KIRCHHOFF'S LAWS

OBJECTIVE

To calculate the currents in a multiloop circuit using Ohm's Law and comparing the results to those calculated with Kirchhoff's Current and Voltage Laws

EQUIPMENT

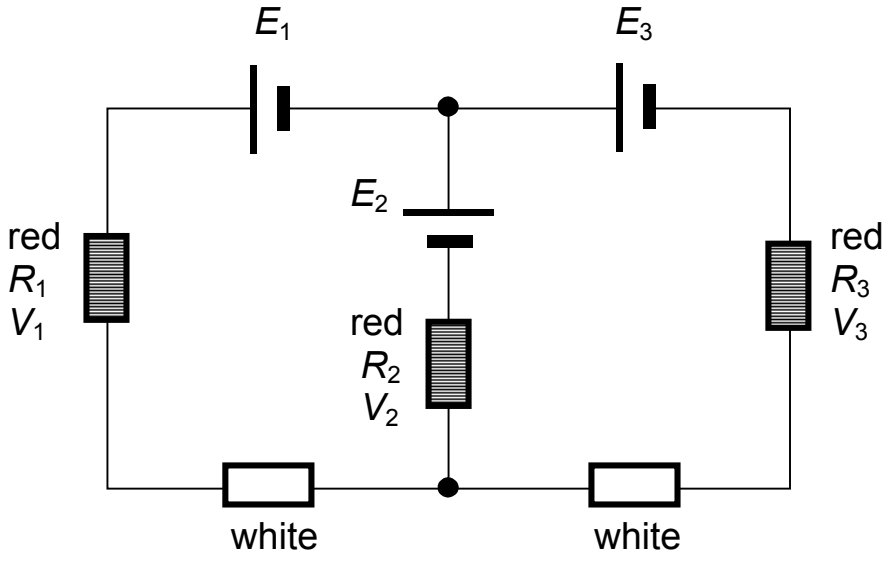
3 battery packs, circuit board, 2 white shunt connectors, 3 red 75-Ω resistive connectors, multimeter

THEORY

- Kirchhoff's Current Law: $\Sigma I = 0$ at any node.
- Kirchhoff's Voltage Law: $\Sigma V = 0$ around any loop.
- Ohm's Law: $V = IR$ for any resistor.

PROCEDURE

1) Measure the resistance of each red connector (R_1, R_2, R_3).
2) Set up the circuit shown below.
3) Measure the terminal voltage across each battery pack (E_1, E_2, E_3) while they are powering the circuit board.
4) Measure the voltages across the red connectors (V_1, V_2, V_3) and calculate their currents using Ohm's Law: $I_1 = V_1/R_1$, $I_2 = V_2/R_2$, $I_3 = V_3/R_3$.
5) Use Kirchhoff's Laws to calculate the currents I_1, I_2, and I_3 using only resistances R_1, R_2, R_3 and terminal voltages E_1, E_2, E_3.
6) Compute the percent discrepancy between your results in Steps 4 and 5.



Name _____ **Date** _____

Partners _____

_____

KIRCHHOFF'S LAWS DATA SHEET

Ohm's Law results:

R_1 = _____ Ω	V_1 = _____ V	I_1 = _____ A
R_2 = _____ Ω	V_2 = _____ V	I_2 = _____ A
R_3 = _____ Ω	V_3 = _____ V	I_3 = _____ A

Terminal voltages:

E_1 = _____ V	E_2 = _____ V	E_3 = _____ V

Show your Kirchhoff's Laws calculations on a separate sheet. Staple it to this sheet when you turn in your work.

Final Results:

Currents	Ohm's Law	Kirchhoff's Laws	% discrepancy
I_1			
I_2			
I_3			

Use % discrepancy = $\dfrac{100 \cdot |Meas - Theo|}{Theo}$

where *Meas* = Ohm's Law currents, and *Theo* = Kirchhoff's Laws currents