CH 105 Supplemental Instruction

Part 1: Units of Measurement

1. List the SI Units for the following:
   - Length: meters
   - Volume: m^3
   - Mass: kg
   - Temperature: Kelvin
   - Time: Seconds

2. Summarize 4 rules for determining the numbers of significant figures.
   - All *NONZERO* numbers are ALWAYS Significant
   - ALL zeroes between non-zero numbers are ALWAYS significant
   - ALL zeroes that are both to the right of the decimal and at the end of the number are significant
   - All zeroes left of a decimal in a number $\geq$ 10 are significant

3. Note the number of sig figs for the following:
   - 27   2
   - .00341   3
   - 501.1080   7
   - 12.890   5
   - .000090   2

4. Write the following numbers in scientific notation:
   - 5000 5×10^3
   - 1,908,125 1.908125×10^6
   - .15 1.5×10^{-1}
   - .0000056 5.6×10^{-6}
   - .0003801 3.801×10^{-4}

5. Write the following numbers in decimal form:
   - 1.2 x 10^-3   .0012
   - 6 x 10^2   600
   - 9.023 x 10^-6 .000009023

- 4E-7   .0000004
- 7.012E4   70,120

6. What does a direct relationship mean? Provide an example.

A change in one variable results in the same type of change. Increase causes increase; decrease causes decrease.

density + mass

e.g. on opp sides of equal sign on same part (top/bot)

7. What does an indirect relationship mean? Provide an example.

An increase in one variable results in a decrease in another.

density and volume

e.g. on same side of equation

8. Some sharks require 40 pounds of food per day in order to have enough energy to survive. If a shark requires exactly 40 pounds of food per day, how many grams of food will he have eaten in 3 days? Kg?

$$40 \text{ lb food/day} \times 3 \text{ days} = 120 \text{ lb food}$$

$$120 \text{ lb food} \times 454 \text{ g/lb} = \boxed{54,480 \text{ grams}}$$

$$54,480 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}} = \boxed{54.48 \text{ kg}}$$

9. Write the relationship for density. Is this a physical or chemical property?

$$\rho = \frac{m}{V} \quad \text{physical property}$$

10. You have a substance with a density of 9.67 g/mL. What mass in grams of the substance do you have if you have 20 cm³ of that substance?

$$1 \text{ cm}^3 = 1 \text{ mL} \qquad \rho = \frac{m}{V} \Rightarrow m = \rho V$$

$$= (9.67 \text{ g/cm}^3)(20 \text{ cm}^3)$$

$$= \boxed{193.4 \text{ grams}}$$