Lab 28-1: **Ohm's Law**

Purpose:
1. To determine the relationship between voltage and current for a resistor.
2. To determine the resistance of an unknown resistor.
3. To become familiar with connecting and reading ammeters and voltmeters.

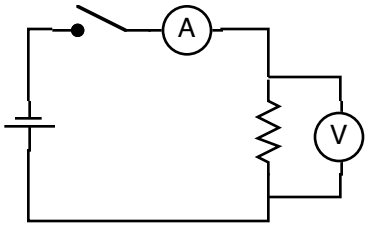
Materials:

1 power supply	2 resistors	6 connecting wires
1 ammeter	1 voltmeter	4 alligator clips
1 switch	1 light bulb & holder	

Warnings: The resistors you are using can become very hot if there are large currents passing through them for any length of time. To prevent burning your fingers, and/or destroying the resistors and meters, observe the following precautions:

1. Only keep the switch closed long enough to take a measurement After getting a reading from the meters, open the switch..
2. Always start with low voltages and currents, and work your way up. Stop if something starts to really heat up.
3. If you smell smoke, immediately disconnect the power supply.

Procedure:
1. Turn on your common sense. Then set up the circuit as shown.



2. Vary the power until you are reading about .05 A in the resistor. Record the exact current and voltage. Remember to record the voltage and current as measured by the portable meters.
3. Repeat #2 for current readings of up to 0.5 A at .05 A intervals.
4. Repeat for a second resistor, recording your data in the table below.
5. Replace the resistor with the light bulb. For this trial, start the **voltage** at the listed values. After the required 4 values, take data for the remaining 6 places by getting the light bulb bright, and then doing 5 more readings in between.

Data:

Resistor #1				Resistor #2				light bulb			
Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps
								0.1			
								0.2			
								0.4			
								0.7			
								1.0			

Calculations:
1. For each set of data, make a graph of voltage vs. current. (Using Graphical Analysis, include *regression lines*, *statistics*, and *scale to zero*.) Make photocopies as needed. Two should be straight lines, and one should not be straight.

2. On each straight line graph, write the equation that describes the relationship voltage and current.

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Questions:

1. Compare and contrast the graphs made with the resistors to the graph made with the light bulb.

2. For the resistors you were given, how does the current in a resistor depend on the applied voltage?

3. Define resistance, both in words and mathematically.

4. What happens to the resistance of a light bulb as the current through it increases?

5. Do the resistors or light become charged in anyway; i.e., do they become positive or negative? Explain.

6. Define each item listed below.
   a. voltage

   b. current

   c. resistance

7. Imagine you have a 20 Ω resistor with a potential difference of 10 volts across the ends.
   a. What is the current in the resistor?

   b. How many electrons would pass through the resistor in one minute?

   c. What is the power being dissipated in the resistor?

   d. How much energy would each electron lose in passing through the resistor?