SERIES & PARALLEL RESISTORS

OBJECTIVE

To explore the relationship between voltage and current in networks of resistors connected in series and parallel. By the end of the lab you should have constructed **five** simple circuits.

PROCEDURE

Step 1:

a) Construct a circuit with two - 1 kΩ resistor in parallel.

- Record the current through, and voltage across, each resistor as well as the entire network.
- Using the ohmmeter, measure the equivalent resistance of the resistor's network.

b) Repeat for the two - 1 kΩ resistor in series.

Step 2:

It is possible to construct several networks containing series and/or parallel combinations of resistors that all have the same equivalent resistance.

a) Construct a network with a total resistance of 250 Ω from two 1 kΩ resistors and one 500 Ω resistor

- Using the ohmmeter, measure the equivalent resistance of the resistor's network.
- Record the current through and voltage across each resistor, as well as the entire network.

b) Construct a network with a total resistance of 250 Ω from three 500 Ω resistors and one 1 kΩ resistor. Repeat your measurements.

Step 3:

Construct a network with a total resistance of 1 kΩ from two 1 kΩ resistors and one 500 Ω resistor. Repeat your measurements.

GRAPHS AND DIAGRAMS

Make schematic diagrams of each configuration.

QUESTIONS AND CALCULATIONS

For each configuration:

1. **Using the given values of the resistors,** compute the theoretical equivalent resistance. **Compare** the measured value obtained with the ohmmeter to that theoretical equivalent resistance.
2. **Using Ohm's law**, verify that the measured currents and voltages matches the given values of each resistors, as well as the theoretical equivalent resistance.

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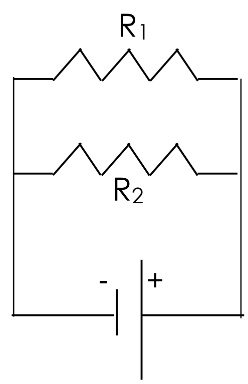
DATA SHEETS

Step 1 a) two - 1 kΩ resistor in parallel

Circuit diagram:



R_1 = 1 kΩ R_2 = 1 kΩ

	Current (mA)	Voltage (V)
R_1		
R_2		
Battery		

	Given value	Measured value
R_{eq} (Ω)	500	

Step 1 b) two - 1 kΩ resistor in series

Circuit diagram:

R_1 = 1 kΩ R_2 = 1 kΩ

	Current (mA)	Voltage (V)
R_1		
R_2		
Battery		

	Given value	Measured value
R_{eq} (Ω)	2000	

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Step 2 a) two 1 kΩ resistors and one 500 Ω resistor

Circuit diagram:

R_1 = 1 kΩ R_2 = 1 kΩ R_3 = 500 Ω

	Current (mA)	Voltage (V)
R_1		
R_2		
R_3		
Battery		

	Given value	Measured value
R_{eq} (Ω)	250	

Step 2 b) one 1 kΩ resistor and three 500 Ω resistors

Circuit diagram:

R_1 = 1 kΩ R_2 = 500 Ω

R_3 = 500 Ω R_4 = 500 Ω

	Current (mA)	Voltage (V)
R_1		
R_2		
R_3		
R_4		
Battery		

	Given value	Measured value
R_{eq} (Ω)	250	

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Step 3 two 1 kΩ resistors and one 500 Ω resistor

Circuit diagram:

R_1 = 1 kΩ R_2 = 1 kΩ R_3 = 500 Ω

	Current (mA)	Voltage (V)
R_1		
R_2		
R_3		
Battery		

	Given value	Measured value
R_{eq} (Ω)	1000	