**Ohm’s Law Exercise Handout**

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Materials:

1. Engineering Notebook
2. Team Contract Spreadsheet
3. Calculators
4. Pen and Pencil
5. 6-volt batteries
6. Resistors between 1kΩ and 100kΩ
7. Voltmeters
8. Ammeters
9. Ohmmeters

Directions:

1. Select a resistor from the assortment, and measure its resistance with your multimeter set to the appropriate resistance range.
2. Be sure not to hold the resistor terminals when measuring resistance or else your hand-to-hand body resistance will influence the measurement!
3. Record this resistance value for future use.
4. Build a one-battery, one-resistor circuit. A terminal strip is shown in the illustration, but any form of circuit construction is okay.
5. Set your multimeter to the appropriate voltage range and measure voltage across the resistor as it is being powered by the battery.
6. Record this voltage value along with the resistance value previously measured.
7. Set your multimeter to the highest current range available. Break the circuit and connect the ammeter within that break, so it becomes a part of the circuit, in series with the battery and resistor.
8. Select the best current range: whichever one gives the strongest meter indication without over-ranging the meter. If your multimeter is auto-ranging, of course, you need not bother with setting ranges.
9. Record this current value along with the resistance and voltage values previously recorded.
10. Taking the measured figures for voltage and resistance, use the Ohm's Law equation to calculate circuit current. Compare this calculated figure with the measured figure for circuit current.
11. Taking the measured figures for voltage and current, use the Ohm's Law equation to calculate circuit resistance. Compare this calculated figure with the measured figure for circuit resistance:
12. Finally, taking the measured figures for resistance and current, use the Ohm's Law equation to calculate circuit voltage. Compare this calculated figure with the measured figure for circuit voltage:
13. There should be close agreement between all measured and all calculated figures. Any differences in respective quantities of voltage, current, or resistance are most likely due to meter inaccuracies. These differences should be rather small, no more than several percent. Some meters, of course, are more accurate than others!
14. Substitute different resistors in the circuit and re-take all resistance, voltage, and current measurements. Re-calculate these figures and check for agreement with the experimental data (measured quantities). Also note the simple mathematical relationship between changes in resistor value and changes in circuit current. Voltage should remain approximately the same for any resistor size inserted into the circuit, because it is the nature of a battery to maintain voltage at a constant level.