

## Study Guide

**Slope**

The ratio of *rise* to *run* is called **slope**. The slope of a line describes its steepness, or rate of change.

On a coordinate plane, a line extending from lower left to upper right has a positive slope. A line extending from upper left to lower right has a negative slope. The slope of a horizontal line is zero. A vertical line has *no slope*.

The slope of a nonvertical line can be determined from the coordinates of any two points on the line.

**Example:** Determine the slope of the line that passes through  $(-1, 5)$  and  $(4, -2)$ .

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-2 - 5}{4 - (-1)} \\ &= \frac{-7}{5} = -\frac{7}{5} \end{aligned}$$

**Determine the slope of the line that passes through each pair of points.**

1.  $(2, 1), (8, 9)$

2.  $(4, 9), (1, 6)$

3.  $(7, -8), (14, -6)$

4.  $(-10, 7), (-20, 8)$

5.  $(3, 11), (-12, 18)$

6.  $(-4, -1), (-2, -5)$

**Determine the value of  $r$  so the line that passes through each pair of points has the given slope.**

7.  $(10, r), (3, 4), m = -\frac{2}{7}$

8.  $(-1, -3), (7, r), m = \frac{3}{4}$

9.  $(-2, r), (10, 4),$   
 $m = -\frac{1}{2}$

10.  $(12, r), (r, 6), m = 2$

11.  $(6, 8), (r, -2), m = -3$

12.  $(r, 9), (7, 5), m = 6$

**Definition of Slope**

The slope  $m$  of a line is the ratio of the change in the  $y$ -coordinates to the corresponding change in the  $x$ -coordinates.

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x} \text{ or } m = \frac{\text{change in } y}{\text{change in } x}$$

**Determining Slope Given Two Points**

Given the coordinates of two points,  $(x_1, y_1)$  and  $(x_2, y_2)$ , on a line, the slope  $m$  can be found as follows:

$$m = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } x_1 \neq x_2.$$