

**CRITIQUE & EXPLAIN**

Paul and Seth know that one point on a line is (4, 2) and the slope of the line is  $-5$ . Each student derived an equation relating  $x$  and  $y$ .

Paul	Seth
$y = mx + b$	$m = \frac{y_2 - y_1}{x_2 - x_1}$
$2 = -5(4) + b$	$-5 = \frac{y - 2}{x - 4}$
$2 = -20 + b$	
$22 = b$	
$y = -5x + 22$	$-5(x - 4) = y - 2$

A. Do the two equations represent the same line? Construct a mathematical argument to support your answer.

B. **Make Sense and Persevere** Generate a table of values for each equation. How can you reconcile the tables with the equations? © MP.1

**HABITS OF MIND**

**Model With Mathematics** How could you represent the equations to show they are equivalent? Explain. © MP.4

**EXAMPLE 1**  **Try It!** Understand Point–Slope Form of a Linear Equation

1. Describe the steps needed to find the  $y$ -intercept of the graph using point-slope form.

**EXAMPLE 2**  **Try It!** Write an Equation in Point–Slope Form

2. Write an equation of the line that passes through  $(2, -1)$  and  $(-3, 3)$ .

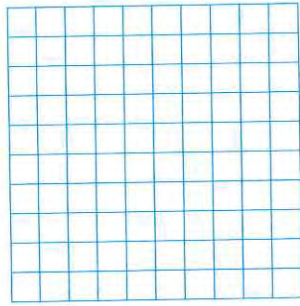
**HABITS OF MIND**

**Generalize** Explain why the equation of a vertical line cannot be written in point-slope form. © MP.8



**EXAMPLE 3** **Try It!** Sketch the Graph of a Linear Equation in Point-Slope Form

3. Sketch the graph of  $y + 2 = \frac{1}{2}(x - 3)$ .

**EXAMPLE 4** **Try It!** Apply Linear Equations

4. Rewrite the point-slope form equation from Example 4 in slope-intercept form. What does the  $y$ -intercept represent in terms of the situation?

**HABITS OF MIND**

**Make Sense and Persevere** When is it appropriate to write the equation of a line in point-slope form rather than in slope-intercept form? © MP.1

## Do You UNDERSTAND?

1. **ESSENTIAL QUESTION** What information does the point-slope form of a linear equation reveal about a line?

2. **Use Structure** If you know a point on a line and the slope of the line, how can you find another point on the line? © MP.7

3. **Error Analysis** Denzel identified  $(3, 2)$  as a point on the line  $y - 2 = \frac{2}{3}(x + 3)$ . What is the error that Denzel made? © MP.3

4. **Generalize** You know the slope and one point on a line that is not the  $y$ -intercept. Why might you write the equation in point-slope form instead of slope-intercept form? © MP.8

## Do You KNOW HOW?

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

5.  $(1, 5)$ ;  $m = -3$       6.  $(-4, 3)$ ;  $m = 2$

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

7.  $(4, 2)$  and  $(1, 6)$

8.  $(-2, 8)$  and  $(7, -4)$

9. Write the equation  $y - 6 = -5(x + 1)$  in slope-intercept form.

10. Write the equation of the line in point-slope form.

