

3.5

Write Ratios and Proportions

Goals • Find ratios and write and solve proportions.

Your Notes

VOCABULARY

Ratio The use of division to compare two quantities

Proportion An equation that states that two ratios are equivalent

RATIOS

1. A ratio uses division to compare two quantities.
2. The ratio of two quantities, a and b , where b is not equal to 0, can be written in three ways:

a to b

$a:b$

$\frac{a}{b}$

3. Each ratio is read “the ratio of a to b ”.
4. Ratios should be written in simplest form.

Example 1 Write a ratio

Cell Phone Use A person makes 6 long distance calls and 15 local calls in 1 month.

- a. Find the ratio of long distance calls to local calls.
- b. Find the ratio of long distance calls to all calls.

Solution

$$\text{a. } \frac{\text{long distance calls}}{\text{local calls}} = \frac{6}{15} = \frac{2}{5}$$

$$\text{b. } \frac{\text{long distance calls}}{\text{all calls}} = \frac{6}{21} = \frac{2}{7}$$

Your Notes

- ✔ **Checkpoint** Shawn and Myra are selling tickets to their school's talent show. Shawn sold 36 tickets, and Myra sold 44 tickets. Find the specified ratio.

1. The number of tickets Shawn sold to the number of tickets Myra sold

$$\frac{9}{11}$$

2. The number of tickets Myra sold to the number of tickets Shawn and Myra sold

$$\frac{11}{20}$$

Example 2 Solve a proportion

Solve the proportion $\frac{y}{15} = \frac{3}{5}$.

Solution

$$\frac{y}{15} = \frac{3}{5}$$

Write original proportion.

$$15 \cdot \frac{y}{15} = 15 \cdot \frac{3}{5}$$

Multiply each side by 15.

$$y = \frac{45}{5}$$

Simplify.

$$y = 9$$

Divide.

Use the same methods for solving equations to solve proportions with a variable in the numerator.

- ✔ **Checkpoint** Solve the proportion. Check your solution.

3. $\frac{9}{4} = \frac{c}{28}$

$$c = 63$$

4. $\frac{a}{32} = \frac{7}{8}$

$$a = 28$$

Your Notes

Example 3 Solve a multi-step problem

Swimming Pool A empty swimming pool is being filled with water. After 5 minutes the pool has 400 gallons of water. If the pool has a volume of 11,200 gallons, how long does it take to fill the empty pool?

Solution

Step 1 Write a proportion involving two ratios that compare the amount of water in the pool to the amount of time.

$$\frac{400}{5} = \frac{11,200}{x}$$

← gallons
← minutes

Step 2 Solve the proportion.

$$\frac{400}{5} = \frac{11,200}{x}$$

Write proportion.

$$x \cdot \frac{400}{5} = x \cdot \frac{11,200}{x}$$

Multiply each side by x .

$$\frac{400x}{5} = 11,200$$

Simplify.

$$5 \cdot \frac{400x}{5} = 5 \cdot 11,200$$

Multiply each side by 5 .

$$400x = 56,000$$

Simplify.

$$x = 140$$

Divide each side by 400 .

The pool is full after 140 minutes.

Homework

✓ **Checkpoint** Complete the following exercise.

5. An Olympic sized pool has a volume of 810,000 gallons. If it is filled at the same rate as the pool in Example 3, how long will it take to fill the pool?

10,125 minutes