Name: _____Date: _____ Class: _____

Cartesian Diver Worksheet

Objectives

- To demonstrate understanding of Pascal's Law and Archimedes' principle.
- To use a Cartesian diver based on understanding of density, buoyancy and pressure.

Definitions

volume

mass

density

buoyancy

pressure

Relationship Question

What is the relationship between volume, mass and density?

Materials

- 1-liter bottle with cap filled with water
- bowl of water
- Cartesian diver

Procedure

1. Fill the bottle with water.
2. Using the bowl of water, adjust the amount of water and air inside the Cartesian diver so that it barely floats.
3. Place the Cartesian diver inside the bottle, making sure the bottle is filled to the top with water.
4. Screw the cap on the bottle so it is closed securely.
5. Squeeze the bottle and observe what happens to the Cartesian diver.

Name: _____Date: _____ Class: _____

Questions

1. What happens when the bottle is squeezed?

2. What happens when the bottle is released?

3. What variables affect an object's ability to float?

4. Use the variables you listed in question 3 to explain what is happening inside the bottle.

5. How do Pascal's law and Archimedes' principle apply to the Cartesian diver?

6. Use the ideal gas law to explain the relationship between volume and pressure when the bottle is pressurized and explain why the Cartesian diver sinks.

   ideal gas law: $PV = nRT$

   Where P = pressure, V = volume, n = number of moles of gas, R = universal gas constant, and T = temperature

7. BONUS: Provide a few examples of how these principles are used in real-world science, engineering and/or technology.