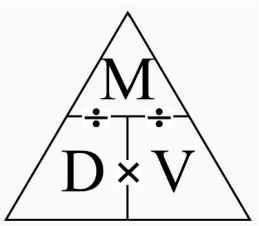
Measurement and Density Lab

Name_____ **Teacher**_____ **Period**_____

Purpose: to practice using tools that we will use throughout the year and gain experience using the scientific method. This includes creating a hypothesis you will test, measuring volume and mass, calculating density and analyzing and presenting your results.

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



Materials:
Objects to test: block of wood, 3 glass beads, 1 rock
Ruler (measure in centimeters or cm)
Balance (measures in grams or g)
Graduated cylinder (measures in milliliters or mL)
Calculator
Pencil or pen

In this lab you will measure mass in grams (g) and volume in milliliters (mL) (1 mL = 1 cm^3). The units for density are g/mL or g/cm^3.

Measuring volume: For geometric shapes like cubes, you can simply measure length, width and height and multiply them together to get volume this is often called dry volume. For irregular shapes, you will use a wet volume method. In this method you partially fill a graduated cylinder with water, record the volume and then add the object to the cylinder and record the new volume. The difference is the volume of the object being measured.

Questions and Hypotheses
Make your hypothesis for the following question, <u>be sure to include why you think that.</u>

Question: Which of the objects is the most dense?

Your hypothesis:_____

_____

_____

Steps:
1) Collect all of your materials

2) Make sure that the balance is zeroed (arrow pointing at line when weights are all at zero and nothing is on the balance).

3) Measure the mass of each of your three (3) objects and record their masses in grams in Table 1 below in the correct row.

4) Use the ruler to measure the height, width and length of each block of wood in centimeters and record your data below (don't forget your units):

Wood block: height_____ width_____ length_____

5) Calculate the volume of each block by multiplying the height by width by length and record your data in milliliters in Table 1. below (remember 1 cm^3 = 1 mL)

6) Partially fill the graduated cylinder with water and record the volume in milliliters here:

Volume of water: _____

7) Add your glass beads to the graduated cylinder and record the new volume in milliliters here:

Volume of water + beads_____

8) Subtract the original volume of water from the volume of water + beads and record this volume in Table 1. This is the volume of the glass beads.

9) Remove the beads from the graduated cylinder and repeat steps 6, 7 and 8 with the rock to find the volume of the rock. Record the volume of the rock in Table 1.

Volume of water: _____ Volume of water + rock_____

10) Calculate the density of each of the objects by dividing its mass by its volume and record this data in Table 1. Be sure to include appropriate units.

Table 1: Mass, volume and density of objects

Object	Mass	Volume	Density (m/v)
Wood block			
Glass beads			
Rock			

Graph:

On the graph below, create a graph comparing the densities of the different objects. Be sure to use the correct type of graph and include all parts of the graph (title, x and y axis labels). Should this be a line or bar graph?

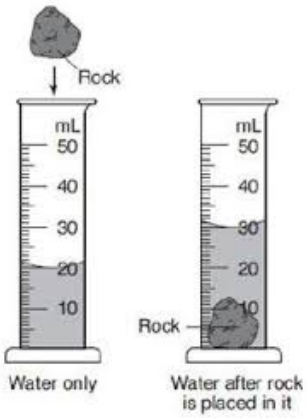
Conclusions:

1) Which of your objects has the highest density? _____

2) Was your hypothesis correct?_____

Practice:

4) The rock in the image to the right has a mass of 55 grams.



What is its density?_____ (SHOW YOUR WORK)

5) A block of wood is 3 cm tall, 5 cm wide and 6 cm long.
It has a mass of 113.4 grams.

What is its density?_____ (SHOW YOUR WORK)

6) Platinum has a density of 21.45 g/mL
You are given a piece of platinum with a mass of 4,290 g.

What is its volume?_____ (SHOW YOUR WORK)