

4.6

Lesson

You can solve proportions using various methods.

Example 1 Solving a Proportion Using Mental Math

Solve $\frac{3}{2} = \frac{x}{8}$.

Step 1: Think: The product of 2 and what number is 8?

Step 2: Because the product of 2 and 4 is 8, multiply the numerator by 4 to find x .

$$\frac{3}{2} = \frac{x}{8}$$

$2 \times ? = 8$

$$3 \times 4 = 12$$

$$\frac{3}{2} = \frac{x}{8}$$

$2 \times 4 = 8$

► The solution is $x = 12$.

Try It

Solve the proportion.

1. $\frac{5}{8} = \frac{20}{d}$

$d = 32$

2. $\frac{7}{z} = \frac{14}{10}$

$z = 5$

3. $\frac{21}{24} = \frac{x}{8}$

$x = 7$

Example 2 Solving a Proportion Using Multiplication

Solve $\frac{5}{7} = \frac{x}{21}$.

$$\frac{5}{7} = \frac{x}{21}$$

Write the proportion.

$$21 \cdot \frac{5}{7} = 21 \cdot \frac{x}{21}$$

Multiplication Property of Equality

$$15 = x$$

Simplify.

► The solution is $x = 15$.



CROSS multiply then divide by the # diagonal to variable

Try It

Solve the proportion.

4. $\frac{w}{6} = \frac{6}{9}$

$6 \cdot 6 = 36 \div 9 = 4$

$w = 4$

5. $\frac{12}{10} = \frac{a}{15}$

$180 \div 10$

$a = 18$

6. $\frac{y}{10} = \frac{3}{5}$

$30 \div 5$

$y = 6$

we do

Example 3 Solving a Proportion Using Cross Products

Solve each proportion.

a. $\frac{x}{8} = \frac{7}{10}$

$x \cdot 10 = 8 \cdot 7$ Cross Products Property

$10x = 56$ Multiply.

$x = 5.6$ Divide each side by 10.

► The solution is $x = 5.6$.

b. $\frac{9}{y} = \frac{3}{17}$

$9 \cdot 17 = y \cdot 3$ Cross Products Property

$153 = 3y$ Multiply.

$51 = y$ Divide each side by 3.

► The solution is $y = 51$.

Try It

Solve the proportion.

you do

7. $\frac{2}{7} = \frac{x}{28}$

$x = 8$

8. $\frac{12}{5} = \frac{6}{y}$

$y = 2.5$

9. $\frac{40}{z+1} = \frac{15}{6}$

$240 = 15(x+1)$
 $240 = 15x + 15$
 $- 15$
 $225 = 15x$
 $\div 15$
 $15 = x$



Example 4 Writing and Solving a Proportion

Find the value of x so that the ratios $3 : 8$ and $x : 20$ are equivalent.

For the ratios to be equivalent, the values of the ratios must be equal. So, find the value of x for which $\frac{3}{8}$ and $\frac{x}{20}$ are equal by solving a proportion.

$$\frac{3}{8} = \frac{x}{20}$$

Write a proportion.

$$20 \cdot \frac{3}{8} = 20 \cdot \frac{x}{20}$$

Multiplication Property of Equality

$$7.5 = x$$

Simplify.

► So, $3 : 8$ and $x : 20$ are equivalent when $x = 7.5$.

Try It

Find the value of x so that the ratios are equivalent.

10. $2 : 4$ and $x : 6$

$$\frac{2}{4} = \frac{x}{6}$$

$$2 \cdot 6 = 12 \div 4$$

$$x = 3$$

11. $x : 5$ and $8 : 2$

$$\frac{x}{5} = \frac{8}{2}$$

$$5 \cdot 8 = 40 \div 2$$

$$x = 20$$

12. 4 to 3 and 10 to x

$$\frac{4}{3} = \frac{10}{x}$$

$$30 \div 4$$

$$x = 7.5$$

Example 5 B.E.S.T. Test Prep: Writing a Proportion

Black Bean Soup

1.5 cups black beans
0.5 cup salsa
2 cups water
1 tomato
2 teaspoons seasoning

A chef increases the amounts of ingredients in a recipe to make a proportional recipe. The new recipe has 6 cups of black beans. Which proportion can be used to find the number x of cups of water in the new recipe?

(A) $\frac{2}{1.5} = \frac{6}{x}$

(C) $\frac{1.5}{2} = \frac{x}{6}$

(B) $\frac{1.5}{6} = \frac{x}{2}$

(D) $\frac{1.5}{2} = \frac{6}{x}$

In the original recipe, the ratio of cups of black beans to cups of water is $1.5 : 2$. In the new recipe, the ratio is $6 : x$.

For the new recipe to be proportional to the original recipe, these ratios must be equivalent. So, the values of the ratios must be equal, $\frac{1.5}{2} = \frac{6}{x}$.

► The correct answer is (D).

