Raising a thought-provoking question is a good way to assess the overall depth of understanding. A couple of suggestions are listed below:

1. Discuss the dangers involved with electricity and the basic safety measures that should be taken when using electrical devices.
2. Discuss the reasons why there are no real practical uses of static electricity.
3. Discuss how electricity moves and through what types of things it flows.

Follow-up Activities

- Using batteries, wires, bells or light bulbs, have children create closed circuits to ring the bell or light the bulb. Emphasize the fact that students should never experiment with electricity outside the classroom.
- After a discussion of simple circuits, have students replicate the investigation in which they test materials as potential conductors and insulators. Ask the children to make generalizations about conductors and insulators.
- Static electricity is always fascinating for children. Have children rub balloons against clothing to repel other balloons and to induce an electric charge on hair and other objects. Have them investigate other ways to collect and release static electricity.
- Researching lightning as an example of static electricity is also fascinating for children. Discuss Benjamin Franklin's invention, the lightning rod, and review safety suggestions to follow if caught out in an electric storm.

Internet Resources

Periodically, Internet Resources are updated on our Web site at www.libraryvideo.com

www.miamisci.org/af/sln/frankenstein/safety.html
At this Atoms Family site, a Science Learning Network resource, students learn about different forms of electricity and electrical safety.

www.dom.com/customer/safety/kidsafety/electric.html
This site offers basic facts about electricity and electrical safety for children in forms such as coloring pages, quizzes and puzzles.

TEACHER'S GUIDE

Suggested Print Resources

- Berger, Melvin. *Switch On, Switch Off.* HarperCollins, New York, NY; 1990.
- Gibson, Gary. *Understanding Electricity.* Millbrook Press, Brookfield, CT; 1996.
- Glover, David. *Batteries, Bulbs, and Wires.* Kingfisher Books, New York, NY; 1993.
- Cast, Vance. *Where Does Electricity Come From?* Barron's, Hauppauge, NY; 1992.

TEACHER'S GUIDE CONSULTANT

Conrad M. Follmer

25 years as a K–5 Science & Math Coordinator for a Pennsylvania public school system, currently an independent consultant to elementary schools.

TITLES

- **ALL ABOUT ELECTRICITY**
- **ALL ABOUT FLIGHT**
- **ALL ABOUT FORCES & GRAVITY**
- **ALL ABOUT LIGHT**
- **ALL ABOUT MAGNETS**
- **ALL ABOUT MOTION & BALANCE**
- **ALL ABOUT PROPERTIES OF MATTER**
- **ALL ABOUT SIMPLE MACHINES**
- **ALL ABOUT SOLIDS, LIQUIDS & GASES**
- **ALL ABOUT SOUND**
- **ALL ABOUT WAVES**

Teacher's Guides Included and Available Online at:

libraryvideo.com

800-843-3620

SCHLESSINGER MEDIA — A DIVISION OF LIBRARY VIDEO COMPANY

TEACHER'S GUIDE

Physical Science for Children™

All About Electricity

Grades K–4

This guide is a supplement, designed for educators to use when presenting this program in an instructional setting.

Before Viewing: Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create an "Everything We Know About…" list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they put on their list were scientifically accurate.

After Viewing: After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts they put on their "Everything We Know About…" list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.

SCHLESSINGER SCIENCE LIBRARY

Program Summary

From the moment we wake up in the morning, we start using electricity; the alarm clock, the lights, the hair dryer, the CD player and the refrigerator are all powered by electricity. But what is electricity, how is it generated and how does it flow to our homes and schools? Electricity is energy, which means that electricity can do work for us. Electricity comes from atoms, which are the tiny building blocks that make up all things. Atoms have an electric charge. The movement of electricity through wires is really the movement of electric charges from atoms being repelled by similar charges and attracted by opposite charges. This is called current electricity. Sometimes electrical charges don't flow, but just build up, waiting to be released in a zap when they find opposite charges. This can happen as you shuffle your slippers across a rug and then touch the door knob. This is called static electricity. Lightning is the same thing!

A conductor is a material that allows electricity to flow through it. Most metals are good conductors, and water is also a good conductor. Materials that don't allow electrons to flow through them are called insulators. Metal electric wires are usually covered in plastic because it is a good insulator. Insulators prevent the current from flowing into our bodies, but even with insulators, we must be very careful whenever we are working with electricity. Power plants generate large amounts of current electricity, which is sent through wires into our homes, schools and offices. Batteries are sources of electricity, too. Electricity does not flow unless a circuit is complete, or closed. In the science investigation, students experiment with different objects to see if they can make a closed circuit for electricity to flow from the battery, through the wire, into the light bulb and back to the battery. If that circle is broken, it is an open circuit, and the current will not flow.

Benjamin Franklin studied static electricity with his famous kite and key experiment in the late 1700s. Over one hundred years later, Thomas Edison worked with current electricity. He tried over 6,000 experiments before he perfected a light bulb that would be useful, and he also built the first electric power plant.

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the show.

energy — The ability to cause a change in something or move it. We use energy to do things like keep us warm and make our cars go.

atoms — The tiny particles that make up all matter.

electricity — Invisible energy that is made up of charged parts of atoms.

(Continued)

electric charge — An imbalance of atomic particles. Atoms are made of particles that have positive or negative charges; when they are balanced, there is no electrical charge. If there are extra electrons, there is a negative electric charge, and if the atoms are missing electrons, there is a positive electric charge.

attract — To pull together. When opposite charges are near each other, they pull together, or attract one another.

repel — To push away. When two similar charges are put together, they repel one another.

static electricity — A build-up of electrical charges that are released all at once when they find an object of the opposite charge. The spark that results releases the charges and returns the object to a neutral charge. Lightning is an powerful example of static electricity.

current — Electrical charges that flow through a conductor.

conductors — Materials that permit electricity to flow through them. Metals and water are good conductors.

insulators — Materials that do not carry electricity through them. Glass, plastic, and rubber are excellent insulators.

circuit — A pathway through which electricity moves that includes an energy source, like a battery or a generator; a device that uses electrical current, such as an electronic computer; and the wires that conduct the electricity. If a circuit is complete, it is considered closed, and energy will flow. If a circuit is broken, it is an open circuit, and no energy will flow.

solar panel — A special device that can turn light energy into electricity, often found in small electronic instruments like calculators.

Benjamin Franklin — (1706–1790) The American publisher, author, inventor and scientist, who discovered that lightning was electricity.

Pre-viewing Discussion

Before students generate their list of "Everything We Know About…" this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

1. What is electricity?
2. What do we use electricity for?
3. Where does electricity come from?

After the class has completed their "Everything We Know About…" list, and before watching the show, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered. ***(Continued)***

Focus Questions

You may wish to ask your class the following questions to assess their comprehension of key points presented in the program:

1. How many things can you name that are operated by electricity?
2. What do atoms have to do with electricity?
3. What causes electricity?
4. What is an electric charge?
5. What are the different types of electric charges?
6. What is meant by "opposite charges attract"?
7. How are electric charges like the poles of a magnet?
8. How does electricity move?
9. What kind of electricity is lightning an example of?
10. What is the difference between static electricity and current electricity?
11. What is a conductor?
12. What is an example of a good conductor?
13. Why are electric wires covered with a rubber or plastic coating?
14. What is an insulator?
15. What is an example of a good insulator?
16. Why can electricity be dangerous to humans?
17. Where do we get the electricity to operate our games and other devices?
18. What is an electrical circuit?
19. Why does an appliance turn off when we push the "off" switch? What kind of circuit is that?
20. What did Benjamin Franklin contribute to our understanding of electricity?
21. How did Thomas Edison change our world?

Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their "Everything We Know About…" list. Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised before viewing the program. ***(Continued)***