FLINN SCIENTIFIC

Name_____

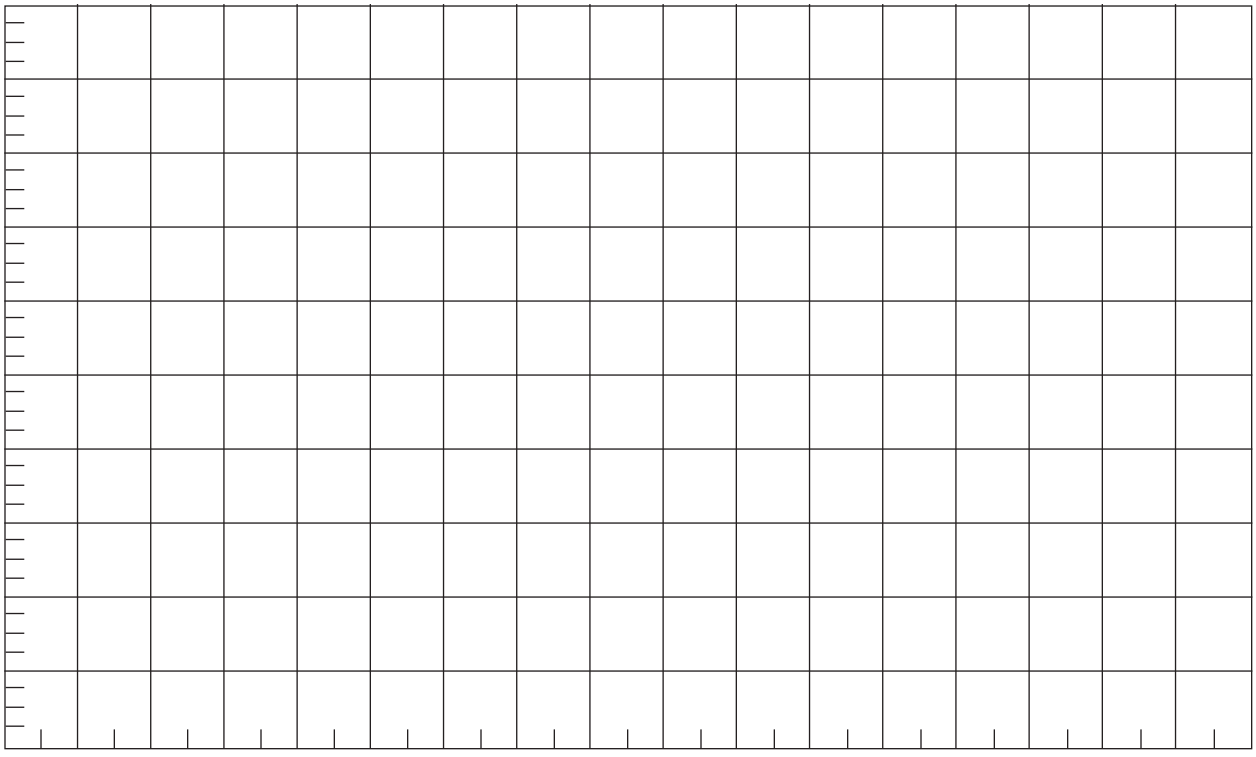
Discovering Density

Data Table

Silver or Gold (circle one)				
Sample	**Mass, g**	**Initial Volume, cm^3**	**Final Volume, cm^3**	**Sample Volume, cm^3**
1				
2				
3				
4				

Graphing the Data

Plot the mass and sample volume data for samples 1–4 on the following graph. Each sample will be represented by one point. Use the horizontal (*x*) axis for the volume and the vertical (*y*) axis for the mass. Label each axis—don't forget the UNITS—and make sure the scale is clearly marked. Do NOT play "connect-the-dots" with the data points.



Post-Lab Questions

1. Does it make sense that any trend or pattern in the mass and volume data should include (0,0) as a point? Explain your reasoning.

2. What kind of trend or pattern is obvious from the plotted graph of the mass and volume data? Is there a consistent relationship between the volume and mass of each sample? Explain.

3. Based on your answers to Questions #1 and 2, draw a "best-fit" line through the data points. The best way to do this is to place a transparent ruler or straightedge at an angle over the data points—find the "best-fit" straight line that includes, or comes close to, as many points as possible.

4. Calculate the slope of the "best-fit" line. Select two points—(x_1, y_1) and (x_2, y_2)—that are closest to the actual line. The slope (m) is calculated using Equation 3. *Show all of your work!* What are the units of the slope? What physical property is represented by the slope?

$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)} \qquad \textit{Equation 3}$$

5. Are there are any data points that seem out of place in the set? Do you think all of the metal pieces in your sample set are made of the same metal? Explain.

6. Compare the calculated slope with that of another student group which used a differently colored metal (i.e., if your samples were silver, compare your data with a group that measured gold samples). Are the values of the slope the same? Why or why not?

7. Use the following information to determine the probable identity of your metal. What type of metal do you have?

Metal	Gold	Silver	Copper	Brass	Iron	Zinc	Aluminum
Slope (g/cm^3)	19.3	10.5	8.9	8.5	7.9	7.1	2.7

8. Assuming that the identification of your metal is valid, use Equation 2 from the *Pre-Lab Questions* to calculate the percent error in your determination of the slope and the physical property it represents. The percent error measures the accuracy of your results. Comment on the accuracy of this procedure and discuss any possible sources of experimental error.

9. *(Optional)* Density can be calculated directly by dividing the mass of an object by its volume. Using the mass and volume measurements recorded in the Data Table, calculate the density for each sample, the average density, and the difference between each density value and the average value. Comment on the precision of this method of density determination.