

Solving Proportions (Pages 188–193)

A **ratio** is a comparison of two numbers by division. The ratio of 3 to 5 can be expressed as 3 to 5, $3:5$, or $\frac{3}{5}$. An equation stating that two ratios are equal is called a **proportion**. In $\frac{a}{b} = \frac{c}{d}$, the numbers ad and bc are **cross products**.

Property of Proportions

The cross products of a proportion are equal.
If $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$. If $ad = bc$, then $\frac{a}{b} = \frac{c}{d}$.

A **rate** is a ratio of two measurements having different units of measure. A **unit rate** is a rate simplified to a denominator of 1. For example, 100 miles in 2 hours is a rate and 50 miles per hour is a unit rate. To solve problems involving rates, you can use **dimensional analysis**, which is the process of carrying units throughout a computation.

EXAMPLES

A Solve the proportion $\frac{3}{4} = \frac{x+2}{x}$.

Set the cross products equal to each other.

$$3(x) = 4(x + 2)$$

$$3x = 4x + 8$$

Distributive Property

$$3x - 4x = 4x + 8 - 4x$$

$$-1x = 8$$

$$\frac{-1x}{-1} = \frac{8}{-1}$$

$$x = -8$$

The solution is -8 .

B Convert 150 centimeters to meters.

$$1 \text{ meter} = 100 \text{ centimeters}$$

Let x represent the number of meters.

Write a proportion.

$$\frac{1 \text{ meter}}{100 \text{ centimeters}} = \frac{x \text{ meters}}{150 \text{ centimeters}}$$

$$1(150) = 100x$$

$$1.5 = x$$

150 centimeters is equal to 1.5 meters.

PRACTICE

Solve each proportion.

1. $\frac{8}{5} = \frac{x}{35}$

2. $\frac{a}{12} = \frac{6}{18}$

3. $\frac{2.2}{6} = \frac{11}{y}$

4. $\frac{5}{p} = \frac{7}{8.4}$

5. $\frac{20}{35} = \frac{2x}{7}$

6. $\frac{1}{2} = \frac{c}{c-5}$

7. $\frac{10}{v+3} = \frac{7}{v}$

8. $\frac{d}{9} = \frac{d-1}{18}$

Convert each measurement as indicated.

9. 2.5 meters to centimeters

10. 96 ounces to pounds

11. 15 gallons to quarts

12. **Medicine** Your doctor has prescribed two teaspoons of medicine to be taken every six hours. How much medicine will you have taken in 4 days?

(Hint: Convert 4 days into hours.)



13. **Standardized Test Practice** Two out of every seven people at a particular high school play in the band. If the school has 742 students, how many of them are in the band?

A 106 students

B 212 students

C 371 students

D 1484 students

Answers: 1. 56 2. 4 3. 30 4. 6 5. 2 6. -5 7. 7 8. -1 9. 250 centimeters 10. 6 pounds 11. 60 quarts 12. 32 teaspoons 13. B