

# Writing Equations in Point-Slope Form

(Pages 290–295)

<b>Point-Slope Form of a Linear Equation</b>	<p>For a given point <math>(x_1, y_1)</math> on a nonvertical line with slope <math>m</math>, the <b>point-slope form</b> of a linear equation is</p> $y - y_1 = m(x - x_1).$ <p>The equation of a vertical line through a point at <math>(x_1, y_1)</math> is <math>x = x_1</math>.</p>
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## EXAMPLES

**A** Write the point-slope form of an equation of the line that passes through  $(2, 3)$  and has a slope of 5.

$$y - y_1 = m(x - x_1) \quad \text{Point-slope form}$$

$$y - 3 = 5(x - 2) \quad \text{Replace } x_1 \text{ with 2, } y_1 \text{ with 3, and } m \text{ with 5.}$$

An equation of the line is  $y - 3 = 5(x - 2)$ .

**B** Write the point-slope form of an equation of the line that passes through  $(0, 3)$  and  $(4, 0)$ .

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

$$= \frac{0 - 3}{4 - 0} \text{ or } -\frac{3}{4}$$

$$y - y_1 = m(x - x_1) \quad \text{Point-slope form}$$

$$y - 3 = -\frac{3}{4}(x - 0) \quad \text{Let } (x_1, y_1) = (0, 3).$$

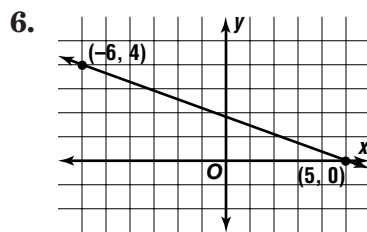
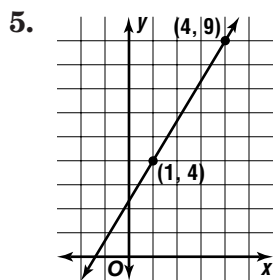
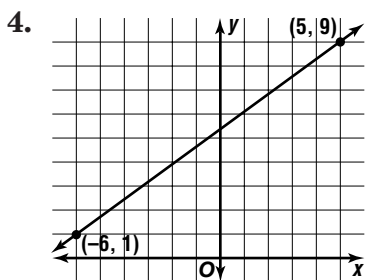
$$y - 3 = -\frac{3}{4}x$$

## PRACTICE

Write the point-slope form of an equation for each line passing through the given point and having the given slope.

- $(-1, -4), m = \frac{2}{5}$
- $(9, 7), m = -\frac{1}{4}$
- $(3, -6), m = 3$

Write the point-slope form of an equation for each line.



- the line through points at  $(-7, -8)$  and  $(2, -7)$
- the line through points at  $(5, -8)$  and  $(2, -5)$
- the line through points at  $(-6, -8)$  and  $(5, -8)$

**10. Standardized Test Practice** What is the point-slope form of an equation of the line that passes through  $(3, -3)$  and has a slope of 1?

- A**  $y - 3 = x - 3$       **B**  $y + 3 = x - 3$       **C**  $y = x$       **D**  $y - 3 = x + 3$

<p><b>Answers:</b> 1. <math>y + 4 = \frac{5}{2}(x + 1)</math> 2. <math>y - 7 = -\frac{7}{1}(x - 9)</math> 3. <math>y + 6 = 3(x - 3)</math> 4. <math>y - 9 = -\frac{11}{8}(x - 5)</math> or <math>y - 1 = \frac{11}{8}(x + 6)</math></p> <p>5. <math>y - 4 = \frac{3}{5}(x - 1)</math> or <math>y - 9 = -\frac{3}{5}(x - 4)</math> 6. <math>y = -\frac{11}{4}(x - 5)</math> or <math>y - 4 = -\frac{11}{4}(x + 6)</math> 7. <math>y + 8 = \frac{6}{1}(x + 7)</math> or <math>y + 7 = \frac{6}{1}(x - 2)</math></p> <p>8. <math>y + 5 = -1(x - 2)</math> or <math>y + 8 = -1(x - 5)</math> 9. <math>y + 8 = 0(x - 5)</math> or <math>y + 8 = 0(x + 6)</math> 10. B</p>
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