

## AA – Section 5.6 – day 1 Examples

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

same slope

Examples – Find the slope of a line parallel to the graph of the given equation.

1.  $y = 4x + 2$

Given line  $m = \underline{4}$

Parallel line  $m = \underline{4}$

2.  $y = \frac{2}{7}x + 1$

Given line  $m = \underline{\frac{2}{7}}$

Parallel line  $m = \underline{\frac{2}{7}}$

3.  $-5x + 5y = 4$

$+5x \quad +5x$

$$\frac{5y}{5} = \frac{5x}{5} + \frac{4}{5}$$

$$y = x + \frac{4}{5}$$

Given line  $m = \underline{1}$

Parallel line  $m = \underline{1}$

4.  $9x - 5y = 4$

$-9x \quad -9x$

$$\frac{-5y}{-5} = \frac{-9x}{-5} + \frac{4}{-5}$$

$$y = \frac{9}{5}x - \frac{4}{5}$$

Given line  $m = \underline{\frac{9}{5}}$

Parallel line  $m = \underline{\frac{9}{5}}$

opposite reciprocals

Examples – Find the slope of a line perpendicular to the graph of the given equation.

5.  $y = -6x + 3$

Given line  $m = \underline{-6}$

Perpendicular line  $m = \underline{\frac{1}{6}}$

6.  $y = \frac{4}{7}x + 1$

Given line  $m = \underline{\frac{4}{7}}$

Perpendicular line  $m = \underline{-\frac{7}{4}}$

$$7. \quad -15x + 5y = 10$$

$$\quad +15x \quad +15x$$

$$\frac{5y}{5} = \frac{15x+10}{5}$$

$$y = 3x + 2$$

$$8. \quad 7x - 2y = 6$$

$$\quad -7x \quad -7x$$

$$\frac{-2y}{-2} = \frac{-7x+6}{-2}$$

$$y = \frac{7}{2}x - 3$$

Given line  $m = \underline{3}$

Perpendicular line  $m = \underline{-1/3}$

Given line  $m = \underline{7/2}$

Perpendicular line  $m = \underline{-2/7}$

Examples – Are the lines parallel, perpendicular, or neither? Explain.

Process – Write each line in slope intercept form, and then compare the slopes.

9.  $9x + 3y = 6$

$3x + 9y = 6$

$$\begin{array}{r} 9x + 3y = 6 \\ -9x \quad -9x \end{array}$$

$$\frac{3y}{3} = \frac{-9x+6}{3}$$

$$y = -3x + 2$$

$$m = -3$$

$$\begin{array}{r} 3x + 9y = 6 \\ -3x \quad -3x \end{array}$$

$$\frac{9y}{9} = \frac{-3x+6}{9}$$

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

$$m = -\frac{1}{3}$$

Neither. These lines are not parallel because they do not have the same slopes. They also do not have opposite reciprocal slope.

10.  $y = -4$   $m = 0$

$y = 4$   $m = 0$

These two lines are parallel because they have the same slopes.

11.  $y = -\frac{5}{2}x + 11$   $m = -\frac{5}{2}$

$-5x + 2y = 20$

$$\begin{array}{r} -5x + 2y = 20 \\ +5x \quad +5x \end{array}$$

$$\frac{2y}{2} = \frac{5x+20}{2}$$

$$y = \frac{5}{2}x + 10 \quad m = \frac{5}{2}$$

Neither. These lines are not parallel because they do not have the same slopes. They are also not perpendicular because they do not have opposite reciprocal slopes.