

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

3.6 Point-Slope Form

point slope form → uses the form $y - y_1 = m(x - x_1)$ where m is the slope and (x_1, y_1) is a point on the line (graph)

↑ can change based on the ordered pair.

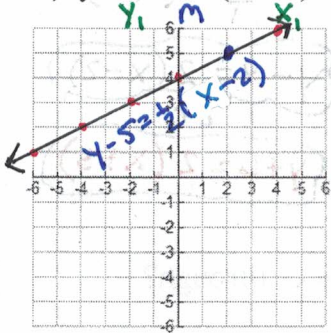
▪ slope (m) is represented by $\frac{\text{rise}}{\text{run}}$ (for a graph) or $m = \frac{y_2 - y_1}{x_2 - x_1}$ (for two points)

▪ (x_1, y_1) represents a point on the line.

* Slope should always be a reduced fraction.

Example 1: Graph each equation that's in point slope form.

a.) $y - 5 = \frac{1}{2}(x - 2)$

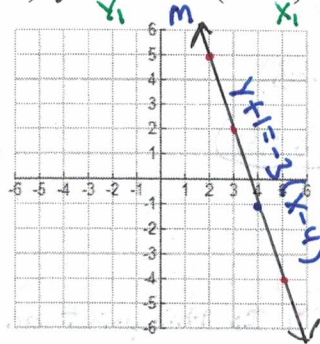


$m = \frac{1}{2}$

pt = (2, 5)

* Opposite of what is in the formula. *

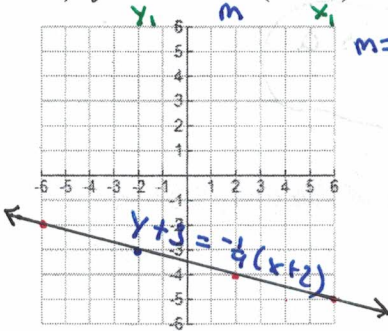
b.) $y + 1 = -3(x - 4)$



$m = -3$

pt = (4, -1)

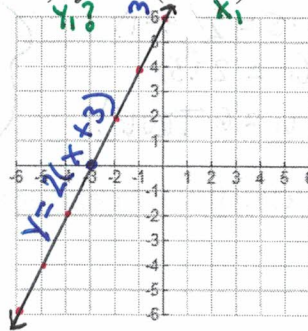
c.) $y + 3 = -\frac{1}{4}(x + 2)$



$m = -\frac{1}{4}$

pt = (-2, -3)

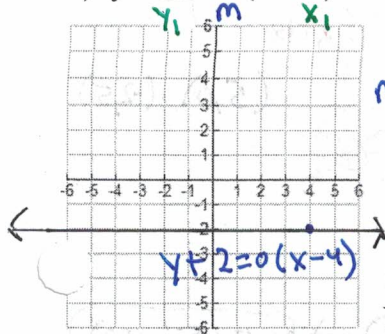
d.) $y = 2(x + 3)$



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

pt = (-3, 0)

e.) $y + 2 = 0(x - 4)$



$m = 0$

pt (4, -2)

Horizontal Line!

* When you pull-out the point from the point-slope form of an equation, the ordered pair will have opposite signs. *

$y - y_1 = m(x - x_1)$ $m = \frac{1}{2}$ pt (-8, 2)

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

NO DOUBLE SIGNS!

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

Point-Slope Form

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

Example 2: Write a linear equation in point slope form with the given information.

a.) line has a slope of 1 and goes thru $(-2, 4)$

$m=1$

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

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

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

b.) line goes through $(-9, 2)$ and $(3, 6)$

1st Step Find Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 2}{3 - -9} = \frac{4}{3 + 9} = \frac{4}{12}$$

REDUCE!

$$m = \frac{1}{3}$$

2nd Step Write Eqn of Line

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

$$y - 2 = \frac{1}{3}(x - -9)$$

$$y - 2 = \frac{1}{3}(x + 9)$$

c.) line has the same slope of as $y = -4x + 3$ and goes through $(-3, -5)$

$m = -4$ pt: $(-3, -5)$

$$y - -5 = -4(x - -3)$$

$$y + 5 = -4(x + 3)$$

d.) line goes through $(2, 4)$ and $(-3, -6)$

1st Step Find Slope

$$m = \frac{-6 - 4}{-3 - 2} = \frac{-10}{-5} = 2$$

2nd Step Write Eqn of Line

$$m = \frac{2}{1} (2, 4)$$

$$y - 4 = 2(x - 2)$$

or

$$y + 6 = 2(x + 3)$$

Example 3: Determine if $(4, 11)$ is a point that the linear equation $y - 5 = 2(x - 1)$ goes through?

x_1, y_1 Is this point on this line?

Plug it in, Plug it in

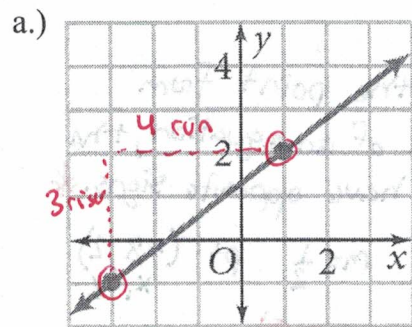
$$11 - 5 = 2(4 - 1)$$

$$6 = 2(3)$$

$$6 = 6 \text{ TRUE!}$$

Yes this point $(4, 11)$ is a point on the line.

Example 4: Write the TWO POSSIBLE linear equations in point slope form of the graph or set of points.



1st Find Slope!

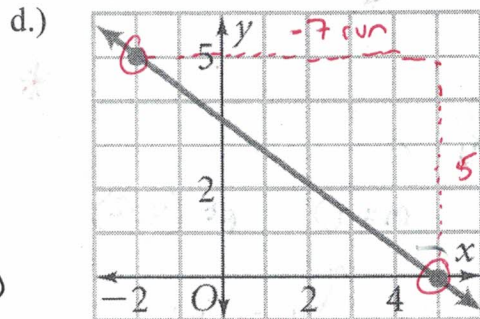
$$m = \frac{3}{4}$$

2nd ID TWO POINTS on Line!

$(-3, -1)$ and $(1, 2)$

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

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



$m = \frac{5}{-7}$

$(5, 0)$ $(-2, 5)$

$$y - 0 = \frac{5}{-7}(x - 5)$$

$$y - 5 = \frac{5}{-7}(x - -2) \rightarrow y - 5 = \frac{5}{-7}(x + 2)$$