Find each ratio. Simplify, if possible.

10. There are 4 mollies and 6 guppies in a fish tank. What is the ratio of guppies to mollies in the tank?

_____

11. Josephine makes an olive salad using green olives and black olives. She adds 5 green olives for every 3 black olives. What is the ratio of all olives to green olives in the olive salad?

_____

Solve each proportion. Name: _____ Hr: _____

1) $\frac{4}{h} = \frac{12}{24}$ h = _____

2) $\frac{x}{15} = \frac{12}{90}$ x = _____

3) $\frac{39}{4} = \frac{t}{12}$ t = _____

4) $\frac{18}{x} = \frac{1}{5}$ x = _____

5) $\frac{76}{304} = \frac{81}{K}$ K = _____

6) $\frac{m}{4} = \frac{175}{20}$ m = _____

Lesson 1 Finding Unit Rates

7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{\frac{1}{2}}{\frac{1}{4}}$ miles per hour, equivalently 2 miles per hour.*

Real World Connections

Key Words
ratio
rate
unit rate

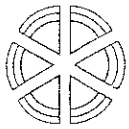
You can use unit rates to easily compare rates. Most part-time jobs that hire young people base the pay on a unit rate.

Both Nigel and Peder are working part-time jobs during the summer. Nigel worked 22 hours one week and earned $159.50 before taxes. During the same week, Peder worked 15 hours and earned $101.25 before taxes. Who earns more per hour at their job?

Nigel's Earnings		Peder's Earnings
$\frac{\$159.50}{22 \text{ hours}}$	rate of earnings	$\frac{\$101.25}{15 \text{ hours}}$
$\frac{159.50}{22} \div \frac{22}{22}$	rate of earnings	$\frac{101.25}{15} \div \frac{15}{15}$
$\frac{\$7.25}{1 \text{ hour}}$	unit rate	$\frac{\$6.75}{1 \text{ hour}}$

Nigel earns $0.50 more per hour than Peder.

A **ratio** compares two numbers. It is usually written as a fraction or with a colon separating the two numbers. A **rate** is a special type of ratio that compares two units such as miles to gallons or feet to seconds. A **unit rate** is a rate that is simplified so that the second number or denominator is 1. The unit rate often uses the word *per* to help you understand the relationship between units. $10 per hour and 65 miles per hour are examples of unit rates.



Take It Apart

In training for the cross country meet, Jimmy and Rana ran at the track. Jimmy ran 3.5 miles in 28 minutes and Rana ran 3 miles in 27 minutes. Who ran at a faster pace? Follow these steps to find and use unit rates to compare each runner's pace in minutes per mile.

Step 1 Write the rates as given to you in the problem as fractions.

Jimmy's rate $= \frac{28 \text{ minutes}}{3.5 \text{ miles}}$ Rana's rate $= \frac{27 \text{ minutes}}{3 \text{ miles}}$

Step 2 Find the unit rate by dividing the numerator and denominator by the denominator.

$\frac{(28 \div 3.5)}{(3.5 \div 3.5)} = \frac{8 \text{ minutes}}{1 \text{ mile}}$ $\frac{(27 \div 3)}{(3 \div 3)} = \frac{9 \text{ minutes}}{1 \text{ mile}}$

Step 3 Use the unit rate to compare rates and answer the question.

Jimmy ran at a unit rate of 8 minutes per mile and Rana ran at a unit rate of 9 minutes per mile. Jimmy ran at a faster pace than Rana.

Use unit rates to compare rates and answer each question.

1. Jared rode $4\frac{3}{4}$ miles in $\frac{1}{4}$ hour. What is Jared's unit rate in miles per hour?

   _____

2. Adam's car can travel 416 miles on a full tank of gas. His gas tank can hold 13 gallons. Kenny's car can travel 450 miles on a full tank of gas. His gas tank can hold 15 gallons. Which car gets better gas mileage? Explain your reasoning.

   _____

   _____

3. Kara is shopping for apples at the farmer's market. She visits three different fruit stands that all have various specials for their apples. Keller's Fruit stand is selling 5 pounds for $6.25, Prum's Fruit is selling 3 pounds for $3.90, and Felby's Apples is selling 6 pounds for $7.20. Find each price per pound. Which stand is offering the best price per pound for apples?

   _____

   _____

Put It Together

Write each rate as a unit rate.

1. recipe for $1\frac{1}{2}$ batches uses $1\frac{1}{2}$ cups of sugar _____

2. density rate of a population 1,200 people in 6 square miles _____

3. \$4.25 for $8\frac{1}{2}$ ounces _____

Solve each problem.

4. Each day the dog shelter uses an average of $82\frac{1}{2}$ cups of food when they are at full capacity. If the shelter can house 33 dogs, how many cups of food does each dog receive each day?

_____

5. The fair increases the pay for its workers \$0.75 per hour for each year they work more than 30 hours. Jakob worked $35\frac{1}{4}$ hours during fair week and earned \$334.88. Racine worked at the fair for $33\frac{1}{2}$ hours and earned \$293.13. Who has worked at the fair longer? Explain.

_____

_____

6. Mr. Crevitt is walking $\frac{1}{4}$ mile in $\frac{1}{2}$ hour. The doctor would like for him to be able to walk 1 mile in $\frac{3}{4}$ hour. Is Mr. Crevitt walking as fast as the doctor would like? Explain your reasoning.

_____

_____

Answer the questions. Share your ideas with a classmate.

7. How can rates be converted to unit rates?

_____

_____

8. What are some ways you use unit rates on an everyday basis? Why do you use unit rates?

_____

_____

Make It Work

Answer the questions below.

1. Jeremiah purchased 3 5-pound bags of potatoes for \$10.47. If individual potatoes sell for \$0.99 per pound, why did Jeremiah get the better buy?

   A. There are more potatoes in a 5-pound bag.

   B. Individual potatoes cost \$1.46 more per pound.

   C. Individual potatoes cost \$0.29 more per pound.

   D. The individual potatoes are the better buy.

2. Katriella can do 3 math problems in $\frac{2}{5}$ minutes. What is her unit rate for math problems?

   A. $\frac{2}{15}$ math problem per minute

   B. $1\frac{1}{5}$ math problems per minute

   C. 3 math problems per minute

   D. $7\frac{1}{2}$ math problems per minute

3. Sarah wants to see who on her mowing crew works faster. Gary was able to mow $10\frac{1}{2}$ lawns in 6 hours. Krissie was able to mow $7\frac{1}{2}$ lawns in 5 hours. Who works faster?

4. Which of the following is a better buy: 8 pounds for \$12.56 or 11 pounds for \$16.83?

5. Jocelyn is considering cell phone packages. The Business Package offers a plan that costs \$49 and includes 750 minutes per month. The Person to Person Package offers a plan that costs \$33 and includes 300 minutes per month. Which package offers the better price per minute? Why might Jocelyn select a package that costs more per minute?

NAME _____ DATE _____ PERIOD _____

Are You Ready?

Apply

1. TRAVEL Kimberly traveled to her friend's house and went 300 miles in 5 hours. On her way home she took a different route and traveled 420 miles in 7 hours. Are these ratios equivalent?

2. TOMATOES On Monday Janine picked 20 tomatoes off 4 tomato plants. On Thursday she picked 15 tomatoes off 3 tomato plants. Determine whether the ratios are equivalent.

3. BASKETBALL Daniel's basketball team won 23 games and lost 8 games. Write the ratio of wins to losses in simplest form.

4. MUSIC Mr. Jansen listened to 8 songs in 28 minutes. He later listened to 5 songs in 21 minutes. Determine whether the ratios are equivalent.

5. MOVIE ATTENDANCE Friday night's movie attendance is shown in the table. Write the ratio of males to females in simplest form.

Friday's Movie Attendance	
Males	58
Females	72

6. MOVIE ATTENDANCE Use the table in Exercise 5 to write the ratio of females to the total number of people attending Friday night's movie in simplest form.

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2) Nathan Paid $56.25 for 75 cans of juice. If he were to buy 3 cans at the same Price, how much would he have to pay?

Name: _____

Hr: _____

Rate Homework

1) Jenny Peddled her bike 11 miles in 45 minutes. If she travelled at the same speed, how far would she travel in 2 hours?

2) Nathan Paid $56.25 for 75 cans of juice. If he were to buy 3 cans at the same Price, how much would he have to pay?