

## 7 Applying Fractions

### 7-1 Ratios

**Objective:** To solve problems involving ratios.

#### Vocabulary

**Ratio** The ratio of one number to another is the quotient when the first number is divided by a second *nonzero* number.

**Example 1** The ratio of 9 to 2 can be written as  $9 \div 2$ ,  $\frac{9}{2}$ , or 9:2.

**Example 2** Write each ratio in simplest form.

a. 18:63

b. 15x:45x

c.  $\frac{8c^2d}{12cd^2}$

**Solution** First rewrite the ratio as a fraction if needed. Then simplify.

$$\text{a. } 18:63 = \frac{18}{63} = \frac{2}{7}, \quad \text{or } 2:7$$

$$\text{b. } 15x:45x = \frac{15x}{45x} = \frac{1}{3}, \quad \text{or } 1:3$$

$$\text{c. } \frac{8c^2d}{12cd^2} = \frac{2c}{3d}$$

Write each ratio in simplest form.

1. 12:18

2. 42:35

3. 9:30

4. 15:75

5. 18x:27x

6. 9y:48y

7.  $6a^2:12a$

8. 30x:6x

9.  $\frac{a^4}{(2a)^2}$

10.  $\frac{25m^4}{45m^3}$

11.  $\frac{56a^2b}{14ab^3}$

12.  $\frac{36rs^4}{12r^2s^2}$

**Example 3** Write each ratio in simplest form: a. 2 h:10 min b. 8 in.:4 ft

**Solution** To write the ratio of two quantities of the same kind, first express the measures in the same unit. Then write the ratio.

$$\text{a. } 2 \text{ h}:10 \text{ min} = \frac{2 \text{ h}}{10 \text{ min}} = \frac{120 \text{ min}}{10 \text{ min}} = \frac{12}{1} \text{ or } 12:1$$

$$\text{b. } 8 \text{ in.}:4 \text{ ft} = \frac{8 \text{ in.}}{4 \text{ ft}} = \frac{8 \text{ in.}}{48 \text{ in.}} = \frac{1}{6} \text{ or } 1:6$$

**CAUTION** Using different units of measure will give an incorrect comparison.

Write each ratio in simplest form.

13. 20 sec:1 min

14. 6 days:2 wk

15. 2 ft:1 yd

16. 12 cm:1.2 m

17. 8 oz:2 lb

18. 1 day:30 h

19. 5 m:250 cm

20. 4 h:30 min

21. 1 lb:6 oz

22. 8 wks:1 yr

23. 3 kg:150 g

24. 6 kg:120 g

**7-1 Ratios** (continued)

**Example 4** Write the ratio of wins to losses for a baseball team that played 72 games and won 45 of them.

**Solution** 45 wins out of 72 games tells you there were  $72 - 45$  or 27 losses.  
The number of wins to losses =  $45:27$ , or  $\frac{45}{27} = \frac{5}{3}$ , or 5:3.

Write each ratio in simplest form.

25. The student-teacher ratio in a school with 2376 students and 132 teachers.
26. The ratio of sunny to cloudy days in a year with 365 days, 275 of them sunny.
27. The ratio of two-door cars to four-door cars in a rental car fleet of 600 cars, 350 of which are four-door cars.
28. Ratio of boys to girls in a school of 1200 students if 660 students are girls.
29. a. The ratio of men to women in an audience if 120 out of 300 are men.  
b. The ratio of women to men in part (a).
30. a. The ratio of fiction books to nonfiction books in a library with 1100 fiction books and 1760 nonfiction books.  
b. The ratio of nonfiction books to fiction books in the library in part (a).

Find the ratio of (a) the perimeters and (b) the areas of each pair of figures.

31. A rectangle with sides 10 cm and 8 cm and one with sides 15 cm and 12 cm.
32. A rectangle with sides 12 in. and 16 in. and one with sides 15 in. and 20 in.
33. A rectangle with length 18 cm and perimeter 84 cm and one with length 15 cm and perimeter 70 cm.
34. A rectangle with length 20 in. and perimeter 100 in. and one with length 30 in. and perimeter 150 in.
35. A square with sides 75 cm and one with sides 1 m.
36. A square with sides 18 in. and one with sides 2 yd.

**Mixed Review Exercises**

Solve.

1.  $5x = 21 - 2x$

2.  $3(x - 5) + x = 5$

3.  $4(3 + n) = 3(8 + 2n)$

4.  $\frac{x + 3}{2} = -9$

5.  $\frac{18 - 3y}{3} = 2y$

6.  $-\frac{c}{7} = 3$

7.  $(r + 3)(r - 4) = 0$

8.  $2x^2 + 10x - 28 = 0$

9.  $2(x - 1) = 3(x - 2)$

Simplify.

10.  $\frac{2b + 1}{3c} + \frac{b}{c}$

11.  $2x + \frac{3}{x}$

12.  $\frac{a}{4} + \frac{3a + 4}{4}$