ECE 109L - SERIES AND PARALLEL CIRCUITS - LAB 13
VOLTAGE AND CURRENT DIVISION

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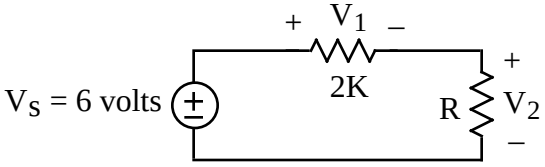
OBJECTIVE

The objective of this lab is to verify the basic properties of voltage and current division in resistor circuits

LAB

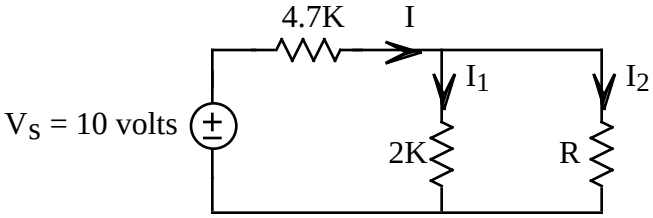
1. Given the following circuit



PARTNER 1: R = 1K PARTNER 2: R = 4.7K

   a. Measure your resistor values. Compare with their nominal values
   b. **PreLab** - Use voltage division equations to calculate V_1 and V_2
   c. Measure V_1 and V_2
   d. Compare your measured and calculated values for V_1 and V_2

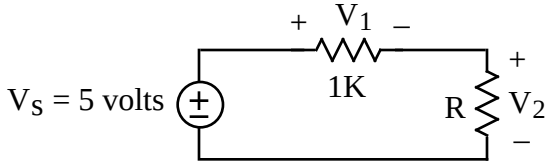
2. Given the following circuit



PARTNER 1: R = 1K PARTNER 2: R = 4.7K

   a. Measure your resistor values. Compare with their nominal values
   b. Measure I
   c. Make use of your measured value of I to calculate I_1 and I_2 using current division equations
   d. Measure I_1 and I_2
   e. Compare your measured and calculated values for I_1 and I_2

3. Given the following circuit

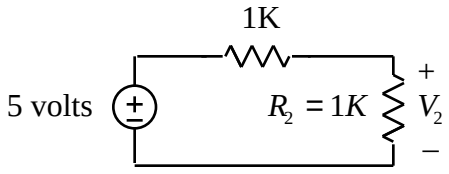


   a. **PreLab** - Derive equations for V_1 and V_2 as functions of R
   b. **PreLab** - Use Mathcad to graph your equations for V_1 and V_2 as functions of R on separate graphs. R should go from 0 to at least 5K. Describe your curves. Make each graph large enough to fill a page. *And be sure to do these graphs carefully because you*

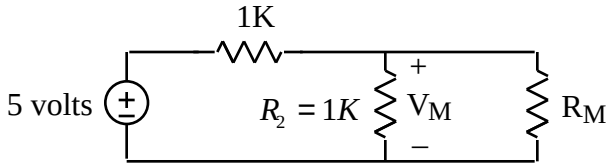
will need them for the lab demo

c. Take enough data points to see how V_1 and V_2 vary as a function of R. Use a potentiometer for R
d. Now add your data points to your graph in part (b)
e. How closely do your data points match your derived curves

4. Suppose we take a nice simple circuit as follows

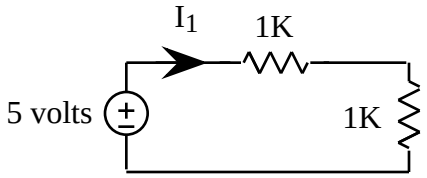


and add a parallel resistor as follows

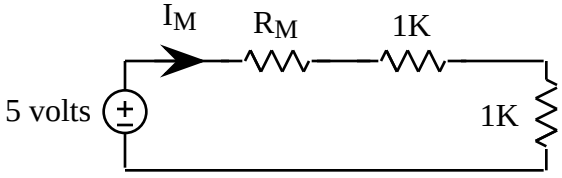


a. Measure V_2 in the original circuit
b. What do you think will happen to V_2 if R_M is relatively small. Why
c. Connect a relatively small resistor $R_M \approx 1K$ across R_2 and see what happens. Were you right in part (b)
d. Now measure V_2 for a much larger R_M
e. Based on the results of this problem would you buy a voltmeter with a large equivalent resistance or a small equivalent resistance. Why

5. Now suppose we take the same nice simple circuit as in Problem (4)



but this time add a series resistor as follows



a. Measure I_1 in the original circuit
b. What do you think will happen to I_M if R_M is relatively small. Why
c. Put a small resistor R_M in the circuit and see what happens. Were you right in part (b)
d. Now measure I_M for a much larger R_M
e. Based on the results of this Problem would you buy ammeter with a large equivalent resistance or a small equivalent resistance. Why