4.4 Find Slope and Rate of Change

Goal • Find the slope of a line and interpret slope as a rate of change.

Your Notes

VOCABULARY

Slope

Rate of change

FINDING THE SLOPE OF A LINE

Words

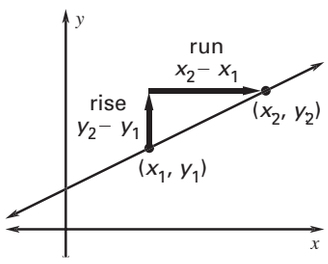
The slope of the nonvertical line passing through the two points (x_1, y_1) and (x_2, y_2) is the ratio of the _____ (change in y) to the _____ (change in x).

Symbols

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

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

Graph

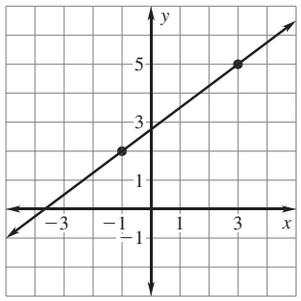


Your Notes

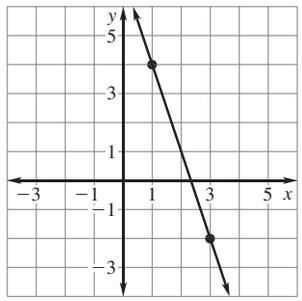
Example 1 ***Find a slope***

Find the slope of the line shown.

a. Let $(x_1, y_1) = (-1, 2)$ and $(x_2, y_2) = (3, 5)$.



b. Let $(x_1, y_1) = (1, 4)$ and $(x_2, y_2) = (3, -2)$.



Solution

Keep the *x*- and *y*-coordinates in the same order in the numerator and denominator when calculating slope. This will help avoid error.

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

$= \dfrac{\square - 2}{\square - (-1)}$ **Substitute.**

$=$ ____ **Simplify.**

The line _____ from left to right. The slope is _____.

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

$= \dfrac{\square - 4}{\square - 1}$ **Substitute.**

$=$ ____ $=$ ____ **Simplify.**

The line _____ from left to right. The slope is _____.

✔ ***Checkpoint*** **Find the slope of the line passing through the points.**

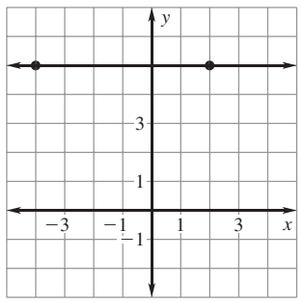
1. $(-3, -1)$ and $(-2, 1)$	**2.** $(-6, 3)$ and $(5, -2)$

Your Notes

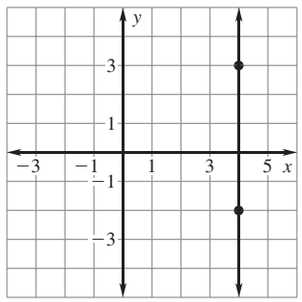
Example 2 ***Find the slope of a line***

Find the slope of the line shown.

a. Let $(x_1, y_1) = (2, 5)$ and $(x_2, y_2) = (-4, 5)$.



b. Let $(x_1, y_1) = (4, -2)$ and $(x_2, y_2) = (4, 3)$.



Solution

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

$= \dfrac{5 - \square}{4 - \square}$ **Substitute.**

$=$ _____ **Simplify.**

The line is _____. The slope is _____.

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

$= \dfrac{3 - \square}{4 - \square}$ **Substitute.**

$=$ _____ **Simplify.**

The line is _____. The slope is _____.

✔ ***Checkpoint*** **Find the slope of the line passing through the points. Then classify the line by its slope.**

3. (1, −2) and (1, 3)	**4.** (−3, 7) and (4, 7)

Your Notes

Example 3 ***Find a rate of change***

Gas Prices The table shows the cost of a gallon of gas for a number of days. Find the rate of change with respect to time.

Time (days)	Day 1	Day 3	Day 5
Price/gal ($)	1.99	2.09	2.19

$$\text{Rate of change} = \frac{\text{change in cost}}{\text{change in time}}$$ **Write formula.**

$$= \frac{2.09 - \square}{3 - \square}$$ **Substitute.**

$$= \frac{\square}{\square} = \underline{\quad}$$ **Simplify.**

The rate of change in price is _____ per day.

Checkpoint

5. The table shows the change in temperature over time. Find the rate of change in degrees Fahrenheit with respect to time.

Temperature (°F)	**Time (hours)**
38	0
43	2
48	4
53	6

Homework