January 7, 2015 Period 4 Lesson 14.2

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

975 × 13	164 × 39	356 × 93	606 × 63	959 × 47	854 × 24

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Warm Up Answers

975	164	356	606	959	854
× 13	× 39	× 93	× 63	× 47	× 24
2,925	1,476	1,068	1,818	6,713	3,416
9,750	4,920	32,040	36,360	38,360	17,080
12,675	6,396	33,108	38,178	45,073	20,496

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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 7, 2015

Essential Question:

How can proportions help you decide when things are "fair"?

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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.

$\frac{\frac{1}{2}}{3} = \frac{1}{6}$ $\quad \frac{1}{6}$ $\quad \frac{\frac{3}{2}}{9} = \frac{1}{6}$ $\quad \frac{2}{12} = \frac{1}{6}$

The ratios are equivalent.

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 ebra

$\frac{2}{3} = \frac{4}{6}$ $\qquad$ $\frac{a}{b} = \frac{c}{d}$

$2 \cdot 6 = 3 \cdot 4$ $\qquad$ $ad = bc$, where $b \neq 0$ and $d \neq 0$

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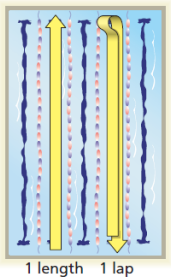
3 Identifying Proportional Relationships

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?



Method 1: Compare unit rates.

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

÷ 4 ÷ 4 ÷ 16 ÷ 16

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 610 - 611 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 frien
money per ho

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.