

Name Teacher Copy

Pre-Algebra Notes
Week 5: Lessons 6.2 and 6.3

Writing and Solving Proportions (6-2)

Math Vocab.

1. proportion - an equation that states that two ratios are equivalent

$$\frac{2}{3} \xrightarrow{\times 4} \frac{8}{12}$$

Multiply both numerator and denominator by 4

Examples

1. Solving a Proportion Using Equivalent Ratios

Solve the proportion $\frac{5}{6} = \frac{x}{18}$ $x=15$

Extra Practice

$$\frac{2}{7} = \frac{x}{21} \quad x=6$$

$$\frac{3}{8} = \frac{x}{32} \quad x=12$$

$$\frac{x}{2} = \frac{20}{10} \quad x=4$$

$$\frac{x}{48} = \frac{6}{12} \quad x=24$$

$$\begin{array}{r} 4 \overline{)48} \\ \underline{48} \\ 0 \end{array}$$
$$\begin{array}{r} 3 \overline{)48} \\ \underline{36} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

You can use the same methods you used to solve equations to solve proportions that have a variable in the numerator

2. Solving a Proportion Using Algebra

Solve the proportion $\frac{x}{12} = \frac{2}{8}$

$$\frac{x}{12} = \frac{2}{8} \quad (12) \frac{x}{12} = \frac{2}{8} (12) = \frac{24}{8} = 3$$

$x=3$

Extra Practice

$$\textcircled{1} \frac{2}{5} = \frac{x}{25} \quad x=10$$

$$\textcircled{2} \frac{x}{9} = \frac{42}{54} \quad x=7$$

Setting up a proportion \Rightarrow make sure you use comparable ratios

Yesterday you rode your bike 18 miles in 2.5 hours. Today you plan to ride for 3.5 hours. If you ride at the same rate as yesterday how far will you ride?

	Today	=	Yesterday
mi	$\frac{x}{3.5}$		$\frac{18}{2.5}$
hrs			

$$2.5x = \frac{63}{2.5}$$

$$x = 25.2$$

$$\begin{array}{r} 18 \\ \times 3.5 \\ \hline 90 \\ 540 \\ \hline 63.0 \end{array}$$

3. Writing and Solving a Proportion

Each day, an elephant eats 5 pounds of food for every 100 pounds of its weight. How much food does a 9300 pound elephant eat per day?

$$\frac{5}{100} = \frac{x}{9300}$$

$$\frac{100x}{100} = \frac{46500}{100}$$

$$x = 465$$

$$\begin{array}{r} 93 \\ \times 5 \\ \hline 465 \end{array}$$

How much food does a 12,500 pound elephant eat per day?

$$\begin{array}{r} 125 \\ \times 5 \\ \hline 625 \end{array}$$

$$\frac{5}{100} = \frac{x}{12500}$$

$$\frac{62500}{100} = \frac{100x}{100}$$

$$x = 625$$

Solving Proportions Using Cross Products (6-3)

Math Vocab.

1. cross product: the product of the numerator of one ratio and the denominator of another.

The cross products of a proportion are equal

$$\frac{3}{5} = \frac{6}{10} \rightarrow 30 \quad \checkmark$$

$$\frac{2}{3} = \frac{6}{11} \rightarrow 22 \quad \times$$

You can use cross products to tell whether two ratios form a proportion

If the cross products are equal then the ratios form a proportion

Examples

1. Determining If Ratios Form a Proportion

Tell whether the ratios form a proportion

a. $\frac{9}{51} = \frac{6}{34}$ $51 \times 6 = 306$

$$34 \times 9 = 306$$

$$\checkmark$$

b. $\frac{12}{20} = \frac{32}{50}$ $32 \times 20 = 640$

$$12 \times 50 = 600$$

$$\times$$

$$\begin{array}{r} 32 \\ \times 2 \\ \hline 64 \end{array}$$

$$\begin{array}{r} 12 \\ \times 5 \\ \hline 60 \end{array}$$

$$\begin{array}{r} 51 \\ \times 6 \\ \hline 306 \end{array}$$

$$\begin{array}{r} 34 \\ \times 9 \\ \hline 306 \end{array}$$

Extra Practice

① $\frac{6}{14}, \frac{3}{7}$ **yes** ② $\frac{6}{11}, \frac{9}{10}$ **NO** ③ $\frac{14}{35}, \frac{8}{20}$ **yes**

You can use cross products property to solve proportions

2. Writing and Solving a Proportion

Human hair grows about 0.7 cm in 2 weeks. How long does hair take to grow 14 centimeters?

$$\frac{0.7 \text{ cm}}{2 \text{ wks}} = \frac{14 \text{ cm}}{x}$$

$$\frac{0.7}{0.7} x = \frac{28}{0.7}$$

$$x = 40$$

$$28 \div 0.7$$

$$x$$

$$\begin{array}{r} 7 \overline{) 28.0} \\ \underline{28} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

Extra Practice

① $\frac{9}{b} = \frac{1.5}{7}$ **b=42**

② $\frac{0.4}{6} = \frac{18}{z}$ **z=270**

Summary: 3 methods to solve a proportion

1. Equivalent ratios

$$\begin{array}{r} 336 \\ + 5 \\ \hline 341 \end{array}$$

$$\frac{5}{12} \xrightarrow{\times 3} \frac{x}{36} \quad \text{or} \quad \frac{5}{12} = \frac{x}{36}$$

$$x = 15$$

2. Algebra

$$\frac{180}{15} = \frac{5}{12} = \left(\frac{36}{1}\right) \frac{5}{12} = \frac{x}{36}$$

$$x = 15$$

3. Cross Products

$$\frac{5}{12} = \frac{x}{36}$$

$$\frac{12}{12} x = \frac{180}{12}$$

$$x = 15$$