



2024 Edition

SCOUTMASTER BUCKY

Electricity Merit Badge

SCOUTS PARTICIPATING IN A SCOUTMASTER BUCKY MERIT BADGE OPPORTUNITY (ONLINE OR IN PERSON), PLEASE CONSIDER ALSO USING THE ELECTRICITY MERIT BADGE CLASS PREPARATION PAGE FOR CLARIFICATIONS, INSIGHTS, AND EXPECTATIONS.

<https://scoutmasterbucky.com/merit-badges/electricity/electricity-cpp.pdf>

ELECTRICITY MERIT BADGE WORKBOOK

REQUIREMENT 1a: Demonstrate that you know how to respond to electrical emergencies by showing how to rescue a person touching a live wire in the home.

This requirement must be reviewed with your merit badge counselor.

Notes:

REQUIREMENT 1b: Demonstrate that you know how to respond to electrical emergencies by showing how to render first aid to a person who is unconscious from electrical shock.

This requirement must be reviewed with your merit badge counselor.

Notes:

REQUIREMENT 1c: Demonstrate that you know how to respond to electrical emergencies by showing how to treat an electrical burn.

This requirement must be reviewed with your merit badge counselor.

Notes:



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REQUIREMENT 1d: Demonstrate that you know how to respond to electrical emergencies by explaining what to do in an electrical storm.

This requirement must be reviewed with your merit badge counselor.

Notes:

REQUIREMENT 1e: Demonstrate that you know how to respond to electrical emergencies by explaining what to do in the event of an electrical fire.

This requirement must be reviewed with your merit badge counselor.

Notes:





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REQUIREMENT 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.

This requirement must be reviewed with your merit badge counselor.

ELECTRICAL HOME SAFETY INSPECTION EXAMPLE

Outlets

- Fix electrical outlets that have loose-fitting plugs
- Replace any missing or broken wall plates
- Place safety covers on all unused outlets that are accessible to children

Cords / Extension Cords

- Replace frayed or cracked cords in all appliances, lights, and electronic equipment
- Move cords out of traffic areas
- Check that no nails or staples are used on cords
- Check that no cords are under carpets or rugs
- Check that no furniture is resting on cords
- Check for overloaded extension cords
- Check for permanently used extension cords – they should be only used temporarily
- Install safety closures on all extension cords

Plugs

- Check that all plugs fit their outlets correctly
- Check that the ground pin has not been removed from any plugs
- Check that no plugs have been forced into an outlet

Ground Fault Circuit Interrupters (GFCIs)

- Ensure GFCIs are installed in appropriate outlet locations in the kitchen, bathroom, laundry room, garage, and other locations where water may be present
- Test GFCIs according to the manufacturer's instructions
- Arrange replacement of non-functioning GFCI with a new GFCI
- Repair any appliance that trips a GFCI at an authorized repair service or replace the appliance

Light Bulbs

- Check bulbs in light fixtures to make sure they are the correct wattage for the size of the fixture. Replace bulbs that are a higher wattage than recommended
- Check that all bulbs are screwed in securely

Circuit Breakers/Fuses

- Check that circuit breakers and fuses are the correct size current rating for their circuit. Have a licensed electrician identify and label the correct size.

Appliances

- Repair or replace any appliance that repeatedly blows a fuse or trips a circuit breaker or has given anyone a shock.
- Check for appliances being used where they may fall into water. Figure out a better place to use the appliance and move it.
- Check to see that all appliances are in good condition and working properly
- Use surge protectors for all computer and home entertainment equipment and other appliances susceptible to burn-out from power spikes

Outdoor Safety

- Check power tools and electric lawn mowers for frayed power cords, broken plugs, and cracked or broken housings
- Check that all extension cords being used outside are specifically designed for outdoor use and are rated for the power needs of the tools being used
- Check that no portable power tools are left plugged in when not in use

Lightning

- During an electrical storm, do not use appliances, computers, or telephones
- During an electrical storm, do not take a shower or bath
- Check that flashlights with fresh batteries are available for power outages

Space Heaters

- Check that all space heaters are a minimum of 3 feet from any combustibles
- Check that space heaters are not used where children may be left unsupervised
- Check that all unused space heaters are turned off and unplugged
- Check that space heaters are connected directly to an outlet and not an extension cord

Halogen Floor Lamps

- Check that all halogen lamps are away from combustibles
- Do not use halogen lamps where children may be left unsupervised



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REQUIREMENT 3: Make a simple electromagnet and use it to show magnetic attraction and repulsion.

Don't forget to bring any work you have done in preparation to share with your merit badge counselor.

This requirement will be reviewed with your merit badge counselor during the class.

BE PREPARED!

REQUIREMENT 4: Explain the difference between direct current and alternating current.

Notes:

REQUIREMENT 5: Make a simple drawing to show how a battery and an electric bell work.

Don't forget to bring any work you have done in preparation to share with your merit badge counselor.

This requirement will be reviewed with your merit badge counselor during the class.

BE PREPARED!



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REQUIREMENT 6: Explain why a fuse blows or a circuit breaker trips.

Notes:

REQUIREMENT 6: Tell how to find a blown fuse or tripped circuit breaker in your home.

Notes:

REQUIREMENT 6: Show how to safely reset the circuit breaker.

This requirement will be reviewed with your merit badge counselor during the class.

REQUIREMENT 7: Explain what overloading an electric circuit means.

Notes:

REQUIREMENT 7: Tell what you have done to make sure your home circuits are not overloaded.

Notes:



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REQUIREMENT 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.

A large grid of blue lines on a white background, intended for drawing a floor plan wiring diagram.



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REQUIREMENT 9a: Read an electric meter and, using your family's electric bill, determine the energy cost from the meter readings.

Don't forget to bring your family's electric bill with you to share with the merit badge counselor.

This requirement must be reviewed with your merit badge counselor.

BE PREPARED!



Electrical meters are usually located on the outside of your home, between the power line coming from the pole and your electrical panel inside. They record how much electricity you and your family are using.

Your electric meter usually has between four and six dials that advance as a central disk turns. The disk is turned by the electricity passing through the meter, giving a readout of how much electricity is being used.

This readout is given in kilowatt hours. One kilowatt hour is equal to the amount of energy it would take to power a 100 watt lightbulb for 10 hours.

Read the numbers from left to right. Do not let the direction of the numbers on each dial confuse you. Some of the dials will be numbered clockwise and other dials may be numbered counterclockwise.

Look exactly where the arrow is pointing. If the arrow is pointing between 2 numbers, the reading is the smaller number. If the arrow is pointing directly on a number, verify what the number should be by referencing the dial to the right of it. If the arrow on that dial is past zero, the reading on the dial to the left is the number the arrow is pointing to. If the arrow on the right hand dial is not to or past the zero yet, the reading on the dial to the left is the previous number.

Digital Meters are much more straightforward, just copy the numbers on the meter display.

Using you last energy bill, you can see the last reading and subtract your current reading from that to get your current electricity usage.

You will still need to figure out what your cost is. Use your math skills to figure it out





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REQUIREMENT 9b: Discuss with your counselor five ways in which your family can conserve energy.

Family Energy Conservation Method #1:

Family Energy Conservation Method #2:

Family Energy Conservation Method #3:

Family Energy Conservation Method #4:

Family Energy Conservation Method #5:

REQUIREMENT 10: Explain the following electrical terms: volt, ampere, watt, ohm, resistance, potential difference, rectifier, rheostat, conductor, ground, GFCI, circuit, and short circuit.

Volt:

Ampere:

Watt:



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Ohm:

Resistance:

Potential Difference:

Rectifier:

Rheostat:

Conductor:



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Ground:

GFCI:

Circuit:

Short Circuit:

DO TWO OF THE FOLLOWING (11A, 11B, 11C, 11D, or 11E) FOR REQUIREMENT 11

REQUIREMENT 11a: Connect a buzzer, bell, or light with a battery. Have a key or switch in the line.

REQUIREMENT 11b: Make and run a simple electric motor (not from a kit).

REQUIREMENT 11c: Build a simple rheostat. Show that it works.

REQUIREMENT 11d: Build a single-pole, double-throw switch. Show that it works.

REQUIREMENT 11e: Hook a model electric train layout to a house circuit.

Don't forget to bring any work you have done in preparation to share with your merit badge counselor.

This requirement will be reviewed with your merit badge counselor during the class.

BE PREPARED!