Lab – Identifying Metals by Density

Purpose: To identify metals by their appearance and density.

Materials:
- *Graduated Cylinder - 50 mL/100 mL*
- *Tap Water*
- *Digital Balance*
- *Beaker - 400 mL*

Introduction:

At room temperature, densities of individual substances (elements and/or compounds) can be identified and are considered to be an identifying property of that substance. Pure metal blocks are on the higher end of densities vs. nonmetals. Density of an object is obtained by finding the mass of the object and dividing it by its volume.

Density of an object can be obtained in two ways:
- If the object is a cube, you can obtain mass (electronic balance) and volume using the formula for calculating volume of a rectangular prism (L x W x H)
- If the object is irregular, you can obtain mass (electronic balance) and volume using water displacement where you fill a graduated cylinder to an exact volume, place the metal inside, and record the difference. This difference is the volume of the object!

Procedure: Write a DETAILED procedure to make quantitative observations of <u>each</u> metal and to determine the density of each. Your procedure should be written in numbered steps.

Name: Date: Pd:

Data Table: Create a data table to organize your quantitative observations as well as any necessary data collected in the lab to find density. <u>You MUST have your data table complete BEFORE you enter the lab area to collect data.</u>

This portion of your lab is INDIVIDUAL- Not group work

Calculations/ Results:

Density Formula: **Density = mass/volume**

Table 1: Density Calculations					
Metal	**Mass (g)**	**Volume (mL)**	**Density Calculations (Show Work)**	**Density (g/mL)**	**Identity of the Metal (Element Name)**
A					
B					
C					
D					

Percent Error Formula: $\% \text{ Error} = \left| \dfrac{\text{Theoretical Value} - \text{Experimental Value}}{\text{Theoretical Value}} \right| \times 100$

Table 2: Percent Error Calculations				
Metal	**Actual Density (From table above)**	**Theoretical Density (provided by teacher)**	**Percent Error Work**	**Percent Error**
A				
B				
C				
D				

Identity of the Metal		
Metal	Identity of the Metal based on your Data (From Table 1)	Real Identity of the Metal (from your teacher)
A		
B		
C		
D		

Graph: Make a graph to show density of each metal. Think about the data to choose a graph style!
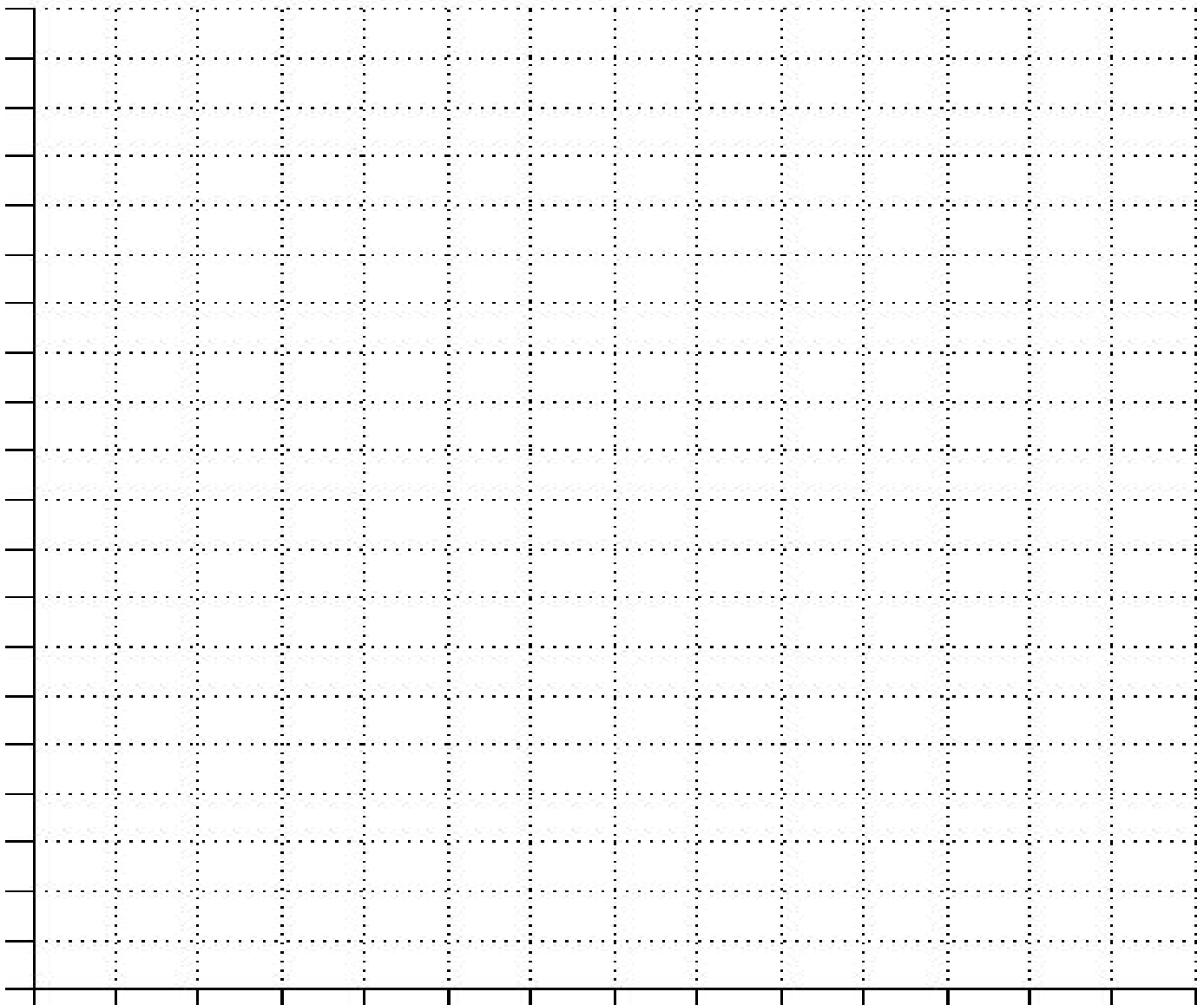
Analysis Questions:

1. What type of graph did you choose? Why?

   _____

   _____

2. Reflect on your percent errors for the metals. How could you change/improve your procedure to reduce your errors (make your density data closer to the theoretical density of each metal).

   _____

   _____

   _____

3. How would your density data be affected if you heated or froze the metals prior to measuring their densities (Think about what would happen to the PARTICLES – phase changes, etc.)?

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4. In addition to having high densities, what are three other properties of metals?

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