

**Algebra 1 Lesson 5.3  
Use Point-Slope Form**

Name Rogers Key

**Objectives:**

- Write the equation of a line in point-slope form given a point and the slope.
- Write the equation of a line in point-slope form given two points.
- Rewrite an equation from point-slope form to standard or slope-intercept form.
- Graph an equation from point-slope form.

**5.3 Point-Slope Form**

Equation of a line in point-slope form:  $y - y_1 = m(x - x_1)$

SLOPE INTERCEPT  
 $y = mx + b$

STANDARD FORM  
 $ax + by = c$

Practice 1: Write the equation of the line in point-slope form with the information given.

a) Point (1, 2)

Slope = 3

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

b) Point (4, -1)

Slope =  $\frac{m}{2}$

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

SLOPE:  
 $m = \frac{y_1 - y_2}{x_1 - x_2}$

Practice 2: Write the equation of the line in standard or slope-intercept form with the information given.

a) Point (-1, 3)

Slope = 2

Point-slope form:  $y - 3 = 2(x - (-1))$

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

Standard form:  $ax + by = c$

$$\begin{aligned} y - 3 &= 2(x + 1) \\ y - 3 &= 2x + 2 \\ -2x &\quad -2x \\ \hline -2x + y - 3 &= 2 \\ +2x &\quad +3 \\ \hline y - 3 &= 2 \\ +3 &\quad +3 \\ \hline y &= 5 \end{aligned}$$

$$2x - y = -5$$

c) Point (2, 0)  $m = -3$

Point-slope form:  $y - 0 = -3(x - 2)$

Slope-intercept form:  $y = 3(x - 2)$

$$y = 3x + b$$

$$y = mx + b$$

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

Point-slope form:  $y - (-4) = -\frac{1}{3}(x - 2)$

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

Slope-intercept:

$$\begin{aligned} 3 \cdot y + 12 &= -\frac{1}{3}(x - 2) \\ 3y + 12 &= -1(x - 2) \\ 3y + 12 &= -x + 2 \\ -x &\quad -12 \\ \hline 3y &= -x - 10 \\ \frac{3y}{3} &= \frac{-x - 10}{3} \\ y &= -\frac{1}{3}x - \frac{10}{3} \end{aligned}$$

d) Point (4, -3)

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

Point-slope form:

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

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

Standard form:

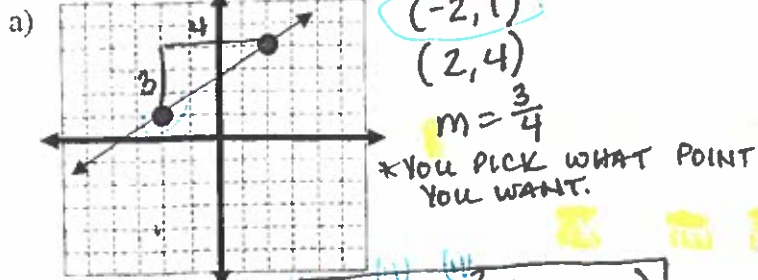
$$\begin{aligned} y + 3 &= \frac{4}{3}(x - 4) \\ 3y + 9 &= 4(x - 4) \\ 3y + 9 &= 4x - 16 \\ -4x &\quad -9 \\ \hline -4x + 3y &= -25 \end{aligned}$$

$$4x - 3y = 25$$

## Point-Slope Form (given a graph)

\*\*Use point-slope when you cannot easily determine the Y-INTERCEPT.

**Practice 3:** Use the graph to write the equation of the line.



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

Standard form:  $4y - 4 = 3(x + 2)$

$$\begin{array}{r} 4y - 4 = 3x + 6 \\ 4y - 4 - 3x - 6 = 3x + 6 - 3x - 6 \\ 4y - 10 - 3x = 0 \\ -3x + 4y = 10 \end{array}$$

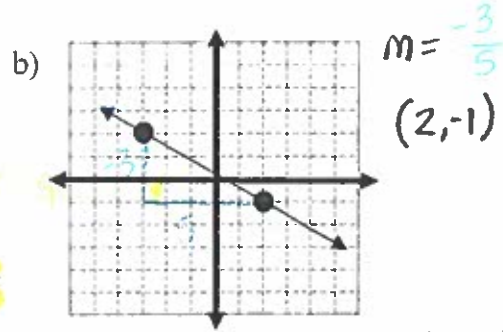
### Special Lines

a) Point (3, 4)  $m = 0$

Point-slope form:  $y - 4 = 0(x - 3)$

Standard form:  $y - 4 = 0$

$y = 4$



Point-slope form:  $y - (-1) = -\frac{3}{5}(x - 2)$

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

Slope-intercept form:  $5y + 5 = -3(x - 2)$

$$\begin{array}{r} 5y + 5 = -3x + 6 \\ 5y + 5 - 5 = -3x + 6 - 5 \\ 5y = -3x + 1 \\ \frac{5y}{5} = \frac{-3x + 1}{5} \\ y = -\frac{3}{5}x + \frac{1}{5} \end{array}$$

b) Point (1, 5)  $m = \text{undefined}$

Point-slope form:

$x = 1$

Standard form:

# BELL RINGER

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

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Write an equation of the line shown on the graph. Decide whether to use POINT SLOPE FORM or SLOPE INTERCEPT form to begin with. Finish by writing the equation in STANDARD form.

1.

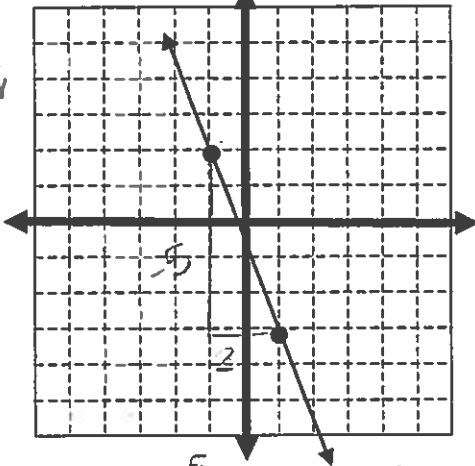
$$y = mx + b$$

2.

3.

$$\rightarrow ax + by = c$$

$m = \frac{\text{Rise}}{\text{Run}}$



$m = -\frac{7}{1}$   
pick a point:  $(-1, 2)$

Point slope:  $(-1, 2)$

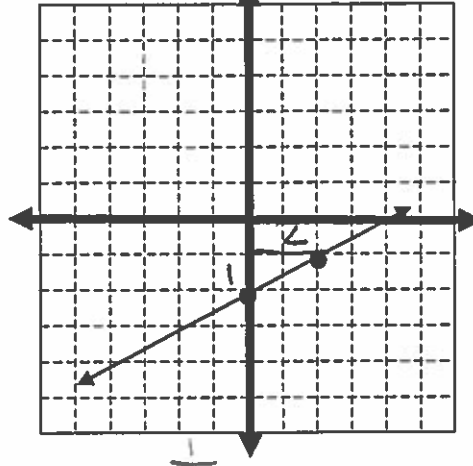
$$y - 2 = -7(x + 1)$$

$$2y - 4 = -7(x + 1)$$

$$2y - 4 = -7x - 7$$

$$7x + 2y = -3$$

Standard form:  $7x + 2y = -3$



$m = \frac{1}{2}$   
 $b = -2$

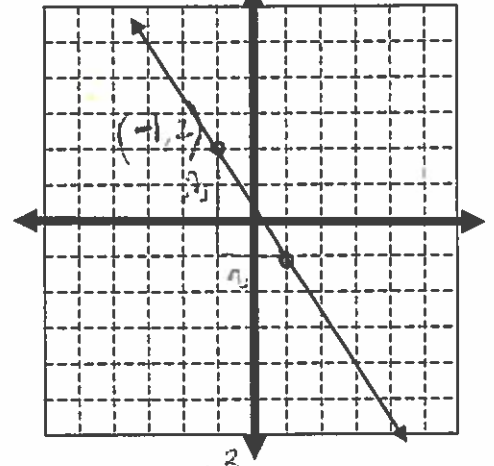
Slope intercept:

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

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

$$x - 2y = 4$$

Standard form:  $x - 2y = 4$



$m = -3$   
pick point:  $(-1, 2)$

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

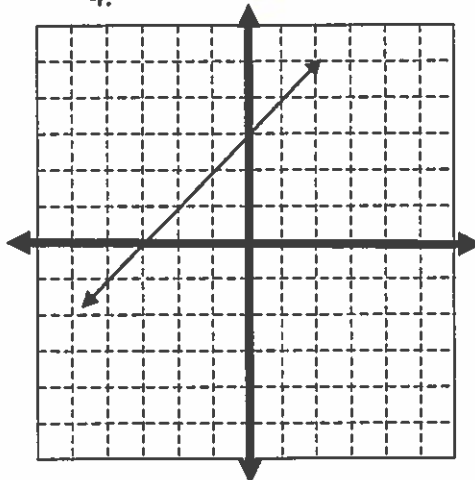
$$2y - 4 = -3(x + 1)$$

$$2y - 4 = -3x - 3$$

$$3x + 2y = 1$$

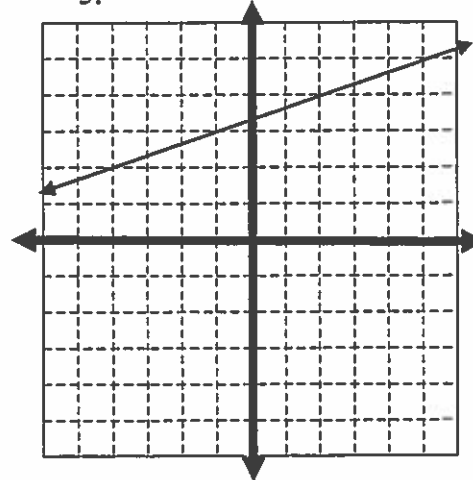
Standard form:  $3x + 2y = 1$

4.



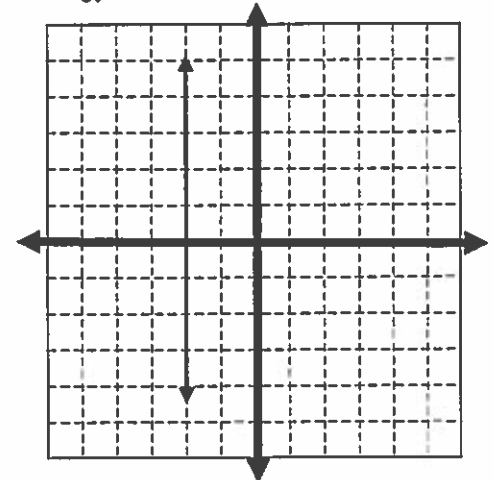
Standard form:

5.



Standard form:

6.



Standard form:

7. How do you decide which form you should start with ... slope intercept form or point slope form? IF YOU SEE Y-INT. YOU CAN USE SLOPE INTERCEPT. IF YOU CANNOT SEE Y-INT. USE POINT SLOPE.



**Algebra 1 Lesson 5.3**  
**Writing Equations Using Point-Slope Form**  
**Given Two Points**

Name Rogers Key

Objectives:

- Write the equation of a line in point-slope form given two points.
- Rewrite an equation from point-slope form into standard or slope-intercept form.

**5.3 Point-Slope Form**

Equation of a line in point-slope form:  $y - y_1 = m(x - x_1)$

When given two points, first calculate the SLOPE. Then use point-slope form by 'plugging' in the SLOPE and any one point given. *(YOU PICK)*

**Practice 1:** Write the equation of the line in standard form with the information given.

a) passes through points  $(-1, 3)$  and  $(1, 5)$

Slope:  $m = \frac{y_1 - y_2}{x_1 - x_2}$

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

$m = 1$

ordered pair:  $(1, 5)$

Point-slope form:  $y - y_1 = m(x - x_1)$

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

$y - 5 = x - 1$   
 $-x + y - 5 = -1$   
 $-x + y = 4$

Standard form:  $x - y = -4$

c) passes through points  $(-2, -4)$  and  $(1, 0)$

Slope:

$m = \frac{-4 - 0}{-2 - 1} = \frac{-4}{-3} = \frac{4}{3}$

$(1, 0)$

Point-slope form:

$y - 0 = \frac{4}{3}(x - 1)$

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

$3y = 4(x - 1)$

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

Slope-intercept form:

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

b) passes through points  $(2, 5)$  and  $(4, 6)$

Slope:  $m = \frac{5 - 6}{2 - 4} = \frac{-1}{-2} = \frac{1}{2}$

Point-slope form:

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

$2y - 10 = 1(x - 2)$

$2y - 10 = x - 2$

$+10$

$\frac{2y}{2} = \frac{x + 8}{2}$

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

Slope-intercept form:

d) passes through points  $(3, 8)$  and  $(-1, 2)$

Slope:

Point-slope form:

Standard form:



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

$$y = mx + b$$

Algebra I  
Worksheet 5.3 & 5.4

Name Rogers Key

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

Write an equation for each line that contains the given pair of points. Write your final answer in slope-intercept form.

1.  $(12, 16)$   $(1, 5)$

$$m = \frac{16 - 5}{12 - 1} = \frac{11}{11} = 1$$

$m = \underline{1}$

choose one point  $(1, 5)$

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

$$y - 5 = x - 1$$

$$y = x + 4$$

Equation: \_\_\_\_\_

2.  $(0, 4)$   $(4, 2)$

$$m = \frac{4 - 2}{0 - 4} = \frac{2}{-4} = -\frac{1}{2}$$

$m = \underline{-\frac{1}{2}}$

choose one point  $(0, 4)$

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

$$(2) y - 4 = -\frac{1}{2}(x - 0)$$

$$2y - 8 = -1(x - 0)$$

$$2y - 8 = -x$$

Equation: \_\_\_\_\_

3.  $(8, 1)$   $(4, 4)$

$m = \underline{\hspace{2cm}}$

choose one point \_\_\_\_\_

4.  $(0, 0)$   $(4, 2)$

$m = \underline{\hspace{2cm}}$

choose one point \_\_\_\_\_

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

Write an equation for each line that contains the given pair of points. Write your final answer in standard form.

5.  $(5, 0)$   $(0, -2)$

$m = \underline{\hspace{2cm}}$

choose one point \_\_\_\_\_

6.  $(-3, 5)$   $(-1, -3)$

$m = \underline{\hspace{2cm}}$

choose one point \_\_\_\_\_

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

7.  $(4, 0)$   $(4, 2)$

$m =$  \_\_\_\_\_

8.  $(-2, -3)$   $(1, -3)$

$m =$  \_\_\_\_\_

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

**Write the equation of the line that passes through the given point and has the given slope. Answers should be written in standard form.**

9.  $(6, 4)$ ,  $m = 5$

10.  $(5, -4)$ ,  $m = \frac{1}{3}$

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

**Write the equation of the line that passes through the given points. Answers should be written in slope-intercept form.**

11.  $(3, -7)$   $(-3, -5)$

12.  $(0, -3)$ ,  $(7, -5)$

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

**Write the standard form of the equation of the horizontal and vertical lines that pass through the given point.**

13.  $(-7, 4)$

horizontal line = \_\_\_\_\_

vertical line = \_\_\_\_\_

14.  $(0, -5)$

horizontal line = \_\_\_\_\_

vertical line = \_\_\_\_\_

**Write the formulas/equations:**

15. Slope-intercept form

16. Point-slope form

17. Standard Form