

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

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

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

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

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

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

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

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 Answers

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

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

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

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

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

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

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

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

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

Lesson 14.2

January 10, 2017

Essential Question:

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

Lesson 14.2

January 10, 2017

Lesson Objective:

Students will be able to:

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.

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

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."

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

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.

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

2 Determining Whether Two Quantities Are Proportional

Tell whether x and y are proportional.

Compare each ratio x to y in simplest form.

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

The ratios are equivalent.

So, x and y are proportional.

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

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

Key Ideas

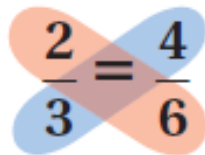
Cross Products

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

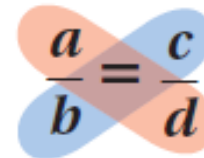
Words The cross products of a proportion are equal.

Numbers Alg


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

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

ebra

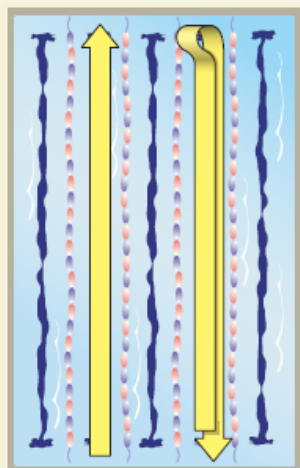

$$\frac{a}{b} = \frac{c}{d}$$

$$ad = bc,$$

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

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

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.

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

Assignment

Complete problems:

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

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

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.

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

Homework

In your Big Ideas Record and Practice Journal
page 308.

