Chapter 2 Study Questions

1. Express the following numbers or answers in scientific notation:
   a) 650 (2 sig fig) b) 0.0005 (1 sig fig) c) 207,000 (3 sig fig)
   d) $(5.0 \times 10^3) \times (2.0 \times 10^2)$ e) $(3.0 \times 10^2) \div (6.0 \times 10^{-3})$

2. For each of the following, indicate the metric unit and a device used to measure it.
   a) volume b) mass c) length

3. Indicate the number of significant figures in the following numbers:
   a) 2,348 b) 7.0001 c) 0.0023 d) 24,500 e) 0.1060

4. Perform the following operations and express the answers in significant figures:
   a) $1.24 \times 8.2 =$ b) $6.78 - 3.3 =$ c) $9.999 + 0.22 =$ d) $(5.67 \times 10^3) \times (2.1 \times 10^{-2})$

5. Bozo determined the density of a sample of aluminum. For his sample, he found the volume was 0.350 cm^3 and the mass was 0.822 g. Calculate the density of aluminum from Bozo's data.

6. Calculate the mass in milligrams of a person with a mass of 50.0 kg.

7. Find the mass in pounds (lbs) of a 275-gram sample of sugar.

8. Find the number of cm in 0.286 miles. (1 km = 0.621 mi)

9. Find the volume in microliters of 11.8 kg of iron. The density of iron is 7.87 g/cm^3.

10. Tungsten is a very dense metal, with a density of 19.3 g/cm^3. Convert the density of tungsten to pounds/quart. (1 L = 1.06 qt)

11. (OPTIONAL) Assuming each ant is 5.0 mm long, how many ants would it take to make a line, single file, from one end to the other of a 100-yard football field? (2 sig fig)

Summary of Chapter 2: Measurements and Problem Solving

Scientific notation
Significant figures: recording, counting & in calculations
SI Units: meter, kilogram, second, Kelvin
Metric prefixes: kilo, centi, milli and micro
Density
English-Metric: 1 lb = 454 g, 1 in = 2.54 cm, 1 mL = 1 cm^3
Dimensional Analysis

Answers to Chapter 2 Study Questions

1. a) 6.5×10^{2} b) 5×10^{-4} c) 2.07×10^{5} d) 1.0×10^{6} e) 5.0×10^{4}

2. a) liters (L) or cm^3, graduated cylinder, buret, or volumetric flask
   b) grams (g), balance c) meters (m), ruler or meterstick

3. a) 4 b) 5 c) 2 d) 3 or 5 e) 4

4. a) $1.24 \times 8.2 = 10.$ b) $6.78 - 3.3 = 3.5$
   c) $9.999 + 0.22 = 10.22$ d) $(5.67 \times 10^{3}) \times (2.1 \times 10^{-2}) = 1.2 \times 10^{2}$

5. $density = \dfrac{mass}{volume} = \dfrac{0.822\ g}{0.350\ cm^3} = 2.35\ g / cm^3$

6. $50.0\ kg \times \dfrac{1000\ g}{1\ kg} \times \dfrac{1000\ mg}{1\ g} = 5.00 \times 10^{7}\ mg$

7. $275\ grams \times \dfrac{1\ lb}{454\ g} = 0.606\ lb$

8. $0.286\ mi \times \dfrac{1\ km}{0.621\ mi} \times \dfrac{1000\ m}{1\ km} \times \dfrac{100\ cm}{1\ m} = 4.60 \times 10^{4}\ cm$ (or convert mi → ft → in → cm)

9. $11.8\ kg \times \dfrac{1000\ g}{1\ kg} \times \dfrac{1\ cm^3}{7.87\ g} \times \dfrac{1\ mL}{1\ cm^3} \times \dfrac{1000\ \mu L}{1\ mL} = 1.50 \times 10^{6}\ \mu L$

10. $\dfrac{19.3\ g}{cm^3} \times \dfrac{1\ lb}{454\ g} \times \dfrac{1\ cm^3}{1\ mL} \times \dfrac{1000\ mL}{1\ L} \times \dfrac{1\ L}{1.06\ qt} = 40.1\ lb/qt$

11. $100\ yd \times \dfrac{36\ in}{1\ yd} \times \dfrac{2.54\ cm}{1\ in} \times \dfrac{1\ m}{100\ cm} \times \dfrac{1000\ mm}{1\ m} \times \dfrac{1\ ant}{5.0\ mm} = 1.8 \times 10^{4}\ ants$