**Exploring Density Lab**

**Problem**: Do all solids have the same density?

**Background Information**:

*Density*: is a material property that tells us how compact (dense) the material is. It is a way of expressing how close atoms are to each other in a material.

It is calculated by the following formula: *Density* = $\frac{mass}{volume}$

Possible units of density: = g/ml, g/cm3, kg/L, kg/m3

Example:

|  |  |  |  |
| --- | --- | --- | --- |
| **Object** | **Mass (g)** | **Volume (ml)** | **Density (g/ml)** |
| Rock |  |  |  |

**Purpose**: To explore and calculate densities using physical materials and online technology.

**Hypothesis**: If density is calculated by finding the mass and volume, then materials can be identified because ...

**Materials**:

**Procedure:**

1. Using the scale, weigh your sample from Mr. Ray
2. Using your ruler and calculator, measure the cube and calculate the volume
3. Calculate the density and identify the material of your sample
4. Log on to the PhET interactive simulations website, and run the density simulator <https://phet.colorado.edu/en/simulation/density>
5. From the right hand side table in the simulator, tick the “mystery” box.
6. Record the mass, volume, and density of each of the mystery box in the table below. Don’t forget to use appropriate units for each measurement.
7. Use the table of densities to determine what the mystery material is based on their density.

**Observations**:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sample  | Material Prediction | Mass (g) or (kg) | Volume (cm3) or (L) | Density (m/v)(g/cm3 kg/L) | Actual Material |
| From Mr. Ray |  |  |  |  |  |
| A |  |  |  |  |  |
| B |  |  |  |  |  |
| C |  |  |  |  |  |
| D |  |  |  |  |  |
| E |  |  |  |  |  |

**Analysis**:

1. Would comparing the sizes of your objects help you predict which has a greatest density? Why or why not?
2. Would comparing the weights of your objects help you predict which has a greatest density? Why or why not?
3. Would the density of an object change if you changed the mass or the volume of the object (by breaking it or cutting it)? Why or why not?
4. Why might it be useful to measure the density of an unknown object? Who might use this information?

**Conclusion:** (refer to rubric)