CHAPTER 17

Skills Practice Lab

Current and Resistance

OBJECTIVES

- **Determine** the resistance of conductors, using the definition of resistance.
- **Explore** the relationships between length, diameter, material, and the resistance of a conductor.

MATERIALS LIST

- **2 multimeters or 1 dc ammeter and 1 voltmeter**
- **insulated connecting wire**
- **momentary contact switch**
- **mounted resistance coils**
- **power supply**

In this experiment, you will study the effects of length, cross-sectional area, and material on the resistance of conductors. You will use a set of mounted resistance coils, which will provide wire coils of different lengths, diameters, and metals. You will measure the potential difference across the resistance coil, and you will find the current in the conductor. Then you will use these values to calculate the resistance of each resistance coil using the definition of resistance.

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

Preparation

1. Read the entire lab, and plan what steps you will take.
2. If you are not using a datasheet provided by your teacher, prepare a data table in your lab notebook with seven columns and six rows. Label the first through seventh columns *Trial, Metal, Gauge Number, Length (cm), Cross-sectional Area* (cm^2), ΔV_x *(V),* and *I (A).* In the first column, label the second through sixth rows *1, 2, 3, 4,* and *5.*

Current at Varied Resistances

3. Set up the apparatus as shown in **Figure 1.** Construct a circuit that includes a power supply, a switch, a current meter, a voltmeter, and the mounted resistance coils. ***Do not turn on the power supply. Do not close the switch until your teacher has approved your circuit.***