

LESSON #4: SLOPE FORMULA

Now:

1. The endpoints of  $\overline{DEF}$  are  $D(1, 4)$  and  $F(16, 14)$ . Determine and state the coordinates of point E, if  $DE:EF = 2:3$ .

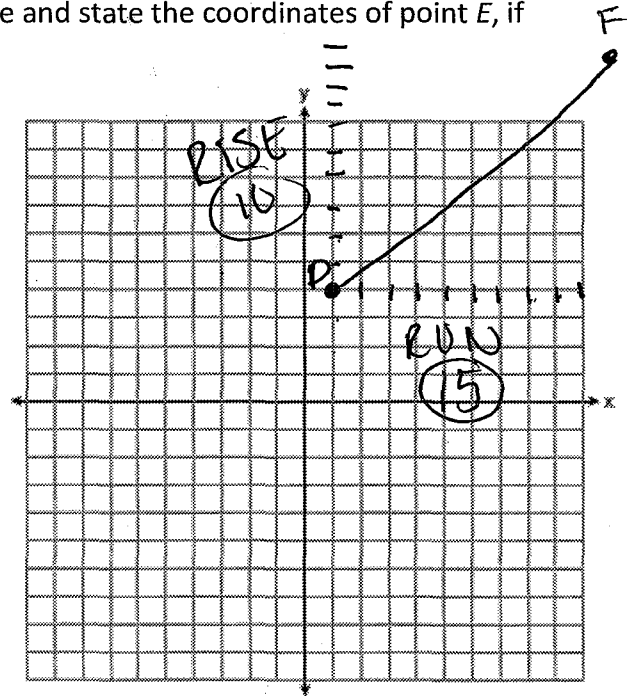
$$k = \frac{2}{5}$$

$$[(x_1 + k(\text{RUN}), y_1 + k(\text{RISE}))]$$

$$(1 + \frac{2}{5}(15), 4 + \frac{2}{5}(10))$$

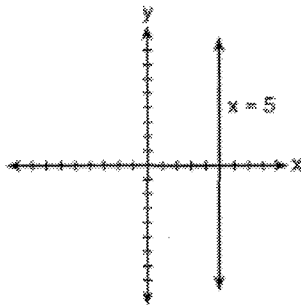
$$(1 + 6, 4 + 4)$$

$$(7, 8) = E$$



2. 1. The accompanying figure shows the graph of the equation  $x = 5$ . What is the slope of the line  $x = 5$ ?

- (1) 5  
 (2) -5  
 (3) 0  
 (4) undefined



2. Given the equation of the line  $3x - 2y = 12$ .  
 a. Identify its slope  
 b. Identify its y-intercept

$$\frac{3x - 2y = 12}{-3x} \quad -3x$$

$$-2y = \frac{12 - 3x}{-2} \quad -2$$

$$y = -6 + \frac{3}{2}x$$

$$\text{slope} = \frac{3}{2}$$

$$\text{yint} = -6$$

HOW DO WE WRITE THE EQUATION OF A LINE WHEN GIVEN TWO POINTS ON THE LINE? THE SLOPE AND A POINT ON THE LINE?

Slope Formula

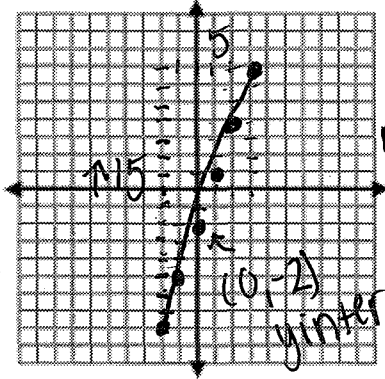
~~$$\frac{y_2 - y_1}{x_2 - x_1}$$~~

$$\frac{y_2 - y_1}{x_2 - x_1}$$

slope      yint

$x_1, y_1 \quad x_2, y_2$ 

3. Plot the points  $(-2, -8)$  and  $(3, 7)$  on the graph below. Find the slope of the line by counting the boxes.



$$m = \frac{15}{5} = \boxed{3}$$

b. Now find the slope of the line using the slope formula.

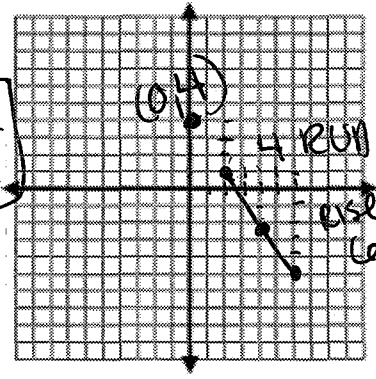
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - (-8)}{3 - (-2)} = \frac{15}{5} = \boxed{3}$$

c. Now write the equation of line.

$$m = 3 \quad b = -2 \quad \boxed{y = 3x - 2}$$

 $x_1, y_1 \quad x_2, y_2$ 

4. Plot the points  $(6, -5)$  and  $(2, 1)$  on the graph below. Find the slope of the line by counting the boxes.



$$\frac{6}{4} = \boxed{-\frac{3}{2}}$$

b. Now find the slope of the line using the slope formula.

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - (-5)}{2 - 6} = \frac{6}{-4} = \boxed{-\frac{3}{2}}$$

c. Now write the equation of line.

$$m = -\frac{3}{2} \quad b = 4 \quad \boxed{y = -\frac{3}{2}x + 4}$$

### Slope Intercept Formula

$$y = mx + b$$

### STEPS FOR WRITING A LINE IN SLOPE INTERCEPT FORM

1. Substitute the given point  $(x, y)$  into  $y = mx + b$
2. Substitute the (slope)  $m$  into  $y = mx + b$
3. Solve for  $b$
4. Substitute  $m$  &  $b$  into  $y = mx + b$
5. Check by using the calculator

m

5. A line having a slope of 3 and passes through the point (1,5). Write the equation of this line in slope-intercept form.

$$y = mx + b$$

$$m = 3$$

$$x = 1$$

$$y = 5$$

$$5 = 3(1) + b$$

$$-3 \quad -3$$

$$b = 2$$

$$y = 3x + 2$$

6. A line having a slope of  $-\frac{4}{3}$  and passes through the point (3,-7). Write the equation of this line in slope-intercept form.

$$y = mx + b$$

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

$$-7 = -\frac{4}{3}(3) + b$$

$$x = 3$$

$$y = -7$$

$$-7 = -4 + b$$

$$+4 \quad +4$$

$$-3 = b$$

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

**Point Slope Formula**

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

**STEPS FOR WRITING A LINE IN POINT SLOPE FORM**

1. Substitute the given point (x, y) into  $y - y_1 = m(x - x_1)$
2. Substitute the given (slope) m into  $y - y_1 = m(x - x_1)$
3. Solve for y, if needed
4. Check using the calculator or plug the points

7. Write a linear equation given the slope and one point.

$$m = \frac{4}{3} \text{ and } (6, 9)$$

$$x_1, y_1$$

$$y - 9 = \frac{4}{3}(x - 6)$$

8. Write a linear equation given the slope and one point.

$$m = \frac{2}{3} \text{ and } (0, 6)$$

$$x_1, y_1$$

$$y - 6 = \frac{2}{3}(x - 0)$$

9. Write a linear equation given the slope and one point.

$$m = -1 \text{ and } (-2, -3)$$

$$x_1, y_1$$

$$y - (-3) = -1(x - (-2))$$

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

10. Write a linear equation given the slope and one point.

$$m = -4 \text{ and } (5, -1)$$

$$x_1, y_1$$

$$y - (-1) = -4(x - 5)$$

$$\boxed{y + 1 = -4(x - 5)}$$

### STEPS FOR WRITING A LINE IN POINT SLOPE FORM

1. Determine the slope.
2. Choose a given point.
3. Substitute the given point  $(x, y)$  into  $y - y_1 = m(x - x_1)$
4. Substitute the given (slope)  $m$  into  $y - y_1 = m(x - x_1)$
5. Solve for  $y$  if needed.
6. Check using the calculator.

### STEPS FOR WRITING A LINE IN SLOPE INTERCEPT FORM

1. Determine the slope.
2. Choose a given point.
3. Substitute the given point  $(x, y)$  into  $y = mx + b$
4. Substitute the (slope)  $m$  into  $y = mx + b$
5. Solve for  $b$ .
6. Substitute  $m$  &  $b$  into  $y = mx + b$
7. Check using the calculator.

11. Write a linear equation given the two points  $(1, 3)$  and  $(8, 5)$  in point slope form.

① Find slope

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 3}{8 - 1} = \frac{2}{7} = \frac{2}{7}$$

② point  $(1, 3)$

$$\begin{array}{c} \downarrow \downarrow \\ x, y \end{array}$$

$$\textcircled{3} \boxed{y - 3 = \frac{2}{7}(x - 1)}$$

↳ that's a  $\frac{2}{7}$ !

12. Write a linear equation given the two points  $(2, 1)$  and  $(5, -2)$  in slope intercept form.

① slope

$$m = \frac{-2 - 1}{5 - 2} = \frac{-3}{3} = -1$$

② point  $(2, 1)$

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

$$\textcircled{4} \begin{array}{c} y - 1 = -x + 2 \\ +1 \quad +1 \end{array}$$

$$\boxed{y = -x + 3}$$