Name: _____ Period: _____ Date: _____

Layers of the Earth: Density Lab

Purpose: Many of Earth's processes are due to different densities of materials within the Earth. Getting a feel for the average densities of different earth materials will give you an understanding of the driving factor behind some of these processes.

Materials:
Graduated cylinders (500 or 1000mL); electronic balances; water; string for lowering sample into graduated cylinder; various rock and mineral samples

Procedures:
1) Use the balance to find the mass of the material.

2) Pour enough water into the large beaker for the rock samples. Measure and record the volume of just the water. This is the initial volume. **You will have to re-measure this volume before each sample.**

3) Carefully place the material being tested in the graduated cylinder. You may tie a string around the sample to help lower the sample into the graduated cylinder. Find the volume of the water plus the material. This is the final volume. Subtract the initial volume from the final volume. This is the volume of the material. Note that 1 mL = 1 cm^3.

4) Divide mass by the volume to find the density.

5) Calculate the percent error:

> **Your Value – Actual Value = Error Value**   *THEN*   **Error Value ÷ Actual Value x 100 = % Error**

Data:	Mass of material (g)	Initial water vol. (mL)	Final water vol. (mL)	Volume of material (mL)	Density of material (g/mL or g/cm³) *Yours* *Actual*		% Error
Hematite *(core)*							
Olivine *(mantle rock/asthenosphere)*							
Basalt *(oceanic crust/lithosphere)*							
Granite *(continental crust/lithosphere)*							
Obsidian *(continental crust/lithosphere)*							

Graph interpretation: Refer to the *Inferred Properties of Earth's Interior* to answer the following questions.

1) What two layers make up the lithosphere? _____ and _____

2) Name the two elements that compose the inner core: _____

3) What is the temperature at a depth of 3000 km? _____

4) What is the temperature at a depth of 500 km? _____

5) What is the pressure at a depth of 5000 km? _____

6) What is the pressure at a depth of 500 km? _____

7) Name the layer where the temperature is 4000°C: _____

8) Name the layer where the pressure is 3.5 million atmospheres: _____

9) Name the layer where the temperature is 6000°C: _____

10) Which layer is completely liquid?_____. **Explain how you can tell by looking at the chart:**

Use the same diagram to fill in the two tables below:

Layer	Density (g/cm³)	Rock type
Continental Crust		
Oceanic Crust		

Layer	Density Range (g/cm³)	Pressure Range (millions of atmospheres)	Temperature Range (°C)
Mantle			
Outer Core			
Inner Core			

Analysis questions: *Answer in <u>complete sentences</u>.*

1) How do the densities you measured for your rock samples (granite, basalt, etc.) compare with the actual values? *(look at your % error!)* What do you think are some sources of error with your measurements?

2) Earth's core is believed to be composed primarily of an iron-nickel alloy. Compare the values you got for the density of Hematite (iron) to the density of the core. Why is there such a difference? Use the *inferred properties of Earth's interior* graph to help.

Conclusion: Write a brief paragraph telling how your data helps explain the internal structure of the Earth:

Inferred Properties of Earth's Interior