Archimedes' Principle Lab 10

Grade Level Expectation: 6.6B: The student is expected to calculate density to identify an unknown substance.

Key Concepts:

- Density is a physical property of matter and can be used to classify substances.
- Density is the measure of how much mass is contained in a given unit volume. The density of an object is calculated as mass divided by volume (d = m/V).
- The density of substance can be calculated and used to identify the substance

Archimedes' principle- You are in a swimming pool, (a fluid) the water exerts a pressure on your body. This pressure comes from the weight of all the fluid above your body. The lower you go in this body of water more pressure accumulates. The pressure is directly proportional to the depth of the fluid. There is an upward force that acts in the opposite direction called buoyant force that acts on objects.

In this lesson we want students to visualize all the forces that are acting on the object. There is the force acting on top from the weight of the fluid, the buoyant force from the bottom, and the force exerted on the sidewalls.

Teacher:

Date:

Subject / grade level: 6th Grade Physical Science

Materials: Several sample objects, sinker, triple-beam balance on support rod, plastic beakers, fine wire, upper cradle and lower cradle, digital calipers, water and mystery fluid

Lesson objective(s):

6.6B Calculate density to identify an unknown substance (Supporting Standard.)

5.5A Classify matter based on physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating), solubility in water, and the ability to conduct or insulate thermal energy or electric energy (Readiness)

Differentiation strategies to meet diverse learner needs:

ENGAGEMEN: Students will calculate the displacement of objects using graduated cylinder.

1. Record the volume of water in a graduated cylinder
2. Measure the mass of rock
3. Place rock in graduated cylinder and see how much water is displaced

by rock.
4. Subtract the amount of water displaced from the original volume of the rock.

EXPLORATION: Measurements will be taken from the bottom of the triple beam balance. This will allow to measure the masses of submerged object. Zero the balance with the cradle and link wire.

Procedure:

1. Measure the mass of the objects
2. Measure the mass of each metal object submerged in unknown liquid.
3. Repeat using water.
4. Measure the mass of the floating object
5. Attach a weight to the floating object (insures object is submerged)
6. Measure the mass of the object/sinker combination with just the sinker in the water
7. Measure the object/sinker with both submerged.
8. Utilize the digital Caliper to measure length and diameter of metal floating objects to get the volume.

EXPLANATION:

1. What is matter?
2. What does the term mass per unit volume mean?
3. Do you think that part or slice of an object will have a different density?
4. Why is density considered to be a physical property?
5. How can the density of irregular shape objects be calculated?

ELABORATION: Students will answer questions from "Stemscopes" next step

inquiry.

EVALUATION: Teacher made test from district on density and the properties of matter.

Three question assessment.