2-7 Reteaching

Solving Proportions

A proportion is an equation that states that two ratios are equal. If a quantity in a proportion is unknown, you can solve a proportion to find the unknown quantity as shown below.

Problem

What is the solution of $\frac{3}{4} = \frac{x}{14}$?

There are two methods for solving proportions—using the Multiplication Property of Equality and the Cross Products Property.

1) The Multiplication Property of Equality says that you can multiply both sides of an equation by the same number without changing the value.

$\frac{3}{4} = \frac{x}{14}$

$14\left(\frac{3}{4}\right) = \left(\frac{x}{14}\right)14$ To isolate x, multiply each side by 14.

$\frac{42}{4} = x$ Simplify.

$10.5 = x$ Divide 42 by 4.

2) The Cross Products Property says that you can multiply diagonally across the proportion and these products are equal.

$\frac{3}{4} = \frac{x}{14}$

$(4)(x) = (3)(14)$ Multiply diagonally across the proportion.

$4x = 42$ Multiply.

$\frac{4x}{4} = \frac{42}{4}$ To isolate x, divide each side by 4.

$x = 10.5$ Simplify.

Real world situations can be modeled using proportions.

Problem

A bakery can make 6 dozen donuts every 21 minutes. How many donuts can the bakery make in 2 hours?

A proportion can be used to answer this question. It is key for you to set up the proportion with matching units in both numerators and both denominators.

For this problem, you know that 2 hours is 120 minutes and 6 dozen is 72 donuts.

Correct: $\frac{72 \text{ donuts}}{21 \text{ min}} = \frac{x \text{ donuts}}{120 \text{ min}}$

Incorrect: $\frac{72 \text{ donuts}}{21 \text{ min}} = \frac{120 \text{ min}}{x \text{ donuts}}$

This proportion can be solved using the Multiplication Property of Equality or the Cross Products Property.

Problem

Solve this proportion using the cross products.

$$\frac{72 \text{ donuts}}{21 \text{ min}} = \frac{x \text{ donuts}}{120 \text{ min}}$$

$21x = (72)(120)$	Cross Products Property
$21x = 8640$	Multiply.
$\frac{21x}{21} = \frac{8640}{21}$	Divide each side by 21.
$x = 411.43$	Simplify.

Since you cannot make 0.43 donuts, the correct answer is 411 donuts.

Exercises

Solve each proportion using the Multiplication Property of Equality.

1. $\frac{3}{4} = \frac{n}{7}$ **2.** $\frac{1}{3} = \frac{t}{10}$ **3.** $\frac{n}{5} = \frac{8}{20}$

4. $\frac{z}{6} = \frac{9}{8}$ **5.** $\frac{15}{5} = \frac{a}{11}$ **6.** $\frac{7}{2} = \frac{d}{8}$

Solve each proportion using the Cross Products Property.

7. $\frac{3}{5} = \frac{b}{8}$ **8.** $\frac{12}{m} = \frac{8}{3}$ **9.** $\frac{z}{2} = \frac{9}{6}$

10. $\frac{14}{v} = \frac{7}{3}$ **11.** $\frac{-4}{-9} = \frac{f}{-12}$ **12.** $\frac{13}{h} = \frac{2}{-6}$

13. A cookie recipe calls for a half cup of chocolate chips per 3 dozen cookies. How many cups of chocolate chips should be used for 10 dozen cookies?

Solve each proportion using any method.

14. $\frac{x-3}{-2} = \frac{4}{5}$ **15.** $\frac{12}{10} = \frac{y+6}{13}$ **16.** $\frac{5}{x-3} = \frac{2}{-6}$

Lesson 2-7

Solve each proportion. Give your answer as a simplified fraction when necessary.

1. $\frac{3}{4} = \frac{-6}{m}$

2. $\frac{t}{7} = \frac{3}{21}$

3. $\frac{9}{j} = \frac{3}{16}$

4. $\frac{2}{5} = \frac{w}{65}$

5. $\frac{s}{15} = \frac{4}{45}$

6. $\frac{9}{4} = \frac{x}{10}$

7. $\frac{10}{q} = \frac{8}{62}$

8. $\frac{3}{2} = \frac{18}{y}$

9. $\frac{x-3}{15} = \frac{2}{5}$

10. $\frac{y+8}{6} = \frac{y}{2}$

11. $\frac{5-a}{8} = \frac{4}{7}$

12. $\frac{9}{b-4} = \frac{12}{5}$

13. If 3 pizzas serve 12 people, how many pizzas are needed for a pizza party with 68 people?

14. You are planting a vegetable garden with 10 rows. If it took 24 minutes to plant the first 3 rows, how long will it take to plant all 10 rows of the garden?

15. Approximately 8 out of every 25 families in the United States own dogs. If you asked 90 families, about how many of them would you expect to own dogs?

Answers: -8, 1, 48, 26, $\frac{4}{3}$, $\frac{45}{2}$, $\frac{155}{2}$, 12, 9, 4, $\frac{3}{7}$, $\frac{31}{4}$, 17 pizzas, 1hr 20min, 28 or 29 families