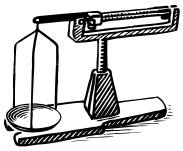
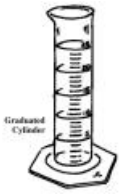
Name: _____ Section: _____

Scientific Method Lab



Density



Density *– the amount of mass of an object per unit volume*

Introduction:

The fact that the concept of density is commonly misunderstood is demonstrated by the old joke, "What weighs more, a pound of feathers or a pound of lead?" There is the urge to reply that a pound of lead weighs more than a pound of feathers, because of your everyday knowledge that lead is denser than feathers, even though we know that a pound of anything weighs the same as a pound of everything else. In short, it is very easy to confuse density with mass. (http://www.rsu.edu/faculty/jsawyer/Chemistry/Density%20Lab%20-%201.doc)

For this lab you will make various measurements and calculations (using the formula: density equals mass divided by volume) in order to determine the densities and identities of five objects. If the density of a metal is known, it is a good clue to the identity of the metal. It will be up to you to determine the proper method of measuring, and procedures for calculating in order to obtain your answer.

Objective: Determine the densities and identities of the objects through measurements and calculations

Materials: Graduated Cylinder
5 Objects (various shapes)
Triple Beam Balance
Ruler (metric)
Paper Towels
Access to Water and Sink

Procedures:

Part I – Determining Mass

1. Pick up the five objects (separately) and try to determine the order of the objects from greatest mass to least mass. Record your estimates in the Table of Estimates.

2. Using your triple beam balance, determine the mass of the five objects (separately) and record your data in the Table of Measurements.

Part II – Determining Volume

3. Pick up the five objects (separately) and try to determine the order of the objects from greatest volume to least volume. Record your estimates in the Table of Estimates.

4. Using a graduated cylinder or ruler (along with the appropriate mathematical formula) determine the volume of the five objects (separately) and record your data in the Table of Measurements.

Note- when it comes to volume measurements, solids have units of cubic centimeters, and liquids have units of milliliters.

Part III – Calculating Density

5. Pick up the five objects (separately) and try to determine the order of the objects from greatest density to least density. Record your estimates in the Table of Estimates.
6. Using your mass and volume measurements, calculate the density of each object by using the following formula and place your calculations in the Table of Density Calculations & Object Identities.

$$\text{DENSITY} = \frac{\text{Mass}}{\text{Volume}}$$

***Be sure to show your calculations in the appropriate table**

7. Using the Table of Densities provided, try to determine the identities of the five objects.

Table of Estimates

Place in order from greatest to least for their respective measurement

Object	Mass	Volume	Density
Silver Bar			
Silver Cube			
Silver Sphere			
Black Sphere			
Fifth Object - ? _____			

Table of Measurements

Object	Mass *(grams)*	Volume *(cm^3)*
Silver Bar		
Silver Cube		
Silver Sphere		
Black Sphere		
Fifth Object - ?		

Table of Density Calculations & Object Identities

Object	Calculations *(grams/cm^3)*	Identity of Object *(Use the Density Table)*
Silver Bar		
Silver Cube		
Silver Sphere		
Black Sphere		
Fifth Object - ?		

Questions:

1) Does an increased volume of a substance increase its density?

2) What effect does an object's shape have on its density?

3) Assume that a plastic object is heated and its volume becomes greater due to expansion. Will the density of the object change?

4) If the same plastic object (from question #3) has an original density of 2.0 grams/cubic centimeter (2 grams/cm^3) and its volume doubled with heating, what is its new density?

5) Water has a density of 1 gram/ml. Will any of the five objects used in this lab float on water? Explain.

6) Pyrite is a mineral/rock that is commonly referred to as Fool's Gold. Imagine your family is caught up in the Gold Rush during the mid-1800's and they decide to head out west for a chance to benefit from the abundance of gold. After a few weeks of mining, your family has come across a significant amount of what appears to be gold. Unfortunately, there have been many cases of miners finding worthless pyrite as opposed to real gold. In an attempt to not look like "fools" when trying to cash in your gold, what could you do to be sure that you have gold and not pyrite?

Interactive Density Lab
http://www.sciencejoywagon.com/explrsci/media/density.htm