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**PH 1120 -- Resistors & Light Bulbs -- Lab Report**

**Your Name: ? Partner’s Name: ?**

**Section: ? Date: ?**

* 1. Write down the values for your measured R1 and R2 in standard form (Uncertainty to one digit unless the lead digit is 1, in which case the first two digits are retained; the main value is then written with digits to the same decimal place as the uncertainty. This may very well involve more or fewer digits than the three we ask for on exams and summary homework – here it just depends on the precision of the particular experiment you are doing.).
  2. The equivalent resistance of two resistors in series is given by Rs = R1 + R2. Because R1 and R2 are independent of one another (determined by independent sets of measurements), the best-value uncertainty of Rs is determined by the following method: square the individual uncertainties of R1 and R2, add the squares together, and take the square root of that sum (this is called the “quadrature” of those two numbers). Now you can write down the calculated Rs-value, complete with uncertainty, in industry-standard form. If you made the measurements in a reasonably careful and consistent fashion, you should find that the MEASURED and CALCULATED values of Rs, each complete with uncertainty, should OVERLAP (or NEARLY so, to within a factor of 2 times the individual resistance uncertainty – or less) in resistance values. Do they?!
  3. If they DO overlap (or nearly so), congratulate yourself on an experiment properly conducted! (If they don’t come close to overlapping, please show your work to your lab instructor – something has evidently gone horribly wrong, and perhaps your lab instructor can spot the problem!) You have also learned some important information about precision of data (that is, how many digits to write down in conveying numerical information). The uncertainties determined for you by the least-squares fitting routine in this experiment ARE the precision of their corresponding slope values (in this experiment, the resistance values), and the industry-standard rules for presenting numerical results COMPLETE WITH UNCERTAINTIES prevent us from stating more digits than we are entitled to present. Because Rp = (1/R1 + 1/R2)−1, the application of the proper rules is a bit more complicated than for Rs, and we are NOT going that far. So for this Lab Report you will simply be asked for the calculated value of Rp from measured values of R1 and R2. You just won’t be asked to go through a determination of calculated uncertainty for the derived quantity Rp. (But you can still compare the measured with the calculated value. How do they compare? How might you express this comparison? How about in terms of percentage deviation, one from the other?) Calculate Rp and the percentage deviation between the calculated and measured values.
  4. State the voltage at which the light bulb first begins to glow.
  5. State the minimum and maximum resistance (in standard form) measured for the light bulb in the range 0 to 4 V. Also state the R-value (in standard form) you found in the range where the resistance was changing most rapidly. (The ONLY reason for stating the uncertainties here is to convey an indication of the precision of your resistance measurements, which of course depends on how many measurements you made and how close together they are.)