

Design Your Own

OBJECTIVES

- **Measure** current in and potential difference across resistors in series and in parallel.
- **Find** the unknown resistances of two resistors.
- **Calculate** equivalent resistances.
- **Analyze** the relationships between potential difference, current, and resistance in a circuit.

MATERIALS LIST

- 2 multimeters, or 1 dc ammeter and 1 voltmeter
- 2 resistors
- insulated connecting wire
- power supply
- switch

Resistors in Series and in Parallel

In this lab, you will design an experiment to compare the circuits created by wiring two unknown resistors first in series and then in parallel. By taking measurements of the current in and the potential difference (voltage) across the resistors, and the potential difference across the whole circuit, you will find the value of the resistance of each resistor and the equivalent resistance for both resistors to compare the total current in each of the two circuits.

SAFETY



- **Never close a circuit until it has been approved by your teacher.**
- **Never rewire or adjust any element of a closed circuit.**
- **Never work with electricity near water; be sure the floor and all work surfaces are dry.**
- **If the pointer on any kind of meter moves off scale, open the circuit immediately by opening the switch.**
- **Do not attempt this exercise with any batteries or electrical devices other than those provided by your teacher for this purpose.**
- **Use a hot mitt to handle resistors, light sources, and other equipment that may be hot. Allow all equipment to cool before storing it.**

PROCEDURE

1. Study the materials provided, and design an experiment to meet the goals stated above. If you are not certain how to use the power supply, the meters, or any of the other materials, ask your teacher for help.
2. Write out your lab procedure, including a detailed description of the measurements to take during each step. You may use **Figure 1** and **Figure 2** as guides to possible setups. The dc power supplies should be set to about 5.0 V when you are taking measurements.
3. Ask your teacher to approve your procedure.
4. Follow all steps of your procedure. **IMPORTANT: Your teacher must approve your circuit before you turn on the power supply in any step. Always open the switch immediately after you have taken measurements. Do not change the circuit or any of the meter connections**