- **www.safeelectricity.org**
  This website offers numerous tips on the safe use of electricity for children and provides electricity-related links and resources for teachers.
- **whyfiles.larc.nasa.gov/text/kids/Problem_Board/problems/electricity/electricity2.html**
  The "Understanding Electricity" page from NASA offers concise explanations and illustrations of electrons, electron flow and electric current.

Suggested Print Resources

- Angliss, Sarah. *Electricity and Magnets.* Larousse Kingfisher Chambers, New York, NY; 2001.
- Brain, Marshall. *More How Stuff Works.* John Wiley & Sons, Hoboken, NJ; 2002.
- Macaulay, David. *The New Way Things Work.* Houghton Mifflin, New York, NY; 1998.
- Schanzer, Rosalyn. *How Ben Franklin Stole the Lightning.* Harper Collins, New York, NY; 2002.
- Tocci, Salvatore. *Experiments With Electricity (True Books).* Children's Press, New York, NY; 2002.

TEACHER'S GUIDE

Paula J. Bense, M.Ed.
Curriculum Specialist, Schlessinger Media

The Way Things Work Video Series includes these 26 programs:

- BALLOONING
- BELTS & GEARS
- COOLING
- ELECTRICITY
- ENGINES
- FLIGHT
- FLOATING
- FRICTION
- HEAT
- INCLINED PLANES
- LEVERS
- LIGHT
- MAGNETS
- MUSICAL INSTRUMENTS
- PHOTOGRAPHY
- PRESSURE
- PULLEYS
- PUMPS
- SCREWS
- SENSORS
- SINKING
- SOUND
- SPRINGS
- STEAM POWER
- TELECOMMUNICATIONS
- WHEELS & AXLES

Teacher's Guides Included and Available Online at:

libraryvideo.com® The Leading Educational Video Distributor

800-843-3620

SCHLESSINGER MEDIA — A DIVISION OF LIBRARY VIDEO COMPANY®

11/07

K7844
V6009

TEACHER'S GUIDE

BASED ON THE BOOK BY
DAVID MACAULAY

Electricity

Grades 3–6

Journey to Mammoth Island, a whimsical place where investigating scientific principles is always an adventure. Olive, a young girl, assisted by the Island's mammoth population and a visiting inventor helps the locals discover why and how machines work. Science facts are clearly demonstrated, giving kids an opportunity to see how important everyday machines are linked together by the science that drives them. Students come to see that science is a way of organizing information about the world, explaining why things work the way they do and allowing us to predict what might happen in new situations.

This guide provides a brief synopsis of the program, background on the science concepts presented, discussion topics, additional activities, vocabulary and suggested print and Internet resources.

SCHLESSINGER MEDIA — A DIVISION OF LIBRARY VIDEO COMPANY®

Program Summary

In *Electricity*, inhabitants of Mammoth Island learn all about static and current electricity during the annual lemon harvest. Electricity can be harnessed to power all sorts of things — from light bulbs to trains. It can be used to carry information through the circuits of a computer, or to power a music system or television set! And it all starts with atoms.

All things are made up of incredibly tiny things called atoms, which are far, far too small for us to see. Atoms are made up of even smaller particles called neutrons, protons and electrons. Every electron has an electrical charge, which scientists call a negative charge. This charge is the fundamental cause of electricity. A negative electrical charge repels other negative charges but attracts positively charged particles.

Static electricity is caused by imbalanced charges. Some materials give up their electrons when they are rubbed, resulting in a positive charge of the object. Other materials easily gain electrons and become negatively charged. Opposite charges attract one another, causing oppositely charged materials to cling together until some electrons leak from the negatively charged material. Other powerful examples of static electricity include the shocks you receive when you touch a metal doorknob after walking across a rug, and the lightning that can be seen during thunderstorms!

The flow of electrons in an electric circuit requires a source of energy to get the electrons moving, and a closed pathway to flow through. This pathway, called a conductor, is a substance that is able to freely release or lose electrons. Copper and other metals like zinc are excellent conductors of electricity. Believe it or not, a lemon can be a source of energy! When Todd and his mammoth spear a lemon with their zinc and copper lances, they complete a circuit, causing electrons to flow. Lemons contain acid that reacts with zinc and copper, causing electrons in the copper to move through the lemon over to the zinc.

Glossary

The following words are included for teacher reference and for use with students to extend the subject matter in the show.

atoms — Small particles that make up matter. Atoms are comprised of neutrons, protons and electrons. Protons are assigned a positive charge while electrons carry a negative charge.

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

circuit — A complete pathway through which electricity moves. 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.

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

current — Electrical charges that flow through a conductor. Direct current (DC) consists of charges flowing in one direction, while alternating current (AC) consists of a flow of electric charge that changes direction.

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.

(Continued)

electricity — Invisible energy that is made up of charged parts of atoms: electrons, which are negatively charged and protons which carry a positive charge.

electrodes — Parts of a battery where electric current enters or leaves the battery.

energy — The ability to do work.

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

machine — Any device that helps you do work.

power — A measure of how quickly work is done.

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 a powerful example of static electricity.

Pre-viewing Discussion

- Ask students to define electricity and to come up with some ways we use electricity in daily life.
- Where does electricity come from?
- What is "static cling"? Where does it come from?

Follow-up Questions & Activities

- Static electricity is always fascinating for children. After viewing the video, ask students whether or not they think it is realistic that a wooly mammoth would build up enough static electricity in its fur to attract a cat. Then provide the children with balloons and wool cloths and have them investigate attraction and repulsion with a number of common items (other balloons, their hair, Styrofoam pellets, salt and pepper, etc.). Direct them to hold their charged balloons a few inches above their test items and observe what happens.
- There are many similarities between electrical and magnetic charges. Have students discuss the ways in which these charges act alike and different.
- Discuss the dangers involved with electricity and the basic safety measures that should be taken when using electrical devices.
- Using 9-volt batteries, copper wire, switches, bulbs and/or bells, have students attempt to create models of open and closed circuits. Have students draw diagrams accompanied with explanations of their investigations.
- Have students find out about early experiments with electricity such as Benjamin Franklin's kite experiment.

Suggested 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.

(Continued)