Week 1 Prelab

Briefly answer the following questions.

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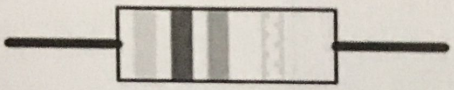
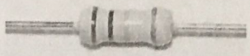
1. Identify the resistors:



Yellow-Violet-Orange-Gold

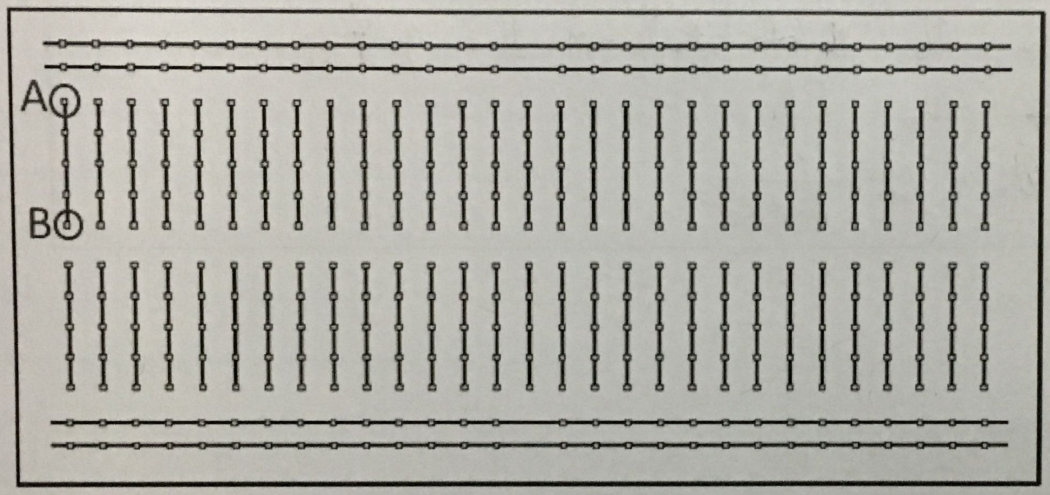
47K Ω with a tolerance of +/- 5 %.



Brown-Black-Yellow-Silver

100K Ω with a tolerance of +/- 10 %.

2.

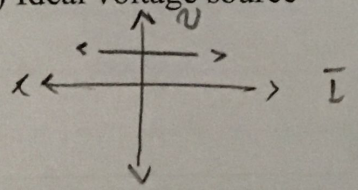


If a resistor is inserted into the breadboard with one leg at point A and one leg at point B, what resistance will an ohmmeter measure for that resistor? Why? What should you do instead to measure the proper resistance?

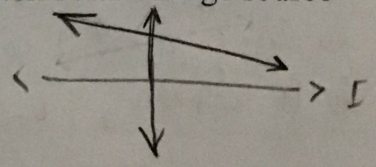
The ohmmeter will measure 0Ω because the current will travel through the strip as a result of current following the path of least resistance. Instead, the resistor must be connected between two different strips and then measured.

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

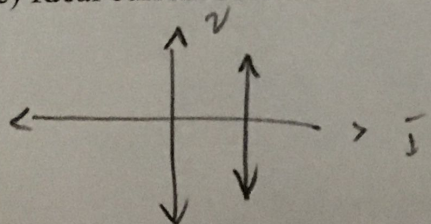
(a) Ideal voltage source



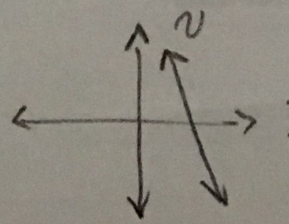
(b) Non-ideal voltage source



(c) Ideal current source

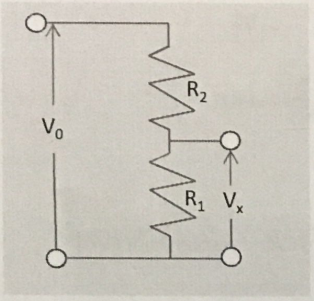


(d) Non-ideal current source



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:

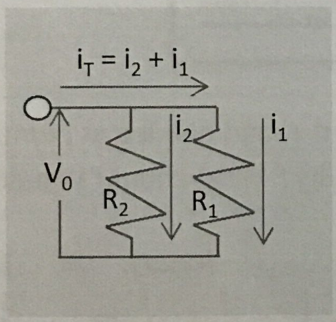
① The resistors are connected in series: $R = R_1 + R_2$

② By Ohm's Law: $V_0 = I(R_1 + R_2) \Rightarrow I = \frac{V_0}{R_1 + R_2}$

③ By Ohm's Law: $V_x = IR_1$

④ Substitute: $V_x = V_0 \frac{R_1}{R_1 + R_2}$

Current Divider



Problem: show that

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

YOUR SOLUTION HERE:

① $R = \frac{R_1 R_2}{R_1 + R_2}$

② $V_0 = i_2 R_2 = i_1 R_1$

③ $V_0 = i_T R = i_T \left(\frac{R_1 R_2}{R_1 + R_2}\right)$

④ By substitution, $i_1 = i_T \left(\frac{R_2}{R_1 + R_2}\right)$

Week 1 Prelab End