

More Unit Conversions

1. What is the mass of 1 quart of water (1 L = 1.057 quarts)?

$$m = 1 \text{ qt} \times \frac{1 \text{ L}}{1.057 \text{ qt}} \times 1000 \frac{\text{mL}}{\text{L}} \times 1.00 \frac{\text{g}}{\text{mL}} = \boxed{946.1 \text{ g H}_2\text{O}}$$

2. What is the mass of 1 quart of mercury (1 L = 1.057 quarts)?

$$m = 1 \text{ qt} \times \frac{1 \text{ L}}{1.057 \text{ qt}} \times 1000 \frac{\text{mL}}{\text{L}} \times 13.53 \frac{\text{g}}{\text{mL}} = 12,800 \text{ g Hg} = \boxed{1.28 \times 10^4 \text{ g}}$$

3. Convert each of the following into SI units:

- a. engine displacement of 454 cubic inches

$$\text{Displacement} = 454 \text{ in}^3 \times \left(\frac{2.54 \text{ cm}}{\text{in}} \right)^3 = 7440 \text{ cm}^3 = 7.44 \text{ L}$$

- b. car speed of 35 mph

$$\text{speed} = 35 \frac{\text{mi}}{\text{h}} \times \frac{1 \text{ h}}{60 \text{ min}} \times \frac{1 \text{ h}}{60 \text{ s}} \times \frac{5280 \text{ ft}}{1 \text{ mi}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{1 \text{ m}}{100 \text{ cm}} = 16 \frac{\text{m}}{\text{s}}$$

- c. height of 6 feet 9 inches $h = 6 \text{ ft} + \frac{9}{12} \text{ ft} = 6.75 \text{ ft}$

$$h = 6.75 \text{ ft} \times 12 \frac{\text{in}}{\text{ft}} \times 0.0254 \frac{\text{m}}{\text{in}} = 2.06 \text{ m}$$

- d. boulder mass of 227 pounds.

$$m = 227 \text{ lb} \times \frac{0.453 \text{ kg}}{1 \text{ lb}} = 103 \text{ kg}$$

- e. gold nugget mass of 1.5 ounces

$$m = 1.5 \text{ oz} \times \frac{28.3495 \text{ g}}{\text{oz}} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 0.043 \text{ kg}$$

- f. light speed of 6.71×10^8 mph

$$c = 6.71 \times 10^8 \frac{\text{mi}}{\text{h}} \times \frac{1 \text{ h}}{3600 \text{ s}} \times \frac{1609.3 \text{ m}}{1 \text{ mi}} = 3.00 \times 10^8 \frac{\text{m}}{\text{s}}$$

- g. hike length of 11 miles

$$l = 11 \text{ mi} \times \frac{1609.3 \text{ m}}{\text{mi}} = 17702 \text{ m} = \boxed{1.8 \times 10^4 \text{ m}}$$

- h. car mileage of 32 miles/gallon.

$$\text{mileage} = 32 \frac{\text{mi}}{\text{gal}} \times \frac{1609.3 \text{ m}}{1 \text{ mi}} \times \frac{1 \text{ gal}}{4 \text{ qt}} \times \frac{1 \text{ qt}}{1.057 \text{ L}} = 12,180 \frac{\text{m}}{\text{L}} = \boxed{1.2 \times 10^4 \frac{\text{m}}{\text{L}}}$$