

Writing Linear Equations

Given a point on a line and the slope of the line, you can write an equation of the line.

Example 1 Write an equation in slope-intercept form of the line that passes through the point $(-5, 6)$ and has a slope of $\frac{3}{5}$.

$$y = mx + b \quad \text{Write the slope-intercept form.}$$

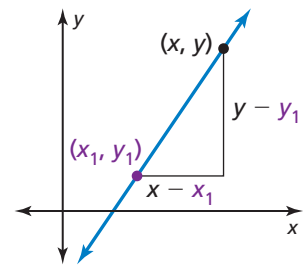
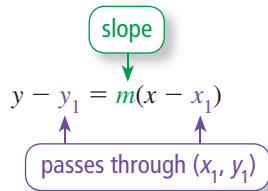
$$6 = \frac{3}{5}(-5) + b \quad \text{Substitute } \frac{3}{5} \text{ for } m, -5 \text{ for } x, \text{ and } 6 \text{ for } y.$$

$$6 = -3 + b \quad \text{Simplify.}$$

$$9 = b \quad \text{Solve for } b.$$

► So, the equation is $y = \frac{3}{5}x + 9$.

A linear equation written in the form $y - y_1 = m(x - x_1)$ is in **point-slope form**. The line passes through the point (x_1, y_1) , and the slope of the line is m .



Example 2 Write an equation in point-slope form of the line that passes through the point $(-8, 3)$ and has a slope of $\frac{3}{4}$.

$$y - y_1 = m(x - x_1) \quad \text{Write the point-slope form.}$$

$$y - 3 = \frac{3}{4}[x - (-8)] \quad \text{Substitute } \frac{3}{4} \text{ for } m, -8 \text{ for } x_1, \text{ and } 3 \text{ for } y_1.$$

$$y - 3 = \frac{3}{4}(x + 8) \quad \text{Simplify.}$$

► So, the equation is $y - 3 = \frac{3}{4}(x + 8)$.

Practice

Check your answers at BigIdeasMath.com.

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

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

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

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|-------------------------------|---------------------------------|----------------------------------|
| 7. $(1, 1); m = 5$ | 8. $(-3, 4); m = 2$ | 9. $(6, -3); m = \frac{3}{2}$ |
| 10. $(5, 7); m = \frac{2}{5}$ | 11. $(-4, 5); m = -\frac{3}{4}$ | 12. $(-2, -3); m = -\frac{3}{8}$ |