

# Laboratory #8

## Liquids

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### Part A. Archimedes' Principle

#### Concepts

Archimedes Principle; Force of buoyancy; Force of gravity; Equilibrium

#### Introduction

Recently you learned that when an object that is less dense than the fluid that surrounds it, it will float (relative buoyancy). This is true always, even if the object is a 67,000 ton cargo ship. Lots of things float--styrofoam floats and so does wood, but styrofoam floats better than wood!? Archimedes' Principle can be used to determine exactly how well things will float.

#### Procedure

- Take a golf ball and determine its volume (use the micrometer).
- Find the mass of the ball.
- Using the known density of water, calculate the mass of a volume of water that equals the volume of the golf ball (ie. The mass of the fluid displaced).
- Find the weight of the ball and the weight of the same volume of water.
- Find the densities of the golf ball and the water.
- Answer the first two questions.
- Repeat the process with the chunk of wood and answer the next two questions.
- Put the objects in the water and see what happens.
- Answer the remaining questions.

## **Part B. The Sometimes Floating, Sometimes Sinking, Eye Dropper**

### **Concepts**

Pressure; Archimedes's Principle

### **Introduction**

In this experiment you will get to see an eyedropper float or sink depending on how hard you squeeze the bottle. It doesn't make much sense at first, but with the tools you have learned in class and a little bit of logic, you can figure out exactly how it works.

### **Procedure**

- Fill the eyedropper just full enough so that it just barely floats.
- Fill the 2-liter soda bottle full of water all of the way to the top.
- Put your partially full eyedropper in the full soda bottle.
- Put the lid on tight so that it is airtight.
- Observe what happens when you squeeze the bottle.
- Observe what happens when you un-squeeze the bottle.

# Lab Reporting Sheet Laboratory #8

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Part A: Archimedes' Principle

	Mass of Object	Volume of Object	Weight of Object	Mass of Same Volume of Water	Weight of fluid displaced	Density of Object	Density of Water
Golf Ball							
Wood Block							

1. Draw a picture of what the system will look like as you submerge the golf ball. Label all the forces (make them proportional).
2. Will the ball go up or down? Using Archimedes' Principle explain why (and show it with your results)?
3. Draw a picture of the block of wood completely submerged in the water, and label all the forces (make them proportional).
4. Will the block go up or down? Using Archimedes' Principle explain why (and show it with your results)?
5. What is the force of buoyancy on the partially submerged (floating) block (you will have to take some new measurements)? What is the force of gravity (use your data)? What do you notice about these two numbers?

## **Part B: The Sometimes Floating, Sometimes Sinking, Eye Dropper**

- **Explain why the eyedropper sinks when you squeeze the bottle. Use the following words in your explanation: pressure, density, buoyant force, and weight.**