Grade 8 Science - Fluids **Why do things float?**

Name: _____ Class: _____ Date: _____

This is a mixed activity in which we will be doing some measuring and some use of given data

1 a) State Archimedes' Principle in terms of buoyancy.

1 b) How does Archimedes' Principle explain whether an object will float or sink in water?

3. Use your understanding of Archimedes' Principle to predict whether the following objects will float or sink in water. You will be given an object that you will measure and calculate the volume. You will then take the mass and calculate the density.

Describe your object:

Length (to the nearest tenth of a cm):

Width (to the nearest tenth of a cm):

Height (to the nearest tenth of a cm):

Volume (L x W x H)

Mass:

Density (d = m/V):

Now calculate the density of each of the following:

a) Object A, with a mass of 15.7 grams that displaces 15.9 milliliters of water

b) Object B, with a mass of 4.2 grams that displaces 1.6 milliliters of water

c) Object C, with a mass of 9.4 grams that displaces 4.7 milliliters of water

d) Object D, with a mass of 11.4 grams that displaces 19.7 milliliters of water

5. The largest passenger ship in the world is the *MS Harmony of the Seas* which is 362m long and has a displacement of about 120,000 t. In comparison, the *RMS Titanic* was 269m long and had a displacement of about 52.000 t. Since both ships are made of metal, how are they able to float (even temporarily)?

Data and Calculations:

Material	Mass (g)	Water Displaced (mL or cm^3)	Density of material (g/cm^3)	Sink or Float in Water?
Wood	13.30	15.6		
Aluminum	5.60	1.1		
Plastic	4.00	4.1		
Lead	20.00	1.8		
Cork	4.00	8.1		
Steel	8.30	1.6		
Clay	15.60	8.5		
Rubber	5.90	4.9		
Candle	10.40	10.5		

Conclusion: In order to see if something will float, how can you use the density of an object to see if it will sink or float?

Reflection: *Did you enjoy this Lab? Explain.*

Does it Float Lab – Extension

The conclusion of the lab is that any material or object that has a density that is less than the fluid will be supported by the buoyant force of that fluid. Water has a density of 1g/mL or 1g/cm^3.

Air is also a fluid. It has a density of 0.00128g/mL. Since gases are much less dense than solids and liquids, we usually represent them in g/L since these units are much smaller. Therefore, the density of air is 1.28g/L.

Go online and find the density of the following gasses and then determine if they float or sink in air.

Gas	Density	Sink or Float in Air?
Hydrogen		
Nitrogen		
Carbon Dioxide		
Chlorine		
Helium		
Radon		

Conclusion:

When we have a gas with a container, we have to take the overall density (like in a hot air balloon, helium balloon, airship, etc.). It is the same as with a submarine, a huge ship or a scuba tank. Most items you want to control the buoyancy in order to control the amount of upward or downward force. We do this by changing the relative density – either through heat or through volume changes.