

Study Guide and Intervention

7MG1.1

Converting Measures

A **unit ratio** is a ratio in which the denominator is 1 and the numerator and denominator are equivalent so that the value of the ratio is 1.

Example 1 Convert $2\frac{1}{2}$ meters to centimeters.

$$\begin{aligned} 2\frac{1}{2} \text{ m} &= 2\frac{1}{2} \cancel{\text{m}} \cdot \frac{100 \text{ cm}}{1 \cancel{\text{m}}} \\ &= 2\frac{1}{2} \cdot 100 \text{ cm or } 250 \text{ cm} \end{aligned}$$

Example 2 Convert 5.4 liters to gallons.

$$\begin{aligned} \text{Use } 1 \text{ gal} &\approx 3.7854 \text{ L} \\ 5.4 \text{ L} &\approx 5.4 \cancel{\text{L}} \cdot \frac{1 \text{ gal}}{3.7854 \cancel{\text{L}}} \\ &\approx 5.4 \cdot \frac{1 \text{ gal}}{3.7854} \text{ or } 1.43 \text{ gal} \end{aligned}$$

Example 3 **DRIVING** While driving out of town for a business trip, Mr. Johansen averaged a speed of 65 miles per hour. How fast is this in meters per second?

$$\begin{aligned} &\frac{65 \cancel{\text{ mi}}}{1 \text{ hr}} \cdot \frac{1 \text{ km}}{0.6214 \cancel{\text{ mi}}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ h}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \\ &= \frac{65 \cancel{\text{ mi}}}{1 \cancel{\text{ hr}}} \cdot \frac{1 \cancel{\text{ km}}}{0.6214 \cancel{\text{ mi}}} \cdot \frac{1000 \text{ m}}{1 \cancel{\text{ km}}} \cdot \frac{1 \text{ h}}{60 \cancel{\text{ min}}} \cdot \frac{1 \cancel{\text{ min}}}{60 \text{ sec}} \\ &= \frac{65000 \text{ m}}{2237.04 \text{ sec}} \\ &= \frac{29.06 \text{ m}}{1 \text{ sec}} \end{aligned}$$

Mr. Johansen averaged 29.06 meters per second.

Exercises Complete each conversion. Round to the nearest hundredth if necessary.

1. 3 T = ■ lb **6,000**

2. $5\frac{1}{2}$ c = ■ fl oz **44**

3. 4.75 m = ■ mm **4,750**

4. 2,473 m = ■ km **2.47**

5. 8.5 yd = ■ ft **25.5**

6. $1\frac{1}{4}$ L = ■ mL **1,250**

7. 4 oz ≈ ■ g **113.4**

8. 5.5 yd ≈ ■ m **5.03**

9. 15 pt ≈ ■ L **7.1**

10. **RESTAURANT** During the dinner rush, a certain restaurant cooks about 25 pounds of spaghetti per hour. How many grams of spaghetti do they cook per second?

3.15 grams

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Converting Square and Cubic Units of Measure

Some of the units of area in the customary system are in², ft², yd², and mi².
Some of the units of area in the metric system are cm² and m².

Example 1 Convert 5 square yards to square feet.

$$\begin{aligned} 5 \text{ yd}^2 &= 5 \cdot \text{yd} \cdot \text{yd} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \\ &= 45 \text{ ft}^2 \end{aligned}$$

Example 2 Convert 2.5 square meters to square centimeters.

$$\begin{aligned} 2.5 \text{ m}^2 &= 2.5 \cdot \text{m} \cdot \text{m} \cdot \frac{100 \text{ cm}}{1 \text{ m}} \cdot \frac{100 \text{ cm}}{1 \text{ m}} \\ &= 25,000 \text{ cm}^2 \end{aligned}$$

Some of the units of volume in the customary system are in³, ft³, yd³, and mi³.
Some of the units of volume in the metric system are cm³ and m³.

Example 3 Convert 1,500 cubic centimeters to cubic meters.

$$\begin{aligned} 1,500 \text{ cm}^3 &= 1,500 \cdot \text{cm} \cdot \text{cm} \cdot \text{cm} \cdot \frac{1 \text{ m}}{100 \text{ cm}} \cdot \frac{1 \text{ m}}{100 \text{ cm}} \cdot \frac{1 \text{ m}}{100 \text{ cm}} \\ &= \frac{1,500 \text{ m}^3}{1,000,000} \\ &= \frac{65,000 \text{ m}}{2,237.04 \text{ sec}} \\ &= 0.0015 \text{ m}^3 \end{aligned}$$

Convert 30 square feet to square meters.

$$\begin{aligned} 30 \text{ ft}^2 &= 30 \cdot \text{ft} \cdot \text{ft} \cdot \frac{0.3048 \text{ m}}{1 \text{ ft}} \cdot \frac{0.3048 \text{ m}}{1 \text{ ft}} \\ &\approx 2.79 \text{ m}^2 \end{aligned}$$

Example 4 Complete each conversion. Round to the nearest hundredth if necessary.

1. $6 \text{ ft}^2 = \blacksquare \text{ in}^2$ **864** 2. $0.25 \text{ m}^2 = \blacksquare \text{ cm}^2$ **2,500** 3. $18 \text{ ft}^2 = \blacksquare \text{ yd}^2$ **2**
 4. $189 \text{ ft}^3 = \blacksquare \text{ yd}^3$ **7** 5. $2 \text{ m}^3 = \blacksquare \text{ cm}^3$ **2,000,000** 6. $3,456 \text{ in}^3 = \blacksquare \text{ ft}^3$ **2**
 7. $24 \text{ cm}^2 \approx \blacksquare \text{ in}^2$ **3.72** 8. $15 \text{ ft}^3 \approx \blacksquare \text{ m}^3$ **0.42** 9. $7 \text{ in}^3 \approx \blacksquare \text{ cm}^3$ **114.71**