Name: _____ Date: _____ Pd: _____

Fundamentals of Chemistry – Measurement Lab

Station 1: Distance

Using any of the materials provided, measure the distance of each piece of tape. Record data in the table to the right.

	Your Measurement	Equipment Used	Two-Group Average
Tape A			
Tape B			
Tape C			

Station 2: Mass

Using the best piece of equipment, mass the metal block at this station. Never place an object directly on the scale -- use a weighing tray. *But remember, the tray has mass! :-)

- Mass of Block: _____ grams

Station 3: Volume

Procedure:

1. Carefully measure 100.0 mL of water using the **600 mL beaker**.
2. Pour the water from the beaker into the **100 mL graduated cylinder**.
   What is the volume of the water according to the **graduated cylinder**? _____ mL
   Dump out the water.

Station 4: Density

Procedure:

1. To determine density you need mass and volume of an object. Determine the mass of all of your aluminum by placing them in the weighing tray and using the digital balance.

   Mass of Three Blocks of Al: _____ g

2. Volume will be obtained using the water displacement method since your object is irregular. Place exactly 20.0 mL of water in the graduated cylinder. Then, GENTLY slide the aluminum pieces down the inside of the graduated cylinder so that it DOES NOT splash. Record the final volume. The difference between these volumes is the volume of the aluminum.

   Volume of Three Blocks of Al: _____ cm^3 (1 mL = 1 cm^3)

Station 5: Temperature

Procedure:

1. Use both pieces of equipment to measure the temperature of the water separately and record how long it takes for the temperature to settle on a reading for 3 or more seconds. Record your data below:

Equipment	Final Temperature	Time to Reach Temperature
Analog Thermometer		
Digital Thermometer		

Station 6: Pressure

Procedure:

1. Pressure is a force exerted on an object. Discuss with your group what happens to the pressure of the gas inside the syringe as you decrease the volume (push in the plunger). **Do not attempt to push the plunger past 5 mL.** Write a statement below that identifies this relationship.

Name: _____ Date: _____ Pd: _____

Post-Lab Analysis:

Station 1: Distance

1. This station was repeated using only a **ruler** to measure the distance of the tapes, yet the answers recorded in the lab were **still** different than the actual measurement of the tapes. Do you believe this is an example of human error or method error (error in the procedure)? Argue your case below!

Station 2: Mass

2. In your procedure, you (should have :-)) zeroed out the scale to to exclude the mass of the weigh boat whereas sometimes you may need to manually remove the mass of the weighing vessel from an overall mass. In either case, **it helps to record the mass of the weighing tray, beaker, etc**. Use this information to complete the table below:

Mass of Filter Paper	1.2 g
Mass of Filter Paper + Calcium carbonate	3.9 g
Mass of Calcium Carbonate Only	

Station 3: Volume

3. Which piece of equipment (beaker or graduated cylinder) is **best used** to **ACCURATELY** measure the volume of a liquid? Explain your reasoning.

Station 4: Density

4. Calculate the density of your Aluminum and include the correct unit:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{\text{g}}{\text{cm}^3} = \frac{\text{g}}{\text{mL}}$$

solids liquids

Station 5: Temperature

5. In addition to speed of response, did you notice anything else regarding the measurements you took for the digital vs. analog thermometers?

Station 6: Pressure

6. Rewrite the statement that you wrote regarding the relationship between pressure and volume. Now, write the opposite statement.

Summary Questions:

7. If you believe that there has been significant **human or method** error in your experiment, what do you think you should do?

8. Are all pieces of science equipment created to be equally accurate? Argue your reasoning below.