

## Lab #2 Measuring Devices in the Lab (Quantitative Chemistry)

**Purpose:** This investigation is designed to introduce you to several types of measurements made in the laboratory, and the instruments that are used to make these measurements. Calculations incorporating these measurements will also be performed.

**Objectives:**

1. Practice measuring objects using metric rulers, graduated cylinders, and electronic balances.
2. Perform calculations using measurements to solve for volume and density.
3. Convert results of measurements to other units (prefixes, English system, etc.).

### Station A: Length & Velocity

**Procedures (A):**

1. Using the meter stick, measure the distance between the 2 marked intervals. Record each to the nearest 0.1 cm.
2. Wind up the car, and measure the time it takes to travel between the 2 marked intervals. Record this in seconds.
3. Calculate its average velocity in cm/s by dividing length by time. Watch significant figures!

**Data Collection (A): Table 1**

Length = \_\_\_\_\_ cm

Time = \_\_\_\_\_ s

Velocity = \_\_\_\_\_ cm/s

**Calculations (A):** Convert the following to the appropriate units. Be sure to use fence-posting when setting up your calculations. *Use significant figures!*

\* Velocity: Convert cm/s to mi/hr.

### Station B: Mass

**Procedures (F):** Using the electronic balance, record the mass of the numbered objects in grams.

**Data Collection (F): Table 5**

Object #1	Object #2	Object #3
Mass = _____ g	Mass = _____ g	Mass = _____ g

**Calculations (F):** Convert the following to the appropriate units. Be sure to use fence-posting when setting up your calculations. *Use significant figures!*

\* Mass of Object #1 Convert from g to kg.

### **Station C: Volume (Error)**

**Procedures (D):** Obtain a 250 mL beaker and a 50 mL graduated cylinder. Add tap water to the beaker until you think it contains 25 mL of water. This is the “experimental” value. Next, pour the water into the graduated cylinder, and determine its “actual” value.

**Data Collection (D):**

Experimental Value = \_\_\_\_\_                      Actual Value = \_\_\_\_\_

**Calculations (D):** Calculate the percent error using the following equation:

$$\text{Percent Error} = \frac{|\text{Actual Value} - \text{Experimental Value}|}{\text{Actual Value}} \times 100$$

Percent Error = \_\_\_\_\_ %

◆ **Question:** Normally, in the lab, a graduated cylinder is used to measure volumes rather than a beaker. Why? (Write your answer below.)

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### **Station D: Density (Liquid)**

Calculate the density of the liquid in the marked container. *Use significant figures!*

**LIQUID** = Yellow or clear (circle one)

**Mass** = Mass of Beaker and Liquid – Mass of Empty Beaker

= \_\_\_\_\_ g – \_\_\_\_\_ g

= \_\_\_\_\_ **g**

Pour the liquid into a graduated cylinder and record its volume to the nearest 0.1 mL.

**Volume** = \_\_\_\_\_ **mL**

**Density** = \_\_\_\_\_ **g/mL**    *Watch significant figures!*

◆ **Convert the density above to lb/L.** Use fence-posting and significant figures, and show your work below.