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**Electric Potential and RC Discharge -- Lab Report**

**Your Name: ? Partner’s Name: ?**

**Section: ? Date: ?**

**As always show your mathematical work with appropriate equations.**

1. Using a single point charge of –2, indicate where (how many grid units away) you would place initial and final points in order to have a potential difference of –3 V. [Note: $∆V=-\left(\frac{U\_{b}}{q\_{0}}-\frac{U\_{a}}{q\_{0}}\right)=q\left(\frac{1}{r\_{f}}-\frac{1}{r\_{i}}\right)$, begin at page p761and continue through p 770, 13th edition Young & Freedman and remember that k=1 for our purposes.]
2. Using a single point charge of –2, indicate where (how many grid units away) you would place initial and final points in order to have a potential difference of +3 V.
3. Using a single point charge of +8, indicate where (how many grid units away) you would place initial and final points in order to have a potential difference of –6 V.
4. Using a single point charge of +8, indicate where (how many grid units away) you would place initial and final points in order to have a potential difference of +6 V.
5. Now for some error analysis of the capacitor measurement situation:

[Note: The slope-uncertainty that you recorded in each of the four experiments should have been within about 0.1% of the corresponding slope magnitude, and certainly less than 0.5% in all cases. The resistor, unfortunately, is too large to be measured using the approach of Experiment #3, so we have to go with the manufacturer’s rating, which is ±5% (that’s what the gold band at one end of the 22,000 Ω resistor means). Five percent is SO much larger than the slope uncertainty that anything calculated from R (or even 1/R) is automatically 5% uncertain. (The slope uncertainty can legitimately be disregarded in comparison with the resistors rated uncertainty!)]

What you should do for this Problem #5 is simply calculate the 4 capacitance values, using the slope magnitudes and 22,000 Ω. Take 5% of each resultant as the uncertainty, and then express each capacitance value in industry-standard format (one significant figure in the uncertainty unless the lead digit is 1, in which case you use two significant figures, and in either case you express the main value to the same level of significance as the uncertainty – hundreds, tenths, ones, tens, …, whatever it is).

1. Now calculate the parallel and series capacitance based on values of the individual capacitors and compare those results to values calculated from the slope values of the individual capacitors in question #5. Are your measured parallel and series capacitances equivalent to your calculated values, taking uncertainty into account? With any luck, they should be!!!