**MAY 19, 2017**

**UNIT 3:   LINEAR RELATIONS**
**            AND FUNCTIONS**

**SECTION 6.5:**
**SLOPE-POINT FORM**
**OF THE EQUATION FOR A**
**LINEAR FUNCTION**

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*NUMBERS, RELATIONS AND FUNCTIONS 10*

## WHAT'S THE POINT OF TODAY'S LESSON?

**We will continue working on the NRF 10 Specific Curriculum Outcomes (SCOs) "Relations and Functions 6 and 7" OR "RF6 and RF7" which state:**

**RF6:** **"Relate linear functions expressed in:**
**slope-intercept form (y = mx + b),**
**general form (Ax + By + C = 0) and**
**slope-point form [y - $y_1$ = m(x - $x_1$)]"**

### AND

**RF7:** **"Determine the equation of a linear relation given: a graph, a point and the slope, two points, a point and the equation of a parallel or perpendicular line or a scatter plot."**

# What does THAT mean???

SCO RF6 means that we will:
* express a linear relation in slope-intercept, general and slope-point forms and compare the graphs
* generalize and explain strategies for graphing a linear relation in slope-intercept, general or slope-point form
* graph a linear relation given in slope-intercept, general or slope-point form
* identify equivalent linear relations from a set of linear relations
* match a set of linear relations to their graphs

# What does THAT mean???

**SCO RF7 means that we will:**
* **determine the slope and y-intercept of a given linear relation from its graph and write the equation in the form y = mx + b**
* **write the equation of a linear relation given its slope and the coordinates of a point on the line and explain the reasoning**
* **write the equation of a linear relation given the coordinates of two points on the line and explain the reasoning**
* **write the equation of a linear relation given the coordinates of a point on the line and the equation of a parallel or perpendicular line and explain the reasoning**
* **graph linear data generated from a context and write the equation of the resulting line**
* **solve a contextual problem using the equation of a linear relation**

# HOMEWORK QUESTIONS?
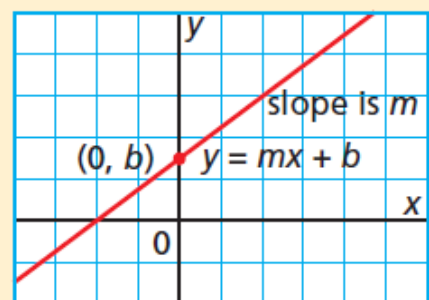## (pages 362 / 363 / 364, #12, #13, #14 and #16 to #24)

12. b) $y = mx + b$

$y = 4x - 6$

$m = \dfrac{rise}{run}$

$= \dfrac{4}{1}$

$= 4$

**AT THIS POINT, YOU KNOW HOW TO EXPRESS A LINEAR FUNCTION USING THE:**

## Slope-Intercept Form of the Equation of a Linear Function

The equation of a linear function can be written in the form $y = mx + b$, where $m$ is the slope of the line and $b$ is its $y$-intercept.

**TODAY, YOU WILL LEARN HOW TO EXPRESS A LINEAR FUNCTION USING THE:**
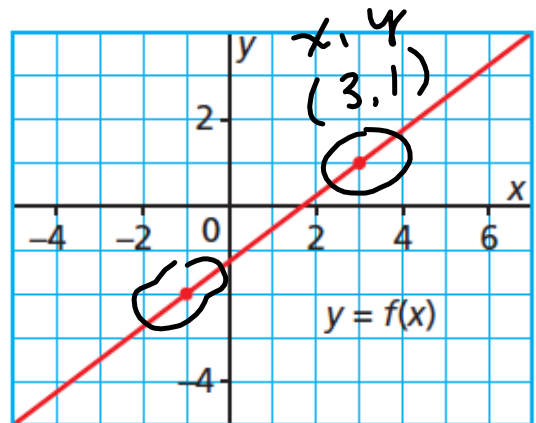
## Slope-Point Form of the Equation of a Linear Function

The equation of a line that passes through $P(x_1, y_1)$ and has slope $m$ is:

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

**EXAMPLE:**

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

b) Write the equation in part a in slope-intercept form. What is the y-intercept of this line?

$$y, y$$
$$(3, 1)$$
$$y = f(x)$$

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

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

$m = \dfrac{rise}{run}$

$= \dfrac{3}{4}$

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

$y - 1 = \frac{3}{4}x - \frac{9}{4}$
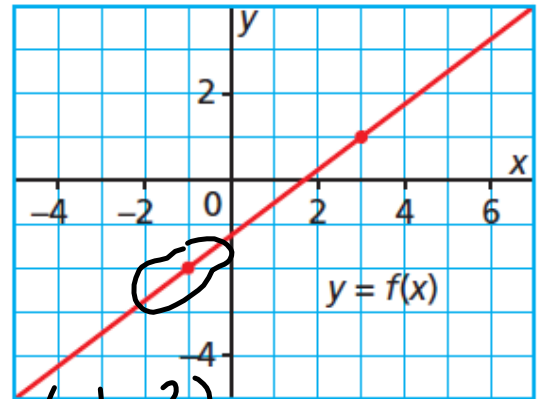
$y = \frac{3}{4}x - \frac{9}{4} + \frac{1}{1}$

$y = \frac{3}{4}x - \frac{9}{4} + \frac{4}{4}$

$y = \frac{3}{4}x - \frac{5}{4} \quad \leftarrow \quad m = \frac{3}{4} \quad b = \frac{-5}{4}$

## EXAMPLE:

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

b) Write the equation in part a in slope-intercept form. What is the $y$-intercept of this line?



$y = f(x)$

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

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

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

$(-1, -2)$
$x_1, y_1$

$m = \dfrac{rise}{run}$

$= \dfrac{3}{4}$

b) $y = mx + b$

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

$y + 2 = \frac{3}{4}x + \frac{3}{4}$

$y = \frac{3}{4}x + \frac{3}{4} - \frac{2}{1} \overset{\times 4}{\phantom{x}}_{\times 4}$

$y = \frac{3}{4}x + \frac{3}{4} - \frac{8}{4}$

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

9

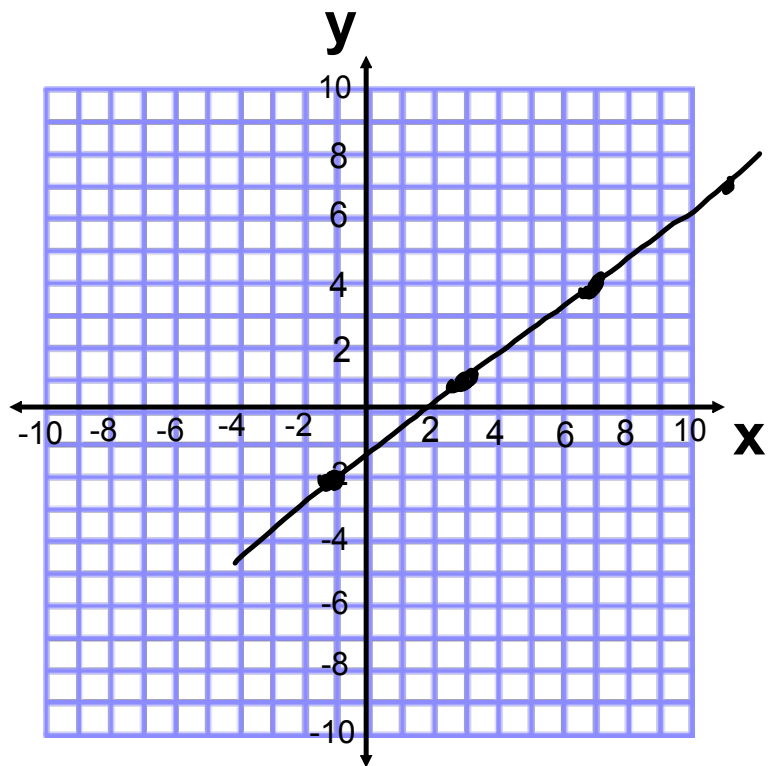$$y - y_1 = m(x - x_1)$$

**Graph the following linear relation:**

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

point: $(3, 1)$

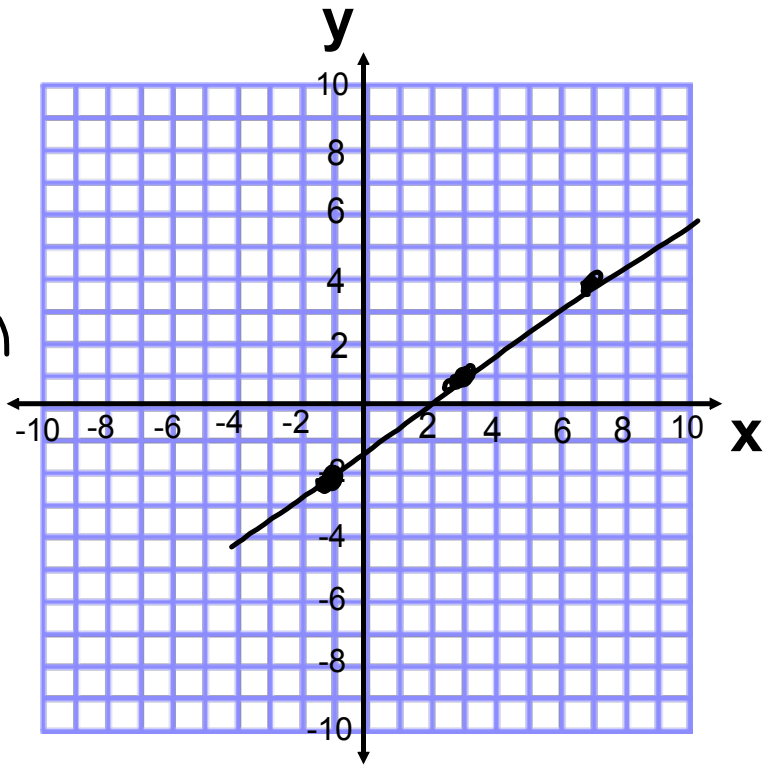$$m = \frac{3}{4} \quad \uparrow (\text{rise}) \quad \rightarrow (\text{run})$$

**Graph the following linear relation:**
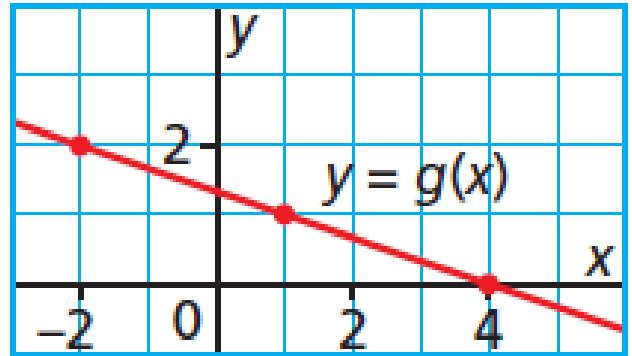
$$y - y_1 = m(x - x_1)$$

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

point: $(-1, -2)$

$$m = \frac{3}{4} \quad \begin{array}{l} \uparrow \text{ (rise)} \\ \rightarrow \text{ (run)} \end{array}$$

**YOU TRY!**

**a)** Write an equation in slope-point form for this line. Use point (1 , 1)
*x   y*

**b)** Write the equation in part a in slope-intercept form. What is the $y$-intercept of this line?



$y = g(x)$

[Answers: a) sample answer:

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

b) $y = -\frac{1}{3}x + \frac{4}{3}; \frac{4}{3}$]

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

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

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

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

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

m          b

## YOU TRY!

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

**b) Write the equation from part a in slope-intercept form. What is the y-intercept of this line?**

E(−4, 3)

F(4, 1)

3

−3      0      3

$y$

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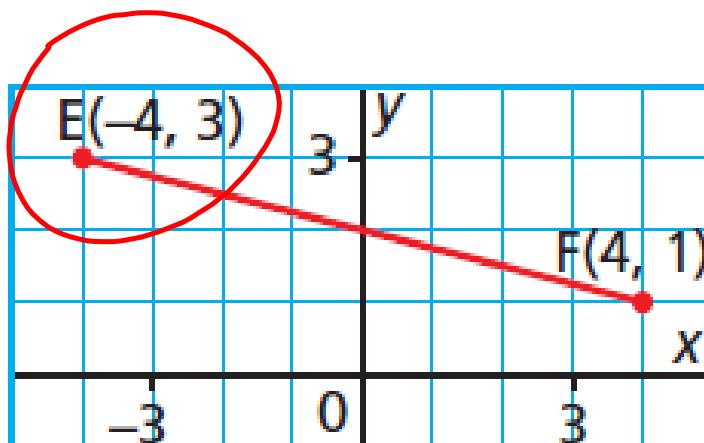
$$y - 3 = -\frac{1}{4}(x + 4)$$

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

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

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

"b"

**ANSWERS:**

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

b) $y = \frac{-1}{4}x + 2$ ; y-intercept = 2

**EXAMPLE:** A line with a slope of 2 passes through the point (7 , 8). Determine the equation of this line in <u>slope-intercept form</u>

$$y = mx + b$$

**SOLUTION:**
$$y - y_1 = m(x - x_1)$$
$$y - 8 = 2(x - 7)$$
$$y - 8 = 2x - 14$$
$$y = 2x - 6$$

**YOU TRY!**

**EXAMPLE:** A line with a slope of -4 passes through the point (-3 , 5). Determine the equation of th line in slope-intercept form.

$$y = mx + b$$

**SOLUTION:**
$$y - y_1 = m(x - x_1)$$
$$y - 5 = -4[x - (-3)]$$
$$y - 5 = -4(x + 3)$$
$$y - 5 = -4x - 12$$
$$y = -4x - 7$$

**CONCEPT REINFORCEMENT:**

*FPCM 10*:
Page 372:          #5, #6 and #9
Page 373:          #12 and #14

# Attachments

Worksheet - Function Notation.pdf