PREPARATION FOR CHEMISTRY LAB: MEASUREMENT (Part I)

Name: _____

Always read over the experiment and complete all pre-lab questions prior to coming to your laboratory session. **You must show all your work, including units, and report final results with the correct number of significant figures on all pre-lab questions, post-lab questions, and laboratory report work (this reminder will not be repeated).**

You should have five questions on this pre-lab assignment.

Next week print out your pre-lab questions using the Pre-Lab link on the laboratory web page. Your drawer number is used for both your ID# as well as your password.

Question:1

Perform the following calculation and report the answer to the correct number of significant figures (assume all quantities are measured):

4.86 + 9.0 + 0.1145

Question:2

Assuming all numbers come from measurements, perform the following calculation and report the answer to the correct number of significant figures

$7.473 \times 8.8 \times (2.19 \times 10^5)$

Question:3

Perform the following calculation and report the answer to the correct number of significant figures (assume all quantities are measured):

(5.5 - 30.5) x 2.178

Question:4

The formula for converting between the Celsius and kelvin (K) temperature scales is discussed in your text. Write the conversion formula below. Using this formula, what is the kelvin temperature corresponding to $56.38^{o}C$?

Question:5

If you have 6.2 L of water, how many cm^3 of water do you have?

MEASUREMENT: PART I

INTRODUCTION

Data collection this semester will often be done using Vernier sensors. Some of the Vernier sensors are connected to a computer by a Go!Link. LoggerPro is the computer program that is used to aid you in the collection and analysis of your data. In this first laboratory you will learn how to access the program and use a sensor. You will also begin to use some of the common measuring techniques used by chemists. It will be up to you to use these techniques correctly in subsequent lab work. There will be times in the laboratory when approximate measurements will be adequate and other times when precise measurements must be made…you will have to make the appropriate choice.

There are two kinds of measurements: quantitative measurements and qualitative measurements. *Quantitative measurements* tell the *amount* (numerical) of a substance or species that is present in a sample. For example, the mass of table salt (NaCl) that is in a slice of bread or the volume of a water sample. *Qualitative measurements* have to do with *identity*. For example, what contaminants are in an impure water sample?

Read and/or review Chapter 1 and Appendix A.1 in your textbook. In all labs, results and answers need to be reported using the correct number of significant figures.

The measurement of mass, length, and temperature will be explored this week in lab.

PROCEDURE

Throughout the semester, make written observations as you proceed with the experiments. Be aware that there may be questions at the end of the lab that depend on observations.

NOTE: There is a general understanding about reading a value from a graduated device such as is used to measure length, volume, and temperature. Estimate the value to one decimal place more than the level of graduation. For example, when reading a thermometer graduated in degrees, estimate to tenths of a degree. For a ruler that is graduated in cm, estimate to mm.

MASS

When making a mass determination, place a piece of weighing paper on the balance pan to protect it. Clean up spills immediately. Press the TARE bar to zero the balance, or to counterbalance the paper and/or weighing container. Place objects on the center of the pan. In the future, when you are told to use something that is **tared**, it means to zero out the mass of the weighing paper or weighing container before weighing out the sample.

a. Using one of the lab balances, determine the mass of a standard weight. Handle the standard weight only with tweezers or a tissue. Make four more independent mass determinations of the same standard weight on the same balance. Record all the digits that the balance displays.

b. Devise an **experiment** (don't just perform calculations) to determine the number of grams in a pound. Describe and perform the experiment. Use any object or material that's available in the lab.

LENGTH

Devise an experiment to find out how many centimeters are in an inch. Describe and perform the experiment. Use any object or material that's available in the lab.

TEMPERATURE

- Start Logger Pro on the computer by double clicking on the Logger Pro icon.
- Plug the temperature probe into the Go!Link. The temperature appears on lower left corner of the screen.
- Boil some deionized water (DI) water in a beaker on a hot plate.
- Measure the temperature of the boiling DI water using an alcohol thermometer as well as the temperature probe. Be careful that the wire for the temperature probe does not contact the hot plate.

  You want the temperature of the water, not the container, so be sure the probe is not touching the sides or bottom of the beaker.

DATA AND ANALYSIS SHEET: MEASUREMENT (Part I)

Name: _____

Date _____ Lab Partner _____

MASS AND WEIGHT

a. Identification # of Standard weight _____ Balance # _____

Weighing	#1	#2	#3	#4	#5	Average
Mass (g)						

Given mass of the standard weight: _____

How does the experimentally determined average mass compare with the given mass of the standard mass? What could be responsible for any differences?

b. Brief description of experiment to find out the number of grams in a pound.

Results: How many grams are in a pound? _____

Compare with accepted value _____ from _____(reference)

LENGTH

a. Brief description of experiment to find out the number of cm in an inch.

Results: How many cm are in an inch? _____

Compare with accepted value _____ from _____(reference)

TEMPERATURE

Alcohol Thermometer:

Temperature of Boiling Water: _____^{o}C _____^{o}F _____K

Temperature Probe:

Temperature of Boiling Water: _____^{o}C _____^{o}F _____K

Atmospheric Pressure in lab (Barometric Pressure on chalk board) _____

Standard Barometric Pressure (handbook) _____

Boiling point of water at standard pressure (handbook) _____