Review: Slope Intercept Form Point Slope Form

$$y = mx + b$$

slope y-intercept

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

slope

point (x_1, y_1)

Key Concepts of Parallel and Perpendicular Lines

- *Parallel Lines* have the <u>same slope</u> but different *y*-intercepts.
- The slopes of *perpendicular lines* are <u>opposite reciprocals</u>.

Examples – Write an equation for the line in slope intercept form that is <u>PARALLEL</u> to the given line and that passes through the given point.

Process –

- Identify the slope of the given line
- Identify a parallel slope
- Using the given point and the slope, write an equation point slope form
- Rewrite in slope intercept form

1. $(4, 0)$; $y = \frac{3}{2}x + 9$ $m = \frac{3}{2}$ $\parallel : m = \frac{3}{2}$

   x_1, y_1

   $$y - 0 = \frac{3}{2}(x - 4)$$

   $$\boxed{y = \frac{3}{2}x - 6}$$

2. $(-8, -4)$; $y = -\frac{3}{4}x + 5$ $m = \frac{-3}{4}$

   x_1, y_1

   $\parallel : m = \frac{-3}{4}$

   $$y + 4 = \frac{-3}{4}(x + 8)$$

   $$y + 4 = \frac{-3}{4}x - 6$$

   $$\underline{-4 \qquad\qquad -4}$$

   $$\boxed{y = \frac{-3}{4}x - 10}$$

Examples – Write an equation for the line in slope intercept form that is <u>PERPENDICULAR</u> to the given line and that passes through the given point.

Process –
- Identify the slope of the given line
- Identify a perpendicular slope
- Using the given point and the slope, write an equation point slope form
- Rewrite in slope intercept form

3. $(6, 4)$; $y = 3x - 2$ $m = 3$ $\perp : m = \frac{-1}{3}$

$$y - 4 = -\frac{1}{3}(x - 6)$$

$$y - 4 = -\frac{1}{3}x + 2$$

$$+4 \qquad +4$$

$$\boxed{y = -\frac{1}{3}x + 6}$$

4. $(-1, -4)$; $y = -\frac{1}{6}x + 1$ $m = \frac{-1}{6}$ $\perp : m = 6$

$$y + 4 = 6(x + 1)$$

$$y + 4 = 6x + 6$$

$$-4 \qquad -4$$

$$\boxed{y = 6x + 2}$$

You try – Write an equation for the line in slope intercept form that is parallel/perpendicular to the given line and that passes through the given point.

5. <u>PARALLEL</u> to $y = \frac{1}{4}x - 3$ thru $(0, 1)$

$m = \frac{1}{4}$ $\parallel : m = \frac{1}{4}$

$$y - 1 = \frac{1}{4}(x - 0)$$

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

$$+1 \qquad +1$$

$$\boxed{y = \frac{1}{4}x + 1}$$

6. <u>PERPENDICULAR</u> to $y = -5x + 9$ thru $(-5, 5)$

$m = -5$ $\perp : m = \frac{1}{5}$

$$y - 5 = \frac{1}{5}(x + 5)$$

$$y - 5 = \frac{1}{5}x + 1$$

$$+5 \qquad +5$$

$$\boxed{y = \frac{1}{5}x + 6}$$