

## Two Resistors in Series and in Parallel

Purpose: to determine the effect of series and parallel arrangements on current flow, voltage, and combined resistance for a circuit

Equipment needed per group:

- 1 power supply
- 1 variable resistor aka rheostat aka potentiometer aka "pot"
- 1 multimeter
- 1 voltmeter
- 2 resistors
  - resistor 1 has a **red** dot
  - resistor 2 has a **blue** dot
- 1 LabQuest with current probes or two ammeters
- 5 red patch cords
- 4 black patch cords
- 1 yellow patch cord
- 2 washers

Procedure:

Measure the resistance of resistor 1 with the ohmmeter and record this resistance rounded to the nearest 10 ohms. Do the same for resistor 2. Connect the two resistors in series and measure the resistance of the combination. Reconnect the two resistors in parallel and measure the resistance of the combination.

### Two resistors in series

Build the circuit for two resistors in series. Do not plug in the power supply until the teacher has approved your circuit. Rotate the shaft of the variable resistor **clockwise** as far as the shaft will rotate. Connect the red patch cord of the voltmeter at point A. Attach the black patch cord of the voltmeter at point D. Plug in the power supply, turn on the power supply and adjust the variable resistor until the reading on the voltmeter is about 5 volts (between 4.5 V and 5.5 V). Record this voltage as the voltage across the combination. Record the current reading from the ammeter as the current through the combination. Record the current through resistor 1 and the current through resistor 2 from the LabQuest readout. **Do not turn the power supply off nor change the variable resistor during the disconnect-reattach sequence that follows!** Disconnect the black voltmeter patch cord and reattach the black cord at point B. Record the reading on the voltmeter. Disconnect the voltmeter patch cords and reattach the red cord at point C and the black cord at point D. Record the reading on the voltmeter. Turn off the power supply and unplug the power supply.

### Two resistors in parallel

Build the circuit for two resistors in parallel. Rotate the shaft of the variable resistor **clockwise** as far as the shaft will rotate. Connect the red patch cord of the voltmeter to washer P. Attach the black patch cord of the voltmeter to washer N. Do not plug in the power supply until the teacher has approved your circuit. Plug in the power supply, turn on the power supply and adjust the variable resistor until the reading on the voltmeter is about 5 volts (between 4.5 V and 5.5 V). Record this voltage as the voltage across the combination. Record the current reading from the ammeter as the current through the combination. Record the current through resistor 1 and the current through resistor 2 from the LabQuest readout. **Do not turn the power supply off nor change the variable resistor during the disconnect-reattach sequence that follows!** Disconnect the voltmeter patch cords and reattach the red cord at point B and the black cord at point D. Record the reading on the voltmeter. Disconnect the voltmeter patch cords and reattach the red cord at point A and the black cord at point C. Record the reading on the voltmeter. Turn off the power supply and unplug the power supply.

Disassemble the circuit and return the components to the locations where you got them.