

Name _____

Density Lab

Objective: Students will learn to write up a lab with components.
Students will be able find density using equipment and the density equation.
Students will be able to compare densities to known accepted values by mathematics.

Materials: 4 metal blocks graduated cylinder water ruler
 Triple beam balance

Hypothesis -

Procedure: write in a step by step fashion – whole sentences!
Finding volume with a ruler:

Finding volume with a graduated cylinder

Data Tables: construct your own table for 4 blocks (Fe, Cu, Al, brass) and measure the following data: volume with a ruler, volume with a graduated cylinder, hand mass

Calculations:

4 density calculations, one for each bar
show general equation one time
substitutions
calculated answer with units

Density Calculation using mass and Ruler volume

Brass	Copper	Iron	Aluminum

Density Calculation using mass and Displacement of Water method for volume.

Brass	Copper	Iron	Aluminum

Percent Error of Ruler Volume vs Accepted Value : using the accepted values below, find the percent error for only one bar. When done there should be 2 calculations one for each volume type.

Write equation

Substitute numbers

Give answer with units

Density calculated compared to density accepted

Accepted density for Cu = 8.9 g/cm³

Fe= 7.2 g/ cm³

Al = 2.7 g/ cm³

Brass= 8.7 g/cm³

Type of bar _____

Percent Error\

(Ruler) Density vs Accepted Value

(Displacement) Density vs Accepted Value

Conclusion: Write a short paragraph. Within the paragraph do the following fluidly:

Accept or deny the hypothesis.

Restate the densities you calculated.

State the percent errors in your calculations.

Make a statement regarding volume found by the displacement method compared to volume found by measurement. Identify which is more accurate and why.

Give reasons (other than human error) for discrepancies.

Keep this paper hand for future labs that you will write up yourselves...put it in your notebook!



Elements of a Well Written Lab

Special Note: All written work must be the student's own words. It must be different from your lab partners. The concept can be discussed but your explanations should be your own.

Objective: simple clear, concise, describes what the lab is designed to discover
Usually starts with words similar to: *To find out... The student will be able to...*

Hypothesis: gives an educated guess as to what is expected to happen during the lab.
For our purposes it will often give a comparison such as most, least, faster, slower. All variables to be tested need to be identified. Never start with *I think*. Statement should start out with your variables or the process. *Ex: The soil is expected to heat up faster than the water.*

Materials: should be listed clearly

Diagram: if necessary, should have set up with all equipment labeled. If there is anything specific to be paid attention to it should be noted. *For example: the distance between the lamp and the soil and water needs to be identical shown with an arrow.*

Data Table: should be neat and orderly. All columns should be labeled with what is being measured or the variable. All columns should also have a unit of measurement attached to it. *Ex: Temperature (degrees C).*

Graph: Should appear on graph paper. Most graphs will be line graphs in high school.
Elements to include:

Overall title in the top right corner of the paper – describing what the graph is showing

X and Y axis labeled with measurement and unit

Key supplied if multiple lines

The graph should take up at least 2/3rds of the paper provided so make sure to gauge your axis' correctly to take up most of the space and include all your points.

Calculations: if required, must start with the general word equation written down. Substitutions should be clearly made and shown. The answer should appear with units attached. If multiple variables, each variable and its calculation should be neatly labeled so you know (and I know) which variable goes with which answer.

Conclusion: A well written paragraph which includes several elements:

Acceptance or denial of the hypothesis.

A restatement of the final data or final calculations to show tested relationships

An explanation or interpretation of the data

Appropriate vocabulary for the objective of the lab.