

1. Classify each of the following as exact numbers (E) or measured numbers (M):

- a. E There are 24 people in our classroom.
- b. M The density of mercury is 13.6 g/mL
- c. M Water boils at 212°F.
- d. E 1 meter = 1,000,000 micrometers.

2. Bacteria that cause pneumonia have diameters roughly equal to 0.000008 meters.

a. Write this number in scientific notation, including units.

$$8 \times 10^{-6} \text{ m}$$



b. Convert this distance to nanometers. (Show calculation.)

$$8 \times 10^{-6} \text{ m} \times \left( \frac{10^9 \text{ nm}}{1 \text{ m}} \right) = 8 \times 10^3 \text{ nm} \quad (\text{or } 8000 \text{ nm})$$

3. My cat, Snickers, weighs 11.7 pounds. What is his mass in grams?

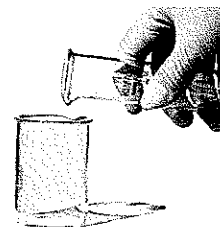
Plan: lb  $\rightarrow$  g



$$11.7 \text{ lbs} \left( \frac{453.6 \text{ g}}{1 \text{ lb}} \right) = 5.31 \times 10^3 \text{ g} \quad \text{or } 5310 \text{ g}$$

4. The density of water is 0.994 g/mL at 25°C.  
Calculate the volume, in milliliters of 250.0 grams of water at 25°C.

Plan: g  $\rightarrow$  mL

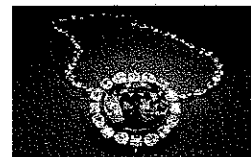


Use density as the conversion factor.

$$250.0 \text{ g} \left( \frac{1 \text{ mL}}{0.994 \text{ g}} \right) = 251.5 \text{ mL}$$

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5. The Hope Diamond, a fancy dark grayish-blue stone, purchased in 1668 from its original owner by King Louis IV of France, has a mass of 45.5 carats. What is this mass in grams? (1 carat = 200 milligrams)

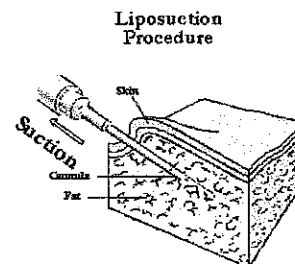


Plan: ct  $\rightarrow$  mg  $\rightarrow$  g

$$45.5 \text{ ct} \left( \frac{200 \text{ mg}}{1 \text{ ct}} \right) \left( \frac{1 \text{ g}}{1000 \text{ mg}} \right) = \boxed{9.10 \text{ g}}$$

6. In a process called liposuction, a doctor removes some adipose tissue (fat) from a person's body. If body fat has a density of 0.91 g/mL and 15 cubic inches of fat are removed, how many pounds of fat were removed from the patient?

Plan: in<sup>3</sup>  $\rightarrow$  cm<sup>3</sup>  $\rightarrow$  mL  $\rightarrow$  g  
 $\downarrow$   
lb



$$15 \text{ in}^3 \times \left( \frac{2.54 \text{ cm}}{1 \text{ in}} \right)^3 \left( \frac{1 \text{ mL}}{1 \text{ cm}^3} \right) \left( \frac{0.91 \text{ g}}{1 \text{ mL}} \right) \left( \frac{1 \text{ lb}}{453.6 \text{ g}} \right)$$

$$= \boxed{0.49 \text{ lbs}}$$