

Name: _____ Section: _____

Density Lab

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

Introduction:

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.

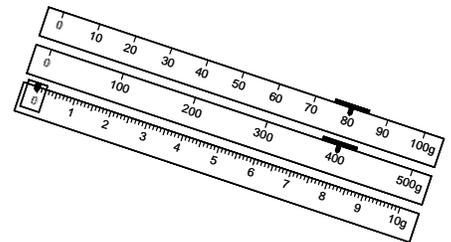
Objective: Determine the densities and identities of five objects through measurements and calculations

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

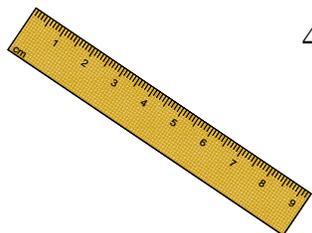
Procedures:

Part I – Determining Mass

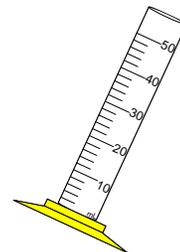
1. Pick up each of the five objects and make observations related to their mass. Rank each object from one to five with one being the object with the most mass and five being the object with the least mass. Record your rankings in the Rankings and Estimates table.
2. Estimate the mass of each object and record your estimates in the Rankings and Estimates table.
3. Using your triple beam balance, determine the mass of each of the five objects and record your data in the Mass and Volume Measurements table.



Part II – Determining Volume



- Pick up each of the five objects and make observations related to their volume. Rank each object from one to five with one being the object with the most volume and five being the object with the least volume. Record your rankings in the Rankings and Estimates table.
- Estimate the volume of each object and record your estimates in the Rankings and Estimates table.
- Using a graduated cylinder or ruler (along with the appropriate mathematical formula) determine the volume of each of the five objects and record your data in the Mass and Volume Measurements table.



**Note- when it comes to volume measurements, solids have units of cubic centimeters, and liquids have units of milliliters. Additionally, $1 \text{ cm}^3 = 1 \text{ mL}$*

Part III – Calculating Density

- Pick up each of the five objects and make observations related to their density. Rank each object from one to five with one being the densest object and five being the least dense object. Record your rankings in the Rankings and Estimates table.
- Estimate the density of each object and record your estimates in the Rankings and Estimates table.
- Using your mass and volume measurements calculate the density of each object by using the formula below and place your calculations in the Density Calculations & Object Identities table.

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

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

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

Observations/Data:

Rankings and Estimates

Object	Mass (grams)		Volume (cm ³)		Density (g/cm ³)	
	Ranking	Estimate	Ranking	Estimate	Ranking	Estimate
Silver Bar						
Silver Cube						
Silver Sphere						
Black Sphere						
Fifth Object (?) _____						

Mass and Volume Measurements

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

Density Calculations & Object Identities

Object	Calculations	Density (grams/cm ³)	Identity of Object (Refer to Table of Densities)
Silver Bar			
Silver Cube			
Silver Sphere			
Black Sphere			
Fifth Object - ?			

Questions/Conclusion:

- 1) Does an object's shape have any affect on its density? Explain your reasoning.

- 2) Consider the density formula. What happens to the density as the mass increases? Explain your reasoning.

- 3) Assume that a 4.0 gram plastic object is heated and its volume becomes greater due to expansion. Will the density of the object change? Explain your reasoning.
- 4) If the same plastic object (from question #3) has an original density of 2.0 grams/cubic centimeter and its volume doubled with heating, what is its new density? Explain your reasoning and show your work.
- 5) Fresh water has a density of 1 gram/cm³. Will any of the five objects used in this lab float on water? Explain your reasoning.
- 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>