
Electric Circuits: 3rd/4th Grade Science Unit

Activities: Students will be investigating the organization of a simple **electric circuit**. Follow-up investigations will help them explain that **electricity** in circuits can produce heat, light, and magnetic effects.

Unifying concept: Our physical world is made up of substances, materials and objects that can be identified by their unique properties, and organized into systems that are interconnected. Interactions among these systems cause changes in matter and energy.

Sub-concepts:

- Electrical circuits require a complete circuit in order to work.
- Conductors allow electric circuits to flow through materials while insulators inhibit the circuits' flow.

Core Books

Bailey, Jacqui and Matthew Lilly. *Charged Up: The Story of Electricity*. Minneapolis: Picture Window Books, 2003. [Science Works series] ISBN: 978-1-4048-0568-2. Shows how electricity comes to our homes from hydroelectric power plants, generators and transformers. Also shows how lightening can disrupt the power and what workers must do to restore power. Appealing cartoon graphics accompany the text.

Price, Sean Stewart. *The Story Behind Electricity*. Chicago: Heinemann Library, 2009. [True Stories series] ISBN: 978-1-4329-2339-6. Begins with the Greek scientist who first studied static electricity and ends with the promise of alternative energy sources. Also covers the how electricity works, interesting facts, and ways to save energy. A timeline is included.

Walker, Sally M. *Electricity*. Minneapolis: Lerner Publications Co., 2006. [Early Bird energy series] ISBN: 978-0-8225-2919-4. This is a user-friendly resource that talks about how electricity affects our lives, how atoms work, electric charges, currents, and circuits. Includes tips for sharing the book with children.

Additional Titles

Bartholomew, Alan. *Electric Mischief: Battery-Powered Gadgets Kids Can Build*. Toronto: Kids Can Press, 2002. [Kids Can Do It series] ISBN: 1-55074-923-4. This

book includes many electric-powered items for students to build, beginning with battery connections and switches. This would be a useful resource for more advanced students or a science club.

Cooper, Christopher. *Electricity: From Amps to Volts*. Chicago: Heinemann Library, 2004. [Heinemann InfoSearch series] ISBN: ISBN: 1-4034-0950-1. Defines electricity, tells what makes it, and discusses how it works. Also includes experiments, important people, amazing facts, and a glossary.

Dreier, David. *Electrical Circuits: Harnessing Electricity*. [Experiencing science series] Minneapolis: Compass Point Books, 2007. ISBN: 978-0-7565-3267-3. This book provides helpful background information on electrical charges and magnetism. It discusses conductors and shows how they work, different kinds of circuits, switches, and safety tips. The small print makes this book more appropriate for more advanced readers.

Vogel, Julia. *Plug it In: Learn About Electricity*. Mankato, MN: The Child's World, 2011. [Learn About series] ISBN: 978-1-60253-511-4. This is a simple introduction to electricity. Vocabulary words are highlighted. The topics covered are static electricity, electrical currents, circuits, and the need to conserve energy. Especially helpful for younger or less advanced readers.

Related Literature

Bang, Molly. *My Light*. New York: Blue Sky Press, 2004. ISBN: 0-439-48961-X. Simple text and fabulous illustrations help the reader appreciate the sun as a source of light and energy. Notes at the back provide more detailed information about electricity and sources of energy.

Cole, Joanna, and Bruce Degen. *The Magic School bus and the Electric Field Trip*. New York: Scholastic Inc., 1997. ISBN: 0-590-44683-5. The class is learning about atoms, electrons, current, receptors and inhibitors, power sources, and uses of electricity. When the power goes out they take a field trip to the power plant to find out how power is harnessed and shared. They also learn how to stay safe around electricity.

Collins, Suzanne and Mike Lester. *When Charlie McButton Lost Power*. New York: Puffin Books, 2005. ISBN: 978-0-14-240857-5. Charlie likes to play computer games but doesn't like to play with toys that don't have blow-up features. When the power goes out he can't find anything to do. Everything else sounds boring.

Then he happens to see his younger sister playing with a toy doll which makes him angry. After getting in trouble, he decides that he enjoys make-believe play with his sister after all.

DeMauro, Lisa. *Thomas Edison: A Brilliant Inventor*. New York: Harper Collins Publishers, 2005. [Time for Kids Biographies series] ISBN: 0-06-057612-X. This is a well-written and engaging story of Thomas Edison's life. Edison's parents encouraged his curiosity, although he got in trouble when one experiment caused the barn to burn down. Some of his many inventions included the phonograph, the light bulb, and the first movie camera.

Schanzer, Rosalyn. *How Ben Franklin Stole the Lightning*. New York: Harper Collins, 2003. ISBN: 0-688-16993-7. This story focuses on Ben Franklin's work as a scientist and an inventor. The practical results of many of his brainstorming and experiments helped make people's lives better. For example, after he proved that lightning was electricity, Franklin invented the lightning rod, which saved countless lives.

Professional Resources

Electric Circuits: Teacher's Guide, National Science Resources Center. Burlington, NC: Carolina Biological Supply Co., 2004. ISBN: 978-0-89278-564-3. This would be useful for science advocates. It comes as part of the VAST kit from Grant Wood AEA. [Available from Amazon.com]

Videos

Current Electricity: Electric Current. Visual Learning Company, 2000. [Learn 360.] <http://www.learn360.com/ShowVideo.aspx?ID=646522&TagID=3344956&SearchText=electric+circuits> Chapters include sources of energy, electrical currents, series and parallel circuits, fuses and breakers, and how to measure electrical power.

Macaulay, David et al. *The Way Things Work: Electricity*. Schlessinger Media 2002. [DVD] The lemon harvest is underway at Mammoth Island. In this 13-minute video, students learn about atoms and electrons, current, static electricity, and conductors.

Magic School Bus: Getting Energized (Using New Energy Sources). Scholastic, 1997. [VHS] ISBN: 1-4171-0055-9. Mrs. Frizzle's science class is trying to raise money at

the carnival for a homeless pet shelter. They have to search for alternative energy sources when the electricity that runs the giant Ferris wheel goes out. The students explore how to get energy from wind, water, batteries, and the sun. [Available from Amazon.com or Scholastic.com]

Websites

“Electricity Activities.” *NASA Sci Files*.

http://scifiles.larc.nasa.gov/text/kids/D_Lab/acts_electric.html. Experiments and simulations for students in grades 3-5 are available on this website. Topics include understanding electricity, parallel and series circuits, lightning and static, and a safety check. Students can also find out how to read an electric meter or calculate how much it costs to use everyday appliances.

“Electric Circuits.” **Grant Wood AEA VAST Center Toolkits**.

<http://www.gwaea.org/vastscience/toolkits/electriccircuits/ecunit.html>. The Van Allen Science Teaching Center (VAST) materials are used for the ICCSD science curriculum. The toolkit provides online support for a discovery-method learning experience about electric circuits. Students explore electricity and its properties, build a circuit, identify problems when the circuits don't work, and the difference between conductors and insulators. In addition to lessons, includes unit concepts and skills, student preconceptions, state and national standards, and literacy links.

Barrow, Mandy. *The Science Zone*.

<http://primaryhomeworkhelp.co.uk/revision/Science/electricity.htm>. This is an interactive website for students. Learning modules help them learn about concepts such as circuits and then test themselves. Links to educational games are also included.