Ratio and Proportion

A *ratio* is a comparison of two quantities. A *proportion* is an equation stating that two ratios are equal.

EXAMPLE A

Find an equivalent ratio to $\dfrac{4}{12}$.

Method 1
Step 1: Multiply each term by the same number.

$$\dfrac{4 \times 2}{12 \times 2} = \dfrac{8}{24}$$

Solution: $\dfrac{4}{12} = \dfrac{8}{24}$

Method 2
Step 1: Divide each term by the same number.

$$\dfrac{4 \div 2}{12 \div 2} = \dfrac{2}{6}$$

Solution: $\dfrac{4}{12} = \dfrac{2}{6}$

To find an unknown value using proportions, create a number sentence using equal ratios. Using cross products, you can determine the value of the variable that makes the proportion a true statement.

EXAMPLE B

Find the value of x: $\dfrac{5}{9} = \dfrac{x}{81}$.

Step 1: Cross multiply.
$$5(81) = 9x$$
$$405 = 9x$$

Step 2: Divide both sides of the equation by 9.
$$\dfrac{405}{9} = \dfrac{9x}{9}$$
$$45 = x$$

Solution: The value of x is 45.

PRACTICE

Find an equivalent ratio.

1. $\dfrac{5}{8}$

2. $\dfrac{15}{30}$

3. $\dfrac{6}{18}$

Find the value of x.

4. $\dfrac{4}{7} = \dfrac{12}{x}$

5. $\dfrac{56}{35} = \dfrac{8}{x}$

6. $\dfrac{0.5}{x} = \dfrac{2.5}{6}$