2-6 Reteaching

Ratios, Rates, and Conversions

A unit rate is a rate with denominator 1. For example, $\dfrac{12 \text{ in.}}{1 \text{ ft}}$ is a unit rate. Unit rates can be used to compare quantities and convert units.

Problem

Which is greater, 74 inches or 6 feet?

It is helpful to convert to the same units. Conversion factors, a ratio of two equivalent measures in different units, are used to do conversions.

Multiply the original quantity by the conversion factor(s) so that units cancel out, leaving you with the desired units.

$$6 \cancel{\text{ft}} \times \frac{12 \text{ in.}}{1 \cancel{\text{ft}}} - 72 \text{ in.}$$

Since 72 in. is less than 74 in., 74 in. is greater than 6 ft.

Rates, which involve two different units, can also be converted. Since rates involve two different units, you must multiply by two conversion factors to change both of the units.

Problem

Jared's car gets 26 mi per gal. What is his fuel efficiency in kilometers per liter? You need to convert miles to kilometers and gallons to liters. This will involve multiplying by two conversion factors.

There are 1.6 km in 1 mi. The conversion factor is either $\dfrac{1.6 \text{ km}}{1 \text{ mi}}$ or $\dfrac{1 \text{ mi}}{1.6 \text{ km}}$.

Since miles is in the numerator of the original quantity, use $\dfrac{1.6 \text{ km}}{1 \text{ mi}}$ as the conversion factor so that miles will cancel.

$$26 \frac{\cancel{\text{mi}}}{\text{gal}} \times \frac{1.6 \text{ km}}{1 \cancel{\text{mi}}}$$

There are 3.8 L in 1 gal. The conversion factor is either $\dfrac{3.8 \text{ L}}{1 \text{ gal}}$ or $\dfrac{1 \text{ gal}}{3.8 \text{ L}}$.

Since gallons is in the denominator of the original quantity, use $\dfrac{1 \text{ gal}}{3.8 \text{ L}}$ as the conversion factor so that gallons will cancel.

$$26 \frac{\cancel{\text{mi}}}{\cancel{\text{gal}}} \times \frac{1.6 \text{ km}}{1 \cancel{\text{mi}}} \times \frac{1 \cancel{\text{gal}}}{3.8 \text{ L}} Å10.9 \frac{\text{km}}{\text{L}}$$

Jared's vehicle gets 10.9 kilometers per liter.

Exercises

Convert the given amount to the given unit.

1. 12 hours; minutes   **2.** 1000 cm; km   **3.** 45 ft; yd

4. 32 cups; gallons   **5.** 30 m; cm   **6.** 15 lbs; kilograms

7. 42 in.; cm   **8.** 10 miles; km   **9.** 25 ft; in.

10. Serra rode 15 mi in 1.5 hr. Phaelon rode 38 mi in 3.5 h. Justice rode 22 mi in 2.25 hr. Who had the fastest average speed?

11. Mr. Hintz purchased 12 gallons of drinking water for his family for $14.28. He knows that this should last for 2 weeks. What is the average cost per day for drinking water for the family?

12. The price for a particular herb is 49 cents for 6 ounces. What is the price of the herb in dollars per pound?

Copy and complete each statement.

13. 45 mi/h = _____ft/s   **14.** 7 g/s = _____kg/min   **15.** 50 cents/min = _____$/h

16. 22 m/h = _____cm/s   **17.** 15 km/min = _____mi/h   **18.** 6 gal/min = _____qt/h

19. Writing Describe the conversion factor you would use to convert feet to miles. How do you determine which units to place in the numerator and the denominator?

20. Writing Describe a unit rate. How do you determine the unit rate if the rate is not given as a unit rate. Illustrate using an example.

Lesson 2-6

Convert the given amount to the given unit. (12 in = 1 ft, 100 cm = 1 m, 60 min = 1 hr, 3ft = 1yd, 2.2 lb = 1 kg, 2.54 cm = 1in)

1. 12 ft; inches

2. 350 cm; meters

3. 255 min; hours

4. 11 yd; meters

5. 35 lb; kilograms

6. 48 cm; feet

7. One bakery is selling 6 muffins for $7.25. Another bakery is selling 8 muffins for $9.29. Which bakery has the better deal?

8. A 12-ounce can of green beans is sold for $1.45. What is the price per pound?

9. A sailboat is traveling at a speed of 10 nautical miles per hour. If 1 nautical mile is 6076 ft, what is the speed of the sailboat in feet per second?

Answers: 144 in, 3.5 m, 4.25 hr, 10.1 m, 15.9 kg, 1.6 ft, 8 for $9.29, $1.93 per pound, 16.9 feet per sec