**ERHS Physics Resistivity Lab**

**Information:** $R = \frac{\rho L}{A}$ where **R** = resistance, $\rho$ = resistivity, **L** = length of conductor and **A** = cross-sectional area of the conductor.

**AWG** = American Wire Guage. AWG is the number of diameters/inch such that 24 guage wire has a diameter of 1/24 inch, etc. The spools of wire you have are 100 feet in length.
1.0 inch = 2.54 cm.

**Part I.** Determining resistivity of an unknown material.
You are to determine the cross-sectional area of a wire conductor of known length and guage, measure the resistance of the conductor using a digital multimeter, and calculate the resistivity $\rho$.

There are two sizes of conductor for you to test, one large diameter than the other. Both are made of the same material. Construct the following table on your own page:

| Lab # | wire color | AWG | area in $cm^2$ | length in cm | resistance in $\Omega$ | resistivity in $\Omega \cdot cm$ |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| | | | | | | |

You and your lab group are to find the resistivity of each of the two sizes of wire (one 18 guage and 1 26 guage). Show all your calculations for these two spools and record your findings in the table Then copy the results for RESISTIVITY for each of the other spools of wire from other groups. Find the average resistivity for each of the two sizes of wire.

Average resistivity of the larger diameter: _____
Average resistivity of the smaller diameter: _____

Question: which diameter of wire had the greatest resistance? Does this verify the statement the text makes regarding the relationship of conductor length to resistance?

**Part II.** You have a coil of copper wire at your lab station. This wire is AWG-18. Measure the resistance of this spool. Look up the resistivity of copper, and determine the length of the wire on the spool. Show all calculations and clearly identify and label your answer.