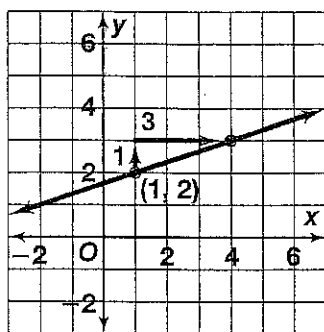
EXAMPLE   Graph the equation $y - 2 = \frac{1}{3}(x - 1)$.

The equation shows that the line passes through (1, 2) with slope $\frac{1}{3}$.

Start at (1, 2). Using the slope, go up 1 unit and right 3 units to (4, 3). Draw a line through the two points.

2 EXAMPLE Write the equation of the line with slope -2 that passes through the point $(3, -3)$.

$$y - y_1 = m(x - x_1)$$
$$y - (-3) = -2(x - 3) \quad \text{Substitute } (3, -3) \text{ for } (x_1, y_1) \text{ and } -2 \text{ for } m.$$
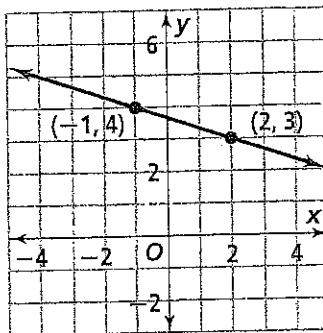$$y + 3 = -2(x - 3) \quad \text{Simplify the grouping symbols.}$$

3 EXAMPLE Write equations for the line in point-slope form and in slope-intercept form.

Step 1: Find the slope.

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

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

The slope is $-\frac{1}{3}$.

Step 2: Use either point to write the the equation in point-slope form.

Use $(-1, 4)$.

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

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

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

Step 3: Rewrite the equation from Step 2 in slope-intercept form.

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

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

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

4 EXAMPLE Is the relationship shown by the data linear? If so, model the data with an equation.

x	y
3	6
2	4
−1	−2
−3	−6

−1 ( ) −2
−3 ( ) −6
−2 ( ) −4

Step 1: Find the rate of change for consecutive ordered pairs.

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

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

$$\frac{-4}{-2} = 2$$

The relationship is linear. The rate of change is 2.

Step 2: Use the slope and a point to write an equation.

$y - y_1 = m(x - x_1)$ Use the point-slope form.

$y - 4 = 2(x - 2)$ Substitute (2, 4) for (x_1, y_1) and 2 for m.

5 EXAMPLE Is the relationship shown by the data linear? If so, model the data with an equation.

x	y
−2	−2
−1	−1
1	0
2	1

−1 ( ) −1
−2 ( ) −1
−1 ( ) −1

Find the rate of change for consecutive ordered pairs.

$$\frac{-1}{-1} = 1$$

$$\frac{-1}{-2} \neq 1$$

$$\frac{-1}{-1} = 1$$

The relationship is not linear.