Density Lab

Problem: Which item is the densest?

Information: density – mass per unit volume of a material (d = m / v)

Hypothesis: **If** we find the mass and volume of the all of the items, **then** the _____ will be the most dense.

Materials:

1. a baggie with 6 items (ex: rock, coin, marble, etc.)
2. a triple beam balance (or electronic balance)
3. a ruler
4. a graduated cylinder
5. a beaker of water

Density Lab Grading Rubric

Points earned	Possible points	Task
	2	Completed hypothesis
	15	Completed Data Tables
	5	**Units on measurements (in table)**
	6	Percent Error Calculations
	12	Conclusion questions answered in paragraph form
	10	Analysis Graph(s) of Densities
	10	Conversion Calculations
	60	TOTAL POINTS

Procedure:

1. find the mass of each object(s)
2. find the volume of each object
   a. **blocks** – use ruler to find L x W x H = V
   b. i**rregular** (all others) – use graduated cylinder (displacement)
      1) Pour approximately 20 mL of water in the cylinder (note the exact amount to 1 decimal place)
      2) Drop the object(s) into the cylinder and read the new water level in the cylinder. (note the exact amount to 1 decimal place). For pennies and small pebbles you must drop 2-3 of them to notice increase in volume.
      3) Final volume – Initial Volume = volume of the object.
   c. **Water** - find mass of EMPTY graduated cylinder then mass of cylinder and approximately 20 mL of water. Subtract the two to find mass of water.
3. Calculate the density of each object (d=m/v)

Observations: Use the data tables on the worksheet provided to gather your data.

Analysis: Create bar graph(s) showing the results of the data gathered. **(Bar graphs of your DENSITY values)**

Percent Error:

Calculate the percent error for the density of water and copper? (SHOW CALCULATONS)

$$\textit{Percent Error: } \frac{|\textit{experimental density} - \textit{known density}|}{\textit{Known density}} \times 100$$

Conversion: Select one of the regular objects (cube or rectangle) and convert the measurement of its mass from grams to megagrams (Mg). Select one of the irregular objects (pebble, penny) and convert its volume from mililiters (mL) to picoliters (pL). Show both conversions using dimensional analysis with units.

Conclusion: Answer the following questions in **paragraph form.**

1. Which item was the densest?
2. Which item was the least dense?
3. How did the results compare to your hypothesis?
4. Do you think that the wooden cubes come from the same type of tree? Explain.
5. How do your calculations of the density of water and copper compare to the known values?
6. Did any of the results surprise you? If so, in what way?

Name _____ Date _____ Period _____

Density Lab

Hypothesis: _____ will be the densest object.

Data table for regular objects:

L x W x H = volume d = m / v

Item description	Length	Width	Height	Volume	Mass	Density
Small Wooden Cube						
Large Wooden Cube						
White Rectangle						

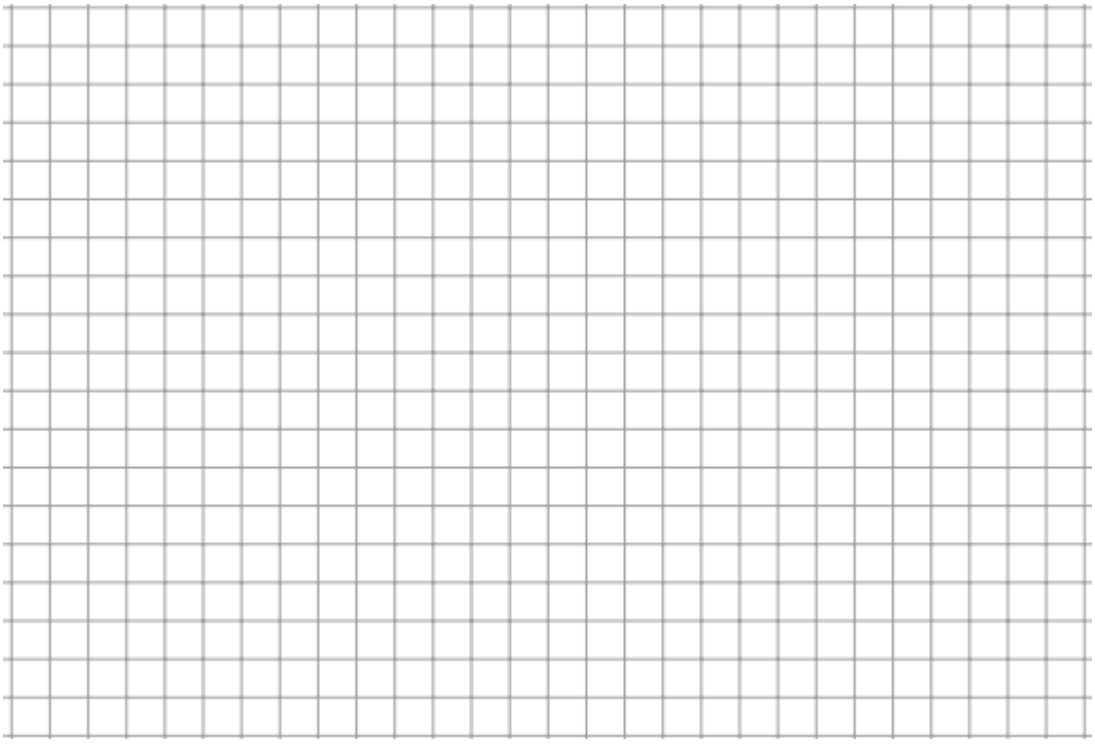
Data table for irregular objects:

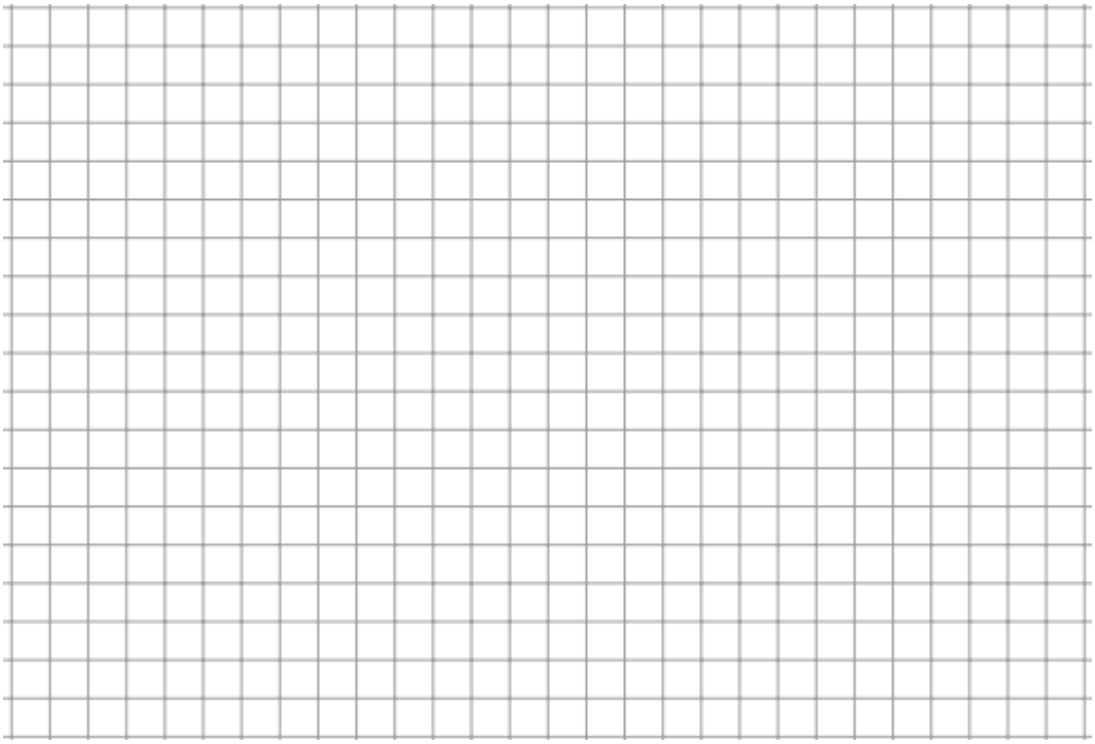
Vf - Vi = volume d = m / v

Item description	Volume of Water	Volume of Water + object	Volume of object	Mass	Density	Known Density
Small Purple						
Large Yellow						
Penny (Copper)						
Water				**		

**Water mass calculations = (Mass of water & graduated cylinder) – (mass of graduated cylinder)

Analysis: Create bar graph(s) showing the results of the densities for each of the items tested. Make sure to number/label your axis.





Percent Error Calculations:

Copper:

Water:

Conversion Calculations:

Regular object _____ objects mass: _____

Conversion:

Irregular object _____ objects volume: _____

Conversion:

Conclusion (you may attach on a separate piece of paper if needed).

Answer the questions in **paragraph form** from the lab instructions.