

## Writing Equations of Parallel and Perpendicular Lines



Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Example 1:** Write an equation of the line parallel to the line  $y = 3x + 5$  and passes through  $(1,4)$  in slope-intercept form.

**Step One:** Determine the slope of the given line.  $y = 3x + 5$  has a slope of  $m=3$ .

**Step Two:** Determine the slope of the line parallel to the given line. Since parallel lines have the same slope, the slope of the line parallel is also  $m=3$ .

**Step Three:** Write the equation of the parallel line in point-slope form using the slope found in Step Two and the point given in the problem. Rewrite the equation in slope-intercept form.

$$y - y_1 = m(x - x_1) \rightarrow y - 4 = 3(x - 1) \rightarrow \boxed{y = 3x + 1}$$

**Example 2:** Write an equation of the line perpendicular to the line  $2x + 6y = -24$  that passes through the point  $(2,1)$  in slope-intercept form.

**Step One:** Determine the slope of the given line.  $2x + 6y = -24$  has a slope of  $m = \frac{1}{3}$ .

**Step Two:** Determine the slope of the line perpendicular to the line given.

**Step Three:** Write the equation of perpendicular line in point-slope form using the slope found in Step Two and the given point in the problem. Rewrite the equation in slope-intercept form.

$$y - y_1 = m(x - x_1) \rightarrow y - 1 = -3(x - 2) \rightarrow \boxed{y = -3x + 7}$$

**Directions:** Find the equation of a line that goes through the given point given and is parallel to the equation. Write your answer in slope-intercept form. Then, find the equation of a line that goes through the point, but is perpendicular to the given equation. Write your answer in slope-intercept form.

1.  $y = 2x + 4$   
 $(-2, 1)$

2.  $y - 3 = -1(x - 2)$   
 $(4, -1)$

3.  $4x - y = 2$   
 $(5, -3)$

4.  $y - 3 = \left(\frac{-1}{3}\right)(x - 6)$   
 $(-2, -2)$

5.  $x + 3y = 5$   
 $(-3, 4)$

6.  $y = -2x + 7$   
 $(0, -1)$

7.  $y - 2 = -5(x - 2)$   
 $(4, -3)$

8.  $y + 4 = 3(x + 2)$   
 $(1, 3)$