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LESSON 8

CC.2.1.6.D.1

Solving Problems with Unit Rates

PART 1 Introduction

A **unit rate** is a ratio that compares one quantity with one unit of another quantity. For example, $8 per hour or 25 miles/gallon are unit rates. You can use unit rates to solve problems.

Latasha drove 160 miles in 2.5 hours. At this rate, how long would it take her to drive 320 miles?

Write unit rates with the word *per,* as a fraction with a denominator of 1, or with a slash (/).

First, write the rate as a fraction: $\frac{160 \text{ mi}}{2.5 \text{ hr}}$

Convert the rate to a unit rate by dividing the numerator and denominator by the denominator.

$$\frac{160 \text{ mi} \div 2.5}{2.5 \text{ hr} \div 2.5} = \frac{64 \text{ mi}}{1 \text{ hr}}$$

Divide the total number of miles by the number of miles per hour to find the time it takes to drive this distance.

$$\frac{320 \text{ mi}}{64 \text{ mi}} = 5$$

It takes 5 hours for Latasha to drive 320 miles.

You can find unit rates to find the cost of items. The unit rate is known as a unit price when describing cost.

Billy bought 2 bottles of water for $2.58. At this rate, how much will Billy pay for 5 bottles of water?

Write the rate as a fraction: $\frac{\$2.58}{2 \text{ bottles}}$

Divide to find the cost per bottle: $\frac{\$2.58 \div 2}{2 \text{ bottles} \div 2} = \frac{\$1.29}{1 \text{ bottle}}$

Multiply the cost of each bottle by the number of bottles to find the total cost: $\$1.29 \times 5 = \$6.45$.

Billy will pay $6.45 for 5 bottles of water.

Think About It

Explain how you know when to multiply and when to divide when using a unit rate to solve rate problems.

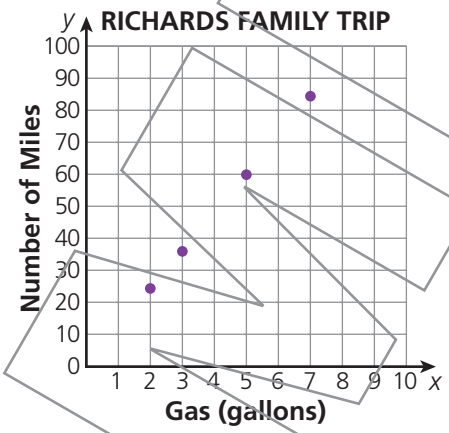
_____

_____

PART 2 Focused Instruction

You can find rates in tables and in graphs. Work with a partner to answer the questions below.

➤ Every summer, the Richards family rents an RV to go on vacation. The graph below shows the miles per gallon of gas the Richards family averaged on their most recent summer vacation.



In Lesson 6, you found rates using tables and graphs.

What does the *x*-axis represent? _____

What does the *y*-axis represent? _____

The *x*-axis is the horizontal axis.

The *y*-axis is the vertical axis.

Look at the point (2, 24). What does the ordered pair represent?

_____

_____

Write a rate based on the point (2, 24). _____

Find the unit rate, in miles per gallon, using the point (2, 24).

_____

Miles per gallon is often abbreviated as "mpg."

Using the unit rate you found, how many gallons of gas will the Richards family use to travel 450 miles? _____

How far can the Richards family travel on 25 gallons? _____

➤ A train is traveling at a constant speed. After 7.25 hours, the train has traveled 450 miles.

What rate is described in this problem? _____

Calculate the unit rate. Round your answer to the nearest whole number. _____

How far will the train travel in 11.5 hours? _____

How long will it take the train to travel 335 miles? Round your answer to the nearest tenth. _____

Should you multiply or divide to find the distance?

Should you multiply or divide to find the time?

Use what you know about unit rates to answer these questions.

A grocery store charges $2.49 for 3 candy bars.

1 At this rate, how many candy bars can be bought for $13.00? Round your answer to the nearest whole number. _____

2 How much will 20 candy bars cost? _____

Solve the following problems.

1 The Fritjof family puts the same amount of money into a savings account each month. The table below shows their deposits.

Month	4	7	11	15
Amount ($)	900	1,575	2,475	3,375

Part A Use the information in the table to find the amount of money the family deposits each month.

You can use any rate from the table to find the unit rate.

Answer $_____

Part B At this rate, how much money will the Fritjof family have deposited in their savings account after 32 months?

Answer $_____

Part C How long will it take the family to save $9,000?

Answer _____ months

2 A grocery store charges $2.29 a pound for chicken. Fill in the missing numbers in the table below.

The unit rate is the cost per pound.

COST OF CHICKEN

Number of Pounds	2	5		
Total Price ($)			18.32	28.63

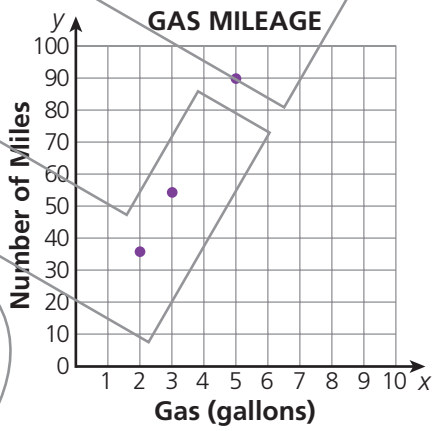
Solve the following problems.

1 Jeanette is shopping for a car. She found three cars that she likes and plans to buy the car that gets the most miles per gallon of gas. The information about the three cars Jeanette likes is shown below.

Car 1

Gas (gallons)	5	8	11
Miles	105	168	231

Car 2



Car 3

Great car! I was able to drive 350 miles on 16 gallons of gas! Call 717-555-1234 for more information.

Part A Complete the table below to show the number of miles per gallon of gas for each car.

Vehicle	Miles per Gallon
Car 1	
Car 2	
Car 3	

Part B Based on what Jeanette wants, which car should she buy?

Answer _____

2 A grocery store charges $3.00 for 4 two-liter bottles of lemonade. Amadou has $12.00 in his wallet. Since Amadou is having a party, he puts 20 two-liter bottles in his grocery cart. Will Amadou have enough money? Explain how you arrived at your answer.

_____

_____

3 A baseball pitcher can throw a ball 120 feet per second. At this rate, how long would it take the ball to travel 300 feet?

A 2 seconds

B 2.5 seconds

C 3 seconds

D 3.5 seconds

4 A bakery makes $8 for every 5 loaves of bread sold. The bakery makes the same dollar amount for each loaf of bread. At this rate, what dollar amount would the bakery make by selling 30 loaves of bread?

A $35

B $43

C $48

D $70

5 Find the unit rate in each problem to solve for the missing number. Use the numbers in the boxes. Write the number next to the correct statement.

2.15	$2\frac{1}{4}$	$4\frac{1}{2}$	12.3

Mr. Howard paid $99 for 18 feet of chain. At this rate, he will pay $67.65 for _____ feet of chain.	
Caleb runs 3 miles every 32 minutes. At this rate, Caleb can run _____ miles in 48 minutes.	
A car traveled 70 miles in $1\frac{1}{4}$ hours. At this rate, it will take the car _____ hours to travel 126 miles.	
Xun sold 2 quarts of strawberries for a total of $8.60. At this rate, it would cost $_____ for $\frac{1}{2}$ quart of strawberries.	