}{4} = b$$

$$b = -\frac{5}{4}$$

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

Ex. Write the equation of the line (in point-slope form and in slope-intercept form) that passes through (2, -3) and

a) is parallel to $y = \frac{2}{3}x + 7$
 $m = \frac{2}{3}$

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

$$(x_1, y_1) = (2, -3)$$

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

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

$$y = mx + b$$

use $m = \frac{2}{3}$ and $(2, -3)$

$$-3 = \frac{2}{3}(2) + b$$

$$-3 = \frac{4}{3} + b$$

$$\frac{-9}{3} - \frac{4}{3} = b$$

$$b = \frac{-13}{3}$$

$$y = \frac{2}{3}x - \frac{13}{3}$$

b) is perpendicular to $y = \frac{2}{3}x + 7 \Rightarrow m_{\perp} = -\frac{3}{2}$

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

use $(2, -3)$ and $m = -\frac{3}{2}$ in

$$y = mx + b$$

$$-3 = -\frac{3}{2}(2) + b$$

$$-3 = -3 + b$$

$$0 = b$$

$\therefore y = mx + b$ becomes

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