Name: _____ Date: _____ Pd: _____

Laboratory Measurements – Sig Figs - Density Activity

BACKGROUND:

In discussing measurements and significant figures, **ACCURACY** tells us how close a measurement is to the ***true*** value of the quantity that is being measured. **PRECISION** refers to the closeness of a set of measurements to ***each other***.

Some of the measuring instruments you will use in the lab are thermometers, graduated cylinders, rulers, burettes, and electronic balances. All of these instruments, except electronic balances, are graduated. This means they are marked with lines and numbers. When recording a reading from a graduated measuring instrument, you should write down all the numbers indicated by the graduations (lines and numbers) plus an estimated (approximated) final digit. This final written digit is called an **UNCERTAIN** digit. The digits preceding the final digit are called **CERTAIN** digits. Data taken in the lab may only ***contain one uncertain digit***.

All the certain digits plus the one uncertain digit collectively are called **SIGNIFICANT FIGURES**. For instance, if a chemistry student or scientist records the number 37.624 on a data sheet, the digits 3, 7, 6, and 2 are certain digits and 4 is an estimated digit. Thus the number 37.624 contains FIVE significant figures.

The exactness of a measurement is determined by the number of significant figures it contains. The number 37.624 contains FIVE significant figures and the number 37.6 contains THREE significant figures. The number 37.624 is more exact or precise than the number 37.6 because 37.624 contains more significant figures. The relative precision of measuring instruments can be determined by noting which instrument can give readings with more significant figures.

PRE-LAB QUESTIONS:

1) How much liquid is in the following graduated cylinders? Record using the correct number of significant figures and units. For each measurement, **PUT AN "X"** over the estimated digit.

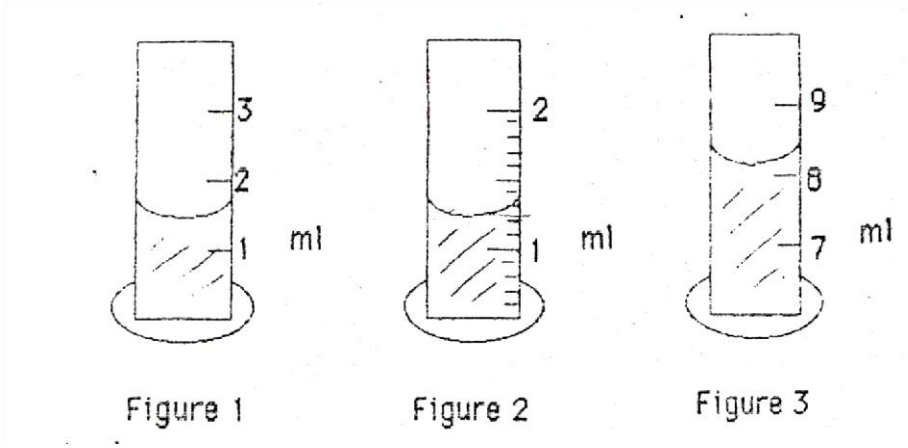


Figure 1 Figure 2 Figure 3

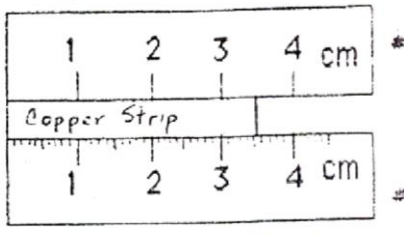
Figure 1: _____

Figure 2: _____

Figure 3: _____

2) In the above question, which graduated cylinder would give the most precise measurement? Why?

3) Measure the copper strip on the right using both rulers. Record using the correct number of significant figures and units. **CIRCLE** the ruler that provides a more precise measurement.



Top Ruler: _____ Bottom Ruler: _____

LAB ANALYSIS:

Around the room are 8 stations with a variety of objects and lab equipment. Using your knowledge about making lab measurements and sig figs, record the correct measurement for each substance with correct units and sig figs.

Station #	**Measurement *(include units)***
#1 – 250 mL Beaker + Liquid	
#2 – 100 mL Graduated Cylinder + Liquid	
#3 – Ruler + Object	
#4 – 100 mL Volumetric Flask + Liquid	
#5 – Unknown Metal Density	Mass = Density = Volume = Identity =
#6 – Electric Scale (Balance) + Object	
#7 – 125 mL Erlenmeyer Flask + Liquid	
#8 – Thermometer + Liquid	

POST-LAB QUESTIONS:

1) How many significant figures do each of the following measurements have?

a. 150 mL : _____

b. 2039 cm : _____

c. 1.20×10^9 mg : _____

d. 5 km : _____

e. 0.00367 mm : _____

f. 1.05 kg : _____

2) A chemistry student was trying to figure out the identity of an unknown chunk of metal. The chunk of metal weighed 0.135 kg.

a. Using dimensional analysis, how many grams was the chunk of metal?

b. If the volume was 50 cm^3, what was the density of the metal? Show you work!

c. What is the probable identity of the metal? _____