Phys Sc 416/430 **Names_____**
Lab 1.1: Density: A Characteristic Property **_____**

Purpose: To identify an unknown solid, using density, and to arrive at a better understanding of mass versus volume graphs.

Part 1

Procedure:

1. Press the tare button on your balance, and find the mass of your unknown metal. Make sure your balance is measuring **grams**(g) and not ounces(oz).

2. Record the mass in the data table at the bottom of the page.

3. Pour approximately 17.0 ml of water into a graduated cylinder. Make sure you're reading the right scale, with "zero" at the bottom of the cylinder. ***Record the exact volume of water used.***

4. Tilt the cylinder slightly, and not to cause splashing and not to break the glass, ***gently*** slide the metal block into the water.

5. Record the new volume in ml = cm^3 in the data table at the bottom of the page.

6. Empty the cylinder, *dry the block with a paper towel*, and repeat steps 1→5.

Data:

TRIAL	Mass(g)	Original Volume of Water(ml)	Volume of Water + Sample(mL)
1			
2			

Analysis of Data:

1. a. Find the volume of the sample from steps 3 and 5 by subtracting. Do it for each trial (see table below).

TRIAL	Volume of unknown (subtract volumes from data table) (mL)
1	
2	
average	

b. Find the average of the two volumes and enter it in the table above.

c. Calculate the average mass. (see data table on previous page)

Average mass(g)	

d. Calculate the density using the average mass and average volume.

Density of unknown(include units)	

e. Use the table to come to a conclusion. Which metal was in your block?

Conclusion: My unknown given to me was #_____and it was the element _____

Possible Element	**Possible Unknown Density (g/cm^3)**
lithium	0.53
aluminum	2.7
titanium	4.0
tin	7.3
iron	7.9
copper	9.0
rhodium	12.4

Part 2 **Procedure**

1. Place an empty graduated cylinder on a balance and press the *tare* button.

2. Pour exactly 5.0 mL of liquid into the cylinder, and record its mass in the data table below.

3. Pour another 5.0 mL for a total of 10.0 mL liquid into the cylinder, and record its mass in the data table below.

4. Pour another 5.0 mL for a total of 15.0 mL liquid into the cylinder, and record its mass in the data table below.

5. Pour another 5.0 mL for a total of 20.0 mL liquid into the cylinder, and record its mass in the data table below.

6. Finally pour another 5.0 mL for a total of 25.0 mL liquid into the cylinder, and record its mass in the data table below. Also record the temperature of the water.

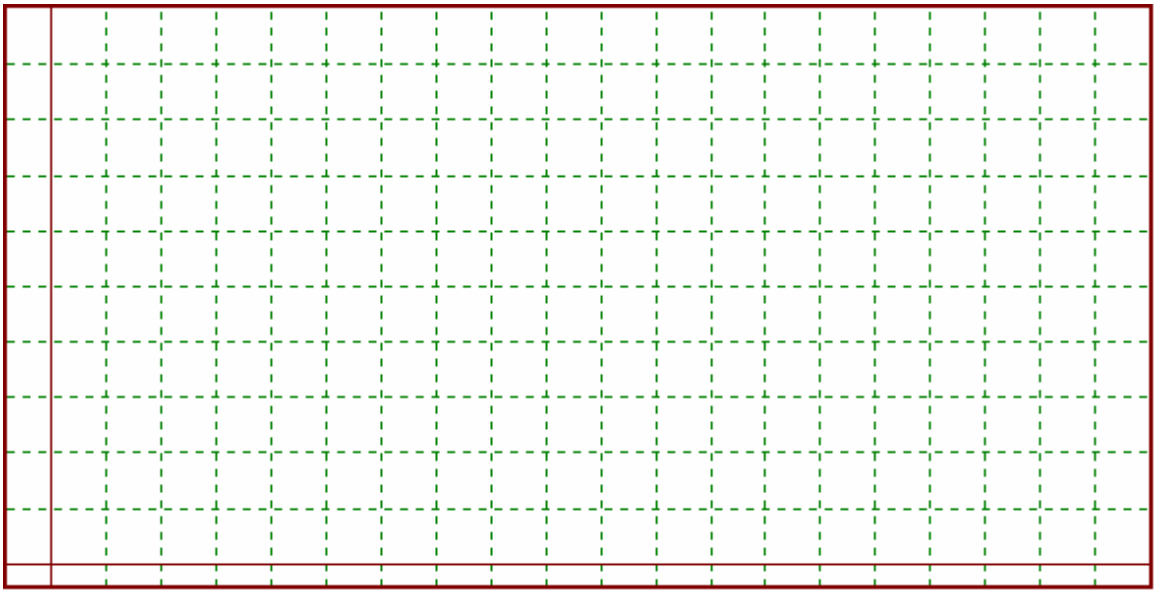
Data: **Temperature =_____**

STEP	Volume(mL)	Mass(g)
2	5.0	
3	10.0	
4	15.0	
5	20.0	
6	25.0	

Analysis:

1. Using volume as *x* and mass as *y*, graph the 5 points from the data table.

Mass(g)



Volume(mL)

2. Calculate the slope (rate of change) for this graph.

Slope =

3. What characteristic property is represented by the slope?_____

4. If a liquid had a density of 0.6 g/ml, what would its slope on the graph be?_____

Conclusion: Does the density of a liquid depend on the amount measured?_____

There was one measurement you recorded which will affect density; it is _____