Density Investigations

Name: _____ Date: _____

Activity 1: Density of a Large Rubber Stopper [Irregular Object]

Purpose:

The purpose if this investigation is to determine the density of an irregular solid.

$$D = \frac{m}{V}$$

Materials:

Electronic balance, rubber stopper, overflow can, water, graduated cylinder

Procedure:

1. Measure the mass of the stopper; record it.
2. Fill an overflow can to the top with water; sit the overflow can over the sink with a graduated cylinder underneath
3. Place the rubber stopper in carefully and collect the displaced water in the cylinder.
4. Measure and record the volume of water in the cylinder: $V_{water} = V_{object}$
5. Calculate the density of the rubber stopper.

Measurements & Calculations:

	Rubber Stopper
Mass (g)	
Volume (mL)	

Density Calculation:

Activity 2: Density of Water [Liquid]

Purpose:

The purpose if this investigation is to determine the density of an water by graphing.

Materials:

Electronic balance, water, graduated cylinder

Procedure:

1. Measure and record the mass of an empty graduated cylinder in grams.
2. Add 10 mL of water into a graduated cylinder and measure the mass of the graduated cylinder and water together.
3. Determine the mass of just the water by subtracting the procedure #1 from procedure #2.
4. Repeat steps 1 to 3 for the volumes of water shown in the chart; complete the chart.

Results:

Mass of empty graduated cylinder (g): _____

Mass of Cylinder + Water (g)	Mass of Water (g)	Volume of Water (mL)
		10 mL
		20 mL
		30 mL
		40 mL
		50 mL

- Create a Density Graph for Water: The Mass of water goes on the y-axis and the Volume on the x-axis. You can use Google Sheets or Excel or some other online graphing tool to create this graph.
- On the graph create a line of best fit (Trend Line) that goes through the origin (0,0).
- Right click on the line and select “Show Equation” – the number in front of the x in the equation is the value of the density since it represents the Mass over the Volume.

Activity 3: Density of 2 Pennies

Purpose:

The purpose if this investigation is to determine the density of a penny made before 1983 and one after 1983.

Materials:

Pennies, electronic balance, ruler

Procedure:

1. Measure and record the mass of each penny.
2. Measure and recored the diameter and height of each penny in cm. (remember that 1 cm = 10 mm – so to convert mm into cm you divide by 10)
3. Calculate the volume for each penny using the formula ($V = \pi r^2 h$)
4. Calculate the density for each penny.

Results & Calculations:

Penny #1	**Penny #2**
Year: _____ Mass: _____	Year: _____ Mass: _____
Radius, r (1/2 the diameter): _____	Radius, r (1/2 the diameter): _____
Height, h, of penny: _____	Height, h, of penny: _____
Volume Calculation:	Volume Calculation:
Density Calculation:	Density Calculation:

Which penny has the greater density? _____

Research:

Research online why pennies have different densities before and after 1983. Write a brief paragraph with the reason why below.