

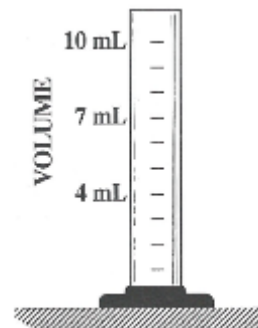
1.4 Act 5 Mass & Volume of Liquids¹

(Edited version for public review)

Part 1: WATER

1. Get a 10 mL graduated cylinder and a gram balance. Center the balance.
2. Measure the mass of the empty graduated cylinder and record it here: _____
3. Fill the graduated cylinder with at least 4 different volumes of water and then measure the mass. Use these measurements to calculate the mass of the water only. Put your data into the table below:

Volume of Water (_____) Label the appropriate units!	Total Mass (_____) Water + Graduated Cylinder Label the appropriate units!	Mass of Water (_____) Label the appropriate units!

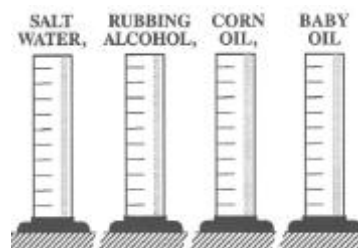


4. There should be a pattern relating the volume and mass of the water in your chart. What pattern do you see? Explain.
5. Use the pattern you found in question 4 to *predict* the following values.
 - a. What would be the mass of a 15 mL sample of water? _____
 - b. What would be the mass of a 27 mL sample of water? _____
 - c. What volume of water would have a mass of 32 g? _____
 - d. Explain the reasoning you used to make the predictions above.
 - e. If you have a larger graduated cylinder available, use it and your balance to test the three predictions you made. How close were your predictions?
6. Look up the term *density* in a dictionary or on the internet and explain what it means in your own words.
7. Explain how to use your results to get a numerical value for the density of water. What is this value? What units are used to measure it?

Part 2: DENSITY OF OTHER LIQUIDS

- You already found that the density of water is 1.0 grams for every 1.0 milliliter (written 1.0 g/mL). Now calculate the density of each of these liquids following the steps below:

- Rinse and dry your 10 mL graduated cylinder between each new liquid. Roll and tape a paper towel to reach the bottom if necessary.
- Find the mass of a 10.0 mL sample of each liquid. (Be sure to take into account the mass of the graduated cylinder as needed!) Fill in the table below as you do this. Notice that some of the labels in the table are missing; fill in appropriate labels.



Liquid Type		Total Mass (____) Liquid + Graduated Cylinder	

- Report the densities of all liquids in grams for every milliliter (g/mL). Show your math and clearly label each liquid!

- Order the 4 liquids, plus water from Part 1, from most dense to least dense.

MOST DENSE → **LEAST DENSE**

- Recall the “Layering the Unknown” activity you performed at the beginning of this unit. With the help of your classmates, list the liquids used for that lab activity and order them from most dense to least dense. Which type of liquid from the “Layering the Unknown” activity would be on the bottom layer (most dense or least dense) and why? Which would be on the top and why?
- What do you think is happening at the particle level? Draw a particle diagram showing what you think different densities of liquid will look like.

Most Dense:

Medium Density:

Least Dense:

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