Density Tower: Why do objects and liquids float?

Lesson Focus: Physical Science – Density

Purpose:

Students will:

- Apply an inquiry process to determine what causes objects/liquids to float in relation to one another.
- Develop an understanding of density; mass per unit volume.
- Develop an understanding of buoyancy; objects less dense than the surrounding fluid will float to the top of that fluid/objects more dense than the surrounding fluid will float to the bottom of that fluid.
- Determine where objects will fall among several layers of different liquids.

Science 8 IRP 2006:

PLO	SWBAT
C7: Determine the density of various substances	For a fixed mass and temperature, describe the differences between volume and density for each of the states of matter

Equipment/Materials:

Equipment	
• 250 mL graduated cylinder • 100 mL graduated cylinder	• 8 100 mL beakers (# dependent on the experiments you do to test student hypotheses) • 2 electronic balances
Materials	
• 35 mL rubbing alcohol • 35 mL grapeseed oil • 35 mL tapwater • 35 mL syrup • 35 mL milk • 35 mL honey • Food coloring	• Board game die • Plastic bead • Candle • Toothpick • Button • Steel rod

Procedure:

Part 1: Preparing the Column

1. Measure out 35 mL of each liquid. Use food coloring to distinguish between the rubbing alcohol and water.
2. Pour the following liquids **slowly** into the **center** of the graduated cylinder in the following order: honey, syrup, milk.
3. Pour the following liquids **slowly** down the **side** of the graduated cylinder in the following order: water, grapeseed oil, rubbing alcohol.

Keep in Mind: Do not have the liquids in step 2 touch the sides of the cylinder while you are pouring; the liquids are thick enough that [illegible] fine; however, if the liquids mix a little while you are pouring (their varying densities will allow the layers to even out).

Part 2: Adding the Objects

Take the small objects and carefully drop them into the graduated cylinder in the following order: steel rod, boardgame die, plastic bead, button, candle, and toothpick.

Assumed Prior Knowledge:

It is expected that students:

- Understand matter is anything that has mass and volume.
- Understand volume is the amount of space occupied by a three-dimensional object or region in space.
- Understand objects can either float or sink.