How Dense?

Background

From the Layered Liquids Lab, you discovered what happens to some liquids when they are poured together. That was followed by sharing data with the class, and a discussion of density and operational definitions.

1. What is the operational definition of *density*?

_____

_____

2. To calculate the density of a substance, what two things must you know about the substance?

A. _____

_____

B. _____

_____

Knowing the density of a substance can be useful. In the activity that follows, you will discover one reason. When making density calculations, measurements must be **very** accurate. Before beginning this lab, it would be helpful to review the use of some of the equipment you have used in the past.

3. What tool is used to measure mass?

_____

4. What tool is used to measure volume of liquids?

_____

5. Here are five points to keep in mind when measuring mass:

A. _____
_____

B. _____
_____

C. _____
_____

D. _____
_____

E. _____
_____

6. Here are five points to keep in mind when measuring the volume of liquids:

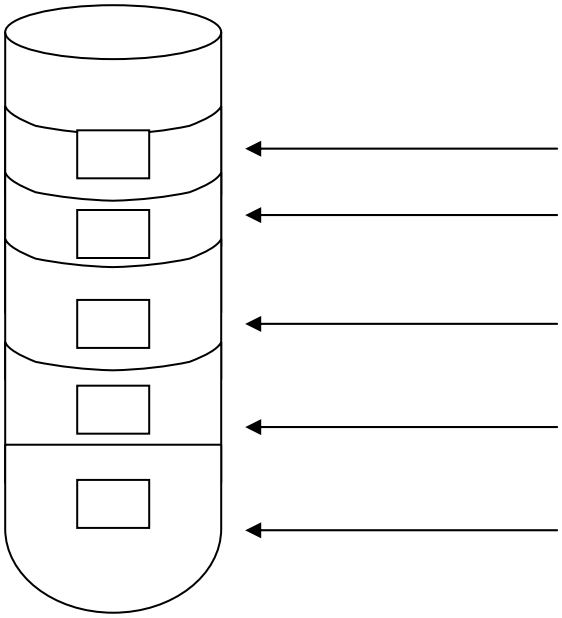
A. _____
_____
B. _____
_____
C. _____
_____
D. _____
_____
E. _____
_____

Lab Activity
You will be measuring the density of the five liquids that you used in the previous lab. You may start with any liquid, and do this in any order. Data will be recorded and displayed in three ways—a table, a graph, and an illustration.

1. Using a graduated cylinder and triple beam balance, make the measurements and calculate the density for each liquid (don't forget to subtract the mass of the graduated cylinder). Fill in the data table below. **Each sample should be between 20 and 25 ml.** Round off density measurements to hundredths (two decimal places).

Liquid	Color of Sample	Mass of Sample	Volume of Sample	Density of Sample
A				
B				
C				
D				
E				

2. Look at the drawing you created for the Layered Liquids Lab. On the test tube below, label the sample letter in each box. Color each layer the appropriate color. On the arrow, write the density for the corresponding layer.



3. Make a bar graph using the density data from the table, or input the mass, volume, and density data into a spreadsheet and experiment with the various types of graphs you could make. Which graph is the most useful? Print your graphs and attach them.

Debriefing

Answer the following questions. Base your answers on the data you collected. Use complete sentences, of course.

1. Compare your data to the data from another lab group. Were your density calculations the same for any of the liquids? _____ Which ones?

_____
_____
_____

2. Were your density calculations different for any of the liquids? _____ Which ones?

_____
_____

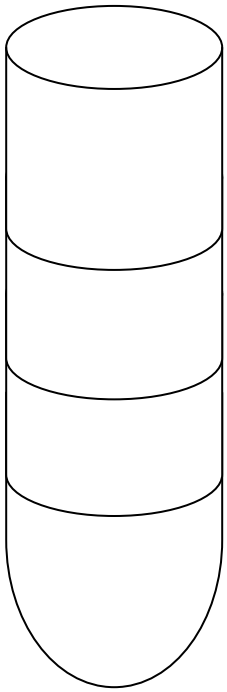
3. Look at your test tube drawing from the lab activity. Look at the density measurements you wrote along the side of the test tube drawing. What pattern do you see?

_____
_____
_____
_____
_____

4. Did the other lab group have a similar pattern? _____ If it was not the same, how was it different? If it was the same, explain why every group was able to get the same pattern.

_____
_____
_____
_____

5. Suppose you are given three liquids—blue, orange, and green. The blue liquid has a density of 1.25 g/ml. The orange liquid has a density of .75 g/ml. The green liquid has a density of 1.47 g/ml. Decide in what order these liquids would layer if they were poured together. Then color the layers on the test tube drawing to the right to show the order in which you think the liquids would layer.



6. Think of two reasons why knowing the density of a substance can be useful. Be ready to share your reasons during the class discussion.

A. _____

_____

_____

B. _____

_____

_____