LESSON 8.1

NAME _____ DATE _____

Reteaching with Practice

For use with pages 457–464

GOAL **Find and simplify the ratio of two numbers**

VOCABULARY

If a and b are two quantities that are measured in the same units, then the **ratio of a to b** is $\frac{a}{b}$.

An equation that equates two ratios is a **proportion.**

In the proportion $\frac{a}{b} = \frac{c}{d}$, the numbers a and d are the **extremes** of the proportion and the numbers b and c are the **means** of the proportion.

Properties of Proportions

1. **Cross Product Property** The product of the extremes equals the product of the means.

   If $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$.

2. **Reciprocal Property** If two ratios are equal, then their reciprocals are also equal.

   If $\frac{a}{b} = \frac{c}{d}$, then $\frac{b}{a} = \frac{d}{c}$.

EXAMPLE 1 ***Simplifying Ratios***

Simplify the ratios.

a. $\frac{8 \text{ in.}}{2 \text{ ft}}$ **b.** $\frac{1 \text{ km}}{500 \text{ m}}$

SOLUTION

To simplify ratios with unlike units, convert to like units so that the units divide out. Then simplify the fraction, if possible.

a. $\frac{8 \text{ in.}}{2 \text{ ft}} = \frac{8 \text{ in.}}{2 \cdot 12 \text{ in.}} = \frac{8}{24} = \frac{1}{3}$ **b.** $\frac{1 \text{ km}}{500 \text{ m}} = \frac{1 \cdot 1000 \text{ m}}{500 \text{ m}} = \frac{1000}{500} = \frac{2}{1}$

Exercises for Example 1

Simplify the ratio.

1. $\frac{25 \text{ cm}}{2 \text{ m}}$ **2.** $\frac{18 \text{ ft}}{2 \text{ yd}}$ **3.** $\frac{2 \text{ ft}}{24 \text{ in.}}$ **4.** $\frac{6 \text{ km}}{9 \text{ km}}$

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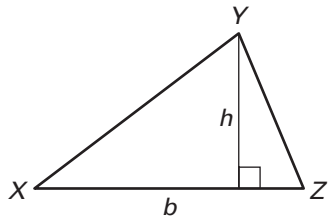
EXAMPLE 2 Using Ratios

Triangle XYZ has an area of 25 square inches. The ratio of the base of $\triangle XYZ$ to the height of $\triangle XYZ$ is 2:1. Find the base and height of $\triangle XYZ$.



SOLUTION

Because the ratio of the base to the height is 2:1, you can represent the base as $2h$.

$A = \frac{1}{2}bh$	Formula for the area of a triangle
$25 = \frac{1}{2}(2h)h$	Substitute for A and b.
$25 = h^2$	Simplify.
$5 = h$	Find the positive square root.

So, $\triangle XYZ$ has a base of 10 inches and a height of 5 inches.

Exercise for Example 2

5. The area of a rectangle is 125 ft^2. The ratio of the width to the length is 1:5. Find the length and the width.

EXAMPLE 3 Solving Proportions

Solve the proportion.

$$\frac{x}{8} = \frac{5}{4}$$

SOLUTION

$\frac{x}{8} = \frac{5}{4}$	Write original proportion.
$4x = 40$	Cross product property
$x = 10$	Divide each side by 4.

Exercises for Example 3

Find the value of *x* by solving the proportion.

6. $\frac{9}{x} = \frac{2}{7}$ **7.** $\frac{5}{3} = \frac{5x}{6}$ **8.** $\frac{4}{x-4} = \frac{3}{x}$ **9.** $\frac{3}{x} = \frac{x}{12}$