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Lab 03 – DC Circuits I

Lab Worksheet

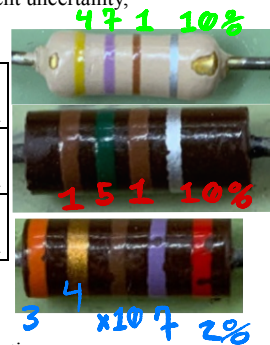
Complete this lab worksheet and turn it in for credit. Show all your work including the calculations you performed (attach additional sheets if necessary).

4.4.1 Measuring Resistance

- Determine the nominal resistance of your three resistors along with the percent uncertainty, and absolute uncertainty.

916
4 Band
4 Band
5 Band

$R_1 = 474 \Omega$	$\delta_{1, \text{percent}} =$	$\delta_{1, \text{abs}} =$
$R_2 = 149 \Omega$	$\delta_{2, \text{percent}} =$	$\delta_{2, \text{abs}} =$
$R_3 = 320 \Omega$	$\delta_{3, \text{percent}} =$	$\delta_{3, \text{abs}} =$



- Measure the resistance of each resistor using the ohmmeter. Include uncertainties.

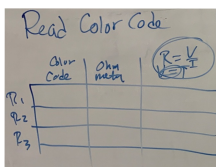
$$R_1 = 474 \Omega$$

$$R_2 = 149 \Omega$$

$$R_3 = 320 \Omega$$

- Measure the voltage across, and current through, each resistor along with uncertainties. Use these values to compute the resistance of each resistor along with the uncertainty.

$V_1 = 1.5V$	$I_1 = 0.0031A$	$R_1 \approx 484 \Omega$	$3.1mA \rightarrow \frac{1.5V}{0.0031A} \approx 484 \Omega$
$V_2 = 1.5V$	$I_2 = 0.0095A$	$R_2 \approx 160 \Omega$	$9.5mA \rightarrow \frac{1.5V}{0.0095A} \approx 160 \Omega$
$V_3 = 1.5V$	$I_3 = 0.005A$	$R_3 \approx 300 \Omega$	$5.00mA \rightarrow \frac{1.5V}{0.005A} \approx 300 \Omega$



4. Make agreement charts that shows the measurements for each resistor. Attach them to this worksheet.

a. Discuss the agreement between the measurements you made for each resistor.

	Color Code	Ohm Meter	$R = \frac{V}{I}$
R_1	 470Ω ± 10%	~474Ω	~484Ω
R_2	 150Ω ± 10%	~149Ω	~160Ω
R_3	 341Ω ± 2%	~320Ω	~300Ω

b. Which method was the most precise for determining the resistance? Explain.

Ohms meter because best used for contact resistance measurements.

c. Which method was least precise for determining the resistance? Explain.

$R = V/I$ is less accurate because it does not account for the contact resistance

d. Which measurement do you feel is most accurate? Explain.

Ohms Meter; for, it factors in the contact resistance

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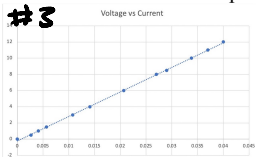
4.4.2 Testing Ohm's Law for a Resistor

1. Do you expect the resistor to be ohmic? Why or why not?

Its ohmic because it
has a linear relationship

2. What is the resistance of the resistor you chose? $R = 300$
3. Make a table as described in the lab manual (don't forget uncertainties!), and attach it to this worksheet.
3. Make a graph of voltage vs. current as described in the lab manual. Attach it to this worksheet.
4. Is the resistor ohmic? Explain how you know.

#3



Its ohmic because it has a linear relationship

#2

R=300Ω	Current (mA)	Current(A)	Voltage
	0	0	0
	2.7	.0027	.5
	4.1	.0041	1
	5.7	.0057	1.5
	10.8	.0108	3
	14.1	.0141	4
	20.7	.0207	6
	27	.027	8
	29	.029	8.5
	33.8	.0338	10
	37	.037	11
	40	.04	12

5. Describe how you can use your graph to determine the resistance of your resistor.
6. Use your answer to (5), and determine the resistance of your resistor *using your graph*. How does it compare to what you found in 4.4.1?

4.4.3 Testing Ohm's Law for a Lightbulb

1. Do you expect the lightbulb to be ohmic? Why?

No. Heat Resistance N/A

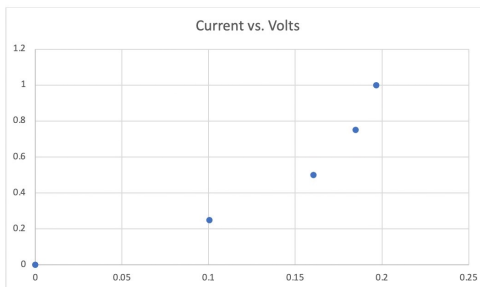
2. What is the resistance of your lightbulb? $R_{bulb} = N/A$
3. Make a table as described in the lab manual (don't forget uncertainties!), and attach it to this worksheet.
3. Make a graph of voltage vs. current as described in the lab manual. Attach it to this worksheet.
4. Is the resistance increasing, decreasing, or remaining constant as the current increases? What does this say about the resistance of the lightbulb?

5. What might be responsible for your answer to (4)?

6. Use your graph to determine the resistance at the beginning, middle and end of your graph. At which location is the resistance closest to what you measured in (2)?

3. Make a graph of voltage vs. current as described in the lab manual. Attach it to this worksheet.

Current(mA)	Current(A)	Volts
0	0	0
100.5	.1005	0.25
160.5	.1605	.5
184.7	.1847	.75
196.6	.1966	1



4. Is the resistance increasing, decreasing, or remaining constant as the current increases? What does this say about the resistance of the lightbulb?

The resistance of the lightbulb is increasing as the number of volts pass through it. Seemingly due to the raising of temperature that is making the filament gain more resistance than its prior states. Leading to more of a curved graph in comparison to our prior test with the resistors.

5. What might be responsible for your answer to (4)?

The increase in temperature will lead to an increase of resistance. Therefore, backing the data we acquired through our acquisition.

6. Use your graph to determine the resistance at the beginning, middle and end of your graph. At which location is the resistance closest to what you measured in (2)?

Unable to quantify due to us not being tasked with measuring the resistance of the bulb by itself.

7. Is the lightbulb ohmic? Explain how you know.

No, its not ohmic because as the temperature goes up the amount of resistance also goes up.