

1-24-18

Aim: SWBAT prove if two ratios form a proportion AND solve proportions algebraically.

HW: Textbook Pg. 351 and Packet Page 8 # 1 - 3

Do Now: 2nd Better Buy question on Packet Page 2

## Ratios, Rates, and Better Buy

Ann washes  $10\frac{1}{2}$  windows in  $\frac{3}{4}$  of an hour. At this rate, how many windows can she wash in 3 hours?  $\frac{10\frac{1}{2} \text{ windows}}{\frac{3}{4} \text{ hr}} \div \frac{\frac{3}{4}}{1} = \frac{14 \text{ windows}}{1 \text{ hr}}$   $14 \cdot 3 = 42$  she can wash 42 windows in 3 hours.

Rina's cookie recipe uses  $1\frac{1}{2}$  cups of brown sugar to make 2 dozen cookies. Brielle wants to make only 1 dozen cookies. How much brown sugar should Brielle use?

**Better Buy:** The cheapest price per unit.

- Step 1: Find each unit price. (Money goes in the numerator)
- Step 2: Compare the unit prices. The least expensive is the better buy.

A 20-ounce box of graham crackers costs \$3.29. A 16-ounce box costs \$2.89. Which is the better buy? Show work.

$$\frac{\$3.29}{20 \text{ oz}} \div \frac{20}{20} = \$0.1645 \text{ per oz} \approx \$0.16 \text{ per oz}$$

$$\frac{\$2.89}{16 \text{ oz}} \div \frac{16}{16} = \$0.180625 \text{ per oz} \approx \$0.18 \text{ per oz}$$

The 20-ounce box is a better buy because it's cheaper per ounce.

The table below shows the price of paper towels at a store. Determine the better buy. Show work.

Super Absorbent Towels	9 rolls for \$5.99
Thirsty Power Towels	12 rolls for \$7.29

Super Absorbent

$$\frac{\$5.99}{9 \text{ rolls}} \div \frac{9}{9} = \$0.665 \text{ per roll} \approx \$0.67 \text{ per roll}$$

Thirsty Power

$$\frac{\$7.29}{12 \text{ rolls}} \div \frac{12}{12} = \$0.6075 \text{ per roll} \approx \$0.61 \text{ per roll}$$

Thirsty Power Towels are the better buy because they are cheaper per roll.

**Ratios, Rates, and Better Buy  
HOMEWORK**

1. You are training for a triathlon that includes a 122 mile bike ride. Today, you rode your bike 12 miles in 45 minutes. What is your rate in miles per hour?

$45 \text{ min} = \frac{3}{4} \text{ hr}$      $\frac{12 \text{ mi}}{\frac{3}{4} \text{ hr}} \div \frac{\frac{3}{4} \text{ hr}}{\frac{3}{4} \text{ hr}} = \frac{16 \text{ miles}}{1 \text{ hr}}$     My rate is 16 miles per hour.

2. You bike 15 miles in 50 minutes. How far can you bike in 1 hour?

$50 \text{ min} = \frac{5}{6} \text{ hr}$      $\frac{15 \text{ miles}}{\frac{5}{6} \text{ hr}} \div \frac{\frac{5}{6} \text{ hr}}{\frac{5}{6} \text{ hr}} = \frac{18 \text{ miles}}{1 \text{ hr}}$     I can ride my bike 18 miles in one hour.

3. The table below shows the price of paper plates at a store. Determine the better buy. Show work.

Sturdy Plates	24-pack for \$3.29
No Spill Plates	10-pack for \$1.79
Compartment Plates	50-pack for \$6.00

Sturdy  $\frac{\$3.29}{24 \text{ plates}} \div \frac{24}{24} = \$0.13708\bar{3}$  per plate

No Spill  $\frac{\$1.79}{10 \text{ plates}} \div \frac{10}{10} = \$0.179$  per plate

Compartment  $\frac{\$6.00}{50 \text{ plates}} \div \frac{50}{50} = \$0.12$  per plate

Compartment Plates is the better buy because it's cheaper per plate.

4. Four presents cost \$28.95. What is the unit price rounded to the nearest cent?

- A. \$7.23 per present  
C. \$115.80 per present

- B. \$7.24 per present  
D. \$116.00 per present

$\$28.95 \div 4 = \$7.2375$

5. Annie paid \$54.50 for 2 pairs of jeans. What should 3 pairs of jeans at the same price cost?

- A. \$27.25    B. \$54.50    C. \$81.50

D. \$81.75     $\frac{\$54.50}{2 \text{ pairs}} = \$27.25$  per pair  
 $(\$27.25)(3)$

6. Which of these is a unit price?

A.  $\frac{\$2.00}{\text{gal}}$

B.  $\frac{\text{gal}}{\$2.99}$

C.  $\frac{\$7.50}{2 \text{ oz}}$

D.  $\frac{2 \text{ pairs}}{\$1.00}$

7. The table below shows the cost of fish at local markets. Which market offers the best buy?

Salmon on Sale	
Captain's	2 lbs for \$7.98 \$3.99 per lb
Seacatch	5 lbs for \$9.75 \$1.95 per lb
Ocean	3 lbs for \$8.25 \$2.75 per lb
Crab Shack	\$2.99/lb

- A. Captain's  
B. Seacatch  
C. Ocean  
D. Crab Shack

## Ratios, Rates, and Better Buy

8. Which is the best buy?

- A. \$6.50 for 6 bagels  $\$1.08\bar{3}$  per bagel  
B. \$2.00 for 3 bagels  $\$0.6\bar{6}$  per bagel  
C. \$7.50 for 8 bagels  $\$0.9375$  per bagel  
D. \$4.00 for 4 bagels  $\$1.00$  per bagel

9. The cost for 2 pounds of apples is \$2.90. At the same rate, which of the following would be true?

$$\frac{\$2.90}{2\text{ lb}} = \$1.45 \text{ per lb.}$$

- A. 1 pound costs \$1.50  
B. 3 pounds cost \$4.35  
C. 4 pounds cost \$5.95  
D. 5 pounds cost \$6.50

Ratios and Proportions

**Equivalent Ratios:** Two ratios that have the same value.

**Proportion:** An equation that states two ratios are equivalent.

**To prove if 2 ratios form a proportion**

- Find the cross-products
- If the cross-products are equal, it is a proportion.
  - Also note, equivalent ratios have the same unit rate!!!

**Prove if the ratios form a proportion.**

<del><math>\frac{6}{9} = \frac{45}{60}</math></del>	<del><math>\frac{15}{9} = \frac{70}{42}</math></del>
<p>Cross-Product Check  <math>6 \cdot 60 = 9 \cdot 45</math>  <math>360 \neq 405</math></p>	<p>Unit Rate Check  <math>0.\bar{6} \neq 0.75</math></p>
<p>Cross-Product Check  <math>15 \cdot 42 = 9 \cdot 70</math>  <math>630 = 630</math></p>	<p>Unit Rate Check  <math>1.\bar{6} = 1.\bar{6}</math></p>
NO, IT'S NOT A PROPORTION	YES, IT'S A PROPORTION

<del><math>\frac{4}{7} = \frac{12}{21}</math></del>	$\frac{6}{5} = \frac{50}{42}$
<p>Cross-Product Check  <math>4 \cdot 21 = 12 \cdot 7</math>  <math>84 = 84</math></p>	<p>Unit Rate Check  <math>\frac{4}{7} = \frac{4}{7}</math></p>
<p>Cross-Product Check</p>	<p>Unit Rate Check</p>

**Solve algebraically to find the unknown value.**

<del><math>\frac{3}{x} = \frac{12}{20}</math></del>	<del><math>\frac{9}{30} = \frac{6}{n}</math></del>	<del><math>\frac{8}{x} = \frac{0.4}{0.62}</math></del>
$\frac{12x}{12} = \frac{60}{12}$ $x = 5$	$\frac{9n}{9} = \frac{180}{9}$ $n = 20$	$\frac{0.4x}{0.4} = \frac{4.96}{0.4}$ $x = 12.4$

Ratios and Proportions

Find the value of x.

<del><math>\frac{2}{x+2} = \frac{18}{27}</math></del> $18(x+2) = 54$ $18x + 36 = 54$ $\quad -36 \quad -36$ <hr/> $18x = 18$ $\frac{18x}{18} = \frac{18}{18}$ $x = 1$	<del><math>\frac{x-2}{8} = \frac{30}{40}</math></del> $40(x-2) = 240$ $40x - 80 = 240$ $\quad +80 \quad +80$ <hr/> $40x = 320$ $\frac{40x}{40} = \frac{320}{40}$ $x = 8$	$\frac{9}{5} = \frac{36}{x-3}$ $9(x-3) = 180$ $9x - 27 = 180$ $\quad +27 \quad +27$ <hr/> $9x = 207$ $\frac{9x}{9} = \frac{207}{9}$ $x = 23$
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Solving Word Problems Using a Proportion

- Set up a blank proportion.
- Insert the given ratio or rate into one side making sure you label the units.
- Label the units on the other side and allow the last number to follow its label.
- Solve algebraically and write your answer in a complete sentence.

In one basketball league, there are 96 players on 8 teams. In another basketball league, there are 12 teams. All the teams have the same number of players. How many players are in the 12-team league?

A car is able to travel 80 miles for every 1.5 gallons of gasoline. The car has a 16 gallon tank. How many miles can the car travel on a full tank of gas?

$$\frac{80 \text{ miles}}{1.5 \text{ gal}} = \frac{x \text{ miles}}{16 \text{ gal}}$$

$$\frac{1.5x}{1.5} = \frac{1280}{1.5}$$

$$x = 853\frac{1}{3}$$

The car can travel  $853\frac{1}{3}$  miles.

A delivery person is able to make 5 deliveries in 30 minutes. He has 3 more hours of work. How many deliveries can he make in that time?

$$\frac{5 \text{ deliveries}}{\frac{1}{2} \text{ hr}} = \frac{x \text{ deliveries}}{3 \text{ hr}}$$

$$\frac{2}{1} \cdot \frac{1}{2} x = 15 \cdot \frac{2}{1}$$

$$x = 30$$

He can make 30 deliveries.

A contestant score 72,500 points during 5 days on a game show. If she earned the same number of points each day, how many points did she earn in 2 days?

Ratios and Proportions  
HOMEWORK

7R: Textbook Pg. 351 # 8 - 11, 16 - 23, 29 - 31 & Word Problems WS # 1 - 3

7A: Textbook Pg. 351 # 8 - 11, 16 - 23, 29 - 34 & Word Problems WS # 1 - 3

## Ratios and Proportions

Solve algebraically using a proportion. Write your answer in a complete sentence.

1. If 2 liters of fruit juice cost \$3.98, how much do 5 liters of the fruit juice cost?
2. If 64 feet of rope weighs 20 pounds, how much will 80 feet of the same rope weigh?
3. If a 10-pound turkey takes 4 hours to cook, how long will it take a 14-pound turkey to cook?
4. In 5 hours of driving, Julie traveled 235 kilometers. If she travels at the same rate, how far will she drive in 11 hours?
5. Martha read 12 books in the last 8 weeks. At this rate, how many books will she read in 18 weeks?
6. Pablo typed 410 words in 5 minutes. How many words per minute did he type?
7. Evan paid \$1.12 for a dozen eggs. Determine the cost of 3 eggs.