

# 4.4 notes

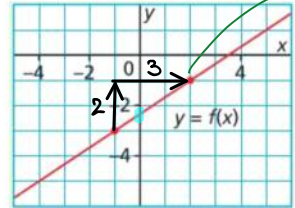
Friday, September 25, 2020 1:20 PM

Foundations and Precalculus 10

## 4.4 Slope-Point Form of the Equation for a Linear Function

cannot easily see so we can solve using a coordinate on line.

Construct your Understanding: Determine an equation for this line.



$m = \frac{\text{rise}}{\text{run}}$   
 $m = \frac{2}{3}$

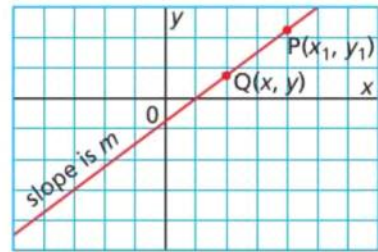
$y = \frac{2}{3}x + b$   
 $2 = \left(\frac{2}{3}\right)(0) + b$   
 $2 = \frac{2}{3} + b$   
 $-\frac{2}{3} = -\frac{2}{3} + b$   
 $-\frac{7}{3} = b$   
 $y = \left(\frac{2}{3}\right)x + \left(-\frac{7}{3}\right)$   
 $y = \frac{2}{3}x - \frac{7}{3}$

Common denominators

$-\frac{1}{3} - \frac{4}{3}$   
 $= -\frac{5}{3}$   
 $= -\frac{7}{3}$

Develop a formula for the slope-point form for the equation of a line.

Consider a line that has slope  $m$  and passes through the point  $P(x_1, y_1)$ . Another point on the line is  $Q(x, y)$



$m = \frac{\text{rise}}{\text{run}}$

$m \cdot (x - x_1) = \frac{y - y_1}{x - x_1} \cdot (x - x_1)$

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

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

slope point  $(x_1, y_1)$

Slope-Intercept

$y = \text{slope}x + \text{y-int}$  ex  $y = \frac{1}{2}x + 5$

**Slope-Point Form of the Equation of a Linear Function**  
 The equation of a line that passes through  $P(x_1, y_1)$  and has slope  $m$  is:

$y - y_1 = m(x - x_1)$   
 slope point  $(x_1, y_1)$

ex  $y + 3 = -2(x - 1)$   
 $y - (-3) = -2(x - 1)$   $m = -2$  point  $(1, -3)$

Foundations and Precalculus 10

**Ex. 1:** Describe the graph of the linear function with this equation and then graph it:

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

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

Compare the given equation with the equation in slope-point form.

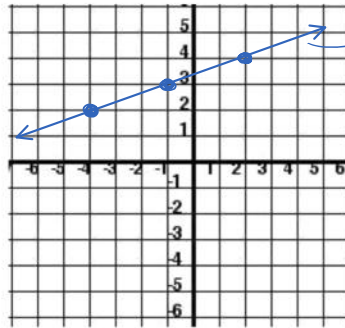
$$y - y_1 = m(x - x_1)$$

To match the slope-point form, rewrite the given equation so the operations are subtraction.

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

Steps:

- ① plot point  $(x_1, y_1)$
- ② use  $m$  to find more points
- ③ extend line through points.



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

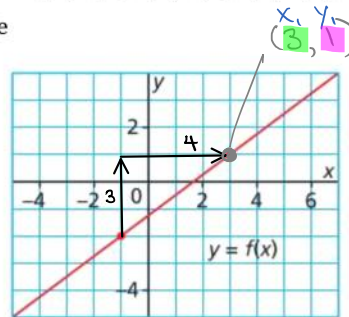
**Ex. 2:** Writing an Equation Using a Point and Slope

- a) Write an equation in slope-point form for this line.

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

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

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



$m = \frac{\text{rise}}{\text{run}}$

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

point  $(3, 1)$

can pick any whole number point!

- b) Write the equation in part a) in slope-intercept form.  $y = mx + b$

What is the y-intercept of this line?

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

$$y - 1 = \frac{3}{4}x - \frac{9}{4} \quad \leftarrow ②$$

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

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

① get rid of brackets: distributive property  
② isolate  $y$ .

$$= -\frac{9}{4} + \frac{1 \cdot 4}{4}$$

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

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

HW p372 #4af, 5ac, 7ab, 9ab(i, ii), 11ab, 14ab, 20a, 25