Week 1 Prelab

Briefly answer the following questions.

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1. Identify the resistors:

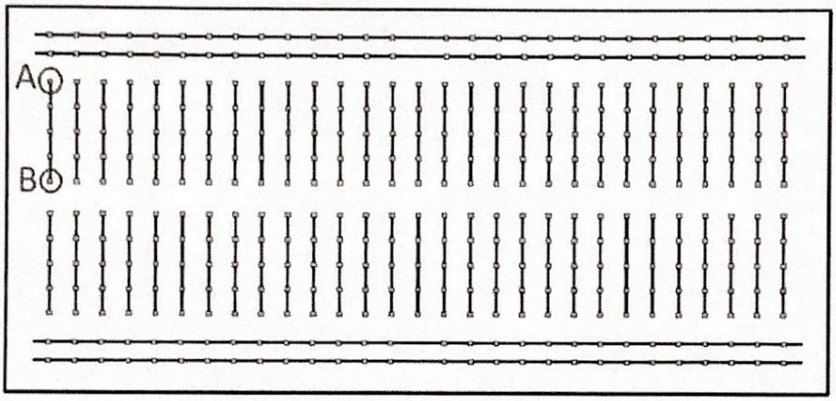
Yellow-Violet-Orange-Gold

47K Ω with a tolerance of +/- 5 %.

Brown-Black-Yellow-Silver

100K Ω with a tolerance of +/- 10 %.

2.

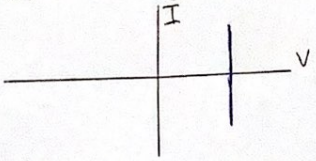


If a resistor is inserted into the breadboard with one leg at point A and one leg at point B, what resistance will an ohmmeter measure for that resistor? Why? What should you do instead to measure the proper resistance?

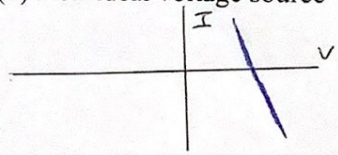
The Ohmeter will measure 0 resistance since the row is connected internally. This means the current will bypass the resistor. Moving either Leg A or Leg B to the columns would help measure the proper resistance as there will be no internal connection. Current will flow through the resistor and resistance can be measured.

3. Draw the I-V curves for the following diagrams

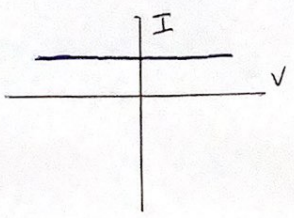
(a) Ideal voltage source



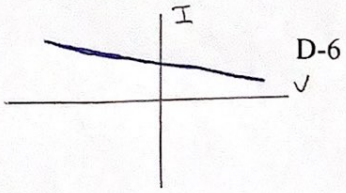
(b) Non-ideal voltage source



(c) Ideal current source

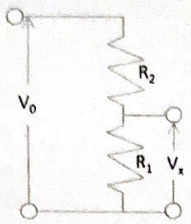


(d) Non-ideal current source



4. Prove the voltage and current divider equations: They are basic and very commonly used equations that you should memorize for use in all your future electronics courses.

Voltage Divider



Problem: show that

$V_x = V_0 R_1/(R_1+R_2)$

YOUR SOLUTION HERE:

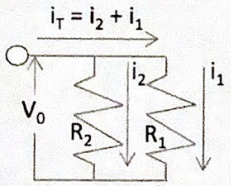
Ohm's Law: $V = IR$

$V_x = I \cdot R_1$

$I = \frac{V_0}{R_1+R_2}$

$V_x = \frac{V_0}{R_1+R_2} \cdot R_1 \longrightarrow V_x = V_0 \frac{R_1}{R_1+R_2}$ ✓

Current Divider



Problem: show that

$I_1 = i_T R_2/(R_1+R_2)$

YOUR SOLUTION HERE:

$V_0 = i_T \cdot R_T$

$R_T = \frac{R_1 \cdot R_2}{(R_1+R_2)}$

↑ total Resistance

$V_0 = i_T \cdot \frac{R_1 \cdot R_2}{(R_1+R_2)}$

$V_0 = I_1 \cdot R_1$ (follows path of least resistance for R_1)

$I_1 \cdot R_1 = i_T \cdot \frac{R_1 \cdot R_2}{(R_1+R_2)}$

$I_1 = i_T \cdot \frac{R_2}{R_1+R_2}$ ✓

Week 1 Prelab End

Resistors in parallel: $R_T = \frac{R_1 \cdot R_2}{R_1+R_2}$