

Section Overview

Ratios and Rates

Lessons 5-1, 5-2

Why? Ratios are used to solve proportions, to find missing lengths in similar figures, and to interpret the scale in scale drawings or scale models.

A ratio compares two numbers.
A **rate** is a ratio that compares two measurement values that have different units.

A **unit rate** has a denominator of 1.
The fraction bar may be read as per in a rate.

Denise ran 5 miles in 40 minutes.

$$\text{Rate: } \frac{5 \text{ mi}}{40 \text{ min}} \text{ or } \frac{40 \text{ min}}{5 \text{ mi}}$$

$$\text{Unit Rate: } \frac{0.125 \text{ mi}}{1 \text{ min}} \text{ or } \frac{8 \text{ min}}{1 \text{ mi}}$$

Proportions

Lessons 5-3, 5-4

Why? Proportions can be used to solve a wide variety of problems, such as those involving prices, monetary conversions, recipes, speed, and density.

A **proportion** shows that two ratios are equivalent.

$$\frac{2}{1} = \frac{6}{3}$$

Cross products in a proportion are equal.

~~$$\frac{2}{1} = \frac{6}{3}$$~~

$$2 \times 3 = 1 \times 6$$

Use cross products to solve the proportion.

$$\frac{x}{6} = \frac{10}{15}$$

$$x \cdot 15 = 6 \cdot 10$$

$$15x = 60$$

$$x = 4$$

Customary Measurements

Lesson 5-5

Why? Customary units of measure are commonly used in the United States.

Common Customary Measurements		
Length	Weight	Capacity
1 foot = 12 inches	1 pound = 16 ounces	1 cup = 8 fluid ounces
1 yard = 36 inches	1 ton = 2,000 pounds	1 pint = 2 cups
1 yard = 3 feet		1 quart = 2 pints
1 mile = 5,280 feet		1 quart = 4 cups
1 mile = 1,760 yards		1 gallon = 4 quarts
		1 gallon = 16 cups
		1 gallon = 128 fluid ounces

Proportions can be used to convert units within the customary system.

Convert 4 yards to feet.

$$\frac{1 \text{ yd}}{3 \text{ ft}} = \frac{4 \text{ yd}}{x \text{ ft}}$$

$$1 \cdot x = 3 \cdot 4$$

$$x = 12 \quad \text{So 4 yards is 12 feet.}$$