

7-1 Study Guide and Intervention *(continued)*

Proportions

Use Properties of Proportions A statement that two ratios are equal is called a **proportion**. In the proportion $\frac{a}{b} = \frac{c}{d}$, where b and d are not zero, the values a and d are the **extremes** and the values b and c are the **means**. In a proportion, the product of the means is equal to the product of the extremes, so $ad = bc$.

$$\frac{a}{b} = \frac{c}{d}$$

$$a \cdot d = b \cdot c$$

\uparrow \uparrow
 extremes means

Example 1 Solve $\frac{9}{16} = \frac{27}{x}$.

$$\frac{9}{16} = \frac{27}{x}$$

$9 \cdot x = 16 \cdot 27$ Cross products

$9x = 432$ Multiply.

$x = 48$ Divide each side by 9.

Example 2 A room is 49 centimeters by 28 centimeters on a scale drawing of a house. For the actual room, the larger dimension is 14 feet. Find the shorter dimension of the actual room.

If x is the room's shorter dimension, then

$$\frac{28}{49} = \frac{x}{14}$$

shorter dimension
longer dimension

$49x = 392$ Cross products

$x = 8$ Divide each side by 49.

The shorter side of the room is 8 feet.

Exercises

Show all work on lined paper!

Solve each proportion.

★ 1. $\frac{1}{2} = \frac{28}{x}$ $1x = 2 \cdot 28$ $x = 56$

★ 2. $\frac{3}{8} = \frac{y}{24}$ $72 = 8y$ $19 = y$

★ 3. $\frac{x+22}{x+2} = \frac{30}{10}$ $10(x+22) = 30(x+2)$
 $10x+220 = 30x+60$
 $10x+160 = 30x$
 $160 = 20x$
 $8 = x$

★ 4. $\frac{3}{18.2} = \frac{9}{y}$ $3y = 163.8$ $y = 54.6$

★ 5. $\frac{2x+3}{8} = \frac{5}{4}$ $4(2x+3) = 40$
 $8x+12 = 40$
 $8x = 28$
 $x = 3.5$

★ 6. $\frac{x+1}{x-1} = \frac{3}{4}$ $4(x+1) = 3(x-1)$
 $4x+4 = 3x-3$
 $x+4 = -3$
 $x = -7$

Use a proportion to solve each problem.

7. If 3 cassettes cost \$44.85, find the cost of one cassette. $x = 14.95$
8. The ratio of the sides of a triangle are 8:15:17. If the perimeter of the triangle is 480 inches, find the length of each side of the triangle.
96, 180, 204
9. The scale on a map indicates that one inch equals 4 miles. If two towns are 3.5 inches apart on the map, what is the actual distance between the towns?

$$8x + 15x + 17x = 480$$

Chapter 7

$$40x = 480$$

$$x = 12$$

Lesson 7-1

7-1 Skills Practice

Proportions

1. **FOOTBALL** A tight end scored 6 touchdowns in 14 games. Find the ratio of touchdowns per game.

$$.43:1$$

2. **EDUCATION** In a schedule of 6 classes, Marta has 2 elective classes. What is the ratio of elective to non-elective classes in Marta's schedule?

$$1:2$$

3. **BIOLOGY** Out of 274 listed species of birds in the United States, 78 species made the endangered list. Find the ratio of endangered species of birds to listed species in the United States.

$$39/137$$

4. **ART** An artist in Portland, Oregon, makes bronze sculptures of dogs. The ratio of the height of a sculpture to the actual height of the dog is 2:3. If the height of the sculpture is 14 inches, find the height of the dog.

$$21 \text{ in}$$

5. **SCHOOL** The ratio of male students to female students in the drama club at Campbell High School is 3:4. If the number of male students in the club is 18, what is the number of female students?

$$24$$

Solve each proportion.

show all work on lined paper

$$\star 6. \frac{2}{5} = \frac{x}{40} \quad 16$$

$$\star 7. \frac{7}{10} = \frac{21}{x} \quad 30$$

$$\star 8. \frac{20}{5} = \frac{4x}{6} \quad 6$$

$$\star 9. \frac{5x}{4} = \frac{35}{8} \quad 3.5$$

$$\star 10. \frac{x+1}{3} = \frac{7}{2} \quad 9.5$$

$$\star 11. \frac{15}{3} = \frac{x-3}{5} \quad 28$$

Find the measures of the sides of each triangle.

12. The ratio of the measures of the sides of a triangle is 3:5:7, and its perimeter is 450 centimeters.

$$90 \text{ cm}, 150 \text{ cm}, 210 \text{ cm}$$

13. The ratio of the measures of the sides of a triangle is 5:6:9, and its perimeter is 220 meters.

$$55 \text{ m}, 66 \text{ m}, 99 \text{ m}$$

14. The ratio of the measures of the sides of a triangle is 4:6:8, and its perimeter is 126 feet.

$$28 \text{ ft}, 42 \text{ ft}, 56 \text{ ft}$$

15. The ratio of the measures of the sides of a triangle is 5:7:8, and its perimeter is 40 inches.

$$10 \text{ in}, 14 \text{ in}, 16 \text{ in}$$

7-1

Practice

Proportions

1. **NUTRITION** One ounce of cheddar cheese contains 9 grams of fat. Six of the grams of fat are saturated fats. Find the ratio of saturated fats to total fat in an ounce of cheese.

2:3

2. **FARMING** The ratio of goats to sheep at a university research farm is 4:7. The number of sheep at the farm is 28. What is the number of goats?

16

3. **ART** Edward Hopper's oil on canvas painting *Nighthawks* has a length of 60 inches and a width of 30 inches. A print of the original has a length of 2.5 inches. What is the width of the print?

1.25 in

Solve each proportion.

Show all work on lined paper

★ 4. $\frac{5}{8} = \frac{x}{12}$ 7.5

★ 5. $\frac{x}{1.12} = \frac{1}{5}$.224

★ 6. $\frac{6x}{27} = \frac{4}{3}$ 6

★ 7. $\frac{x+2}{3} = \frac{8}{9}$ $\frac{2}{3}$

★ 8. $\frac{3x-5}{4} = \frac{-5}{7}$ $\frac{5}{7}$

★ 9. $\frac{x-2}{4} = \frac{x+4}{2}$ -10

Find the measures of the sides of each triangle.

10. The ratio of the measures of the sides of a triangle is 3:4:6, and its perimeter is 104 feet.

24ft, 32ft, 48ft

11. The ratio of the measures of the sides of a triangle is 7:9:12, and its perimeter is 84 inches.

21in, 27in, 36in

12. The ratio of the measures of the sides of a triangle is 6:7:9, and its perimeter is 77 centimeters.

21cm, 24.5cm, 31.5cm

Find the measures of the angles in each triangle.

13. The ratio of the measures of the angles is 4:5:6.

48, 60, 72

14. The ratio of the measures of the angles is 5:7:8.

45, 63, 72

15. **BRIDGES** The span of the Benjamin Franklin suspension bridge in Philadelphia, Pennsylvania, is 1750 feet. A model of the bridge has a span of 42 inches. What is the ratio of the span of the model to the span of the actual Benjamin Franklin Bridge?

 $\frac{1}{500}$ is simplified