# Report for Experiment 5

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Class 110

**ABSTRACT:**

**DATA:**

**Table 5–1**

| Component | Listed Value | Measured Value |
|---|---|---|
| $R_1$ | 2.7 kΩ | 2.67kΩ |

**Table 5–2**

| Measured value of | | |
|---|---|---|
| Resistance | Voltage | Current |
| 2.67 kΩ | 12 V | 4.5 mA |
| Computed Power | | |
| $P = IV$ | $P = I^2R$ | $P = \frac{V^2}{R}$ |
| 54 mW | 54.7 mW | 53.3 mW |

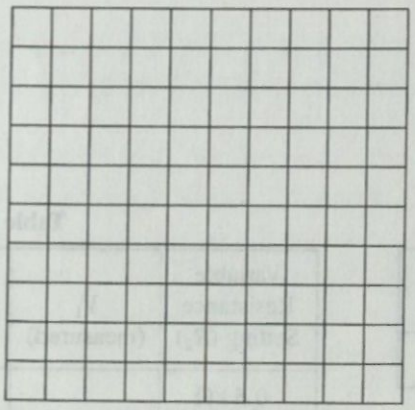
**Table 5–3**

| Variable Resistance Setting ($R_2$) | $V_1$ (measured) | $V_2$ (measured) | Power in $R_2$ $P_2 = \frac{V_2^2}{R_2}$ |
|---|---|---|---|
| 0.5 kΩ | 10.1V | 1.93V | 7.4mW |
| 1.0 kΩ | 8.8V | 3.3V | 10.89mW |
| 2.0 kΩ | 6.9V | 5.2V | 13.52mW |
| 3.0 kΩ | 5.6V | 6.4V | 13.65mW |
| 4.0 kΩ | 4.8V | 7.2SV | 13.14mW |
| 5.0 kΩ | 4.2V | 7.9V | 12.5mW |
| 7.5 kΩ | 3.2V | 8.9V | 10.56mW |
| 10.0 kΩ | 2.53V | 9.53V | 9mW |


**Plot 5–1**

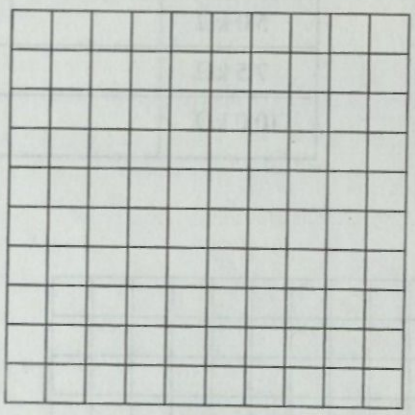
**RESULTS AND CONCLUSION:**

**FURTHER INVESTIGATION RESULTS:**



**Plot 5–2**

**APPLICATION PROBLEM RESULTS:**



**Plot 5–3**

**EVALUATION AND REVIEW QUESTIONS:**

1. In the first part of the experiment, you computed the power in a resistor using three different equations. Why might the results in each case be slightly different?

During exponential calculations, the remainders can be 10s+ giving an answer slightly higher or lower

2. For the circuit in Figure 5–1, assume a student accidentally set the power supply to 24 V instead of 12 V.
   (a) How much power would be dissipated in the resistor? 213.3 mW
   (b) Would a ¼ W resistor be adequate for this case? yes, a 1/4 W resistor is good up to 250 mW.

3. For the circuit in Figure 5–2, what was happening to the *total power* in the circuit as the resistance of $R_2$ was increasing? Explain your answer.

The measured resistance value of R1 closely matched the resistance value of R2 at its peak power measurement. Anything lower in R2, or anything higher in R2 decreased the power curve.

4. A 1.5 kΩ resistor is found to have 22.5 V across it.
   (a) What is the current in the resistor? 15mA
   (b) What is the power dissipated in the resistor? 337.5 mW
   (c) Could a ¼ W resistor be used in this application? Explain your answer.

No, a 1/4W resistor (250mW) would not be sufficient for a 337.5mW current a 1/2W resistor (500mW) would instead be sufficient

5. What physical characteristic determines the power rating of a resistor?

The wire size and the material of the resistor

6. What is the smallest value of resistance that can be used across 10 V if the power dissipated is not to exceed 0.5 W?

$(10V^2) / 200\Omega = 0.5W$

200 Ω