ANSWER KEY: session 1

CH 105 Supplemental Instruction
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Sessions: Monday, 1:15-2:15, EB 128
Wednesday, 3:30-4:30, EB 133
Office Hour: Thursday, 3:30-4:30, EB 242 (Academic Success Center)

Part I: Matter

1. List the two types of solid matter and explain each.
   - crystalline: regular, repeating, 3-D patterns. (ex salt, sugar)
   - Amorphous: without shape. (gas + many plastics).

2. Label each change as a chemical or physical change:
   - Baking a cake: Chemical
   - Freezing liquid water: physical (phase changes are physical)
   - Causing an explosion after mixing two reactants: Chemical

Part II: Units of Measurement

1. List the SI Units for the following:
   - Length: meter (m)
   - Volume: cubic meter (m³)
   - Mass: kilogram (kg)
   - Temperature: kelvin (K)
   - Time: second (s)

   Metric:
   m (meter)
   liter (l)
   gram (g)
   degree Celsius (°C)
   second (s)

2. Your dog has a mass of 60 pounds. What is his mass in kg? What is the difference between the number you calculate and his weight? (1 pound=454 g, 1kg=2.20 pounds, 1 kg=1000 g).

$$60. \text{ pounds} \left(\frac{1 \text{ kg}}{2.20 \text{ pounds}} \right) = 27.3 \text{ kg}$$

~~A what would the answer be if Sig Figs counted?~~
30 kg b/c 60 with NO decimal only has 1 Sig Fig.

• weight is a force of gravity.
   weight = mass × acceleration due to gravity.

• Mass determines weight, but they are not the same.

Part III: Scientific Notation/ Sig Figs

1. Write the following numbers in scientific notation. For the first one, label the coefficient and the exponential:
coefficient 1.3790×10^3] exponential
- 1379.0 :
- 261.9 : 2.619×10^2
- 0.000000178 : 1.78×10^{-7}

2. Give two situations when a zero would NOT be significant.
Table 1.4 on page 13 of your notes is an excellent chart for sig figs.

- at the beginning of a decimal number
  ex: 0.0013 = 2 sig figs
- used as a placeholder in a large number without a decimal point.
  ex: 1,130,000 = 3 sig figs

3. What is the rule for significant figures in an answer to a multiplication or division problem? What about addition and subtraction?

· multiplication + division: the answer has the amount of sig figs that the number with the fewest sig figs has. (ex: 225/51 = 4.4)
· addition + subtraction: answer has the same # of decimal places as the # with the fewest digits after the decimal point.

Part IV: Writing Conversion Factors

1. What does it mean to have direct proportionality?
If 2 quantities increase or decrease linearly.

2. Give two examples of conversion factors.
$\left(\dfrac{60 \text{ sec}}{1 \text{ min}} \right)$ + $\left(\dfrac{1000 \text{ g}}{1 \text{ kg}} \right)$

3. 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?

$\dfrac{40 \text{ pounds}}{1 \text{ day}} \left(\dfrac{454 \text{ g}}{1 \text{ pound}} \right) \left(\dfrac{3 \text{ days}}{1} \right)$ = 54,480 g of food in 3 days
(sig fig answer: 50,000 g)

$54,480 \text{ g} \left(\dfrac{1 \text{ kg}}{1000 \text{ g}} \right)$ = 54.48 kg

Part V: Density

1. Write the formula/relationship for density. Include the typical units.

$$Density = \frac{mass\ (g)}{Volume\ (ml\ or\ cm^3)}$$

2. Is density a physical or chemical property of matter?

physical

3. You have a substance with a density of 4.67 g/mL. What mass in grams of the substance do you have if you have 20 cm³ of that substance?

$$4.67\ g/cm^3 (=mL) = \frac{X\ g}{20\ cm^3 (mL)}$$

$$X\ g = 4.67 \times 20 = 93.4\ g$$

Part VI: Specific Gravity

1. What is the formula for specific gravity? When is it most often used?

$$specific\ gravity = \frac{density\ of\ material}{density\ of\ water}$$

often used with urine and saline solutions.