

RATES

11/12

$$\text{SPEED} = \frac{\text{DISTANCE}}{\text{TIME}}$$

"PER" → $\frac{30 \text{ MILES}}{1 \text{ HOUR}}$



30 MILES PER HOUR

STARTING PAY \$23 PER HOUR = $\frac{23}{1}$ ← UNIT RATE

FACT
ALITA'S CAR DROVE 78 MILES ON 3 GALLONS OF GAS

"ON" → $\frac{78 \text{ MILES}}{3 \text{ GALLONS}} = \frac{26}{1 \text{ GALLON}}$

$\div 3$ (above 78)
 $\div 3$ (below 3)

QUESTION
HOW MANY MILE ON 1 GALLON OF GAS?

$$\begin{array}{cc} 78 \div 3 & \\ \swarrow & \searrow \\ \frac{18}{3} = 6 & \frac{60}{3} = 20 \\ & \searrow \swarrow \\ & 26 \end{array}$$

FACTS
CEREAL 12oz FOR \$2.54 OR 18oz FOR \$3.50

$$\frac{2.54}{12}$$

$$\frac{3.50}{18}$$

QUESTION
WHICH BOX OF CEREAL COSTS LESS PER OUNCE?

$$12 \overline{) 2.54}$$

$$18 \overline{) 3.50}$$

A 32-ounce bottle of apple juice for \$2.50 or a 48-ounce bottle for \$3.84.

$$\frac{2.50}{32} \leftarrow \text{FOR}$$

$$\begin{array}{r} 0.078 \\ 32 \overline{) 2.50} \\ \underline{224} \\ 260 \\ \underline{256} \\ 4 \end{array}$$

$$\begin{array}{r} 1 \\ 32 \\ \times 8 \\ \hline 256 \end{array}$$

THE 32 oz
BOTTLE COSTS
THE LEAST

$$0.078 \approx 0.08$$

32 oz COSTS A LITTLE LESS
THAN \$0.08 PER OUNCE

$$\frac{3.84}{48}$$

$$\begin{array}{r} 0.08 \\ 48 \overline{) 3.84} \\ \underline{384} \\ 0 \end{array}$$

$$50 \overline{) 400}$$

48 oz COSTS EXACTLY
\$0.08 PER OUNCE

Lesson 1-1 Rates

A ratio that compares two quantities with different kinds of units is called a **rate**. When a rate is simplified so that it has a denominator of 1 unit, it is called a **unit rate**.

Example 1

DRIVING Alita drove her car 78 miles and used 3 gallons of gas.
What is the car's gas mileage in miles per gallon?

Write the rate as a fraction. Then find an equivalent rate with a denominator of 1.

$$\begin{aligned} 78 \text{ miles using 3 gallons} &= \frac{78 \text{ mi}}{3 \text{ gal}} && \text{Write the rate as a fraction.} \\ &= \frac{78 \text{ mi} \div 3}{3 \text{ gal} \div 3} && \text{Divide the numerator and the denominator by 3.} \\ &= \frac{26 \text{ mi}}{1 \text{ gal}} && \text{Simplify.} \end{aligned}$$

The car's gas mileage, or unit rate, is 26 miles per gallon.

Example 2

SHOPPING Joe has two different sizes of boxes of cereal from which to choose. The 12-ounce box costs \$2.54, and the 18-ounce box costs \$3.50. Which box costs less per ounce?

Find the unit price, or the cost per ounce, of each box. Divide the price by the number of ounces.

$$\begin{array}{ll} 12\text{-ounce box} & \$2.54 \div 12 \text{ ounces} \approx \$0.21 \text{ per ounce} \\ 18\text{-ounce box} & \$3.50 \div 18 \text{ ounces} \approx \$0.19 \text{ per ounce} \end{array}$$

The 18-ounce box costs less per ounce.

Exercises

Find each unit rate. Round to the nearest hundredth if necessary.

- | | |
|----------------------------|-------------------------------|
| 1. 18 people in 3 vans | 2. \$156 for 3 books |
| 3. 115 miles in 2 hours | 4. 8 hits in 22 games |
| 5. 65 miles in 2.7 gallons | 6. 2,500 Calories in 24 hours |

Choose the lower unit price.

7. \$12.95 for 3 pounds of nuts or \$21.45 for 5 pounds of nuts
8. A 32-ounce bottle of apple juice for \$2.50 or a 48-ounce bottle for \$3.84.

Lesson 1-1 Rates Skills Practice**SHOW YOUR WORK!****Find each unit rate. Round to the nearest hundredth if necessary.**

1. \$112 in 8 hours

$$\frac{112}{8} \leftarrow \text{"in"}$$

$$\frac{112}{8} \div \frac{2}{2} = \frac{56}{4} \div \frac{4}{4} = \frac{16}{1}$$

$$\frac{16}{1}$$

UNIT RATE

$$\begin{array}{r} 8 \overline{)112} \\ 14 \\ 4 \overline{)56} \\ 4 \\ 16 \end{array}$$

3. 49 points in 7 games

5. 120 problems in 5 hours

7. 6 eggs in 7 days

$$\frac{6}{7} \quad \frac{\text{EGGS}}{\text{DAY}}$$

$$7 \overline{)6.0}$$

9. 122 patients in 4 weeks

11. \$8.43 for 3 pounds

13. 25 letters in 4 days

15. 5 breaks in 8 hours

17. 2 pay raises in 3 years

19. 15 pounds in 6 weeks

21. 8 glasses every 24 hours

Choose the lower unit price.

23. \$4.99 for 6 cans or \$7.99 for 10 cans

24. \$21.50 for 4 pounds of lunch meat or \$15.10 for 3 pounds of lunch meat