Skills Practice

What You'll Do

- Construct parallel and series circuits.
- Predict voltage and current by using the resistance law.
- Measure voltage, current, and resistance.

What You'll Need

battery, dry-cell battery holder multimeter resistors (2) tape, masking wires, connecting (5)

Safety



Constructing Electric Circuits

The current that flows through an electric circuit depends on voltage and resistance. All these factors are dependent on one another. In this lab, you will make circuits using different configurations of resistors and batteries to see how the voltage and current depend on them.

Procedure

Preparing for Your Experiment

- In this laboratory exercise, you will use an instrument called a *multimeter* to measure voltage, current, and resistance. Your teacher will demonstrate how to use the multimeter to make each type of measurement.
- As you read the steps listed below, refer to the diagrams for help making the measurements. Write down your predictions and measurements in your lab notebook. CAUTION: Handle the wires only where they are insulated.

Circuits with a Single Resistor

- Using the multimeter, measure the resistance in ohms of one of the resistors. Write the resistance on a small piece of masking tape, and tape it to the resistor. Repeat for the other resistor.
- Use the resistance equation, R = V/I, to predict the current in amps that will be in a circuit consisting of one of the resistors and one battery. (Hint: You must rearrange the equation to solve for current.)
- 5 Test your prediction by building the circuit. Do the same for the other resistor.



Circuits with Two Resistors in Series

Measure the total resistance across both resistors when they are connected in series.



 Using the total resistance that you measured, predict the current that will be in a circuit consisting of one battery and both resistors in series. Test your prediction.



Using the current that you measured, predict the voltage across each resistor in the circuit that you just built. Test your prediction.

Circuits with Two Resistors in Parallel

Measure the total resistance across both resistors when they are connected in parallel.



Using the total resistance that you measured, predict the total current that will be in an entire circuit consisting of one battery and both resistors in parallel. Test your prediction.



Predict the current that will be in each resistor individually in the circuit that you just built. Test your prediction.

Analysis

- 1. **Describing Events** If you have a circuit consisting of one battery and one resistor, what happens to the current if you double the resistance?
- 2. **Describing Events** What happens to the current if you add a second, identical battery in series with the first battery?
- **3. Describing Events** What happens to the current if you add a second resistor in parallel with the first resistor?

Communicating Your Results

- **4. Drawing Conclusions** Suppose that you have a circuit consisting of one battery plus a 10 Ω resistor and a 5 Ω resistor in series. Which resistor will have the greater voltage across it?
- 5. Drawing Conclusions Suppose that you have a circuit consisting of one battery plus a 10 Ω resistor and a 5 Ω resistor in parallel. Which resistor will have more current in it?

Extension

Suppose that someone tells you that you can make the battery in a circuit last longer by adding more resistors in parallel. Is this statement correct? Explain your reasoning.