

## Answers to Factor-Label Problems

$$\begin{array}{llll} 2.54 \text{ cm} \equiv 1 \text{ inch (in)} & 1 \text{ quart} \approx 0.946 \text{ liter (L)} & 1 \text{ kg} \approx 2.20 \text{ lb} & 1 \text{ calorie} = 4.184 \text{ joules} \\ 5280 \text{ ft} \equiv 1 \text{ mile} & 12 \text{ in} \equiv 1 \text{ foot (ft)} & 3 \text{ feet} \equiv 1 \text{ yard} & 100 \text{ cm} = 1 \text{ meter (m)} \end{array}$$

1. How many inches are present in 12 cm?

$$12 \text{ cm} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} = 4.7 \text{ inches}$$

2. How many quarts are present in a 2.0 liter bottle?

$$2.0 \text{ L} \times \frac{1 \text{ quart}}{0.946 \text{ L}} = 2.1 \text{ quarts}$$

3. If a person weighs 150 pounds (lb), how many kilograms (kg) is this?

$$150 \text{ lb} \times \frac{1 \text{ kg}}{2.20 \text{ lb}} = 68 \text{ kilograms}$$

4. If a car travels 65  $\frac{\text{miles}}{\text{hour}}$ , how far can this car go in 3.5 hours? (Hint:  $\frac{65 \text{ miles}}{1 \text{ hour}}$  is the conversion factor)

$$3.5 \text{ hours} \times \frac{65 \text{ miles}}{1 \text{ hour}} = 227.5 \text{ miles}$$

5. [Harder] How many yards are present in 400 meters? (Hint: m  $\rightarrow$  cm  $\rightarrow$  inches  $\rightarrow$  feet  $\rightarrow$  yards)

$$400 \text{ m} \times \frac{100 \text{ cm}}{1 \text{ m}} = 40,000 \text{ cm}$$

$$40,000 \text{ cm} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} = 15748 \text{ in}$$

$$15748 \text{ in} \times \frac{1 \text{ ft}}{12 \text{ in}} = 1312 \text{ ft}$$

$$1312 \text{ ft} \times \frac{1 \text{ yard}}{3 \text{ ft}} = 437 \text{ yards}$$

*Alternatively, all of these steps can be combined to give:*

$$400 \text{ m} \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{1 \text{ yard}}{3 \text{ ft}} = 437 \text{ yards}$$