Writing Linear Equations in Point-Slope and Standard Forms

If you know the slope of a line and the coordinates of one point on the line, you can write an equation of the line by using the **point-slope form.** For a given point (x_1, y_1) on a nonvertical line with slope m, the point-slope form of a linear equation is $y - y_1 = m(x - x_1)$.

> Any linear equation can be expressed in the form $Ax + By = C$ where A, B, and C are integers and A and B are not both zero. This is called the **standard form.** An equation that is written in point-slope form can be changed to standard form.

Example 1: Write the point-slope form of an equation of the line that passes through $(6, 1)$ and has a slope of $-\dfrac{5}{2}$.

$$y - y_1 = m(x - x_1)$$
$$y - 1 = -\frac{5}{2}(x - 6)$$

Example 2: Write $y + 5 = 3(x - 4)$ in standard form.

$$y + 5 = 3(x - 4)$$
$$y + 5 = 3x - 12$$
$$-3x + y = -17$$
$$3x - y = 17$$

You can also find an equation of a line if you know the coordinates of two points on the line. First, find the slope of the line. Then write an equation of the line by using the point-slope form or the standard form.

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

1. $(2, 1)$, 4

2. $(-7, 2)$, 6

3. $\left(\dfrac{1}{2}, 3\right)$, 5

4. $(4, 9)$, $\dfrac{3}{4}$

5. $(-6, 7)$, 0

6. $(8, 3)$, 1

Write the point-slope form of an equation of the line that passes through each pair of points.

7. $(6, 3)$, $(-8, 5)$

8. $(-1, 9)$, $(10, 7)$

9. $(8, 5)$, $(0, -4)$

10. $(-3, -4)$, $(5, -6)$

11. $(2, 9)$, $(9, 2)$

12. $(-1, -4)$, $(-6, -10)$