

Variable Resistors in Series Circuits

Purpose: To create a circuit using a variable resistor and measure the changes in current and potential difference across resistors in the circuit

Equipment Needed:

- Multimeter and electrical circuits box that contains:
- (1) Variable Resistor
- (2) small light bulbs
- (1) battery pack with 1.5 volt batteries

Part I:

1. Make a series circuit including (2) light bulbs, the variable resistor and both batteries wired in series.
2. Turn the variable resistor on so that the light bulbs are fully lit as bright as they can be
3. Record the total voltage drop in the circuit (to do this place the multimeter probes at the beginning of the first resistor in the circuit and at the end of the last resistor in the circuit. Place this reading here:
 - a. Total Voltage drop: _____ Volts
4. Measure the voltage drops across each light bulb and the variable resistor and place these readings in the spaces below:
 - a. Voltage drop across light bulb #1: _____ Volts
 - b. Voltage drop across light bulb #2: _____ Volts
 - c. Voltage drop across the variable resistor: _____ Volts
 - d. Do these drops add up to the total recorded in 3a? _____
5. Change the settings in the multimeter to amps or milliamps, place the multimeter in series in the circuit and record the total current flowing in the circuit. Record the total current below:
 - a. Total current in the circuit: _____ (amps or milliamps; circle one)

Part II: Turn the variable resistor down so that the lightbulbs are just barely glowing and answer the questions that follow.

6. Make a series circuit including (2) light bulbs, the variable resistor and both batteries wired in series.
7. Record the total voltage drop in the circuit (to do this place the multimeter probes at the beginning of the first resistor in the circuit and at the end of the last resistor in the circuit. Place this reading here:
 - a. Total Voltage drop: _____ Volts

8. Measure the voltage drops across each light bulb and the variable resistor and place these readings in the spaces below:
- a. Voltage drop across light bulb #1: _____ Volts
 - b. Voltage drop across light bulb #2: _____ Volts
 - c. Voltage drop across the variable resistor: _____ Volts
 - d. Do these drops add up to the total recorded in 7a? _____
9. Change the settings in the multimeter to amps or milliamps, place the multimeter in series in the circuit and record the total current flowing in the circuit. Record the total current below:
- a. Total current in the circuit: _____ (amps or milliamps; circle one)

Questions: What differences did you notice by changing the setting on the variable resistor? State three observations:

- a. _____
- b. _____
- c. _____

Did changing the variable resistor affect the total of the voltage drops? Explain your reasoning.

Draw the circuit you and your partner made using the symbols from the reference table.