

Ratio and Proportion

6



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SECTION 6.1

Ratios

Objectives

- A** Express ratios as fractions in lowest terms.
- B** Use ratios to solve application problems.

Ratios


The *ratio* of two numbers is a way of comparing them.

If we say that the ratio of two numbers is 2 to 1, then the first number is twice as large as the second number.

For example, if there are 10 men and 5 women enrolled in a math class, then the ratio of men to women is 10 to 5.

Because 10 is twice as large as 5, we can also say that the ratio of men to women is 2 to 1.

We can define the ratio of two numbers in terms of fractions.



A Ratios as Fractions in Lowest
Terms

Ratios as Fractions in Lowest Terms

Definition

A **ratio** is a comparison between two numbers and is represented as a fraction, where the first number in the ratio is the numerator and the second number in the ratio is the denominator.

If a and b are any two numbers, then the ratio of a to b is $\frac{a}{b}$. ($b \neq 0$)

Ratios as Fractions in Lowest Terms

We handle ratios the same way we handle fractions.

For example, when we said that the ratio of 10 men to 5 women was the same as the ratio 2 to 1, we were actually saying

$$\frac{10}{5} = \frac{2}{1}$$

Reduce to lowest terms.

Because we have already studied fractions in detail, much of the introductory material on ratios will seem like review.

Example 1

Express the ratio of 16 to 48 as a fraction in lowest terms.

Solution:

Because the ratio is 16 to 48, the numerator of the fraction is 16 and the denominator is 48:

$$\frac{16}{48} = \frac{1}{3}$$

Notice that the first number in the ratio becomes the numerator of the fraction, and the second number in the ratio becomes the denominator.

Ratios as Fractions in Lowest Terms

Table 1 shows several more ratios and their fractional equivalents.

TABLE 1		
Ratio	Fraction	Fraction In Lowest Terms
25 to 35	$\frac{25}{35}$	$\frac{5}{7}$
35 to 25	$\frac{35}{25}$	$\frac{7}{5}$
8 to 2	$\frac{8}{2}$	$\frac{4}{1}$ We can also write this as just 4.
$\frac{1}{4}$ to $\frac{3}{4}$	$\frac{\frac{1}{4}}{\frac{3}{4}}$	$\frac{1}{3}$ because $\frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{4} \cdot \frac{4}{3} = \frac{1}{3}$
0.6 to 1.7	$\frac{0.6}{1.7}$	$\frac{6}{17}$ because $\frac{0.6 \times 10}{1.7 \times 10} = \frac{6}{17}$

Ratios as Fractions in Lowest Terms

Notice that in each case the fraction has been reduced to lowest terms.

Also, the ratio that contains decimals has been rewritten as a fraction that does not contain decimals.



B Applications of Ratios

Example 4

During a game, a basketball player makes 12 out of the 18 free throws he attempts. Write the ratio of the number of free throws he makes to the number of free throws he attempts as a fraction in lowest terms.

Solution:

Because he makes 12 out of 18, we want the ratio 12 to 18, or

$$\frac{12}{18} = \frac{2}{3}$$

Because the ratio is 2 to 3, we can say that, in this particular game, he made 2 out of every 3 free throws he attempted.