

**5.2 Proportions**

**Objective:** 1. Use equivalent ratios to determine whether two ratios form a proportion.  
2. Use the Cross Products Property to determine whether two ratios form a proportion.

**Key Idea: Proportion**

**Words:** A \_\_\_\_\_ is an equation stating that two ratios are equivalent. Two quantities that form a proportion are \_\_\_\_\_.

**Examples:**

**EXAMPLE 1 Determining Whether Ratios Form a Proportion**

Tell whether  $\frac{6}{4}$  and  $\frac{8}{12}$  form a proportion.

**EXAMPLE 2 Determining Whether Two Quantities Are Proportional**

Tell whether  $x$  and  $y$  are proportional.

- The most common way to tell if  $x$  and  $y$  are proportional is to see if each pair of  $x$  and  $y$  values have a constant ratio of  $y$  to  $x$ ,  $\left(\frac{y}{x}\right)$ .

$x$	$y$
$\frac{1}{2}$	3
1	6
$\frac{3}{2}$	9
2	12

Two quantities that are proportional are in a \_\_\_\_\_.

A proportional relationship is a relationship between two quantities in which the \_\_\_\_\_ of one quantity to the other is \_\_\_\_\_.

## Key Ideas: Cross Products

In the proportion  $\frac{a}{b} = \frac{c}{d}$ , the products  $a \cdot d$  and  $b \cdot c$  are called \_\_\_\_\_.

## Cross Products Property

**Words:** The cross products of a proportion are equal.

**Examples:**

### Study Tip

You can use the Multiplication Property of Equality to show that the cross products are equal.

$$\begin{aligned}\frac{a}{b} &= \frac{c}{d} \\ b\cancel{d} \cdot \frac{a}{\cancel{b}} &= b\cancel{d} \cdot \frac{c}{\cancel{d}} \\ ad &= bc\end{aligned}$$

### EXAMPLE 3 Identifying Proportional Relationships

You swim your first 4 laps in 2.4 minutes. You complete 16 laps in 12 minutes. Is the number of laps proportional to your time?

- Use the Cross Products Property.

On your Own:

Tell whether the ratios form a proportion.

1.  $\frac{1}{2}$ ,  $\frac{5}{10}$

2.  $\frac{4}{6}$ ,  $\frac{18}{24}$

3.  $\frac{10}{3}$ ,  $\frac{5}{6}$

4.  $\frac{25}{20}$ ,  $\frac{15}{12}$

5. Tell whether  $x$  and  $y$  are proportional.

Birdhouses Built, $x$	1	2	4	6
Nails Used, $y$	12	24	48	72

6. You read the first 20 pages of a book in 25 minutes. You read 36 pages in 45 minutes. Is the number of pages read proportional to your time?