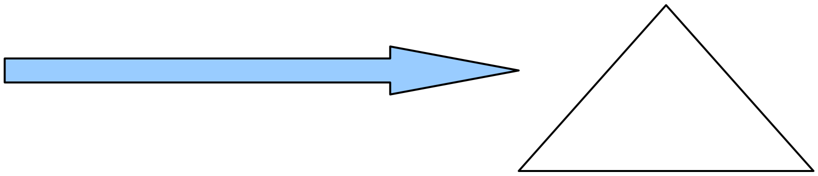
Name ____________________________________ Period_________
Earth Science

Liquid Density

Objectives: To experimentally determine the range of possible densities of three unknown liquids. Students will be able to calculate the density of a liquid based on the volume and mass to the nearest hundredth. Students will be able to estimate the densities of liquids based on the density of a solid. Students will also learn to name and operate different equipment of measuring in a science laboratory setting.

Material: Balance, unknown liquids, possible densities (on the board), pipet, 50ml beakers, 10 ml graduated cylinders, and a calculator.

Formula: please fill in the Density triangle.



Procedure:

Part 1

Use the following procedure to determine the density of the unknown liquids. Follow each step that is numbered below

1. Find the mass of an empty 10-ml graduated cylinder to the nearest tenth of a gram. Enter the mass on your report sheet with proper units. You will have to measure the mass of the empty graduated cylinder ever time! Do not assume it is exactly the same every time.

2. Fill the graduated cylinder with approximately 5ml of any of the three liquids. Read the measurement to the nearest tenth of a milliliter. Enter this volume on the report sheet with proper units. You can use a pipet to key on an exact volume.

3. Find the mass of the graduated cylinder and the liquid combined on the balance to the nearest tenth. Enter this mass on your report sheet with proper units.

4. Subtract the mass of the empty cylinder from the mass of the graduated cylinder and the liquid. Record this mass to the nearest tenth of the liquid sheet with proper units.

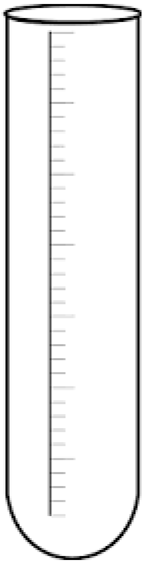
5. Calculate the density of the liquid to the nearest tenth. Record this in column density of liquid. Show all work and include proper units on the report sheet.

6. Clean and *dry* your graduated cylinder.

7. Repeat the procedure two more times for the other 2 liquids.

Part 2

1. Now that you know the density of the liquids you should be able to layer them into a test tube
2. Using the pipet take a sample of the highest density liquid and place a small sample at the bottom of the test tube.
3. Clean the pipet
4. Take the next lower density liquid and apply it carefully above the layer of the first liquid
5. Last add the lowest density liquid to the test tube.
6. You should be able to see each liquid in their separate form at the bottom of the test tube. Please draw what you observe in the diagram below



Report Sheet

Sample Liquid ______	**Mass** of empty graduated cylinder	**Mass** of graduated cylinder and liquid	**Mass** of liquid	**Volume** of liquid	**Density** of liquid
				Average =	

Sample Liquid ______	**Mass** of empty graduated cylinder	**Mass** of graduated cylinder and liquid	**Mass** of liquid	**Volume** of liquid	**Density** of liquid
				Average =	

Sample Liquid ______	**Mass** of empty graduated cylinder	**Mass** of graduated cylinder and liquid	**Mass** of liquid	**Volume** of liquid	**Density** of liquid
				Average =	

Discussion Questions:

1. Can a liquid have a higher density than a solid?
   ____________________________________ .
2. How would the densities of these fluids be affected if we increased the temperature from 20^0C to 40^0C?
   ____.
3. At what temperature does water have the highest density?
   __________________________________.
4. How would the following affect your measurements and calculations of the density of the liquids?

- Water on the balance would ________________________________ the density.
- Reading the volume of the liquid lower than the actual level would ___________________the density.
- Measuring the mass of a graduated cylinder that was not completely dry would ___________ ______the density