**General Physics eJournal 2**

**Resistors**

**Instructions:**

Follow the Writeup and fill out the eJournal as you complete the lab activities. Submit your eJournal report by uploading the completed WORD or PDF document to our class Learninghub site. If the Learninghub site is down, email the completed report file directly to a lab TA.

**Preliminaries:**

* Title:
* Name(s):
* Date:
* Time In & Out:

**Plan:**

**Hypothesis**

Form hypotheses relating resistance to length and area.

**Experiment Outline**

Briefly describe your plan for testing your hypotheses.

**Equipment List**

* List
* Equipment
* Here

**Action:**

Describe the techniques used to collect data by responding to the bullet point questions:

* How did you use paper to construct resistors of varying lengths and widths?
* How did you measure the resistance of your paper resistors?
* How did you measure resistors in series?
* How did you measure resistors in parallel?

*Insert labeled images of your apparatuses*

**Results:**

Use the tables below to record resistance measurements.

**Table I: Length and resistance for a 1 cm wide strip of conductive paper**

|  |  |
| --- | --- |
| **Length (cm)** | **Resistance (kΩ)** |
| 20 |  |
| 18 |  |
| 16 |  |
| 14 |  |
| 12 |  |
| 10 |  |
| 8 |  |
| 6 |  |
| 4 |  |
| 2 |  |
| 0 | 0 |

**Table II: Width and resistance for 20 cm long strips of conductive paper**

|  |  |
| --- | --- |
| **Width (cm)** | **Resistance (kΩ)** |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
| 7 |  |

**Analysis:**

Generate plots of R vs. L and R vs. 1/w. Apply a linear fit to each graph and record the correlation coefficient of each.

*Insert graph of R vs L*

Correlation Coefficient = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Insert graph of R vs 1/w*

Correlation Coefficient = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Compare the individual nominal and measured resistances for both lab partner’s sets of resistors.

**Table III: Nominal and Measured Resistor Values (Part 1)**

|  |  |  |
| --- | --- | --- |
| **Nominal Color Band Resistance (kΩ)** | **Measured Resistance (kΩ)** | **% Difference** |
|  |  |  |
|  |  |  |
|  |  |  |

**Table IV: Nominal and Measured Resistor Values (Part 2)**

|  |  |  |
| --- | --- | --- |
| **Nominal Color Band Resistance (kΩ)** | **Measured Resistance (kΩ)** | **% Difference** |
|  |  |  |
|  |  |  |
|  |  |  |

Are these percent differences within the tolerance for your resistors?

Common Tolerance Colors: Silver band = ±10%, Gold band = ±5%, Brown band = ±1%
Check a [resistor color code table](https://resistorcolorcodecalc.com/) if your resistors have a different tolerance.

Compare the predicted and measured equivalent series and parallel resistances.

**Table V: Resistors in Series**

|  |  |  |
| --- | --- | --- |
| **Predicted Req (kΩ)** | **Measured Req (kΩ)** | **% Difference** |
|  |  |  |

**Table VI: Resistors in Parallel**

|  |  |  |
| --- | --- | --- |
| **Predicted Req (kΩ)** | **Measured Req (kΩ)** | **% Difference** |
|  |  |  |

**Conclusion:**

Interpret your results in light of your hypothetical predictions. Do the results support your hypotheses? How is adding resistors in series similar to increasing the length of a resistor? How is adding resistors in parallel similar to increasing the area of a resistor? How might you improve this experiment or explore it further?