Exhibit B
Getting Started

Discussion

Some questions you may want to ask your students are:

1. What things can you list that have to do with electricity? Students may identify a variety of electrical appliances. They may also say lightning, electric sockets, wires, and transmission towers.

2. Which of the things you listed are similar to each other? How? Students should find relationships among the items they listed in response to question 1.

3. Where is the safest place to be during an electrical storm? Why? Answers may vary. Students may be aware that out in the open, near a tall object such as a tree, or near water are hazardous places to be during an electrical storm. Students may suggest a car because the rubber tires act as insulators through which electric charge does not flow.

The way in which students answer these questions will help you to identify any misconceptions about electricity that they may have.

Suggested Materials

Magnets, a variety of items such as soft drink can tops, paper clips, rubber bands, paper, cloth, and screws.

Trouble Shooting

Some refrigerator magnets may not be strong enough for use in this activity. Hardware stores often sell strong rectangular magnets you may find more suitable for use than refrigerator magnets.

Purpose

To observe how a magnet affects different materials.

Background Information

A magnet has two poles, designated north and south. Opposite poles attract each other, but like poles repel. The attractive force around a magnet, in its magnetic field, is most powerful at the poles.

Electrical currents can produce magnetic fields. This phenomenon is used in some kinds of switches and in doorbells.

Try It!

1. Bring the magnet close to items such as paper clips, rubber bands, aluminum soft drink can tops, and paper. Based on your observations, write a general statement in your Science Journal describing what the magnet does.

2. Using the materials that were attracted by the magnet, place a sheet of paper between the magnet and materials. Do you notice any difference in the way the magnet works? In your Science Journal, describe what happens.

Answers to Questions

1. A magnet attracts certain metal objects and attracts or repels other magnets.

2. No. The magnet attracts the objects through the paper.

Try It Again

Some explanations and predictions may change.

Assessment

Process

Have students make a data table and classify the objects according to whether or not they were attracted to the magnet. Use the Performance Task Assessment List for Data Table in PASC, p. 27.
# Chapter 1 Electricity

## TEACHER CLASSROOM RESOURCES

<table>
<thead>
<tr>
<th>Student Masters</th>
<th>Transparencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study Guide</strong>, p. 7 - Homework</td>
<td>Teaching Transparency 1, Like and Unlike Charges</td>
</tr>
<tr>
<td><strong>Making Connections: Technology &amp; Society</strong>, p. 5</td>
<td><strong>Section Focus Transparency 1</strong></td>
</tr>
<tr>
<td><strong>Science Discovery Activities</strong>, 1-1</td>
<td></td>
</tr>
<tr>
<td><strong>Laboratory Manual</strong>, pp. 1–2, Electrical Charges</td>
<td></td>
</tr>
<tr>
<td><strong>Activity Masters</strong>, Design Your Own Investigation 1-1, pp. 7–8</td>
<td></td>
</tr>
<tr>
<td><strong>Study Guide</strong>, p. 8</td>
<td>Section Focus Transparency 2</td>
</tr>
<tr>
<td><strong>Critical Thinking/Problem Solving</strong>, p. 9</td>
<td></td>
</tr>
<tr>
<td><strong>Take Home Activities</strong>, p. 6</td>
<td></td>
</tr>
<tr>
<td><strong>How It Works</strong>, p. 5</td>
<td></td>
</tr>
<tr>
<td><strong>Study Guide</strong>, p. 9</td>
<td>Teaching Transparency 2, Series and Parallel Circuits</td>
</tr>
<tr>
<td><strong>Multicultural Connections</strong>, pp. 5, 6</td>
<td><strong>Section Focus Transparency 3</strong></td>
</tr>
<tr>
<td><strong>Making Connections: Integrating Sciences</strong>, p. 5</td>
<td></td>
</tr>
<tr>
<td><strong>Critical Thinking/Problem Solving</strong>, p. 5</td>
<td></td>
</tr>
<tr>
<td><strong>Science Discovery Activities</strong>, 1–2, 1–3</td>
<td></td>
</tr>
<tr>
<td><strong>Laboratory Manual</strong>, pp. 3–4, Wet-cell Battery</td>
<td></td>
</tr>
<tr>
<td><strong>Study Guide</strong>, p. 10</td>
<td>Section Focus Transparency 4</td>
</tr>
<tr>
<td><strong>Making Connections: Across the Curriculum</strong>, p. 5</td>
<td></td>
</tr>
<tr>
<td><strong>Concept Mapping</strong>, p. 9</td>
<td></td>
</tr>
<tr>
<td><strong>Activity Masters</strong>, Investigate 1–2, pp. 9–10</td>
<td></td>
</tr>
</tbody>
</table>

## ASSESSMENT RESOURCES

- Review and Assessment, pp. 3–10
- Performance Assessment
- BLAST!
- Mindjogger Videoquiz
- Alternate Assessment in the Science Classroom
- Computer Test Bank

## TEACHING & TECHNOLOGY

- Spanish Resources
- Cooperative Learning Resource Guide
- Lab and Safety Skills
- Science Interactions, Course 3, CD-ROM
- Computer Competency Activities

*Performance Assessment in the Science Classroom*
Chapter 1 Electricity

REVIEW AND REINFORCEMENT

Study Guide*

Concept Mapping

Critical Thinking/Problem Solving

ENRICHMENT AND APPLICATION

Integrating Sciences

Across the Curriculum

Technology and Society

Multicultural Connection**

Performance Assessment

Review and Assessment

* Study Guide

** Multicultural Connection

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**Note:** The images include diagrams and text that would be difficult to transcribe accurately. The text is primarily educational content related to electricity, with sections on study guides, concept mapping, critical thinking, integrating sciences, across the curriculum, technology and society, performance assessment, and review and assessment.
EXPLORE! ACTIVITY

Can a comb pick up paper?

What To Do
- Take a small plastic comb and hold it over several tiny scraps of paper.
- Slowly hold a piece of dry, wool cloth along several times with the other hand.
- Hold the comb over the scraps of paper. What happens?
- Can the comb produce a force that overcomes gravity? Why does the paper not stick to the comb after brushing with wool?
- In your journal, explain how you think these things happen.

EX: - COMB + HAIR - BLASTING
- BALLOON + HAIR - STATIC
- DRYER - TRAMBLER
- CARPET + PETS?

ASSESSMENT PLANNER

PORTFOLIO
Refer to page 47 for suggested items that students might select for their portfolios.

PERFORMANCE ASSESSMENT
- Process, pp. 21, 22, 25, 33, 37, 39, 40
- "Share! Activities, pp. 21, 29
- "What's Out! Activities, pp. 22, 27, 32, 35, 37, 40
- Investigate, pp. 24–25, 38–39

CONTENT ASSESSMENT
- Oral, pp. 27, 29
- Check Your Understanding, pp. 26, 30, 35, 41
- Reviewing Main Ideas, p. 45
- Chapter Review, pp. 46–47

GROUP ASSESSMENT
Opportunities for group assessment occur with Cooperative Learning Strategies.
1 Motivate

Bellringer

Before presenting the lesson, display Section Focus Transparency I on an overhead projector. Assign the accompanying Focus Activity worksheet.

Demonstration

Play the song “Opposites Attract” by Paula Abdul as students come into the room. Ask students to relate the main phrase of the song to the information in this section.

2 Teach

Tying to Previous Knowledge

Have students recall past observations by describing what can happen if you touch a door-knob after walking across a carpet. They may reply that you get a shock. Explain that friction between the carpet and shoes induces a net charge. The electric shock is a static discharge, or “loss” of static electricity.

Theme Connection

In their study of this section, students will be exposed to the theme of scale and structure. Students will experiment with charged objects to see how charges interact. This macroscopic scale is appropriate for students who have not yet studied atomic structure. You may wish to point out, however, that it is also possible to study charge on a much smaller scale, that of individually charged particles.

Content Background

Objects become charged through the transfer of negatively charged particles (electrons). If an object gains these particles, it becomes negatively charged. If it loses these particles, it becomes positively charged. (Because students have not yet learned about atomic structure, refer to the movement of “particles” rather than “electrons.”)

What To Do

1. Fold over about 5 mm on the end of the tape for a handle. Then tear off a strip 8 to 10 cm long. Stick the strip on a dry, smooth surface, such as your desktop. Make a second strip and stick it on top of the first.

2. Quickly pull both pieces off the desk and pull them apart. Then bring the strips close together. Observe what happens.

3. Now make two new strips of tape, but this time press each one onto the desk. Then pull them off and bring the two strips close together. What happens?

At this point – make a hypothesis – write down conjecture and apply

4. What happened when you brought the first pair of tapes close together? What happened when you brought the second pair together?

5. What did you do that might have caused the two different reactions?

When you pulled the strips of tape from the desk, you caused them to have an electrical charge. An electrical charge is a concentration of electricity. By sticking one strip on top of the other, you treated the two strips differently. Each strip had an excess of different charges. Unlike charges attract one another. When you prepared the strips the same way, they received like charges. Like charges repel one another.

You can learn more about different types of charge produced by various materials in the Investigate activity on the next page.

Figure 1-2

The two effects you saw in the Find Out activity showed you that there must be at least two different kinds of charge. Like the tape strips you prepared, the rods with like charges repel one another and those with unlike charges attract one another.

Program Resources

Study Guide, p. 7
Teaching Transparency 1
Section Focus Transparency 1
Plan the Experiment

1. Prepare a data table in your Science Journal or in a database on the computer for the objects and fabrics you will test.

2. Will you test more than one kind of object? Will you use more than one fabric? Yes

Check the Plan

1. How will you make the cellophane tape charge detectors? How will you distinguish between the two detectors?

2. How will you charge the objects? Friction, Rub, Static Treat

Plan close to How will you use the tape detector to check for charge? Will you use both pieces of tape? Yes

3. Watch for the strength of the attraction. Does one combination of fabric and object make a stronger charge? Are the detectors attracted to the objects or fabrics if they are not rubbed together?

4. Write out your plan and check it with your teacher. Make any suggested changes and carry out your experiment.

Analyze and Conclude

Analyze: How many different kinds of charge did you differentiate?

Compare: Compare the charges on the object and the fabric. Are they alike or different? Was your hypothesis accurate?

Identify: Was there any material that did not become charged? If so, identify the material. Why was it not charged?

Conclude: When an electrical charge is produced by rubbing, are the charges always opposite?

Going Further

A plastic comb is rubbed with a piece of wool and is suspended from a string. What will happen if a glass object that has been rubbed with silk is brought near the comb?

Van de Graaf - do with H2O (water)

- always because of four bonds
- with a charged comb = it should attract the H2O
- van de Graaf - is like a "cloud" or net, charges on the outside of your body
- and on wooden clear = hair will rise.

ENRICHMENT

Research: Have students work in groups and use reference materials to investigate Coulomb's law - the relationship among the electric charge and distance between two charged objects.

Evaluating: Students can predict the effect of changes in the law similar to Newton's law of gravitation.
Electrical Charges

In the last section, you observed that electrical charges may be positive (+) or negative (-). What type of material moves charges from one to another? Do all materials attract each other? Do electrical charges stay put on some materials? You can answer this question by combining and expanding two activities from Section 1-1.

Find Out! ACTIVITY

Do electrical charges stay put?

As you've observed, electrical charges move to and from objects. What controls that movement?

What To Do

1. Charge a plastic comb by rubbing one end of it with a piece of wool while holding it by the other end. Bring it close to a tape charge detector.
2. Now, with your finger, touch the comb on the end you charged. Bring the comb near the charge detector again.

Conclude and Apply

1. In your journal, describe what happened the first time you brought the comb near the charge detector.
2. What happened the second time you brought the comb to the charge detector?
3. What happened to the electrical charge?

In the Find Out activity above, you observed that the comb held a charge until you touched the charged end. Electrical charges don't move freely from one place to another through some materials such as plastic. If the charges had been able to move in the comb, you wouldn't have had to touch its other end to remove the charges. A material in which electrical charges do not move freely from place to place is called an insulator.

Teaching the Activity

Troubleshooting: Experiments with static electricity work best on dry, cool days.

Science Journal: Ask students to write predictions of what will happen.

Expected Outcome

Students should observe that the comb held the charge until they touched the charged end.

Preparation

Planning the Lesson

Refer to the Chapter Organizer on pages 20A–D.

Concepts Developed

Students observe how charges move freely through conductors, but not through insulators.

1 Motivate

Bellringer

Display Section Focus Transparency 2 on an overhead projector and assign the accompanying Focus Activity worksheet.

Student Text Questions

What types of material move charges from one place to another? Do all materials move charges in the same way? Do electrical charges stay put on some materials? Yes
**Teaching the Activity**

**Science Journal** Encourage students to draw diagrams showing the transfer of charge between the wool and balloon and the foil.

**Expected Outcome**

Students should observe that the pieces of foil move toward the charged balloon and wool and conclude that the foil experienced a net attractive force. The metallic balloon does not attract the foil.

**Answers to Questions**

1. Yes.
2. Yes. In both cases, the bits of foil are attracted to the object because the opposite charges are closer than the like charges.
3. The shiny balloon did not attract the foil because the charge flowed around the balloon, through the person, and into the ground.

**Assessment**

**Oral** Ask students to propose a method for preventing the charge from flowing from the shiny balloon to the ground. The person could wear a rubber glove on the hand holding the balloon. Have students make a drawing showing how they think the balloon would interact with the foil. The balloon would hold the charge and attract the foil. Select the appropriate Performance Task Assessment List in PASC. 1b

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**Exploration Activity**

**What to Do**

Hold a balloon that has been given a negative charge by being rubbed with wool over a few small (less than 1 cm x 1 cm) strips of aluminum foil. Is the foil attracted to the negatively charged balloon?

Hold the positively charged wool over the foil. Is the result the same? Can you explain why?

Now, try the same experiment with a charged shiny metallic balloon like the one shown. What happens? In your journal, draw what you think happened and write a brief explanation.

The Explore activity showed that conductors are attracted to both positive and negative charges. The shiny balloon didn't hold a static charge because the thin layer of aluminum on the balloon is a conductor. The charge flowed around the balloon and through you to the ground.

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**Answers to Do You Think?**

1. Why do you think water animals use electricity in this way, while animals that live on land do not?

2. Why might it matter where the electrical impulses enter the body of an electric eel's prey?

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**Program Resources**

- **Study Guide,** p. 8
- **Critical Thinking/Problem Solving,** p. 9
- **Take Home Activities,** p. 6
- **How It Works,** p. 5
- **Section Focus Transparency 2**

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**2 Teach**

**Tying to Previous Knowledge**

Ask students if they have ever shuffled across a carpet or removed a sweater and then received a shock when they touched a doorknob. Did they get a second shock if they touched the doorknob again? No. What might have happened to the static charge? After the first shock, the body no longer carried a charge.
Moving Electrical Charges

During a thunderstorm, the charge jumping from cloud to cloud striking Earth produces a flash of light. Could you light a lamp this way? Probably not. The spark occurs for only an instant. A lamp needs energy from a continuous flow of charge to stay lit.

It takes energy to separate positive and negative charges. Till now, you’ve provided that energy either by rubbing or pulling tape away from a desk top. There are more convenient ways to store that energy for use later. After you study the diagrams below, try making charges flow by doing the activity on the next page.

**Figure 1-6**

**Water Wheel**

Continuous flow of electrical charge can be maintained in the same way that water in the diagram below is made to flow.

**A** The water pump works against gravity, lifting water into the reservoir. The potential energy added by the pump does work as the water escapes and turns the water wheel.

**B** Electrical charges can be made to flow and do work in much the same way as water. A chemical reaction in a battery adds potential energy as it separates charges. Charges move along a conducting wire. The potential energy does work as it lights a light bulb. What forms of energy do we use electricity to produce?

**Potential Difference**

- Source of electricity
- Light bulb
- Wire
- Direction of current flow

Section Objectives
- State the function of a battery in a circuit.
- Light a bulb using a battery.
- Explain the effect of resistance on the current in a circuit.

Key Terms
- potential difference
- circuit
- current
- resistance

**1 MOTIVATE**

**Bellringer**

**SWAT CLASS**

Before presenting the lesson, display Section Focus Transparency 3 on an overhead projector. Assign the accompanying Focus Activity worksheet.

**Demonstration**

Encourage the development of observation skills. Obtain a fresh lemon, a new penny, and a silver dime (one minted before 1965). Attach an alligator clip to each coin and insert the coins into the lemon about 2 cm apart. Use the leads from the coins to connect an LED to complete the circuit. Ask students what makes the LED light. (LEDs are available from scientific supply houses and electronics supply houses.)

**2 TEACH**

**Content Background**

In circuit diagrams, positive charges are often shown flowing through a circuit. This is called conventional current, which cannot be distinguished from real current in which electrons flow in the opposite direction.
When you made the battery light the bulb, you created a complete path through which charge flowed. Such a complete, or closed, path is called a circuit.

The rate at which charges flow through the lamp and wires is called electric current. Current is how much electric charge flows past a point in a circuit during a given time. It is measured in amperes (A).

The electric potential energy is the total stored energy of all the charges. The change in potential energy divided by the total charge is called the electric potential difference, or potential difference. The potential difference is measured in joules per coulomb (J/C) or volts (V).

**Visual Learning**

Figure 1-7: How can you tell? The light is brighter. What does this tell you about the effect of the switch on the current? Each of the three “On” positions of the switch allows more current to flow through the bulb.

**Find Out!**

Troubleshooting Tell students that the terminals of the battery are very important in this activity. Have one volunteer from each group point to the terminals while the rest of the group checks to make sure that the terminals have been identified correctly.

Science Journal Have students diagram the circuit showing where it has its greatest electrical potential.

**Expected Outcome**

Students should complete the circuit so that the bulb lights.

**Conclude and Apply**

1. Diagrams should include all items in the circuit, and should show negative charges leaving the battery and flowing through the circuit to light the bulb.

2. Like the pump, the battery maintains a difference in potential. The water does the work of turning the wheel as it flows down. The electric current does the work of lighting the bulb as the current moves through the circuit.

**Process**

Ask students to draw a diagram in their journals showing the energy changes that happen in the electrical circuit. Diagrams should show chemical energy in the battery changing to electrical potential energy which changes to light and heat energy in the bulb. Use the Performance Task Assessment List for Scientific Drawing in PASC, p. 55.
3 Assess

Check for Understanding

Assign questions 1 and 2 under Check Your Understanding. To help students answer question 3, have a volunteer state the relationship between current and resistance. Current and resistance are inversely related.

Reteach

Discussion To help students understand the concept of potential energy, use the analogy of an eraser on a desk. We say the eraser has potential energy because of its height. The potential energy changes when the eraser falls. The potential energy is being changed into other forms of energy such as the energy of motion as it falls and sound energy when it hits the floor.

In a battery, the potential energy at one terminal is greater than at the other. This makes it possible for electrons to move, or fall, through the circuit.

Extension

Discussion Have students describe parts of the human circulatory system. They will probably list heart, blood vessels, and blood. Ask them what is similar about the function of the heart in the circulatory system and the function of the battery in the circuits they made. Each is a pump. The heart pumps blood. The battery "pumps" charge.

4 Close

Discussion

Inform students that, in 1800, an Italian physicist named Alessandro Volta observed that two metals connected by a conducting liquid produced a continuous transfer of charges. Ask students how this phenomenon is different from static electricity. Static electricity does not move in a continuous flow; electric current does.
How does increasing voltage affect current?

Why do some flashlights have more D-cells than others? To find out, you’ll need two D-cells, wire, and two bulbs.

**What To Do**
1. Make a complete circuit with the two bulbs and one D-cell as shown. Observe the brightness of the bulbs.
2. Disconnect the circuit and add a second D-cell as shown. Be sure the D-cell connections match the photo before connecting the bulbs. Again, observe the brightness of the bulbs.

**Conclude and Apply**
*In your Journal, write to explain how the brightness in the first circuit compares with the brightness in the second circuit. Explain any differences.*

If a pump lifts water to an even higher level, the water will have to fall from a larger distance. Similarly, if a battery with a higher voltage is used, the potential drop across the bulb will be greater. How will this affect the current? We can investigate this with another water model.

**Program Resources**

**Study Guide**, p. 10
**Making Connections: Across the Curriculum**, p. 5, Prevent Electrical Hazards

**Multicultural Perspectives**

**Innovations in Science**
Meredith Gourdine, an African-American scientist, conducted research on producing high-voltage electricity from natural gas. His research may be applied to preserving foods, burning coal more efficiently, and desalination. He also won a silver medal in track at the 1932 Olympic Games.
Possible Procedures: After measuring the height of the apparatus, students can measure the time needed for 100 mL of water to flow into the lower beaker. Students should complete several trials, lowering the funnel for each trial. Students can also complete several trials using tubing of a smaller diameter. Students should record their measurements in a data table and write their observations in their journals.

Science Journal: Ask students to write a hypothesis in their journals about the effect of potential difference and resistance on the flow of water. Students should make sure that the experiments they design test their hypotheses.

Expected Outcome
By observing the model, students should infer that, with a constant voltage, increasing the resistance will decrease the current.

Answers to Analyzing/Concluding and Applying
1. Tables should organize funnel height, tube diameter, and measured time.
2. Rate of flow = 100 mL + measured time.
3. Graph should show that a large funnel height corresponds to a high rate of flow.
4. The trial with the greatest funnel height, as the diameter decreases, the rate of water flow decreases.
5. The trial with greatest funnel height; resistance.
6. The current should decrease. The current should increase.

Assessment
Process Have students imagine making a model using copper or steel wire, D-batteries, and a light bulb. Students should draw diagrams showing how current could be maximized by using these materials. Using more batteries and copper wire will maximize current. Additional batteries increase the voltage, and copper wire is a better conductor and therefore has less resistance than steel wire. Select the appropriate Performance Task Assessment List in PASC.
Ohm's Law

The relationship among current, resistance, and potential difference can be made quantitative by using measurements. We can say that current is equal to the potential difference divided by the resistance. The relationship can be expressed mathematically: \( I = \frac{V}{R} \).

Batteries are a source of potential energy waiting to do work in a flashlight or tape player. Lights and appliances use the properties of resistance, voltage, and current.

**Check your Understanding**

1. Two flashlight bulbs are powered by separate, identical 9-volt batteries. One bulb is dimmer. What does that imply about the resistance of the bulbs? How do the currents in the two circuits compare?

2. A piece of carbon, resistance 18Ω, is connected to a 12-V battery. Find the current in the carbon. What would be the current if a 6-V battery were used?

3. Apply A length of wire is cut in half, forming two shorter wires. How does the resistance of each half compare to that of the original wire? If the two short wires are placed side by side and twisted together, how does the resistance of the combination compare to the resistance of one short wire? How could you test your answers to these questions?

**4 Close**

Explain that there are two main ways the parts of a circuit can be connected. Ask students to suggest different ways to arrange the elements of a circuit.
Ever since Thomas Edison patented the light bulb, people have been trying to improve it.

One of the first to improve the light bulb was Lewis Howard Latimer. Latimer, a self-taught draftsman, worked for Alexander Graham Bell in the 1870s. Latimer’s ability to draw detailed diagrams of complex electrical devices was invaluable. He drew the plans for Bell that resulted in the 1876 patent of the telephone.

Latimer first became associated with Thomas Edison when Edison patented the first incandescent bulb in 1879. Latimer set about making it better. His improved method for securing the carbon filament to metal wires inside the vacuum bulb was patented in 1881. Latimer continued to work on the incandescent bulb and in 1882 received what he considered his most important patent. He improved the process for producing the carbon filaments used in light bulbs.

Latimer was the only African American invited to join the Edison Pioneers, a group of scientists and inventors who worked for Edison. He was asked to supervise the installation of electrical streetlights in New York City, Philadelphia, and London.

**Making Better Light Bulbs**

The part of a modern light bulb that lights up is the thin tungsten wire, the filament, in the center. When an electric current passes through it, it glows. Unfortunately, some of the tungsten molecules get so hot that they vaporize, leaving the wire and adhering to the glass bulb. When enough tungsten has left the filament, the light bulb dies.

In newer bulbs, krypton gas may be used. A light bulb full of krypton gas stays relatively cool, so less tungsten gets hot enough to leave the filament. This makes the light bulb last longer at the same brightness.

If brightness is more important than long life, the krypton-filled bulb can be operated at higher filament temperatures to give a brighter light more efficiently than non-krypton-filled bulbs. Brighter krypton bulbs are used in slide and movie projectors.

One vital use for krypton light bulbs is illuminating airport runways at night. Electric-arc lights filled with krypton pierce fog for 300 meters (1000 feet) or more.

**What Do You Think?**

Think of several other places on Earth or in the solar system where krypton bulbs’ greater brightness or longer life might be useful.

- Example: **Making a Light Bulb—Carbon (Graphite)**

**Going Further**

Help students learn to communicate their research by working in small groups to research and report on Thomas Edison’s invention of the light bulb or on Edison’s research group, The Edison Pioneers. Assign two group members the task of doing research. Assign one or two other students in each group the task of organizing the research, and one student per group the task of making an oral presentation to the class.

**GLENCOE TECHNOLOGY**

_The Infinite Voyage: Miracles by Design_

Chapter 6
New Ceramics: New Uses

Chapter 7
Ceramic Superconductors: Rapid Transportation
Science Journal

Review the statements below about the big ideas presented in this chapter, and answer the questions. Then, reread your answers to the Did you Ever Wonder questions at the beginning of the chapter.

Your Science Journal, write a paragraph about how your understanding of the big ideas in the chapter has changed.

1. There are two kinds of electrical charges, positive and negative. How could you tell if a charge was positive or negative?

2. Electric charges can move easily through conductors, but not through insulators. How could you tell if an object is an insulator or a conductor?

3. Electrical charges flow through a circuit and do work by changing potential energy into other forms of energy. What role does a battery play in an electrical circuit?

4. The three requirements of a circuit are a complete path, a source of potential difference, and resistance. Resistance depends on the material of the conductor as well as its length and thickness. What does resistance describe?

Teaching Strategies

Have students work in groups of four to answer the question that goes with each main idea and illustration. Tell groups to explain the concept that their photograph or diagram illustrates by suggesting another way that the same concept could be illustrated.

Students can also work in pairs to select one of the images and create a poster from it. Encourage students to recreate the drawing or photograph as a picture and add a paragraph of explanation.

Answers to Questions

1. One could find out by comparing the unknown charge to a charge of known sign. How the unknown interacts with the known charge reveals what sign it is. Unlike charges attract one another and like charges repel one another.

2. If an object closes a gap in a circuit and current then flows through the circuit, the object is a conductor.

3. A battery is a source of potential energy. It separates positive and negative charges by a chemical reaction.

4. Resistance is a measure of how much potential energy is lost as current flows through a material. Very low resistance indicates a good conductor, and very high resistance indicates a poor conductor.

ScienCe Journal

Did you ever wonder...

- Static cling is the attraction of opposite charges on two pieces of clothes that have just been dried in a dryer. (p. 24)
- Chemical reactions, similar to those produced in a battery, make electric eels electric. (pp. 28–29)
- One safe place to be is inside a car, because the charge would flow over the outside and to the ground. (pp. 28–29, 33)

Project

Have students use reference materials to research the origin and history of lightning rods. Tell them to relate their findings in a poster or written report. Display completed reports on a bulletin board titled Safe Inside. Select the appropriate Performance Task Assessment List in PASC. [11]

Mindjogger Videoquiz

Chapter 1 Have students work in groups as they play the Videoquiz game to review key chapter concepts.
Critical Thinking

In your Journal, answer each of the following questions.

1. A bird can sit on a single power line wire without harm. Why? What would happen if the bird was to touch another wire of lower potential at the same time?
2. Signs often say “Danger - High Voltage.” Why don't they say “Danger - High Current”?
3. Electrical cords attached to a household appliance are constructed as shown in the diagram. Explain the materials used in this construction.

Problem Solving

Read the following problem and discuss your answers in a brief paragraph.

You are playing with your friends in a field. Suddenly, there is a bright flash of light. You know that a thunderstorm is coming and you had better take shelter. Nearby there is a metal building, a car, and a tree.

Which would be safe places to wait out the storm? Why? Which would be the most hazardous? Why?

Connecting Ideas

Discuss each of the following in a brief paragraph.

1. Theme—Energy After you receive a shock from a doorknob, touching it right away a second time probably will not produce a second shock. Why? What could you do to give yourself a shock a second time?
2. Theme—Systems and Interactions Many times a car will not start if one of its battery terminals is covered with corrosion. Why won’t the car start? How could it be fixed? What electrical property of the corrosion causes this problem?
3. A Closer Look Describe the role negatively charged particles play in producing lightning.
4. Science and Society What are two actions that you can take to decrease the hazard caused by discarded batteries?

Assessment

Portfolio Review the portfolio options that are provided throughout the chapter. Encourage students to select one product that demonstrates their best work for the chapter. Have students explain what they learned and why they chose this example for placement into their portfolios.

Additional portfolio options can be found in the following Teacher Classroom Resources:
- Making Connections: Integrating Sciences, p. 5

Multicultural Connections, pp. 5–6
- Making Connections: Across the Curriculum, p. 5
- Concept Mapping, p. 9
- Critical Thinking/Problem Solving, p. 9
- Take Home Activities, p. 6
- Laboratory Manual, pp. 1–2; 3–4
- Performance Assessment