Name _____

Rates

Essential Question How can you find rates and unit rates?

UNLOCK the Problem REAL WORLD

CONNECT You know how to write ratios to compare two quantities. A **rate** is a ratio that compares two quantities that have different units of measure. A **unit rate** is a rate that has 1 unit as its second term.

Rafael is shopping at a used book and music store. A sign advertises 4 CDs for $12. What is the unit rate for the cost of 1 CD?

- What are the units of the quantities that are being compared?

  _____

- What operations can you use to write equivalent ratios?

  _____

  _____

Write the rate in fraction form. Then find the unit rate.

STEP 1

Write the rate in fraction form to compare dollars to CDs.

$$\frac{\text{dollars}}{\text{CDs}} \longrightarrow \frac{12}{\square}$$

_____

STEP 2

Divide to find an equivalent rate so that 1 is the second term.

$$\frac{12}{4} = \frac{12 \div \square}{4 \div \square} = \frac{\square}{1} \longleftarrow \text{unit rate}$$

So, the unit rate for CDs is _____ for 1 CD.

Math Talk Would it make sense to compare CDs to dollars to find a unit rate? **Explain.**

- **What if** the regular price of CDs is 5 for $20? What is the unit rate for CDs at the regular price? **Explain** how you found your answer.

_____

_____

_____

Share and Show

1. Find the unit rate of speed for 120 miles in 2 hours.

$$\frac{\text{miles}}{\text{hours}} \rightarrow \frac{120}{\square} = \frac{\square \div 2}{2 \div \square} = \frac{\square}{\square}$$

The unit rate of speed is _____ per _____.

Find the unit rate.

2. $5.00 for 2 T-shirts

_____

3. 200 words in 4 min

_____

4. 150 mi on 10 gal of gas

_____

On Your Own

Write the rate in fraction form.

5. 90 words in 2 min

_____

6. $1.20 for 6 goldfish

_____

7. $0.05 per page

_____

Find the unit rate.

8. $208 for 4 tires

_____

9. 300 mi per 15 gal

_____

10. 240 people per 2 sq mi

_____

Problem Solving

11. An ice skating rink charges $1.50 to rent ice skates for 30 minutes. What is the unit rate per hour for renting ice skates?

_____

Name _____

Distance, Rate, and Time

Essential Question How can you solve problems involving distance, rate, and time?

UNLOCK the Problem REAL WORLD

You can use the formula $d = r \times t$ to solve problems involving distance, rate, and time. In the formula, d represents distance, r represents rate, and t represents time. The rate is usually a unit rate comparing distance to time, such as miles per hour.

- What word is used in place of rate?

  _____

- What are the given values?

  _____

- What is the unknown value?

  _____

Example 1

The winner of an automobile race drove 500 miles at an average speed of 150 miles per hour. How long did it take the winner to finish the race?

STEP 1

Write the formula.

$d = r \times t$

STEP 2

Replace d with 500 and r with 150.

$d = r \times t$

$500 = \square \times t$

STEP 3

Use what you know about inverse operations to find t.

$500 \div \square = t$

$3\frac{1}{3} = t$

So, it takes the winner _____ hours or _____ hours _____ minutes to complete the race.

Example 2

A race car driver traveled at an average speed of 120 miles per hour to finish a race in 2 hours. What was the length of the race?

STEP 1

Write the formula.

$d = r \times t$

STEP 2

Replace r with 120 and t with 2.

$d = r \times t$

$d = \square \times \square$

STEP 3

Multiply to solve for d.

$d = 120 \times 2$

$d = \square$

So, the race was _____ miles long.

Math Talk Why were different operations used in Step 3 of Examples 1 and 2?

Share and Show

1. A cyclist travels 45 miles in 3 hours. What is the cyclist's speed?

Write the formula: $d = \square \times \square$

Replace d with _____.

Replace t with _____.

The rate is _____ miles per hour.

Use the formula $d = r \times t$ to solve. Include the units in your answer.

2. A train travels at an average speed of 80 miles per hour for 5 hours. How far does the train travel?

_____

3. A horse travels at an average speed of 12 miles per hour. How long does it take the horse to travel 60 miles?

_____

On Your Own

Use the formula $d = r \times t$ to solve. Include the unit in your answer.

4. A hiker travels at a speed of 3 miles per hour for 3 hours. How far does the hiker travel in that time?

_____

5. A snail travels at a speed of 2 centimeters per minute. How long does the snail take to travel 30 centimeters?

_____

6. A boat travels 6 miles in 24 minutes. What is the average speed of the boat?

_____

7. $d = 320$ cm

$r =$ _____

$t = 8$ sec

8. $d =$ _____

$r = 50$ km per hr

$t = 6$ hr

9. $d = 150$ ft

$r = 20$ ft per min

$t =$ _____

_____

Problem Solving

10. In an experiment, Ava found that it took a ball 5 seconds to roll down an 80-foot ramp. What is the average speed of the ball?

_____

11. Jason's family is driving 1,375 miles to Grand Canyon National Park. They plan to drive at an average speed of 55 miles per hour. How long will they be driving to reach the park?

_____