Week 1 PreLab

Briefly answer the following questions.

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1.Identify the resistors:

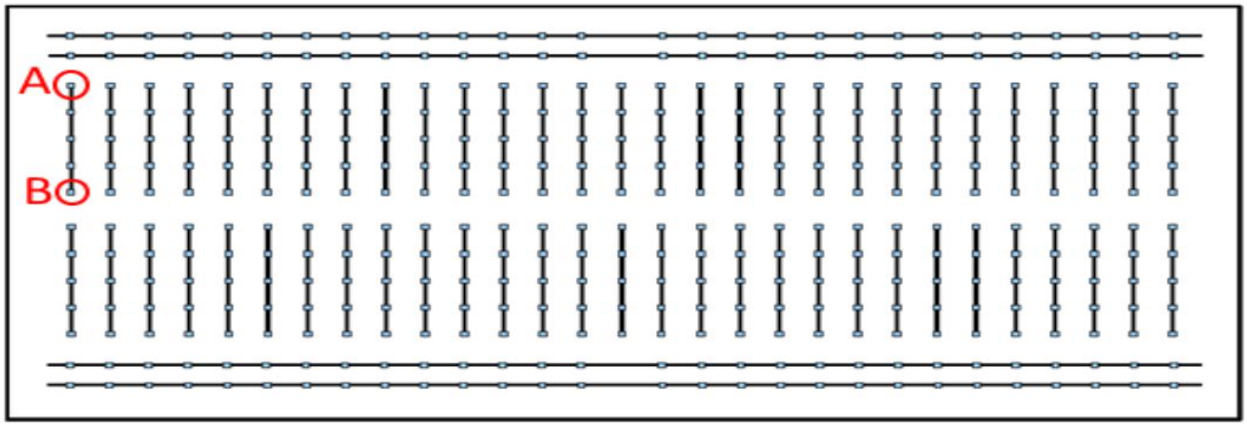
Yellow-Violet-Orange-Gold

Brown-Black-Yellow-Silver

47 kΩ with a tolerance of +/- **5%**

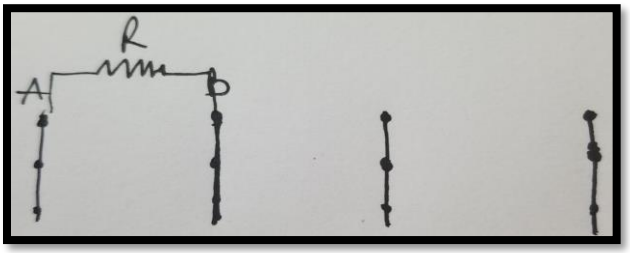
100 kΩ with a tolerance of +/- **10%**.

2.



Because A and B are connected in breadboard internally, the voltage at A and B are equal. So, if a resistor is inserted with one leg at point A and other at point B, current would bypass the resistor that makes the ohmmeter will measure **0 Ω.**

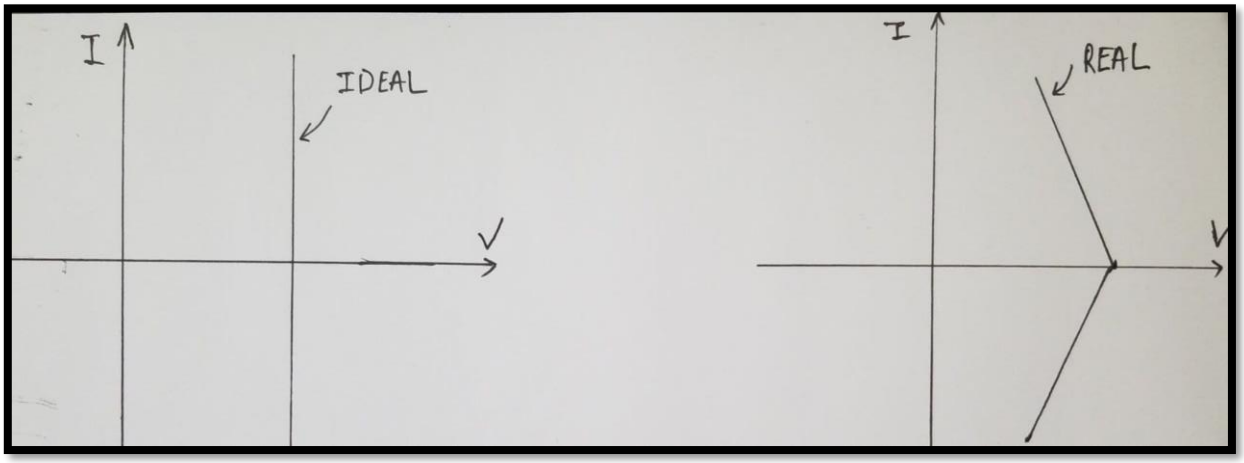
To get the proper resistance, we need to move one of the legs of the resistor into another line as the picture bellow:



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

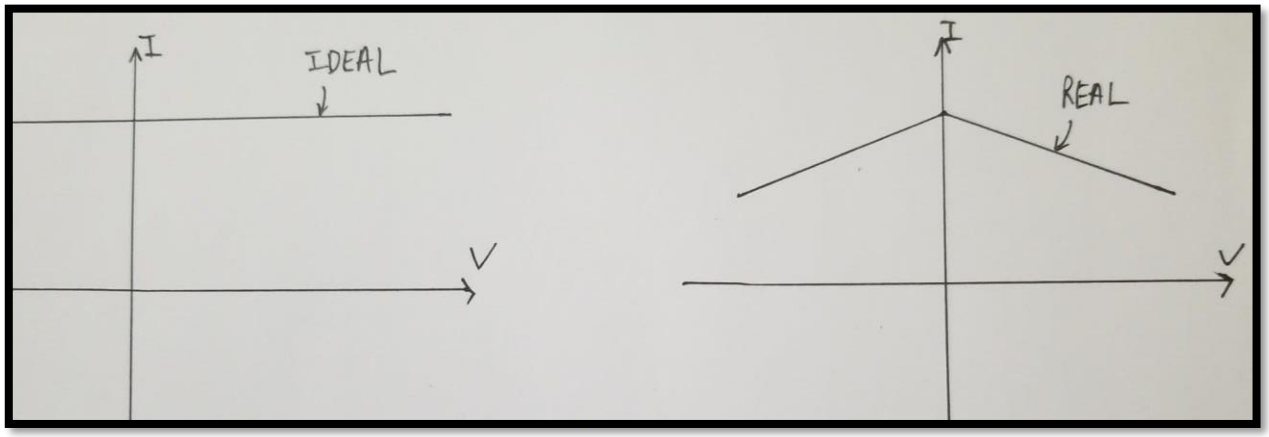
a) Ideal voltage source

b) Non-ideal voltage source



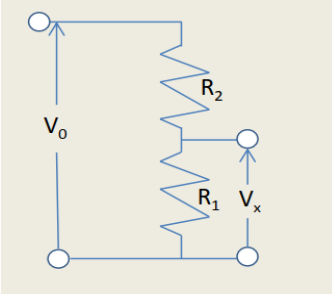
c) Ideal current source

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

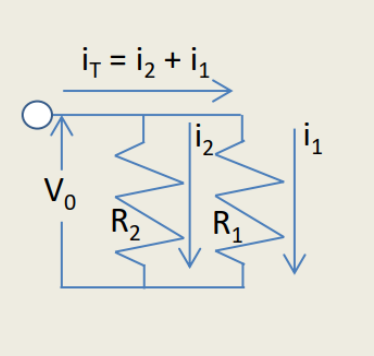
$V_x = V_0 R_1/(R_1+R_2)$

We have:

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

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

Current Divider



Problem: show that

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

We have: $R_{eq} = R_1 \| R_2 = \frac{R_1 R_2}{R_1+R_2}$

$V = I_T \times R_{eq} = I_T \frac{R_1 R_2}{R_1+R_2}$

Also $V = V_{R_1} = I_1 \times R_1$

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

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