**Conductivity of a metal wire**

Purpose: To measure the conductivity of a metal wire using a [digital multi meter](http://www.youtube.com/watch?v=bF3OyQ3HwfU) (DMM).

Apparatus: DMM, one long metal (nichrome) wire (≈100 cm), connector box, micrometer, and meter stick.

Theory: [Resistance](http://hyperphysics.phy-astr.gsu.edu/hbase/electric/resis.html), R of a metal wire of length *L* and cross-sectional area *A* is given by:

                    $R=\frac{L}{σA}$

The plot of R versus L will yield a slope of, $\frac{1}{σA}$ *.* Knowing A, the conductivity, σ can be determined.

Procedure:

Variation of resistance with length:

1. Set the DMM to measure resistances and connect it to the connector box.
2. Connect one end of the long metal wire to one of the terminals of the connector box.
3. Measure 10 cm length of wire, (do not cut the wire) and connect it to the other terminal so that there is exactly 10 cm of wire between the terminals.
4. Record the resistance value and repeat the above procedure for other lengths: 20, 30, 40, 50, 60, 70, 80, 90, 100 cm.
5. Plot a graph, R versus L, determine its slope, and attach the graph to your report.
6. Measure the diameter of the wire with a micrometer, calculate the cross-sectional area, and calculate the resistivity of the metal.

Variation of resistance with diameter:

1. Fold the wire into half and then again half to make 4 equal pieces. 
2. Measure the resistance of one fold, two folds, three folds, and four folds.
3. Tabulate your data, plot an appropriate graph, and see what happens.
4. Add an appropriate trend line, and obtain resistivity from your fit.
5. Attach your graph to the report.

DATA

Variation of resistance with length:

Slope of R versus L, graph:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Diameter of wire = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    Cross-Sectional area of wire =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Experimental conductivity of wire = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Accepted conductivity of wire = 1.00 x 104 mhoohm.cm. % Error = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Variation of resistance with diameter:

Coefficient of the fit = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Length of wire = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    Cross-Sectional area (for 1 fold) =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Experimental conductivity of wire = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Accepted conductivity of wire = 1.00 x 104 mhoohm.cm. % Error = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Conclusion: