

Lesson 6 Reteach

Solve Proportional Relationships

A **proportion** is an equation that states that two ratios are equivalent. To determine whether a pair of ratios forms a proportion, use cross products. You can also use cross products to solve proportions.

Example 1

Determine whether the pair of ratios $\frac{20}{24}$ and $\frac{12}{18}$ form a proportion.

Find the cross products.

$$\begin{array}{l} \frac{20}{24} \cdot \frac{12}{18} \rightarrow 24 \cdot 12 = 288 \\ \frac{20}{24} \cdot \frac{12}{18} \rightarrow 20 \cdot 18 = 360 \end{array}$$

$$\frac{4}{6} = \frac{2}{3} \quad \begin{array}{l} 6 \cdot 2 = 12 \\ 4 \cdot 3 = 12 \end{array}$$

Since the cross products are not equal, the ratios do not form a proportion.

Example 2

Solve $\frac{12}{30} = \frac{k}{70}$

$$\frac{12}{30} = \frac{k}{70}$$

$$12 \cdot 70 = 30 \cdot k$$

$$840 = 30k$$

$$\frac{840}{30} = \frac{30k}{30}$$

$$28 = k$$

CHECK
 $\frac{3}{16} \times \frac{16}{96} = \frac{48}{96}$

Write the equation.

Find the cross products.

Multiply.

Divide each side by 30.

Simplify.

$$\frac{4}{6} = \frac{x}{24}$$

$$6x = 4(24)$$

$$6x = 96$$

$$x = \frac{96}{6}$$

$$6 \overline{) 96}$$

$$\underline{60}$$

$$36$$

$$4x = 12 \quad \frac{12}{4} = x = 3$$

The solution is 28.

Exercises

Determine whether each pair of ratios forms a proportion.

1. *NOT A PROPORTION* $\frac{17}{10} = \frac{12}{5}$ $10 \cdot 12 = 120$ $17 \cdot 5 = 85$
2. *PROPORTION* $\frac{6}{9} = \frac{12}{18}$ $9 \cdot 12 = 108$ $6 \cdot 18 = 108$
3. *PROPORTION* $\frac{8}{12} = \frac{10}{15}$ $8 \cdot 15 = 120$ $12 \cdot 10 = 120$
4. *NO* $\frac{7}{15} = \frac{13}{32}$ $7(32) = 224$ $15 \cdot 13 = 195$
5. *YES* $\frac{7}{9} = \frac{49}{63}$ $9(49) = 441$ $7(63) = 441$
6. *NO* $\frac{8}{24} = \frac{12}{28}$ $24 \cdot 12 = 288$ $8 \cdot 28 = 224$
7. *NO* $\frac{4}{7} = \frac{12}{71}$ $7 \cdot 12 = 84$ $4 \cdot 71 = 284$
8. *NO* $\frac{20}{35} = \frac{30}{45}$ $35(30) = 1050$ $20(45) = 900$
9. *YES* $\frac{18}{24} = \frac{3}{4}$ $24 \cdot 3 = 72$ $18 \cdot 4 = 72$

Solve each proportion.

10. $\frac{x}{5} = \frac{15}{25}$ $5 \cdot 15 = x \cdot 25$ $3 \cdot 25 = 75$ $75 = 25x$ $3 = x$ *CHECK* $3 \cdot 25 = 75$ *SAME*

11. $\frac{3}{4} = \frac{12}{c}$ $3 \cdot c = 4 \cdot 12$ $3c = 48$ $c = 16$ *CHECK* $3 \cdot 16 = 48$ *SAME*

12. $\frac{6}{9} = \frac{10}{r}$ $6 \cdot r = 9(10)$ $6r = 90$ $r = 15$ *CHECK* $6 \cdot 15 = 90$ *SAME*

13. $\frac{16}{24} = \frac{3}{15}$ $16 \cdot 15 = 24 \cdot 3$ $240 = 24 \cdot 3$ $10 = 3$ *CHECK* $10 \cdot 24 = 240$ *SAME*

14. $\frac{5}{8} = \frac{8}{12}$ $5 \cdot 12 = 8 \cdot 8$ $60 = 64$ $7.5 = 8$ *CHECK* $8(7.5) = 60$ *SAME*

15. $\frac{14}{t} = \frac{10}{11}$ $14(11) = t(10)$ $154 = 10t$ $15.4 = t$ *CHECK* $15.4(10) = 154$ *SAME*

16. $\frac{10}{6} = \frac{2.8}{7}$ $6(2.8) = 10 \cdot 7$ $16.8 = 70$ $1.68 = 70$ *CHECK* $7(2.4) = 16.8$ *SAME*

17. $\frac{5}{y} = \frac{7}{16.8}$ $5(16.8) = 7 \cdot y$ $84 = 7y$ $12 = y$ *CHECK* $7 \cdot 12 = 84$ *SAME*

18. $\frac{x}{18} = \frac{7}{36}$ $x(36) = 18(7)$ $36x = 126$ $x = 3.5$ *CHECK* $3.5(36) = 126$ *SAME*