APPLYING SIGNIFICANT FIGURES IN THE LAB

Name:_____
Lab Group:_____ Period:_____

A. Examine the following different glassware and determine the maximum capacity. Notice the markings on each and list units of each division and the maximum number of significant figures that is reasonable for each (recall that significant figures may only include *one* estimated digit.):

Example:

Glassware Item	Maximum Capacity	Marked Divisions	Maximum Sig Figs Reportable
Beaker	600 mL	each 50 mL	3

Glassware Item	Maximum Capacity	Marked Divisions	Maximum Sig Figs Reportable
Erlenmeyer Flask			
Beaker			
Beaker			
Beaker			
Beaker			
Graduated Cylinder			
Graduated Cylinder			

B. Compare *two* different sizes of graduated cylinder. Which one has the greater precision? The _____ mL graduated cylinder has greater precision that the _____mL graduated cylinder because_____.

C. Weigh an empty, dry 50 mL beaker on the digital electric balance and record this mass. Fill the beaker to the 30 mL mark utilizing an eye dropper or Pasteur pipet to measure precisely to the mark. Reweigh the beaker of water and record this mass. Determine the mass of the water alone. (Mass of Beaker with water - Mass of empty Beaker = Mass of Water).

Mass of Empty 50 mL Beaker	Mass of Beaker with 30 mL of water	Mass of water

D. Assuming the density of water is 1.00 g/mL, based on the mass of water *you* determined above, how many milliliters were actually contained in the beaker? This is the *theoretical* volume.

_____ grams H_2O X $\frac{\text{mL}}{\text{1.00 grams}}$ = _____ mL H_2O

Is there a difference in the volume you *measured* (in the 50 mL beaker) and the one *calculated* (from the mass) above? If so, how can you account for this difference?

_____

E. Now transfer the water in the beaker in small aliquots (portions) to a 10 mL graduated cylinder. It will take 3 to 4 fillings of the 10 mL cylinder to measure the 30 mL in the beaker. Make sure that you **do not** exceed its capacity of 10 mL. Record the exact volume of each aliquot, then add each measured volume together for the total volume. (Discard the water after each recorded filling.)

Volume of H_2O in 10 mL graduated cylinder				Total (*Experimental)* Volume
1.	2.	3.	4.	

F. Compare the total volume measured in the graduated cylinder with the volume you calculated in Part C which was based on mass.

If there is a difference, can you explain why?

_____

G. List three sources of error that may have been introduced in the recording of your data.

1. _____ 2._____ 3._____

H. Calculate the percent error of the *total volume* of water measured in the 10 mL graduated cylinder as compared to the calculated volume based on the mass of the water. (Show your work)

$$\%\ \text{error} = \frac{(\text{experimental value } \textit{Part E} - \text{theoretical value } \textit{Part D})}{\text{theoretical value } \textit{Part D}} \times 100\%$$

I. Utilizing the mass of water measured in Part C and the total volume of water in Part E, determine the density of water from your experimental data. Density = $\frac{\text{mass (g)}}{\text{volume (mL)}}$

J. Your textbook lists the density of water as 1.00 g/mL. Utilizing this as the theoretical value, calculate the percent error of the experimentally determined density of water from Part I.

K. *Journal Entry:* Describe the chemistry skills, concepts, calculations and new vocabulary required to complete this activity in full and complete sentences.