

## 3-4 Reteaching

### Point-Slope Form

The **point-slope form** of a nonvertical linear equation is  $y - y_1 = m(x - x_1)$ . In this equation,  $m$  is the slope and  $(x_1, y_1)$  is a point on the graph of the equation.

#### Problem

A line passes through  $(5, -2)$  and has a slope  $-3$ . What is an equation for this line in point-slope form?

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

Use point-slope form.

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

Substitute  $(5, -2)$  for  $(x_1, y_1)$  and  $-3$  for  $m$ .

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

Simplify.

#### Problem

A line passes through  $(1, 4)$  and  $(2, 9)$ . What is an equation for this line in point-slope form? What is an equation for this line in slope-intercept form? First use the two given points to find the slope.

$$m = \frac{9 - 4}{2 - 1} = \frac{5}{1} = 5$$

Use the slope and one point to write an equation in point-slope form.

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

Use point-slope form

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

Substitute  $(1, 4)$  for  $(x_1, y_1)$  and  $5$  for  $m$ .

$$y - 4 = 5x - 5$$

Distributive Property

$$y = 5x - 1$$

Add 4 to each side.

An equation in point-slope form is  $y - 4 = 5(x - 1)$ . An equation in slope-intercept form is  $y = 5x - 1$ .



Find the equation of the line with the given slope that passes through the given point. Write the equation of the line in point-slope form.

1.  $m = 2$  and  $(-1, -3)$

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

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

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

$$y + 3 = 2x + 2$$

$$\begin{array}{r} -3 \\ -3 \end{array}$$

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

2.  $m = -7$  and  $(1, -1)$

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

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

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

$$y + 1 = -7x + 7$$

$$\begin{array}{r} -1 \\ -1 \end{array}$$

$$\boxed{y = -7x + 6}$$

5.  $m = 3$  and  $(0, 10)$

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

$$y - 10 = 3(x - 0)$$

$$y - 10 = 3x - 0$$

$$\begin{array}{r} +10 \\ +10 \end{array}$$

$$\boxed{y = 3x + 10}$$

6.  $m = -9$  and  $(8, 9)$

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

$$y - 9 = -9(x - 8)$$

$$y - 9 = -9x + 72$$

$$\begin{array}{r} +9 \\ +9 \end{array}$$

$$\boxed{y = -9x + 81}$$

Find the equation of the line that passes through the given points. Write the equation in point-slope form.

9.  $(-1, 3)$  and  $(-2, 5)$

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

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

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

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

$$y - 5 = -2x - 4$$

$$\begin{array}{r} +5 \\ +5 \end{array}$$

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

10.  $(-7, 7)$  and  $(5, -6)$

$$m = \frac{-6-7}{5-(-7)} = \frac{-6-7}{5+7} = \frac{-13}{12}$$

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

$$y - (-6) = \frac{-13}{12}(x - 5)$$

$$y + 6 = \frac{13}{12}(x - 5)$$

$$y + 6 = \frac{13}{12}x - \frac{65}{12}$$

$$y + 6 = \frac{13}{12}x - 5\frac{5}{12}$$

$$\begin{array}{r} +6 \\ +6 \end{array}$$

$$\boxed{y = \frac{13}{12}x + \frac{7}{12}}$$

13.  $(-6, 10)$  and  $(2, -5)$

$$m = \frac{-5-10}{2-(-6)} = \frac{-5-10}{2+6} = \frac{-15}{8}$$

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

$$y - (-5) = \frac{-15}{8}(x - 2)$$

$$y + 5 = \frac{-15}{8}x + \frac{30}{8}$$

$$y + 5 = \frac{-15}{8}x + 3\frac{6}{8}$$

$$\begin{array}{r} -5 \\ -5 \end{array}$$

$$\boxed{y = \frac{-15}{8}x - \frac{1}{4}}$$

14.  $(-8, 7)$  and  $(-3, -5)$

$$m = \frac{-5-7}{-3-(-8)} = \frac{-5-7}{-3+8} = \frac{-12}{5}$$

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

$$y - (-5) = \frac{-12}{5}(x - (-3))$$

$$y + 5 = \frac{-12}{5}(x + 3)$$

$$y + 5 = \frac{-12}{5}x - \frac{36}{5}$$

$$y + 5 = \frac{-12}{5}x - 7\frac{1}{5}$$

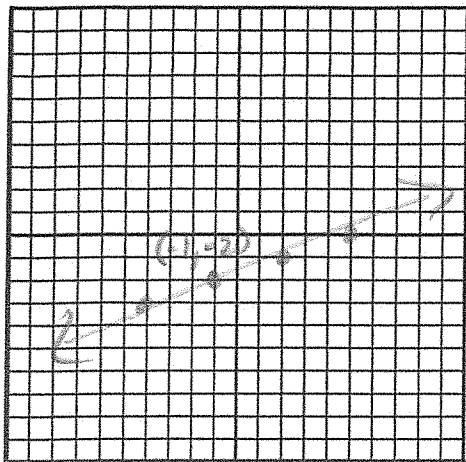
$$\begin{array}{r} -5 \\ -5 \end{array}$$

$$\boxed{y = \frac{-12}{5}x - 12\frac{1}{5}}$$

Graph each of the following lines by first giving the point and the slope.

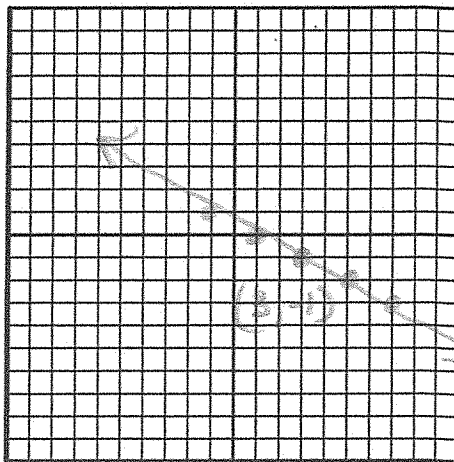
13.  $y + 2 = \frac{1}{3}(x + 1)$

Point  $(-1, -2)$  Slope  $\frac{1}{3}$



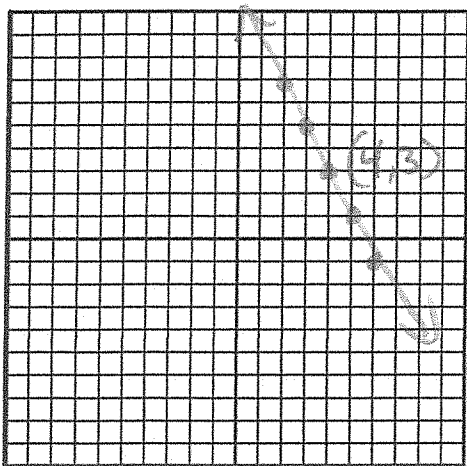
14.  $y + 1 = -\frac{1}{2}(x - 3)$

Point  $(3, -1)$  Slope  $-\frac{1}{2}$



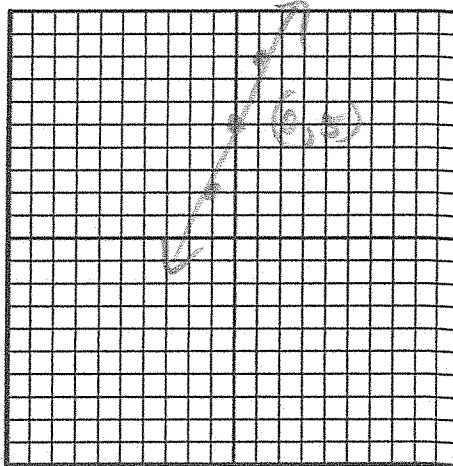
15.  $y - 3 = -2(x - 4)$

Point  $(4, 3)$  Slope  $-2/1$



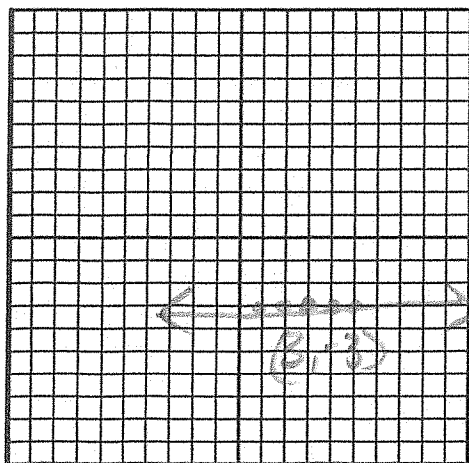
16.  $y - 5 = 3x$

Point  $(0, 5)$  Slope  $3/1$



17.  $y + 3 = 0(x - 3)$

Point  $(3, -3)$  Slope  $0/1$



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

Point  $(-2, 1)$  Slope  $-\frac{5}{2}$

