

# Proportions

A **proportion** is an equation stating that two ratios are equal. For example, if you mix 2 gallons of red paint with 3 gallons of white, the ratio of red to white is  $\frac{2}{3}$ . If you mix 4 gallons of red paint with 6 gallons of white, the ratio of red to white is  $\frac{4}{6}$ . The shades of pink for the two mixtures are the same, because  $\frac{2}{3} = \frac{4}{6}$  is a true proportion.

A quick way to check that two ratios are equal is to **cross-multiply**. Write the ratios side by side and draw double-pointed arrows that cross. Multiply the pairs of numbers and see if you get the same result both times. It does not matter which pair of numbers is multiplied first. Look at this example.

## EXAMPLE

Is  $\frac{2}{3} = \frac{4}{6}$  a true proportion?

$$\frac{2}{3} \times \frac{4}{6}$$

Cross-multiply.

$$(2)(6) = 12 \text{ and } (3)(4) = 12$$

Since you get the same result (12), then  $\frac{2}{3} = \frac{4}{6}$  is a true proportion. If you get different results when you cross-multiply, the ratios are not equal.

## PRACTICE

Use cross-multiplying to tell whether the proportion is true or false. Write *true* or *false*.

1.  $\frac{8}{12} = \frac{6}{9}$  <sup>a</sup> true

$$\frac{8}{12} \times \frac{6}{9} \quad 72 = 72$$

$\frac{4}{5} = \frac{9}{10}$  <sup>b</sup> \_\_\_\_\_

$\frac{16}{24} = \frac{2}{3}$  <sup>c</sup> \_\_\_\_\_

2.  $\frac{8}{10} = \frac{11}{15}$  \_\_\_\_\_

$\frac{6}{10} = \frac{12}{20}$  \_\_\_\_\_

$\frac{7}{8} = \frac{21}{24}$  \_\_\_\_\_

3.  $\frac{18}{20} = \frac{9}{10}$  \_\_\_\_\_

$\frac{8}{16} = \frac{10}{20}$  \_\_\_\_\_

$\frac{8}{27} = \frac{2}{6}$  \_\_\_\_\_