4.4 Find Slope and Rate of Change

TEKS A.2.C, A.6.A, A.6.B

Before You graphed linear equations.

Now You will find the slope of a line and interpret slope as a rate of change.

Why? So you can find the slope of a boat ramp, as in Ex. 23.

Key Vocabulary
- **slope**
- **rate of change**

The **slope** of a nonvertical line is the ratio of the vertical change (the *rise*) to the horizontal change (the *run*) between any two points on the line. The slope of a line is represented by the letter m.

KEY CONCEPT *For Your Notebook*

Finding the Slope of a Line

Words

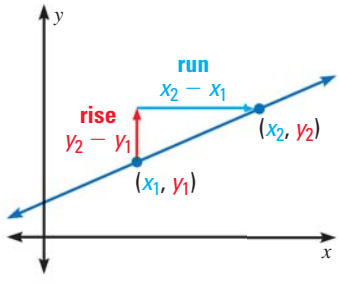
The slope m of the nonvertical line passing through the two points (x_1, y_1) and (x_2, y_2) is the ratio of the rise (change in y) to the run (change in x).

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x}$$

Symbols

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

Graph



READING
Read x_1 as "x sub one." Think "x-coordinate of the first point." Read y_1 as "y sub one." Think "y-coordinate of the first point."

EXAMPLE 1 Find a positive slope

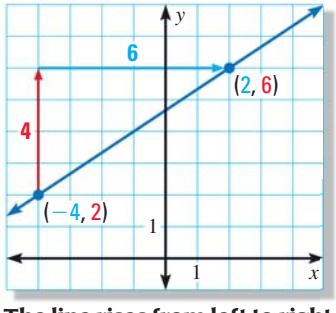
Find the slope of the line shown.

Let $(x_1, y_1) = (-4, 2)$ and $(x_2, y_2) = (2, 6)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Write formula for slope.

$$= \frac{6 - 2}{2 - (-4)}$$ Substitute.

$$= \frac{4}{6} = \frac{2}{3}$$ Simplify.



The line rises from left to right. The slope is positive.

AVOID ERRORS
Be sure to keep the x- and y-coordinates in the same order in both the numerator and denominator when calculating slope.

GUIDED PRACTICE for Example 1

Find the slope of the line that passes through the points.

1. (5, 2) and (4, −1)
2. (−2, 3) and (4, 6)
3. $\left(\frac{9}{2}, 5\right)$ and $\left(\frac{1}{2}, -3\right)$