

CHAPTER 1
TUTORIAL QUESTIONS

1. Classify each of the following as an **element**, a **compound**, a **homogeneous mixture**, or a **heterogeneous mixture**:
 - a. Water from a well
 - b. Argon gas
 - c. Sucrose
 - d. A bottle of red wine
 - e. Chicken noodle soup
 - f. Orange juice
 - g. Sugar dissolved in tea
 - h. Olive oil in water
 - i. Water
 - j. Oxygen
 - k. Air

2. What is the **number of significant figures** in each of the following measurements?
 - a. 4867 mi
 - b. 56 mL
 - c. 60,104 tons
 - d. 2900 g
 - e. 40.2 g/cm³
 - f. 0.0000003 cm
 - g. 0.7 min
 - h. 4.6×10^{19} atoms

3. Carry out the following operations as if they were calculations of experimental results, and express each answer in the **correct units** with the **correct number of significant figures**:
 - a. $5.6792 \text{ m} + 0.6 \text{ m} + 4.33 \text{ m}$
 - b. $3.70 \text{ g} - 2.9133 \text{ g}$
 - c. $4.51 \text{ cm} \times 3.6666 \text{ cm}$
 - d. $(3 \times 10^4 \text{ g} + 6.827 \text{ g}) / (0.043 \text{ cm}^3 - 0.021 \text{ cm}^3)$

4. Carry out the following conversions:
 - a. 22.6 m to decimeters,
 - b. 25.4 mg to kilograms,

- c. 556 mL to liters,
 - d. 10.6 kg/m³ to g/cm³.
5. The “normal” lead content in human blood is about 0.40 part per million (that is, 0.40 g of lead per million grams of blood). A value of 0.80 part per million (ppm) is considered to be dangerous. How **many grams** of lead are contained in 6.0×10^3 g of blood (the amount in an average adult) if the lead content is 0.62 ppm?
6. Classify the following as physical or chemical change:
- a. Sugar dissolved in water
 - b. Freezing of water
 - c. Burning wood
 - d. Souring milk
 - e. Mixing acid and base
 - f. Digesting food
 - g. Cooking an egg
 - h. Heating sugar to form caramel
 - i. Baking a cake
 - j. Rusting of iron
 - k. Crumpling a sheet of aluminum foil
 - l. Melting an ice cube
 - m. Casting silver in a mold
 - n. Breaking a bottle
 - o. Boiling water
 - p. Evaporating alcohol
 - q. Shredding paper
 - r. Sublimation of dry ice into carbon dioxide vapor