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Solving Proportions

7.RP.2.a-c, 7.RP.3

A cross product is the product of the denominator of one fraction and the numerator of the other. If the cross products of two ratios are equal, they form a proportion.

LESSON



 $6 \cdot 10 \stackrel{2}{=} 4 \cdot 15$ 60 = 60

To simplify ratios, divide the numerator and the denominator by their greatest common factor.

Variables, or letters such as *n* or *x*, are often used to represent unknown quantities in proportions. A **proportion** shows that two ratios are equal. To see if two ratios form a proportion, simplify each ratio to see if they are equal.

Train A was on time $\frac{16}{20}$ of the time. Train B was on time $\frac{24}{30}$ of the time. Are these ratios proportional?

Simplify $\frac{16}{20}$: $\frac{16 \div 4}{20 \div 4} = \frac{4}{5}$ Simplify $\frac{24}{30}$: $\frac{24 \div 6}{30 \div 6} = \frac{4}{5}$

Both ratios simplify to $\frac{4}{5}$, so yes, they are proportional.

Proportions can be used to solve problems.

The ratios of times that trains C and D were on time are proportional Train C was on time 15 out of 20 times this month. Train D ran 36 times this month. How many of these times was train D on time?

Write a proportion to show the two ratios are equal. Let x represent the unknown quantity.

 $\frac{15}{20} = \frac{x}{36}$

Write the cross products.

 $20 \cdot x = 15 \cdot 36$

Simplify and solve for x.

20x = 540 $x = 540 \div 20 = 27$

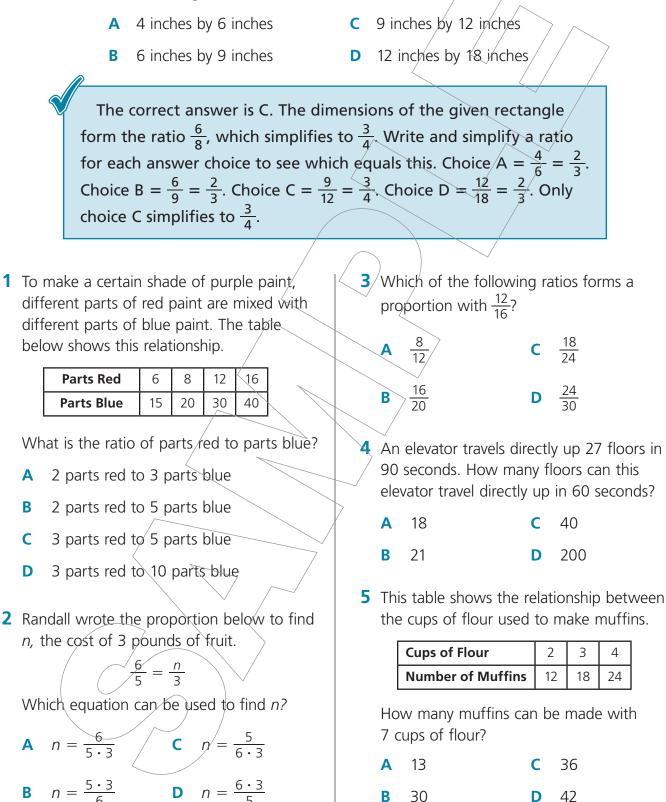
Train D was on time 27 times.

12

UNIT 1 West And Percent

Read each problem. Circle the letter of the best answer.

SAMPLE The lengths and widths of two rectangles are proportional. One rectangle is 6 inches by 8 inches. What could be the dimensions of the other rectangle?



B 30 **D** 42

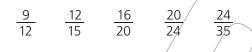
Ratio, Proportion, and Percent

Read each problem. Write your answer.

SAMPLE A car travels 270 miles on 15 gallons of gas. How many gallons of gas are needed for this car to travel 100 miles?

Answer _____ Set up a proportion that compares miles traveled to gallons of gas used. Let x represent the unknown number of gallons: $\frac{270}{15} = \frac{100}{x}$. Cross multiply and then solve for x: $270 \cdot x = 15 \cdot 100$, 270x = 1,500, $x = 1,500 \div 270 = 5\frac{5}{9}$ gallons.

6 Which of the following ratios are proportional?



Answer _____

7 This table shows proportional relationships.

12	20	24	48	
3	5	G	12	

What is the ratio that is common throughout this table, written in simplest form?

Answer _____

8 Clearance items in a store are all marked down proportionally. A shirt with an original price of \$32 is on clearance for \$12. What is the clearance price of a shirt with an original price of \$40? Show your work.

Answer



Read each problem. Write your answer to each part.

9 A recipe calls for 3 parts water to 2 parts oats. Misty mixes $\frac{3}{4}$ cup of water with $\frac{1}{2}$ cup of oats.

Write a ratio

for each pair of numbers. Are the

ratios equal?

Part A Is Misty following this recipe?

Answer _____

Part B Explain how you know your answer is correct.

- 10 A video store charges the same fee each day a video is returned late. Craig returned a video 4 days late and paid a \$3 fee.
 - **Part A** Write a proportional equation that can be used to find the late fee for a video that is returned 7 days late.

Answer _____

Part B What is the fee for a video that is returned 7 days late? Explain how you know.

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