

Learning Objective: Students will be able to use multiplication and division, and the Cross Products Property to decide if two ratios are equal.

Warm Up

$$\begin{array}{r} 975 \\ \times 13 \\ \hline \end{array}$$

$$\begin{array}{r} 164 \\ \times 39 \\ \hline \end{array}$$

$$\begin{array}{r} 356 \\ \times 93 \\ \hline \end{array}$$

$$\begin{array}{r} 606 \\ \times 63 \\ \hline \end{array}$$

$$\begin{array}{r} 959 \\ \times 47 \\ \hline \end{array}$$

$$\begin{array}{r} 854 \\ \times 24 \\ \hline \end{array}$$

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Warm Up Answers

$$\begin{array}{r} 975 \\ \times 13 \\ \hline 2,925 \\ 9,750 \\ \hline 12,675 \end{array}$$

$$\begin{array}{r} 164 \\ \times 39 \\ \hline 1,476 \\ 4,920 \\ \hline 6,396 \end{array}$$

$$\begin{array}{r} 356 \\ \times 93 \\ \hline 1,068 \\ 32,040 \\ \hline 33,108 \end{array}$$

$$\begin{array}{r} 606 \\ \times 63 \\ \hline 1,818 \\ 36,360 \\ \hline 38,178 \end{array}$$

$$\begin{array}{r} 959 \\ \times 47 \\ \hline 6,713 \\ 38,360 \\ \hline 45,073 \end{array}$$

$$\begin{array}{r} 854 \\ \times 24 \\ \hline 3,416 \\ 17,080 \\ \hline 20,496 \end{array}$$

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Homework Answers

14.1 Record and Practice Journal

Write the ratio as a fraction in simplest form.

1. 8 to 14

$$\frac{4}{7}$$

2. 36 even : 12 odd

$$\frac{3}{1}$$

3. 42 vanilla to 48 chocolate

$$\frac{7}{8}$$

Find the unit rate.

4. \$2.50 for 5 ounces

\$0.50 per ounce

5. 15 degrees in 2 hours

7.5 degrees per hour

6. 183 miles in 3 hours

61 miles per hour

Use the ratio table to find the unit rate with the specified units.

7. pounds per box

Boxes	0	1	2	3
Pounds	0	30	60	90

30 pounds per box

8. cost per notebook

Notebooks	0	5	10	15
Cost (dollars)	0	9.45	18.90	28.35

\$1.89 per notebook

9. You create 15 centerpieces for a party in 5 hours.

a. What is the unit rate?

3 centerpieces per hour

b. How long will it take you to make 42 centerpieces?

14 hours

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Lesson 14.2

January 6, 2016

Essential Question:

How can proportions help you decide when things are “fair”?

Lesson Objective:

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use multiplication and division, and the Cross Products Property to decide if two ratios are equal.

Self-Evaluation Scale

Score	Description
4	I can teach other students how to use multiplication and division, and the Cross Products Property to decide if two ratios are equal.
3	I can use multiplication and division, and the Cross Products Property to decide if two ratios are equal.
2	I recognize, but still need help to use multiplication and division, and the Cross Products Property to decide if two ratios are equal.
1	I do not know how to use multiplication and division, and the Cross Products Property to decide if two ratios are equal.

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Key Idea

Proportions

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

Numbers $\frac{2}{3} = \frac{4}{6}$ The proportion is read "2 is to 3 as 4 is to 6."

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1

Determining Whether Ratios Form a Proportion

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

Compare the ratios in simplest form.

$$\frac{6}{4} = \frac{6 \div 2}{4 \div 2} = \frac{3}{2}$$

$$\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$$

The ratios are *not* equivalent.

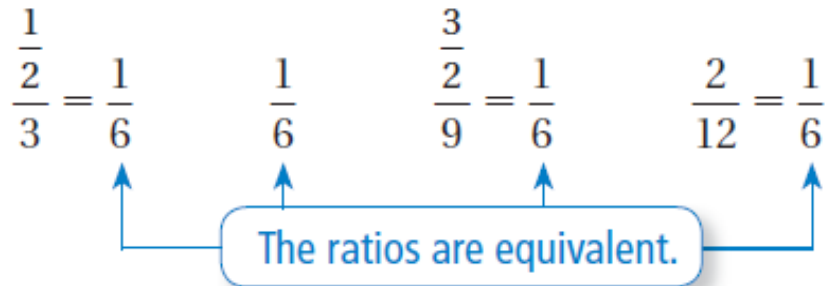
∴ So, $\frac{6}{4}$ and $\frac{8}{12}$ do *not* form a proportion.

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2 Determining Whether Two Quantities Are Proportional

Tell whether x and y are proportional.

Compare each ratio x to y in simplest form.



••• So, x and y are proportional.

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

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Key Ideas

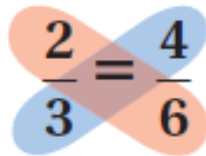
Cross Products

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

Cross Products Property

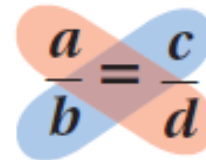
Words The cross products of a proportion are equal.

Numbers Alg


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

$$2 \cdot 6 = 3 \cdot 4$$

ebra

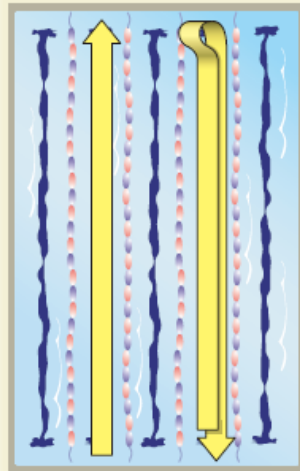

$$\frac{a}{b} = \frac{c}{d}$$

$$ad = bc,$$

where $b \neq 0$ and $d \neq 0$

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3 Identifying Proportional Relationships



1 length 1 lap

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?

Method 1: Compare unit rates.

$$\frac{2.4 \text{ min}}{4 \text{ laps}} = \frac{0.6 \text{ min}}{1 \text{ lap}} \quad \frac{12 \text{ min}}{16 \text{ laps}} = \frac{0.75 \text{ min}}{1 \text{ lap}}$$

$\div 4$ (top left) $\div 16$ (top right)
 $\div 4$ (bottom left) $\div 16$ (bottom right)

The unit rates are *not* equivalent.

❖ So, the number of laps is *not* proportional to the time.

Method 2: Use the Cross Products Property.

$$\frac{2.4 \text{ min}}{4 \text{ laps}} \stackrel{?}{=} \frac{12 \text{ min}}{16 \text{ laps}}$$

Test to see if the rates are equivalent.

$$2.4 \cdot 16 \stackrel{?}{=} 4 \cdot 12$$

Find the cross products.

$$38.4 \neq 48$$

The cross products are *not* equal.

❖ So, the number of laps is *not* proportional to the time.

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Assignment

Complete problems:

6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, & 32
on pages 6I0 - 6I1 in your Big Ideas Text Book.

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Assignment Answers

6. yes

8. no

10. no

12. no

14. yes

16. no

18. no

20. no

22. you: 1.1 beats per second
friend: 1.2 beats per second
No, the rates are not equivalent.

24. no

26. a. \$7 per hour
b. \$9 per hour
c. no; Your friend's money per hour

28. a. x and y , x and z , y and z

b. 30

30. a. no

b. *Sample answer:* If the collection has 50 quarters and 30 dimes, when 10 of each coin are added, the new ratio of quarters to dimes is 3 : 2.

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Homework

In your Big Ideas Record and Practice Journal
page 312.