

Name: _____

Date: _____

Chapter 3: Measurement Lab

In this laboratory exercise you will take measurements to determine the volume and mass of objects for the purpose of reviewing metric units and conversions. Keeping in mind that all measurements are estimates, this exercise will also be an introduction in the use of significant figures in measurement and calculation. The laboratory report must include all data and calculations. In this exercise you will use and gain skill in the use of the graduated cylinder and balance, and gain a clearer understanding of the difference between Volume and Mass. **(Remember to record all measurements and show all calculations)**

CONVERSIONS & AREA

- 1) Use a ruler (using the metric side) to measure the length of the front your lab drawer. Record the length in centimeters.
 - a. Convert this length into meters, mm, and kilometers.

- 2) What is the area of the front of your textbook (cm)?

- a. Which of the numbers are measured and which are calculated?

VOLUME

- 3) What is the volume of your textbook in cm^3 ?

- a. What is the volume of your textbook in m^3 ? **Bonus** (*everyone must try, but you won't lose point if incorrect*)

- 4) Fill a beaker to the 20 mL line. Then pour the water from the beaker into a graduated cylinder. Record the exact volume of water in the graduated cylinder _____.

Note: to correctly read the volume in a graduated cylinder, you must read the bottom of the meniscus (curve of water).

- a. What is the difference in the measurements from the beaker to the graduated cylinder?
 - b. The graduated cylinder is the more precise and accurate instrument to use to measure volume. Explain why this is true.
 - c. Convert your volume of water from the graduated cylinder into Liters, cL, and kL.

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- 5) Calculate the volume of a cube that measures 1.00 cm on each side.
 - a. Fill the larger graduated cylinder in your lab drawer with tap water to the 50 mL line. Record the exact volume of the water _____. Carefully drop the cube into the water
 - b. How much does the level of water rise?
 - c. What is the relationship between a cubic centimeter and a milliliter?

- 6) What is the volume of a cube measuring 2.00 cm on each side? If the volume of this cube were measured by water displacement, how much would the water level rise?

- 7) Volume of a metal cylinder.
 - a. Using a ruler and geometric formula, ($V = \pi r^2 h$), determine the volume of a metal cylinder.
 - b. Using the water displacement method, determine the volume of the same metal cylinder.
 - c. How do the two volumes compare? Which do you think is more accurate? Why? Is either answer the exact volume of the cylinder? Explain.

MASS

- 8) Obtain a cup of pennies. Record the mass of the cup and all the pennies.
 - a. Determine the mass of all of the pennies.
 - b. Remove one penny from the cup and record its mass.
 - c. Divide the mass of all the pennies by the mass of one penny to determine the number of pennies in the cup.
 - d. Remove all the pennies from the cup and count them. Does the counted number of pennies agree with the calculated number of pennies? If not, how could you explain the difference?

- 9) Record the mass of an empty 100.0 mL graduated cylinder.
 - a. Place 50.0 mL of water in a graduated cylinder and record the mass.
 - b. Determine the mass of 50.0 mL of water.
 - c. Count the number of drops of water in 1.0 mL. Using this data, determine the number of drops in 50.0 mL of water.
 - d. Determine the mass of 1 drop of water.