

5-4 Point-Slope Form Notes

Point-slope form:

- an equation of a non-vertical line with a slope and a point
- another way to write a linear equation of a function
- most useful for finding the equation of a line when you are given 2 points on a line

Formula:

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

Why does it say non-vertical? A vertical line does not have a slope (the slope is undefined). Therefore, how can I write an equation of a line in point-slope form, if a slope does not exist. The answer is I cannot.

Review

Ex.

$$(2, 1) \\ (5, -8)$$

Write slope-intercept form

Step #1: Find slope

$$\frac{\Delta y}{\Delta x} = \frac{1 - (-8)}{2 - 5} = \frac{9}{-3} \\ = -3$$

$$y = mx + b$$

$$y = -3x + 7$$

Step #2: Substitute an order pair to find "b".

$$y = -3x + b, (2, 1)$$

$$1 = -3(2) + b$$

$$1 = -6 + b$$

$$+6 \quad +6$$

$$7 = b$$

Step #3:

Check:

Substitute the other ordered pair into the slope-intercept form.

$$y = -3x + 7, (5, -8)$$

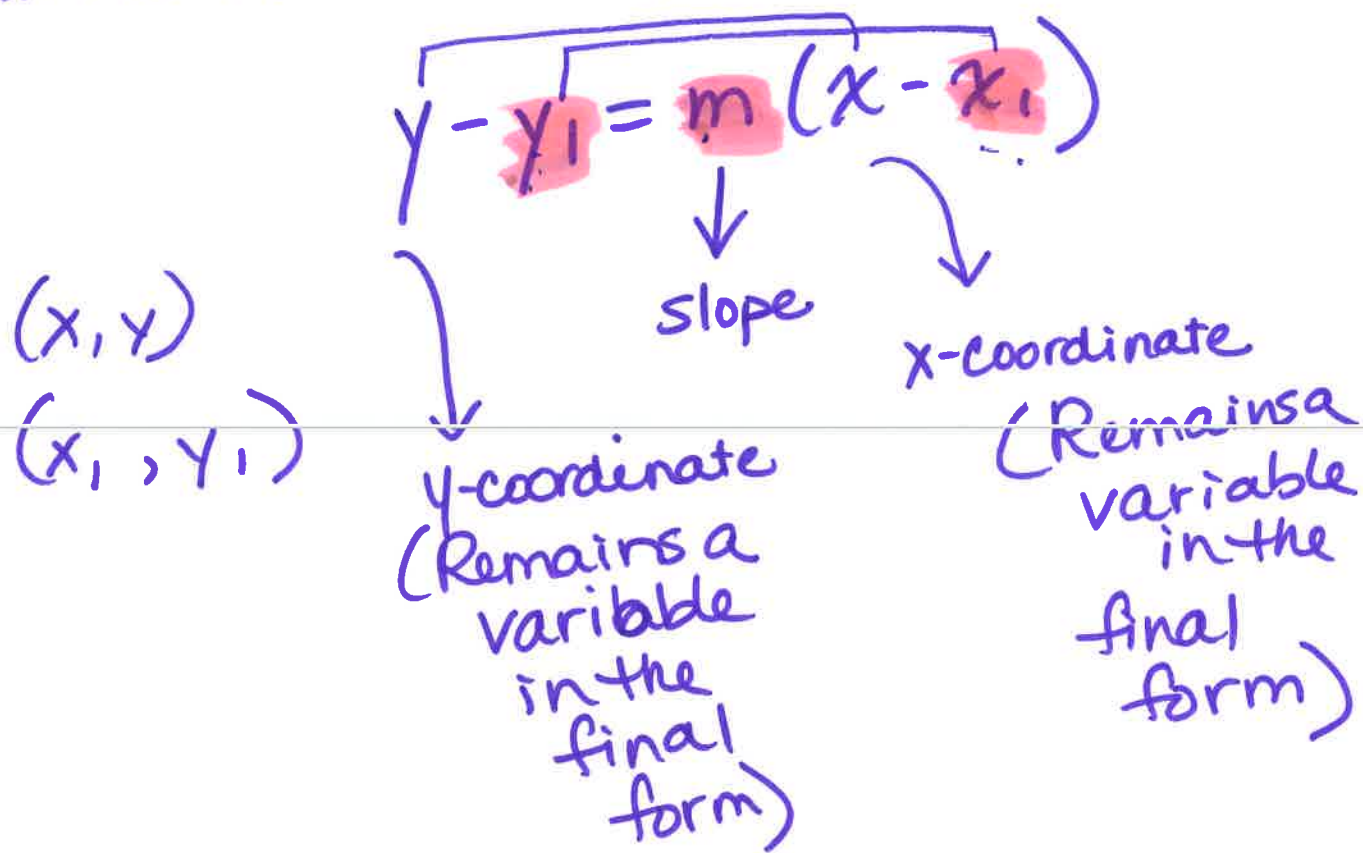
$$-8 = -3(5) + 7$$

$$-8 = -15 + 7$$

$$-8 = -8 \checkmark$$

* Point-slope form can be an easier way to write an equation of a line because you can skip steps #2 & #3.

What do the variables represent?



* Variables that need a value substituted in for the final answer

Given:
 $(18, -12)$

$m = 7,$

Write
point-
slope
form

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

$y - -12 = 7(x - 18)$

$y + 12 = 7(x - 18)$

* Given $y + 3 = 12(x + 70)$,

what is slope? 12

what is the ordered pair? $(-70, -3)$

* Given $(-2, -3)$
 $(1, 4)$, what is point-slope form?

Step #1: find slope

$$\begin{matrix} (-2, -3) \\ (1, 4) \end{matrix} \quad m = \frac{\Delta y}{\Delta x} = \frac{-3 - 4}{-2 - 1} = \frac{-7}{-3} = \frac{7}{3}$$

Step #2 substitute slope & an ordered pair into the formula

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

$$y - 3 = \frac{7}{3}(x + 2)$$

OR

$$y - 4 = \frac{7}{3}(x - 1)$$

⇒ Either answer is correct

Can you rewrite these 2 equations in slope-intercept form?

Yes →

$$y+3 = \frac{7}{3}(x+2)$$

Rewrite to
 $y = mx + b$

$$y+3 = \frac{7}{3}(x+2)$$
$$y+3 = \frac{7}{3}x + \frac{14}{3}$$

-3 -3

$$y = \frac{7}{3}x + \frac{14}{3} - \frac{9}{3}$$

$$y = \frac{7}{3}x + \frac{5}{3}$$

$$y-4 = \frac{7}{3}(x-1)$$

Rewrite to
 $y = mx + b$

$$y-4 = \frac{7}{3}(x-1)$$
$$y-4 = \frac{7}{3}x - \frac{7}{3}$$

+4 +4

$$y = \frac{7}{3}x - \frac{7}{3} + \frac{12}{3}$$

$$y = \frac{7}{3}x + \frac{5}{3}$$

Same, slope-intercept form,
because it all creates
the same line.