Chemistry Honors **Density Practice Worksheet**

Name: Key Date: _____ Class: ____

Density Practice Problems

#1) A 22.4-g sample of a substance was added to a graduated cylinder. It caused an 18.3 mL change in the volume of water in the cylinder. What is the density of the substance?

$\frac{22.4g}{18.3mL} = 1.22\ g/mL$

#2) A 250.0 ml sugar solution had a density of 1.37 g/mL. An additional 30.0 g of sugar was added to the solution, raising the volume by 24.6 mL. What is the density of the resulting sugar solution?

$1.37\ g/mL \times 250.0mL = 342.5g$

250.0
+ 24.6
274.6mL

342.5
+ 30.0
372.5g

$\frac{372.5g}{274.6mL} = 1.357\ g/mL$

#3) A certain red tomato has a mass of 45.6 g. A green tomato also has a mass of 45.6 g. However, when placed in water, the green tomato floats and the red one sinks. Which of the two is denser? Explain how two tomatoes with the same mass can have different densities.

Red is denser
They have different volumes.

#4) A material will float on the surface of a liquid if the material has a density less than that of the liquid. Given that the density of water is approximately 1.00 g/ mL, will a block of material having a value of 1.2 x 10^4 in^3 weighing 350 lb. float or sink when placed in a reservoir of water? (1 inch = 2.54 cm)

$1.2 \times 10^4 in^3 \times \frac{16.387cm^3}{1in^3} = 196644\ cm^3$

$350lb \times \frac{454g}{1lb} = 158900g$

float

$\frac{158900g}{196644cm^3} = 0.808\ g/cm^3$

#5) A rectangular block has dimensions 2.9 cm x 3.5 cm x 10.0 cm. The mass of the block is 615.0 g. What are the volume and density of the block?

$= 101.5cm^3$ $1.0 \times 10^2\ cm^3$

$D = \frac{615.0g}{101.5cm^3}$ 6.059

$6.19\ g/cm^3$

#6) Diamonds are measured in carats, and 1 carat = 0.200 g. The density of diamond is 3.51 g/cm^3. What are the volume and density of the block? The sample is 4.5 carats.

$$4.5 \text{ carats} \times \frac{0.200 \text{ g}}{1 \text{ carat}} = 0.90 \text{ g}$$

#7) The density of pure silver is 10.5 g/cm^3 at 20°C. If 5.25 g of pure silver pellets is added to a graduated cylinder containing 11.2 mL of water, to what volume level will the water in the cylinder rise?

$$5.25 \text{ g} \times \frac{1 \text{ cm}^3}{10.5 \text{ g}} = 0.5 \text{ cm}^3$$

11.7 cm^3

#8) The density of osmium (the densest metal) is 22.57 g/cm^3. If a 1.00 kg rectangular block of osmium has two dimensions of 4.00 cm x 4.00 cm, calculate the third dimension of the block.

$$1.00 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 1000 \text{ g} \times \frac{1 \text{ cm}^3}{22.57 \text{ g}} = 44.31 \text{ cm}^3 = 16.0 x$$

$x = 2.77 \text{ cm}$

#9) In the opening scene of the movie *Raiders of the Lost Ark*, the hero Indiana Jones tries to remove a gold idol from a booby-trapped pedestal. He replaces the idol with a bag of sand of approximately equal volume. (Density of gold = 19.3g/cm^3; density of sand ≈ 2.00 g/cm^3.)

a) Did he have a reasonable chance of not activating the mass sensitive booby trap?

No, because then the mass of gold is 965x more

b) In a later scene he and an unscrupulous guide play catch with the idol. Assume that the volume of the idol is about 1.0 L. If it were solid gold, what mass would the idol have? Is playing catch with it plausible?

$$1.0 \text{ L} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{19.3 \text{ g}}{1 \text{ mL}} = 19300 \text{ g}$$

$$19300 \text{ g} \times \frac{1 \text{ lb}}{454 \text{ g}} = 42.5 \text{ lbs}$$