

Electricity

Merit Badge Workbook



Merit badges are earned by doing: reading the pamphlet, practicing the skills, and showing your counselor what you have learned.
This workbook gives you a place to organize your notes and track your progress along the way.
Merit badge counselors may not require the use of this or any similar workbook.
You still must satisfy your counselor that you can demonstrate each skill and have learned the information.
Use the space under each requirement to note what you have done and what you want to talk about, not to write out full answers.
When a requirement says discuss, show, tell, explain, or demonstrate, that is what you must do.
No one may add to or subtract from the official requirements found on scouting.org (Guide to Advancement 7.0.4.8).
Scouting America last updated this badge's requirements page on January 7, 2026.
Requirements change from time to time. Double-check scouting.org before you start.

Scout's name: _____ Unit: _____ Date started: _____

Counselor's name: _____ Phone no.: _____ Email: _____

Links marked "Scouting America resources" are the ones Scouting America shares on its official badge page.
This workbook is unofficial and not endorsed by Scouting America.

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1. Demonstrate that you know how to respond to electrical emergencies by doing the following:

(a) Explain how to turn off power for a particular circuit and the whole house in the event of an emergency.

Scouting America resources: How To Turn Off Your Home's Electrical Power Supply (video)
Turning Off Electricity at the Circuit Box (video)

Turning off power in an emergency

Turning off power for	How to do it
A particular circuit	
The whole house	

(b) Demonstrate how to rescue a person touching a live wire in the home.

Date _____ Demonstrated for _____

Notes on the rescue steps I showed

(c) Describe how to safely get out of a car in an accident if you suspect a utility wire is on the car.

Scouting America resources: Electric Safety: What To Do if a Downed Wire Falls on Your Car (video)

How to safely get out of the car

(d) Show how to render first aid to a person who is unconscious from an apparent electrical shock.

Scouting America resources: Electrical Hazards and Emergency Situations (video)

Date _____ Demonstrated for _____

Notes on the first aid I showed

(e) Show how to treat an electrical burn.

Date _____ Demonstrated for _____

Notes on how I treated the burn

(f) Explain what to do in the event of an electrical fire.

Scouting America resources: 5 Steps To Put Out an Electrical Fire (video)

What to do in an electrical fire

(g) Explain what to do if caught out in the open during an electrical storm.

Scouting America resources: Lightning Safety: How To Protect Yourself, What To Avoid (video) · Frankenweenie Clip (video)

What to do if caught in the open during an electrical storm

Requirement 1 completed on _____ counselor initials _____

2. Complete an electrical home safety inspection of your home, using the checklist found in the Electricity merit badge pamphlet or one approved by your counselor. Discuss what you find with your counselor.

Scouting America resources: Electrical Fire Safety Checklist (PDF)

Checklist I used _____ Date of inspection _____ Discussed on _____

My home safety inspection

Area or item I checked	What I found	Notes to discuss with my counselor

Requirement 2 completed on _____ counselor initials _____

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

Scouting America resources: How To Make an Electromagnet! (video)

Date _____ Materials I used _____

- ☐ Showed magnetic attraction
- ☐ Showed magnetic repulsion

Requirement 3 completed on _____ counselor initials _____

4. Do the following:

(a) Explain the difference between direct current and alternating current, the advantages and disadvantages of each, and give a practical example of the use of each type.

Scouting America resources: AC and DC Current Explained (video)

Direct current and alternating current

	Direct current (DC)	Alternating current (AC)
How they differ		
Advantages		
Disadvantages		
Practical example		

(b) Explain three ways that electricity is produced.

Scouting America resources: Generating Electricity (video)

Three ways electricity is produced

Way it is produced	How it works

Requirement 4 completed on _____ counselor initials _____

5. Make a simple drawing to show how a battery and an electric bell work. Describe the purpose of each of the components.

Scouting America resources: How an Electric Bell Works / 3D Animation (video)
How Do Electric Bells Work? (3D Animation | Electromagnets) (video)

My drawing of how a battery and an electric bell work (draw here or attach)

Components and their purpose

Component	Its purpose

Requirement 5 completed on _____ counselor initials _____

6. Do the following:

(a) Define what overloading an electric circuit means. Tell what you have done to make sure your home circuits are not overloaded.

Scouting America resources: Overloaded Circuit (video)

What overloading an electric circuit means

What I have done to make sure our home circuits are not overloaded

(b) Determine if there is an overload on a branch circuit by either getting the current draw from all the equipment plugged into the circuit or use the power equation to calculate the current draws.

Branch circuit I checked _____ Its fuse or breaker rating _____

Equipment plugged into this circuit

Equipment	Watts	Volts	Current draw (amps)

Total current draw _____ Is it overloaded? _____

(c) Explain why a fuse blows and a circuit breaker trips.

Scouting America resources: Circuit Breaker Keeps Tripping - 3 Common Reasons (video)

What happens	Why it happens
A fuse blows	
A circuit breaker trips	

(d) Tell how to find a blown fuse and a tripped circuit breaker in your home. Show how to safely reset the circuit breaker.

Scouting America resources: How To Identify and Reset a Tripped Circuit Breaker (video)

What to find	How to find it in my home
Blown fuse	
Tripped circuit breaker	

Date _____ Showed how to safely reset a breaker for _____

Requirement 6 completed on _____ counselor initials _____

7. 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.

Scouting America resources: How To Wire a Bedroom Diagram (video)

Room _____ Date _____

My floor plan wiring diagram with the fuse or breaker for each light, switch, and outlet (draw here or attach)

Requirement 7 completed on _____ counselor initials _____

8. Do the following:

(a) Read a meter associated with an electric bill. Determine the total power used since the bill, and the cost of that power.

Scouting America resources: Reading a Digital Electric Meter & Calculate Usage and Cost (video)

Date of the last bill | Meter reading on that bill | Meter reading now

Power used since the bill (kWh) | Cost per kWh | Cost of that power

How I worked it out

(b) Explain other charges on the bill that were taxes or fees.

Scouting America resources: Here Are the Costs That Affect Your Electricity Bill (video)

Other charges on the bill

Charge	Tax or fee?	What it is for

(c) Discuss with your counselor five ways your family can conserve energy.

Scouting America resources: Saving Energy at Home - Energy Efficiency Tips (video)

Five ways my family can conserve energy

Way to conserve energy	How my family can do it

Requirement 8 completed on | counselor initials

9. Explain the following:

(a) Electrical terms: current, energy, power, resistance, and voltage

Scouting America resources: Electrical Terms Explained (website)

Electrical term	What it means
current	
energy	
power	
resistance	
voltage	

(b) Units of measure: ampere (amps), ohms, volts, watts, and watt-hours

Scouting America resources: The Difference Between Volts, Watts, and Amps - Explained Like You're Five (video)

Unit of measure	What it measures
ampere (amps)	
ohms	
volts	
watts	
watt-hours	

(c) Electrical conditions: generating source with example, ground, open circuit, overvoltage, potential difference, and short circuit

Scouting America resources: Open Circuits, Closed Circuits & Short Circuits - Basic Introduction (video)
What Is Electric Potential Difference? (video)

Electrical condition	What it means
generating source with example	
ground	
open circuit	
overvoltage	
potential difference	
short circuit	

(d) Equipment and their use: circuit, conductor, Ground Fault Circuit Interrupter (GFCI), insulator, inverter, rectifier, rheostat, substation, surge protection, solar panel, transformer, transmission and distribution systems, and wind turbine.

Scouting America resources: Types of Circuit Breakers (website w/ video) · Surge Protectors (website w/ video)

Equipment	What it is and its use
circuit	
conductor	
Ground Fault Circuit Interrupter (GFCI)	
insulator	
inverter	
rectifier	
rheostat	
substation	
surge protection	
solar panel	
transformer	
transmission and distribution systems	
wind turbine	

Requirement 9 completed on _____ counselor initials _____

10. Do TWO of the following:

☐ **(a)** Connect a buzzer, bell, or light with a battery. Have a key or switch in the line.

Scouting America resources: Adding Batteries in Series - Buzzer (video)

Date _____ What I connected (buzzer, bell, or light) _____

Parts I used, including the key or switch

☐ **(b)** Make and run a simple electric motor (from a kit is acceptable, if approved by your counselor ahead of time).

Scouting America resources: Make the Simplest Electric Motor (video)

Date _____ Homemade or kit _____ If a kit, counselor approved it on _____

How I made and ran my motor

☐ **(c)** Build a simple rheostat. Show that it works.

Scouting America resources: The Rheostat (video)

Date _____ Showed it working to _____

How I built my rheostat

☐ **(d)** Build a single-pole, double-throw switch. Show that it works.

Scouting America resources: How To Replace Switches and Outlets (video)

Date _____ Showed it working to _____

How I built my switch

☐ **(e)** Explain how 3-way switch wiring works in a lighting circuit.

Scouting America resources: Best Explanation of 3WAY Switching - in Under 3 Minutes! (video)

How 3-way switch wiring works in a lighting circuit (sketch or write)

☐ **(f)** Connect two lights together in a series circuit along with a battery and a switch. Then connect the same circuit in parallel. Discuss the differences in the two circuits.

Scouting America resources: What Is the Difference Between Series and Parallel Circuits (video)

Date _____ Parts I used _____

Circuit	What I noticed
Series	
Parallel	

Differences between the two circuits

Requirement 10 completed on _____ counselor initials _____

11. Identify three career opportunities that would use skills and knowledge in electricity. Pick one and research the training, education, certification requirements, experience, and expenses associated with entering the field. Research the prospects for employment, starting salary, advancement opportunities and career goals associated with this career. Discuss what you learned with your counselor and whether you might be interested in this career.

Scouting America resources: Electricians: The Many Career Paths (video)
Power Plant Operators, Distributors, and Dispatchers Careers (video)

Three careers that use electricity skills and knowledge

Career	How it uses electricity

The career I picked

What I researched

Topic	What I found
Training	
Education	
Certification requirements	
Experience	
Expenses	
Prospects for employment	
Starting salary	
Advancement opportunities	
Career goals	

Whether I might be interested in this career, and why

Requirement 11 completed on counselor initials

Counselor sign-off

Your counselor signs your blue card or approves the badge in Scoutbook, and your unit records it. This line is for your own records.

Counselor's signature Date completed

Official Scouting America resources

Scouting America resources: Electricity merit badge page (requirements and resources) · Electricity merit badge pamphlet (free PDF)
All merit badges

Made by Cole at ScoutSmarts.com, an Eagle Scout who loves helping Scouts.
Spot an error or a requirement change? Tell me at scoutsmarts.com/contact.
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