Measurements Lab

Pre-Lab

Purpose

The students will learn how to make scientific measurements with meter sticks, graduated cylinder, thermometer, balances, and stop watches. They will also gain hands-on experience with accuracy, precision, percent error, and dimensional analysis.

Materials

lab paper	pencil	calculator
meter stick	triple beam balance	stop watch
thermometer	beaker - 250 mL	graduated cylinder
gatorade bottle (20 oz)	unknown sample	

Safety

- Do not horseplay during this activity, for this may result in damage or injuries. Any horseplay will result in a reduction of one letter grade for this activity.

- Handle the glass beakers and thermometers with care. If any glassware breaks, then report this to your teacher as soon as possible.

Procedure

One person from each lab group will come to the front and obtain a meter stick and the unknown sample. Record the ID for the unknown sample in the data section of this lab.

There will be multiple stations, so you can start at any one. Just make sure that you do each of them

Station 1 - Mass Measurements

- Determine the mass of your unknown sample by using each of the three triple-beam balances provided. Record the mass to 0.001 g from each scale in the data section of this lab.

- Using the mass provided by your teacher, determine the percent error for each of your mass measurements and record them in the data section of this lab.

Station 2 - Length and Volume Measurements

- Use the meter stick to determine the length, width, and height of the lab table to 0.1 cm. Record these values in the data section of this lab.

- Use these values to determine the area and area of the table top (ignore the fact that there is a hole for the sink). Record these values in the data section of this lab.

- Using the area and volume provided by your teacher, determine the percent error for each of your measurements and record them in the data section of this lab.

Station 3 - Liquid Volume Measurements

- Fill the gatorade bottle with water from the sink in the back. Determine the volume of water to 0.1 milliliters in the bottle by using the graduated cylinder provided. Repeat the procedure and then record both volumes in the data section of this lab.

- Using the volume provided by your teacher, determine the percent error for each of your measurements and record them in the data section of this lab.

Station 4 - Temperature Measurements

- Fill the 250 mL beaker with 200 mL of water from the sink in the back of the room.

- Insert the thermometer, wait for 1 minute, and then record the temperature to 0.1 $^{\circ}$C. Repeat this process with the other two thermometers. Record all three values in the data section of this lab.

- Calculate the average temperature. Compare this average value to the value provided by the teacher in order to determine the percent error. Record this value in the data section of this lab.

Station 5 - Time Measurements

- Make sure the ramp is set up and aligned with the tape marks. Obtain a timer from your teacher.

- Line up your unknown sample with the tape mark at the top of the ramp. Start the timer when you release the sample and stop the timer when the sample reaches the floor. Record this time to 0.01 s in the data section of this lab. Repeat this process four more times.

- Using the values provided by your teacher, determine the percent error for each measurement, and record these values in the data section of this lab.

When you finish each station, return everything to its proper place and give your unknown sample back to your teacher.

Data

Station 1 - Mass Measurements

ID =	
mass 1 =	% error =
mass 2 =	% error =
mass 3 =	% error =

Station 2 - Length and Volume Measurements

length =	
width =	
height =	
area =	% error =
volume =	% error =

Station 3 - Liquid Volume Measurements

volume 1 =	% error =
volume 2 =	% error =

Station 4 - Temperature Measurements

temperature 1 =	
temperature 2 =	average temperature =
temperature 3 =	% error for the average =

Station 5 - Time Measurements

time 1 =	% error =
time 2 =	% error =
time 3 =	% error =