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Experiment Worksheet

A. Experiment Topic

Series and parallel circuit

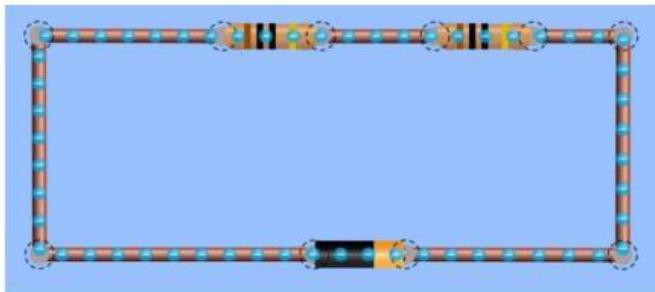
B. Learning Objectives

- 1) Differentiate between series and parallel resistor configurations.
- 2) Measure current and voltage in simple electric circuits using PhET simulation.
- 3) Explain how brightness in bulbs is related to current and resistance.

C. Experiment Steps and Questions

Series Circuit

- 1) Open the PhET Simulation here: https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_all.html
- 2) Make a series circuit consist of two identical resistors like the picture below:



- 3) You can set the value of resistors and battery by clicking them and adjust the value (initial value of each resistor is 10 Ohms and for battery is 9 Volts).
- 4) Use the Amperemeter to measure the current through the wire, and each resistor (name the left resistor as R1, right resistor as R2, and the current through the R1 is I1, the current through R2 is I2).
- 5) Use the Voltmeter to measure the voltage cover the battery, do it to each resistor as well (name the voltage cover the R1 as V1, and the voltage cover R2 as V2).

6) Input your data into the table below:

$V_{\text{battery}} = \dots\dots\dots$ Volts

$I_{\text{wire}} = \dots\dots\dots$ Amperes

No	I_1 (A)	I_2 (A)	V_1 (V)	V_2 (V)
1.				

7) Look at the current! Are their value the same with I_{wire} ? Please, explain the reason based on your opinion!

Answer:

8) Look at the voltage! Are their value the same with the V_{battery} ? If not, try to find their corelation by filling this missing part of the equation below!

$$V_{\text{battery}} = \dots + \dots$$

9) We can write the V_{battery} as V_{total} and I_{wire} as I_{total} .

10) Change the V by using the Ohm's Law ($V = IR$) and fill these missing part of the equation below!

$$V_{\text{total}} = \quad +$$

$$I_{\text{total}} \cdot R_{\text{total}} = \quad +$$

Notes: you know that the value of I_{total} and I_1 are the same, with the value of I_2 as well. So what can you do with the last equation above?

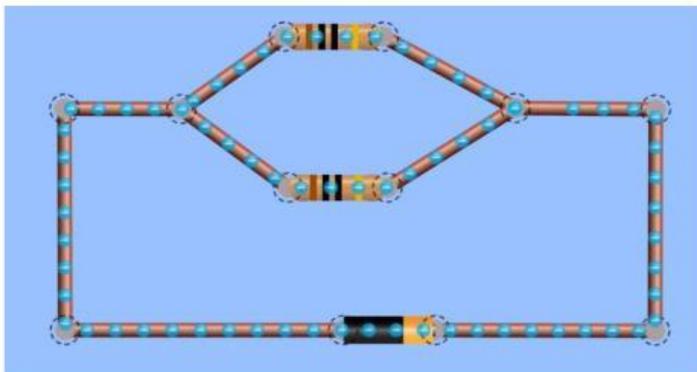
$R_{\text{total}} = \quad +$

11) It is the formula to fing the total resistance in series circuit!

Series Circuit

1) Open the PhET Simulation here: https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_all.html

2) Make a series circuit consist of two identical resistors like the picture below:



- 3) Use the Amperemeter to measure the current through the wire (before or after the branching point), and each resistor (name the left resistor as R1, right resistor as R2, and the current through the R1 is I1, the current through R2 is I2).
- 4) Use the Voltmeter to measure the voltage cover the battery, do it to each resistor as well (name the voltage cover the R1 as V1, and the voltage cover R2 as V2).
- 5) Input your data into the table below:

$V_{\text{battery}} = \dots\dots\dots$ Volts

$I_{\text{wire}} = \dots\dots\dots$ Amperes

No	I ₁ (A)	I ₂ (A)	V ₁ (V)	V ₂ (V)
1.				

- 6) Look at the voltage! Are their value the same with V_{battery} ? Please, explain the reason based on your opinion!

Answer:

- 7) Look at the current! Are their value the same with the I_{wire} ? If not, try to find their correlation by filling this missing part of the equation below!

$$I_{\text{wire}} = \dots + \dots$$

- 8) We can write the V_{battery} as V_{total} and I_{wire} as I_{total} .

- 9) Change the I by using the Ohm's Law ($V = IR$) and fill these missing part of the equation below!

$$I_{\text{total}} = \quad +$$

$$\frac{V_{\text{total}}}{R_{\text{total}}} = \quad - + \quad -$$

Notes: you know that the value of V_{total} and V_1 are the same, so do the value of V_2 . So what can you do with the last equation above?

$$\frac{\quad}{R_{\text{total}}} = \quad - + \quad -$$

- 10) It is the formula to find the total resistance in parallel circuit!