AP Physics B Name: _____
Experiment, Circuits

The purpose of this experiment is twofold: to determine if a light bulb obeys Ohm's Law and to verify Kirchhoff's Laws: $\sum_{\text{Loop}} V = 0$ and $\sum_{\text{Node}} i = 0$. We will construct four different circuits: a light bulb connected across a power supply, a series circuit, a parallel circuit, and a series-parallel circuit. The diagrams for these circuits are on the back of this lab handout.

First, attach the light bulb to the power supply. Vary the voltage supplied by the battery (up to 10 V) and measure the current through the resistor. Repeat this procedure with a 10 Ω resistor. Make graphs of Current versus Voltage and determine if each object obeys Ohm's Law.

Second, fix the potential around 5 V and attach the first of the three series/parallel circuits to the power supply. Measure the current through each circuit element, including the power supply, and measure the voltage drop across each resistor. Be sure to measure the potential supplied by the power supply with a voltmeter as the readings on the power supply can vary. Do the same for each of the other two circuits – leave the potential fixed at the same value for all three circuits.

Using the values of the resistances and the value of the potential supplied by the battery, calculate the **current** supplied by the battery, the **current** through each resistor, and the **voltage** drop across each resistor. Also, determine the **power** supplied by the battery and the **power** expended by each resistor. Finally, compare you theoretical values with the actual measured values. Be sure to include a **percent error**.

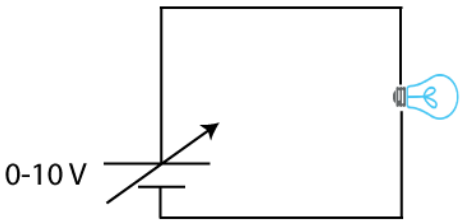
(1) Title, Names, etc. (Section 1 on the handout: Lab Write Ups)
(2) Purpose (Section 2 on the handout: Lab Write Ups)
(3) Method (Section 3 on the handout: Lab Write Ups)
(4) Data (Section 4 on the handout: Lab Write Ups)

(5) Analysis (Section 5 on the handout: Lab Write Ups)
Include a graph (or two graphs) of current versus voltage for the light bulb and the resistor. Determine appropriate regression equations with r^2 value. Complete the calculations for each circuit including a circuit diagram and percent error.

(6) Conclusion (Section 6 in the handout: Lab Write Ups)
You will want to consider the following questions in your conclusion. (a) How well did your light bulb and your resistor conform to Ohm's Law? Why? (b) How well did your circuits conform to Kirchhoff's laws? Why? (c) Comment on other factors and principles that your experiment verified.

This conclusion should be quite detailed. There is a lot of data to analyze and explain.

Part 1: Light bulb/10 Ω resistor



Part 2: Series and Parallel