

Sec. _____ Name: _____

Experiment: Uncertainty of Measurements
(B. Science 10-1-4e)

Purpose: To learn how accurately matter can be measured.

Materials: meterstick metric ruler
100 mL graduated cylinder beam balance
150 mL beaker of colored water
small pebble irregular object
Celsius thermometer paper towel
250 mL beaker of ice and water

Methods: (Seven stations are set up in the room. Make sure you and your partner rotate to each station in any order. Record your results in your part of the data table **in this lab & on chalk board**).

1. Use the meterstick to measure the length and width of the classroom. If the room is irregular shaped, measure the longest width and the longest length. Record in results section, use meters for units.
2. Use the meterstick to measure the length and width of your desk. Express your measurements in centimeters & record them in results.
3. Use the metric ruler to find the volume of the regular object (biology textbook).
Volume = length x width x height. Express the volume in cm^3 .
4. Use the graduated cylinder to find the volume of the colored liquid in the beaker. Remember to always read a graduated cylinder at the bottom curve of the meniscus. Pour the liquid back into the beaker. Express your measurement in milliliters and record in results.
5. Make certain the riders on the triple-beam balance are moved all the way to the left and that the pointer rests on zero. Place the pebble on the pan on the triple-beam balance. Move the riders until the pointer is at zero. Express your measurement in grams and record it in results table. Remove the pebble and return all riders to the far left of the balance.
6. Fill the graduated cylinder half full with water from the beaker (Remember how many milliliters present). Find the volume of the irregular object. (Place irregular object in graduated cylinder, remember total volume. Now take total volume and subtract beginning volume). Express the volume of the object in mL and record in results. Carefully remove the object from the graduated cylinder. Pour the water back into the beaker.
7. Use the Celsius thermometer to find the temperature of the ice water. Express the temperature in degrees Celsius and record it in the data table. Remove the thermometer and carefully dry it with a paper towel.
8. After you have done all your recordings fill in your results in the data table on chalkboard for your partner and you in the results table for the class. **Now fill in the rest of your class results in your table.**
9. Calculate the average measurement for the class for each step.

Results:

Step	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	(avg)
1													
2													
3													
4													
5													
6													
7													

Conclusions:

1. What is the smallest unit shown on the meterstick?
2. What is the smallest unit shown on the small metric ruler?
3. What is the smallest unit shown on the graduated cylinder?
4. What is the smallest unit shown on the triple-beam balance?
5. What is the smallest unit on the Celsius thermometer?
6. Study the class data table. Do each group's measurements have the exact same value for each station? Explain.
7. Which stations had measurements that were most nearly alike? Explain why these measurements were so similar.
8. Which stations had measurements that were most varied? Explain why these measurements were so varied.

Discussion:

1. Why is it important for the rider on the triple-beam balance to always start at the far left of the balance before you place object in the pan to be measured?
2. Of the following graduated cylinders - 100 mL, 25 mL, or 10 mL - which would you use to most accurately measure 8 mL of a liquid? Explain your answer.
3. Which is more accurate for measuring a fairly small liquid volume, a beaker or a graduated cylinder? Explain your answer.
4. Describe two variables that might affect the accuracy of your measurement of volume when using a metric ruler to measure the dimensions of an object.
5. As we study measurement and the metric system we are gaining a lot of knowledge and understanding of it. Read Proverbs 2: 6 - 7 and comment on the insight this text gives in reference to knowledge, wisdom and understanding.