

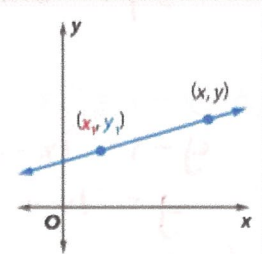
Chapter 4.3 Notes (Writing Equations in Point-Slope Form)

Objectives:

- Write equations of lines in point-slope form.
- Write linear equations in different forms.

Point-Slope Form: $y - y_1 = m(x - x_1)$

- Useful when we know the *slope* and the coordinates of *one point*

Words	The linear equation $y - y_1 = m(x - x_1)$ is written in point-slope form, where (x_1, y_1) is a given point on a nonvertical line and m is the slope of the line.	
Symbols	$y - y_1 = m(x - x_1)$	

- Examples: Write an equation in *point-slope* form for the line that passes through each point with the given slope. Then, graph the equation.

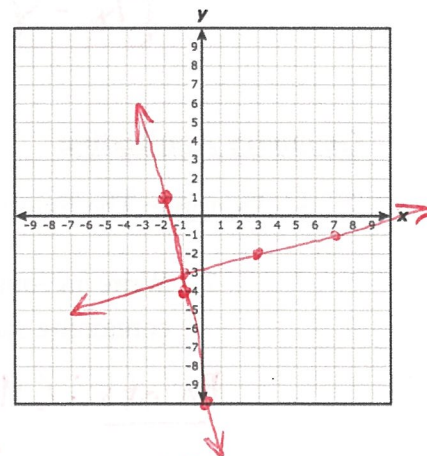
1. $(3, -2); m = \frac{1}{4}$

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

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

2. $(-2, 1); m = -6$

$$y - 1 = -6(x + 2)$$



Converting to Slope-Intercept Form: $y = mx + b$

- Examples: Write each equation in *slope-intercept* form.

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

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

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

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

4. $y + 6 = -3(x - 4)$

$$y + 6 = -3x + 12$$

$$y = -3x + 6$$

Converting to Standard Form: $Ax + By = C$

- Examples: Write each equation in *standard form*.

5. $y - 1 = -\frac{2}{3}(x - 5)$

$$3[y - 1 = -\frac{2}{3}(x - 5)]$$

$$3y - 3 = -2(x - 5)$$

$$3y - 3 = -2x + 10$$

$$3y = -2x + 13$$

$$\Rightarrow \boxed{2x + 3y = 13}$$

6. $y - 1 = 7(x - 5)$

$$y - 1 = 7x - 35$$

$$y = 7x - 34$$

$$-1(-7x + y = -34)$$

$$\boxed{7x - y = 34}$$

Standard Form: $Ax + By = C$

- $A \geq 0$
- $A, B,$ and C are integers (no fractions or decimals)
- A and B are *not both zero*

Geometry Application

- Example: The figure shows square $RSTU$.

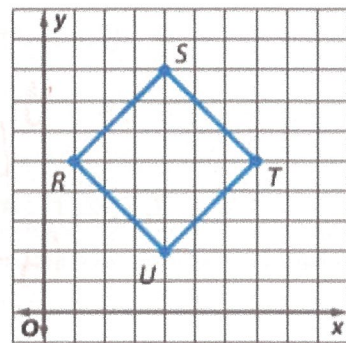
7. Write an equation in *point-slope form* for the line containing side \overline{TU} .

Points: $(4, 2)$ and $(7, 5)$

$$\text{slope} = \frac{5-2}{7-4} = \frac{3}{3} = 1$$

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

$$\text{OR} \quad \boxed{y - 5 = 1(x - 7)}$$



8. Write an equation in *standard form* for the same line.

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

$$y - 2 = x - 4$$

$$y = x - 2$$

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