Physics 102

Lab 9: Kirchhoff's Law

Myat Thit Ko Ko

Date: 10/29/2026

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Purpose

The purpose of this seventh lab is to obtain practical skills in finding current across the circuit to attest Kirchhoff's Law empirically.

Members

This lab group consisted of four members.

1. Myat Thit Ko Ko (author)
2. Chris Zoldi
3. Jorge Ramirez
4. Sergio Cano

Procedure

The lab consists of the following steps and procedures.

Part I

- Measuring current across the circuit for theoretical current value
- Measuring voltage & resistance across the circuit to calculate experimental current value

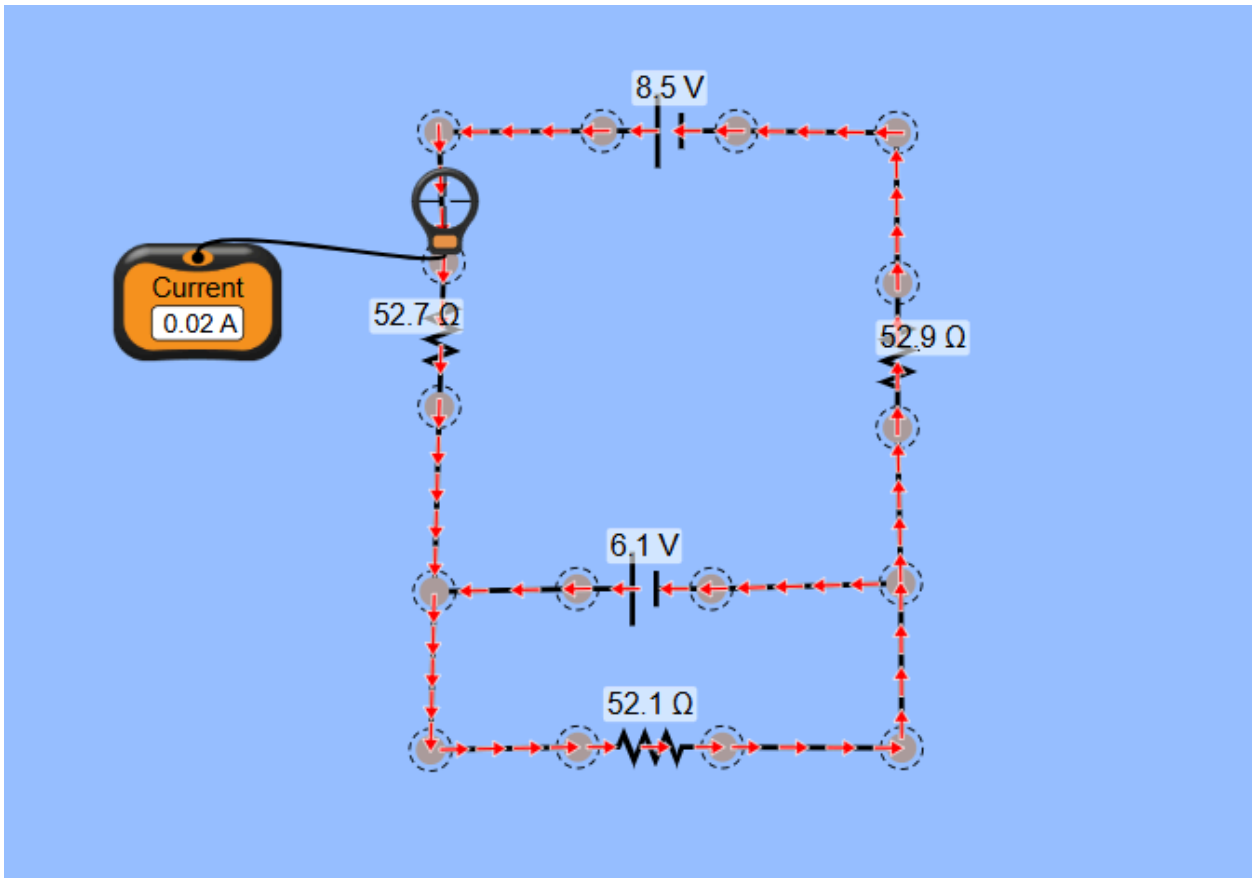
Part II: Reverse Voltage Polarity

- DC Battery providing V2 is reversed in polarity.
- Measuring the new current across the circuit for theoretical current value
- Measuring voltage & resistance across the circuit to calculate experimental current value

All calculated values in this lab are rounded to 3 significant figures when necessary.

Data & Analysis

Part I



Circuit Setup (Illustration Purpose Only. Real values may vary)

Readings are recorded as follows:

R1 = 52.7 ohms
R2 = 52.9 ohms
R3 = 52.1 ohms

V1 = 8.47 V
V2 = 6.05 V

I1 = 0.025 A

Part I (cont.)

Based on the readings, calculations show that

$$V_{upper\ loop} = V_1 - R_1 I_1 - V_2 - R_2 I_1 = 0$$

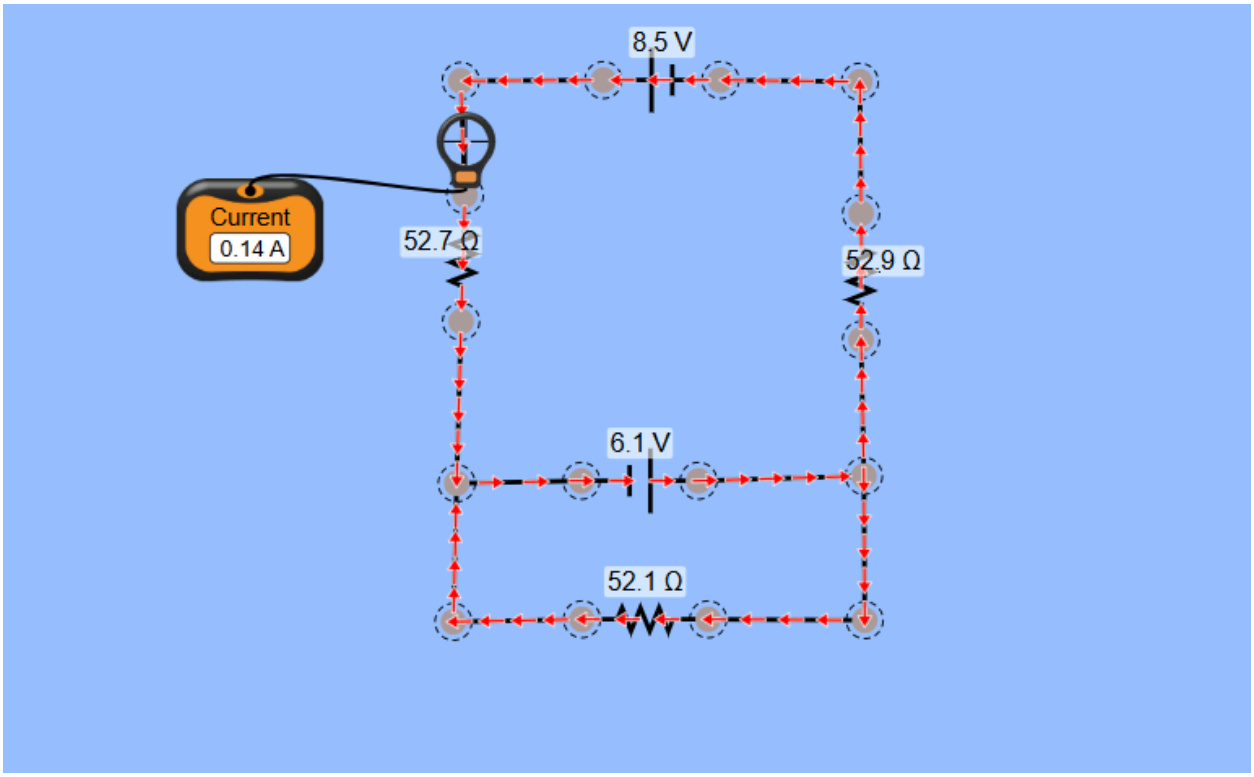
$$8.47\ V - (52.7\ ohms) I_1 - 6.05\ V - (52.9\ ohms) I_1 = 0$$

Therefore,

$$I_{1exp} = \frac{-8.47\ V + 6.05\ V}{-(52.7\ ohms) - (52.9\ ohms)} = 0.023\ A$$

$$\%error = \frac{|I_{1theo} - I_{1exp}|}{\frac{I_{1theo} + I_{1exp}}{2}} \times 100\% = \frac{|0.025A - 0.023A|}{\frac{0.025A + 0.023A}{2}} \times 100\% = 8.33\%$$

Part II: Reverse Voltage Polarity (V2)



Circuit Setup (Illustration Purpose Only. Real values may vary)

Readings are recorded as follows:

R1 = 52.7 ohms
R2 = 52.9 ohms
R3 = 52.1 ohms

V1 = 8.47 V
V2 = 6.05 V

I1 = 0.134 A

Part II: Reverse Voltage Polarity (V2) (cont.)

Based on the readings, calculations show that

$$V_{upper\ loop} = V_1 - R_1 I_1 + V_2 - R_2 I_1 = 0$$

$$8.47\ V - (52.7\ ohms) I_1 + 6.05\ V - (52.9\ ohms) I_1 = 0$$

$$I_{1exp} = \frac{-8.47\ V - 6.05\ V}{-(52.7\ ohms) - (52.9\ ohms)} = 0.138\ A$$

$$\%error = \frac{|I_{1theo} - I_{1exp}|}{\frac{I_{1theo} + I_{1exp}}{2}} \times 100\% = \frac{|0.134A - 0.138A|}{\frac{0.134A + 0.138A}{2}} \times 100\% = 2.94\%$$

Analysis

Despite simply reversing the polarity, error percentages of part 1 and part 2 were inconsistent with one being close to 8% while the other was close to 3%. This is likely due to equipment limitations, namely the measurement devices on circuits with a very low current.

Conclusion

Since all error percentages were found to be less than 10%, this lab is deemed satisfactory.

Summary

Experiment Title: Kirchhoff's Law

Student’s name: Myat Thit Ko Ko

Date: 10/29/2026

Purpose: To find current across the circuit and attest Kirchhoff's Law empirically.

Procedure: Measuring current, voltage, and resistance. Calculations. Reversing Polarity.

Analysis: Error percentages were 8.33%, and 2.94% respectively.

Conclusion: Satisfactory