

## Lesson 8-4

### Example 1 Use Rise and Run to Find Slope

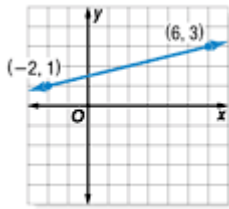
Find the slope of a roof that rises 2 feet for every horizontal change of 10 feet.

$$\begin{aligned}\text{slope} &= \frac{\text{rise}}{\text{run}} && \text{Write the formula.} \\ &= \frac{2}{10} && \text{rise} = 2 \text{ ft, run} = 10 \text{ ft} \\ &= \frac{1}{5} && \text{Simplify.}\end{aligned}$$

The slope of the roof is  $\frac{1}{5}$  or 0.20.

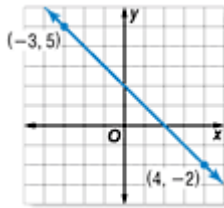
### Example 2 Positive Slope

Find the slope of the line.



$$\begin{aligned}m &= \frac{y_2 - y_1}{x_2 - x_1} && \text{Definition of slope} \\ m &= \frac{3 - 1}{6 - (-2)} && (x_1, y_1) = (-2, 1), (x_2, y_2) = (6, 3) \\ m &= \frac{2}{8} \text{ or } \frac{1}{4} && \text{The slope is } \frac{1}{4}.\end{aligned}$$

**Example 3 Negative Slope**  
**Find the slope of the line.**



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Definition of slope

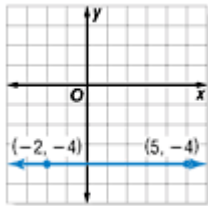
$$m = \frac{5 - (-2)}{-3 - (4)}$$

$(x_1, y_1) = (4, -2), (x_2, y_2) = (-3, 5)$

$$m = \frac{7}{-7} \text{ or } -1$$

The slope is -1.

**Example 4 Zero Slope**  
**Find the slope of the line.**



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Definition of slope

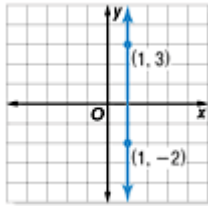
$$m = \frac{-4 - (-4)}{5 - (-2)}$$

$(x_1, y_1) = (-2, -4), (x_2, y_2) = (5, -4)$

$$m = \frac{0}{7} \text{ or } 0$$

The slope is 0.

**Example 5 Undefined Slope**  
**Find the slope of the line.**



$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Definition of slope}$$

$$m = \frac{3 - (-2)}{1 - 1} \quad (x_1, y_1) = (1, -2), (x_2, y_2) = (1, 3)$$

$$m = \frac{5}{0}$$

Division by 0 is undefined. So, the slope is undefined.

**Example 6 Compare Slopes**  
**Multiple-Choice Test Item**

There are two major roads coming into a small town. The first road rises 8 feet vertically for every 12-foot run. The second road rises 6 feet vertically for every 10-foot run. Which statement is true?

- A. The first road is steeper than the second road.
- B. The second road is steeper than the first road.
- C. Both roads have the same steepness.
- D. You cannot determine which road is steeper from the information given.

**Read the Test Item** To compare the steepness of the roads, find the slope.

**Solve the Test Item**

**First Road**

$$\begin{aligned} \text{slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{8}{12} \\ &= \frac{2}{3} \text{ or } 0.6666\dots \end{aligned}$$

**Second Road**

$$\begin{aligned} \text{slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{6}{10} \\ &= \frac{3}{5} \text{ or } 0.60 \end{aligned}$$

$0.6666\dots > 0.60$ , so the first road is steeper than the second. The answer is A.