

MERIT BADGE SERIES



ELECTRICITY



BOY SCOUTS OF AMERICA®

STEM-Based

BOY SCOUTS OF AMERICA
MERIT BADGE SERIES

ELECTRICITY



"Enhancing our youths' competitive edge through merit badges"



BOY SCOUTS OF AMERICA®

Requirements

1. Demonstrate that you know how to respond to electrical emergencies by doing the following:
 - a. Show how to rescue a person touching a live wire in the home.
 - b. Show how to render first aid to a person who is unconscious from electrical shock.
 - c. Show how to treat an electrical burn.
 - d. Explain what to do in an electrical storm.
 - e. Explain what to do in the event of an electrical fire.
2. Complete an electrical home safety inspection of your home, using the checklist found in this pamphlet or one approved by your counselor. Discuss what you find with your counselor.
3. Make a simple electromagnet and use it to show magnetic attraction and repulsion.
4. Explain the difference between direct current and alternating current.
5. Make a simple drawing to show how a battery and an electric bell work.
6. Explain why a fuse blows or a circuit breaker trips. Tell how to find a blown fuse or tripped circuit breaker in your home. Show how to safely reset the circuit breaker.
7. Explain what overloading an electric circuit means. Tell what you have done to make sure your home circuits are not overloaded.

8. Make a floor plan wiring diagram of the lights, switches, and outlets for a room in your home. Show which fuse or circuit breaker protects each one.
9. Do the following:
 - a. Read an electric meter and, using your family's electric bill, determine the energy cost from the meter readings.
 - b. Discuss with your counselor five ways in which your family can conserve energy.
10. Explain the following electrical terms: volt, ampere, watt, ohm, resistance, potential difference, rectifier, rheostat, conductor, ground, circuit, and short circuit.
11. Do any TWO of the following:
 - a. Connect a buzzer, bell, or light with a battery. Have a key or switch in the line.
 - b. Make and run a simple electric motor (not from a kit).
 - c. Build a simple rheostat. Show that it works.
 - d. Build a single-pole, double-throw switch. Show that it works.
 - e. Hook a model electric train layout to a house circuit. Tell how it works.

Electricity Resources

Scouting Literature

Deck of First Aid; Chemistry, Electronics, Energy, Engineering, First Aid, Home Repairs, Inventing, Lifesaving, Nuclear Science, and Safety merit badge pamphlets

Visit the Boy Scouts of America's official retail website at <http://www.scoutstuff.org> for a complete listing of all merit badge pamphlets and other helpful Scouting materials and supplies.

Books

- Asimov, Isaac. *The Kite That Won the Revolution*. Houghton Mifflin Company, 2000.
- Bartholomew, Alan. *Electric Gadgets and Gizmos*. Kids Can Press, 1998.
- Billings, Charlene W. *Superconductivity: From Discovery to Breakthrough*. Cobblehill Books; Dutton, 1991.
- De Pinna, Simon. *Electricity Science Projects*. Raintree Steck Vaughn, 1998.
- DiSpezio, Michael Anthony. *Awesome Experiments in Electricity and Magnetism*. Sterling, 2006.
- Dixon, Malcolm, and Karen Smith. *Electricity*. Evans Brothers, 2005.
- Epstein, Sam and Beryl. *The First Book of Electricity*, rev. ed. Franklin Watts, 1977.
- Flaherty, Michael. *Electricity and Batteries* (Science Factory). Copper Beach Books, 2008.
- Gibilisco, Stan. *Teach Yourself Electricity and Electronics*. McGraw-Hill, 2011.
- Good, Keith. *Zap It! Exciting Electricity Activities*. Lerner Publications Co., 2003.
- Matt, Stephen R. *Electricity and Basic Electronics*. The Goodheart-Willcox Co. Inc., 2012.
- Meiani, Antonella. *Magnetism: Experimenting With Science*. Lerner Publications Co., 2003.
- Morrison, Ralph. *Electricity: A Self-Teaching Guide*. John Wiley, 2003.
- Parker, Steve. *Electricity and Magnetism*. Gareth Stevens Publishing, 2007.
- . *Eyewitness: Electricity*. DK Publishing, 2005.
- Parsons, Alexandra. *Make it Work! Electricity*. World Book Inc., 1997.
- Riley, Peter D. *Electricity* (Straightforward Science). Franklin Watts, 1999.
- Royston, Angela. *Using Electricity* (My World of Science). Heinemann, 2008.

Wood, Robert W. *Electricity and Magnetism FUNDamentals: FUNtastic Science Activities for Kids*. Chelsea House, 1998.

—. *Physics for Kids: 49 Easy Experiments With Electricity and Magnetism*. TAB Books, 1990.

Organizations and Websites

Boston Museum of Science

Telephone: 617-723-2500
Theater of Electricity website:
<http://www.mos.org/live-presentations/lightning>

Energy Information Administration

1000 Independence Ave. SW
Washington, DC 20585
Website: <http://www.eia.gov>

Energy Kids Page

Website: <http://www.eia.gov/kids>

Home Energy Saver

Website: <http://hes.lbl.gov>

HowStuffWorks.com

c/o Convex Group Inc.
One Capital City Plaza
3350 Peachtree Road NE, Suite 1500
Atlanta, GA 30326-1425
Website: <http://www.howstuffworks.com>

Institute of Electrical and Electronics Engineers

445 Hoes Lane
Piscataway, NJ 08854-4141
Telephone: 732-981-0060
Website: <http://www.ieee.org>

National Energy Education Development Project

8408 Kao Circle
Manassas, VA 20110
Telephone: 703-257-1117
Website: <http://www.need.org>

North American Electric Reliability Corporation

1325 G St. NW, Suite 600
Washington, DC 20005-3801
Telephone: 202-400-3000
Website: <http://www.nerc.com>

Safe Electricity.org

Electric Universe
Website: <http://eec.electricuniverse.com>

U.S. Department of Energy

1000 Independence Ave. SW
Washington, DC 20585
Telephone: 202-586-5000
Website: <http://energy.gov>

Acknowledgments

The Boy Scouts of America is grateful to the men and women serving on the Merit Badge Maintenance Task Force for the improvements made in updating this pamphlet.

Photo and Illustration Credits

The Franklin Institute Science Museum, courtesy—page 11 (*lightning rod*)
Shutterstock.com, courtesy—cover (*light bulb*, ©Bizroug/Shutterstock; *digital meter*, ©Pi-Lens/Shutterstock; *power lines and lightning*, ©gui jun peng/Shutterstock; *danger sign*, ©Allen Graham - PDImages/Shutterstock); pages 6 (*lightning*, ©loflo69/Shutterstock), 8 (*electrical discharge*, ©anigoweb/Shutterstock), 9 (*feather*, ©mexrix/Shutterstock), 13 (*power lines*, ©Shebeko/Shutterstock), 18 (*magnetic force*, ©MilanB/Shutterstock), 23 (*car battery*, ©Vereshchagin Dmitry/Shutterstock), 25 (*bird on a wire*, ©sundayhill/Shutterstock), 27 (*voltmeter*, ©auremar/Shutterstock),