

Week 1 Prelab

Briefly answer the following questions.

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UID: **00000000**

1. Identify the resistors:



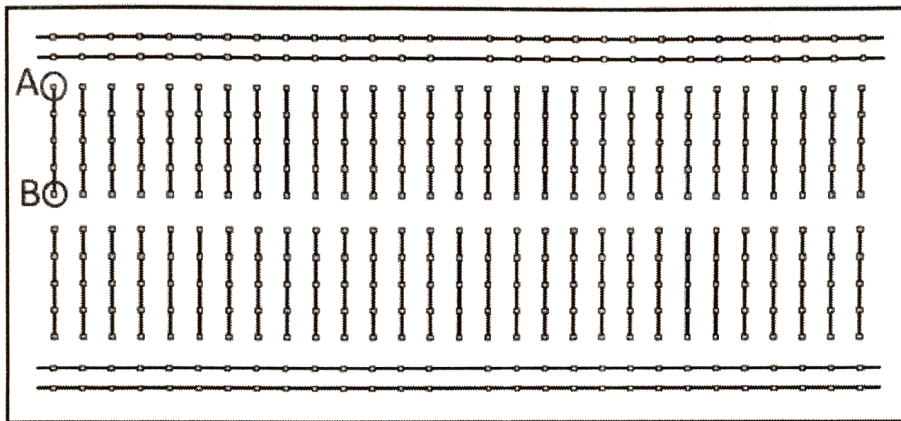
47,000 Ω with a tolerance of \pm **5** %.



Brown-Black-Yellow-Silver

100,000 Ω with a tolerance of \pm **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?

AN OHMMETER WOULD MEASURE 0 VOLTS BECAUSE A AND B ARE ON THE SAME GRIDLINE. TO MEASURE THE PROPER RESISTANCE, MOVE POINT A OR B TO A POINT THAT'S PARALLEL TO ITS CURRENT POSITION.

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

(a) Ideal voltage source



(b) Non-ideal voltage source



(c) Ideal current source

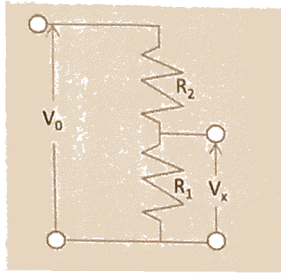


(d) Non-ideal current source



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:

$$\begin{aligned} V_0 &= V_x + V_2 \\ &= IR_1 + IR_2 \\ &= V_x + IR_2 \\ I &= \frac{V_0}{R_1 + R_2} \end{aligned}$$

$$\begin{aligned} V_0 &= V_x + \frac{V_0}{R_1 + R_2} R_2 \\ &= V_x + \frac{V_0 R_2}{R_1 + R_2} \end{aligned}$$

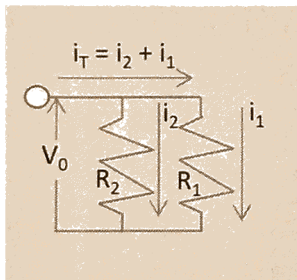
$$V_0 - \frac{V_0 R_2}{R_1 + R_2} = V_x$$

$$V_x = \frac{V_0 (R_1 + R_2) - V_0 R_2}{R_1 + R_2}$$

$$= \frac{V_0 R_1 + \cancel{V_0 R_2} - \cancel{V_0 R_2}}{R_1 + R_2}$$

$$\Rightarrow V_x = \frac{V_0 R_1}{R_1 + R_2}$$

Current Divider



Problem: show that

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

YOUR SOLUTION HERE:

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} \quad I_1 = \frac{R_2}{R_1} \times I_T = \frac{\frac{R_1 R_2}{R_1 + R_2}}{R_1} \times I_T$$

$$R_T = \frac{R_1 R_2}{R_1 + R_2}$$

$$\Rightarrow I_1 = \frac{R_2 I_T}{R_1 + R_2}$$

Week 1 Prelab End