

# LAB: DON'T HATE THE LAYER, HATE THE GAME

What is density and why is it so important to understanding science? Density is a measure of how much matter (atoms) is packed into a certain amount of space. The amount of matter is the mass and the space it takes up is the volume. That's why we use the formula  $D = M/V$  to calculate it (it's a unit rate like you learned in math class!). We can identify objects based on their density because it is a characteristic property but we can also compare objects and how they will behave with each other because of their densities. This applies to all matter: solids, liquids, and gases. In this lab you will explore density and work to make connections to the Earth and other planets and how density plays a role in how their creation and how they function.

## PART I: CALCULATING DENSITY AND PREDICTING BEHAVIOR IN WATER

1. Calculate the density for the mystery lab objects using the formula  $D=M/V$ . Be sure to measure in appropriate scientific units. Then, using the chart provided, identify the material.

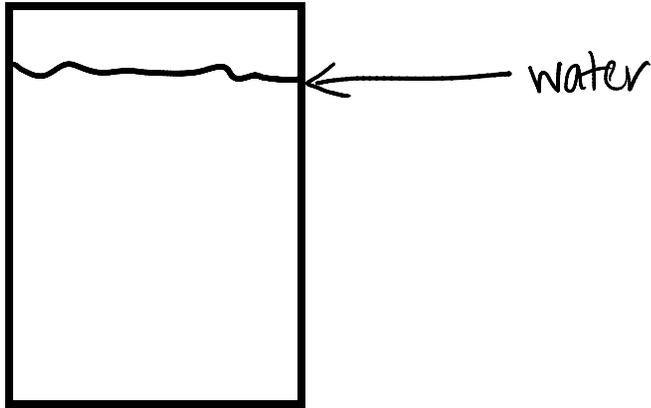
Describe the Mystery Material	Mass (g)	Volume (LxWxH) (cm <sup>3</sup> )	Density (g/cm <sup>3</sup> )	Identify the Material	Predict if it will Sink or Float in Water



Glue this side into your notebook



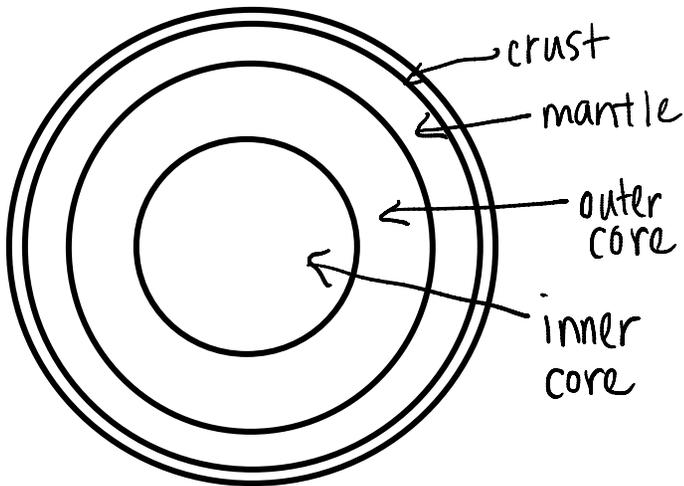
2. Now put the objects in the water and diagram it on the picture below with appropriate labels.



3. Make an inference about the density of water (use appropriate units!)

Density of water = \_\_\_\_\_

4. Based on what you've uncovered about density above, label the image below of the Earth's layers with the least and most dense layers.



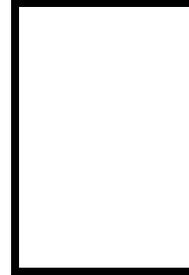
5. Why are the layers of Earth organized the way that they are, according to what you've learned about density?

## PART 2: UNDERSTANDING PLANETARY DIFFERENTIATION

The term planetary differentiation sounds confusing but you are going to define it.

1. Watch the demo with shaker container. Describe what the particles look like in the shaker initially.

2. Watch as the container is shaken. Sketch what you see at the end with labels.



3. This is essentially how planets form! How does density play a role here?

4. Come up with a definition for **planetary differentiation** based on the previous questions.

5. When planets form, there is a lot of heat formed. Explain why you think that is based on what you observed.

6. Density is the reason for convection currents. Research and sketch/explain where we find convection currents in the atmosphere (gas), hydrosphere (liquid), and inside the Earth (solid).

Atmosphere	Hydrosphere	Inside Earth