# I. Metric Mania Lab

<u>II.Theory and Purpose:</u>

<u>Concepts studied:</u>  metrics, scientific method, sig figs, DA

How do you measure with scientific instruments?

<span style="color:red">Instruments:</span>                          <span style="color:red">Accurate to:</span>

| | |
|---|---|
| Graduated cylinder | 0.0 mL |
| Digital Balance | 0.0 g |
| Metric ruler | 0.0 cm |

<u>III. Prelab</u>:  (use this for help: http://www.molelady.com/html/METRICHO.htm )

1. What is the basic unit for length? _____
2. What is the basic unit for mass? _____
3.  What is the basic unit for temperature? _____
4. What are the freezing and boiling points for water on this scale? _____     _____

    5.   What is the basic unit for volume? _____

    6.   What is the best unit for measuring each distance:
        a. Thickness of an eyelash:      mm      cm      m
        b. Length of a pencil:    cm      m        km

    7.   What is the best unit for measuring each mass:
        a. Amount of spices in a batch of cookies:       mg      g        kg
        b. Your mass:   mg        g        kg
         c. Mass of 10 pennies:   mg       g        kg

    8.   What is the best unit for measuring each volume?
        Amount of soda in 1 can:         mL                 L
        Water in a bathtub:              mL                 L

    9.   Circle the best choice: (all temperatures are in Celsius)
        a. Temperature on a hot summer's day: 0º         35º        90º
        b. Room temperature: - 20º      0º       20º

<u>Procedure:</u>

Explore measurements of length, mass, volume, and temperature.  Use the accuracy of the instrument to record a unit of measurement for each answer.  Remember to record the APPROPRIATE amount of sig figs.

<u>**IV. Data**</u>:  Use units of measurement and sig figs in your lab notebook with appropriate headings.

**Part A.  LENGTH**:

In the lab #  __1__, measure the circumference of a balloon.(cm) _____ cm.      Then convert to km. Show your work here:

In the lab # 7, use a metric ruler to find each measurement.
       a. Width of this page _____ mm or _____ cm

       b. Length of an unsharpened pencil _____ cm

**Part B. MASS:  Remember to include the accuracy of the instrument as part of the sig figs in your answer.**

In lab # ____2____ , use a digital balance to find these masses.

a. Mass of an ink pen _____ g          b. Mass of a can of soda _____ g

**Part C. TEMPERATURE:**

At Lab #_3
 Record time you took the temp: _____
Take the temperature  of the water. _____

Convert to K. _____ by using K=°C + 273

***After you take the temperature, put the thermometer or probe back where you found it.

**Part D. VOLUME:**

At Lab #  4 ,
a. Use the eraser and record the following:   (don't forget the units of measurement)

Length: _____
Width: _____
Height: _____

Use L x W x H to find the volume of a chalkboard eraser _____ cm$^3$

b. Convert to mL _____

At Lab # 5 ,  Identify the name of each glassware and read the volume:
A.  Item 1 _____          Volume _____

B.  Item 2 _____          Volume _____

C.  Item 3 _____          Volume _____

At Lab # 6,  Measure 10.0 mL in the following pieces of glassware & record the measurement.

A.  Graduated cylinder (accurate to .0 mL)                _____mL
B.  A small beaker (accurate to the whole number)        _____mL
C.  Test tube (1 mL = 10 drops)                          _____mL

**** Put your water sample into the sink.  Put glassware back into drawers 1 or 2.

V. PostLab

Calculations: Show your work below each measurement – Do this in PENCIL!

1. Convert the following measurements. (use K=ºC+273)

      a. $90.5^0$ C = _____ K                    b. 45 K = _____ $^0$ C

2. Convert the following measurements: **(by DA - show all work)**

      a. $1.6 \times 10^{-3}$ mg = _____ g     b. 4.7 kg = _____ g

3. Convert the following measurements: **(by DA - show your work for each)**

      a. 34 mm = _____ cm              b. 3 km = _____ m

4. Convert the following measurements: **(by DA)**

      a.  $2.30 \times 10^4$ KL = _____ L

      b.  456 cL = _____ mL

      c. 20. mL = _____ $cm^3$