PhET BUOYANCY LAB

This lab was adapted from a lab submitted to PhET by Jared Schmidt (lax18s@hotmail.com), Lincoln Park Performing Arts Charter School, on 1/3/11.

Directions: Go to the following website to use an interactive simulation to work with buoyancy and density, **http://phet.colorado.edu/en/simulation/buoyancy and click "Run Now".**

Procedure:

Getting Familiar

1. On the Intro screen, mess with the apparatus, changing the blocks, observing what happens when the mass, volume and densities are held constant.
2. Check and uncheck the boxes under "Show Forces" and "Readouts" to see where they act and their relative values.
3. Observe the differences between a tank filled with water versus one with oil.

Intro: Give a brief description of what the relationship is between mass, volume and density of each object and how it affects whether the object will sink or float.

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Lab Setup

1. Click over to the Buoyancy Playground to begin the lab.
2. There are 5 different fluids to choose from in the lab and five different types of materials. (Styrofoam, wood, ice, brick and aluminum)
3. Use the table supplied below to organize your work.

Lab Procedure: Part 1

1. In each of the scenarios below, determine first, by predicting, whether the object will sink or float.
2. Test each object once you have predicted and record the results. Use default values for mass and volume

Part 1: Write an "S" for sink or an "F" for float. Predictions first!!

FLUIDS→	Air		Gasoline		Olive Oil		Water		Honey	
OBJECTS↓	Pred.	Act.	Pred.	Act.	Pred.	Act.	Pred.	Act.	Pred.	Act.
Styrofoam										
Wood										
Ice										
Brick										
Aluminum										

Lab Procedure: Part 2

1. For each of the objects, vary the fluid density at the bottom of the tank to determine the density at which the object sinks in kg/L. Use the default values for mass and volume given when object is selected.

2. List this value in the table.

	Fluid Density
Styrofoam	
Wood	
Ice	
Brick	
Aluminum	

3. How does the fluid density at which the object sinks compare to the density of the object?

Lab Procedure: Part 3

1. In this part of the lab, determine the amount of buoyant force, gravity force and contact force that is acting on each block. Set volume to 5L.

2. Click on the "Show Forces" and "Readout" options. The contact force only applies when objects sink to the bottom. In this case you must use the scale at the bottom of the tank.

3. Record these values in the table below.

	Air	Gasoline	Olive Oil	Water	Honey
	Buoy/Grav/Con (N)	Buoy/Grav/Con (N)	Buoy/Grav/Con (N)	Buoy/Grav/Con (N)	Buoy/Grav/Con (N)
Styrofoam					
Wood					
Ice					
Brick					
Aluminum					

Conclusions:

1. What is the relationship between the buoyant force, gravity force and contact force?

2. In the part 1 of the lab, what happened when the ice was placed in olive oil?

3. In part 2 of the lab, which of the objects had the greatest density?

4. From part 3, what is the relationship between the buoyant force and the weight of an object when the object:

   a. Sinks

   b. Floats

5. How is it possible to have two objects of the same mass where one object sinks and the other object floats? Use your observations from the Intro part of the lab to answer this question.

6. Why will an object float in one fluid, and sink in another?

The answers on this lab are a product of my own work and effort. Though I may have received some help in understanding the concepts and/or requirements, I did the work myself.

Student Signature

(for electronic submission, type student number in lieu of signature)

ROOM FOR IMPROVEMENT

APPLICABILITY: This lab is best suited for (check all that apply):

☐ Physics I Honors/ Pre-IB Physics   ☐ IB Physics 2   ☐ IB Physics 3   ☐ None of These

IMPROVEMENT: This lab can be improved by:

Comments: