

CS 3651 Lab: Using a Multimeter & Ohm's Law

Name(s): _____

Learning Objectives:

1. Measure resistance, voltage & current
2. Calculate values using Ohm's Law
3. Practice drawing simple schematics
4. Develop familiarity with solder-less breadboards, Resistors, Batteries, and LEDs.

Step 1: Use your multimeter to measure the resistance of the two resistors given to you. Afterwards, use a resistor color code chart to determine their actual rated values. Explain any differences.

Measured Values: 1. _____ 2. _____

Color bands: 1. _____ 2. _____

Rated Values: 1. _____ 2. _____

Notes:

Step 2: Find a low voltage DC power source (Battery, Transformer, etc...) What is its rated voltage level? Measure its actual voltage level using your multimeter. Explain any differences.

Rated Voltage: _____ Actual Voltage: _____

Notes:

Step 3: Use Ohm's Law to calculate the amount of current that would flow through both of your resistors if you used them (in series!) to connect the positive and negative leads of your power supply. **(Do NOT actually connect this circuit!)** Show your work:

Current: _____

Step 4: Would it be safe to construct this circuit? (i.e. how much current would be dissipated as heat by the resistors?) If your amount above is less than 20mA, construct the circuit. **If it is greater than 20mA, swap one or both of your resistors for ones of a higher rating until the current would be below 20mA.**

If you swapped your resistors, what are the new values? How much current will the circuit dissipate now?

Resistor 1 value: _____ **Resistor 2 value:** _____ **Current:** _____

Step 5. Connect both of your resistors (in series!) between the positive and negative terminals of your power supply. (Do not do this for long periods of time. Make sure that you can use your multimeter to measure the current running through the circuit. **Use caution when connecting the circuit, as the resistors and/or wires may become very hot, or melt** if you made a mistake in your calculations above and your power supply is capable of producing a high amperage (current). We suggest you **use a small battery (9V, or 3V)** for this step if you are unsure about your calculations. *Alternatively, raise your hand and ask for assistance from the instructor or TA before connecting power to your circuit.*

Using your multimeter, measure the actual current flowing through your circuit, and record it.

Current: _____

Draw a simple schematic of your circuit. Be sure to indicate how your multimeter is part of the circuit:

Step 6: Retrieve a LED. If the current in your circuit is lower than 20mA, insert the LED into the circuit such that it lights up. Draw a simple schematic of your circuit. Measure the voltage drop across each of the components in your circuit and record them below. Label the points where you placed the multimeter leads to measure each voltage drop on the schematic with letters. Write the letters below for each measurement.

Resistor 1: _____ Point1: _____ Point2: _____

Resistor 2: _____ Point1: _____ Point2: _____

LED: _____ Point1: _____ Point2: _____