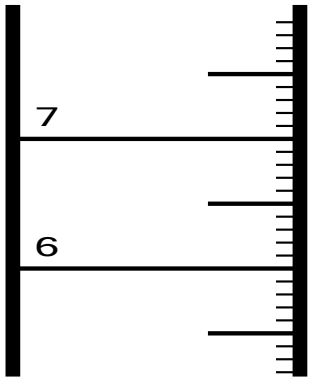
SNC 1D1

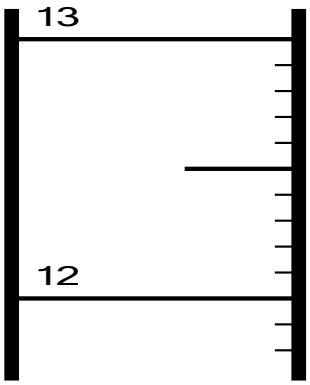
MASS, VOLUME AND DENSITY OF THREE DIFFERENT SUBSTANCES

Reading a Graduated Cylinder:

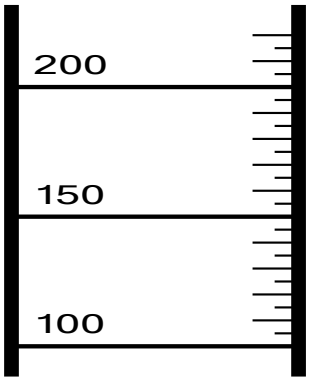
Record the volume indicated on each of the above graduated cylinders. Include ONE uncertain digit. Note that the scale is different for each cylinder.



_____ mL



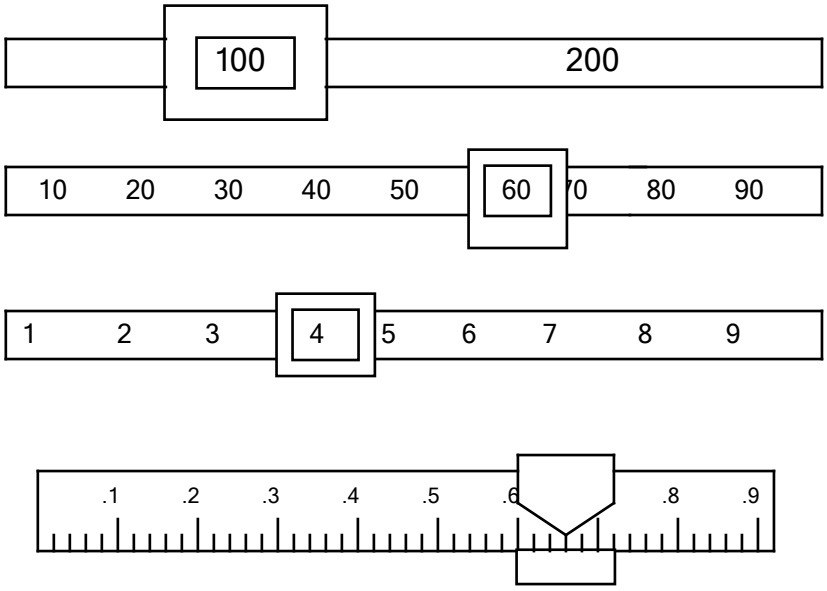
_____ mL



_____ mL

Reading a Balance:

What is the mass reading on the balance below? Include ONE uncertain digit. _____ g.



INTRODUCTION:

Give background information on mass, volume, and density. (e.g. the definition of each, how each is calculated, the significance of each, etc. Also, give a general indication of what will be done in the experiment, and how it will be done.

PURPOSE:

Calculating mass and volume (for both regular and irregular solids) of 9 samples of three different substances; _____, _____, and _____ and analyzing the density curves for each substance.

HYPOTHESIS:

Make a general prediction of what the outcome of the lab will be.

APPARATUS:

100 mL graduated cylinder
pan balance
1 large overflow can
graph paper
two 400 mL beakers
water bottle
50 mL graduated cylinder
stand
paper clip
1 small overflow can
10 mL graduated cylinder
pencil, eraser, calculator, ruler
2 ring clamps
wire gauze
three different sizes (small, medium, large) of 3 different substances – one of them consisting of regular shapes

METHOD: (make sure to rewrite it in the past tense!!)

1. Find the mass of each object and record these values in the table.
2. Find the volume of each of the regular-shaped objects using the method for regular solids, and record your results.
3. Find the volume of each of the irregular-shaped objects using the method for irregular solids, and record your results.
4. Plot the mass (g) versus volume (cm^3) points for each substance on the same graph. Remember which is the dependent, and which is the independent variable!!
5. Draw the line of best fit for each substance, using different colours to represent each of them. Provide a legend for your graph.

OBSERVATIONS:

Part A: Record your results in three tables like the following. Remember to give each table a title!

REGULAR SOLID (substance #1)	**mass (g)**	**length (cm)**	**width (cm)**	**height (cm)**	**volume (cm^3)**
small					
medium					
large					

IRREGULAR SOLID #1 (Substance #2)	**mass (g)**	**volume (mL)**	**volume (cm^3)**
small			
medium			
large			

IRREGULAR SOLID #2 (Substance #3)	**mass (g)**	**volume (mL)**	**volume (cm^3)**
small			
medium			
large			

Part B: Include your graph in this section. Remember the 5 STEPS!!

DISCUSSION:

Part A: Include all volume calculations made in this section (e.g. V = l x w x h).
Include all the density calculations made in this section (e.g. D = M/V)

Part B: Answer the following questions:

1. Which **technique** for measuring volume did you find to be more accurate? Why?
2. Explain why both mass/volume lines on the graph pass through the origin (0,0).
3. Calculate the **AVERAGE** density of each substance using all three samples of each substance.
4. From your graph determine which substance has a greater density? How did you come to this result? Where would the curve for lead be found on your graph? (Hint: use p. 36 of textbook)
5. From your graph, determine the volume of a 5 g sample of each substance?
6. Describe some possible sources of error in any one of the techniques used in the experiment.
7. In determining whether the three substances are made of the same material, which value - mass, volume, or density - is the only value that can be used? Explain.

CONCLUSION:

Write a general summary of all your lab results here. Restate the hypothesis and explain whether or not it was supported. Were there any problems/errors in the experimentation, or in the calculation of the results? What corrections should be made to avoid such problems?