

Electronics & Electricity

Prepared By:

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Target Group:

All Scouts (Third Year)

Capacity:

12 Scouts

Time Allotted:

50 minute block

Pre-Requisites:**Electricity**

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.

Electricity

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.
- (b) Explain other charges on the bill that were taxes or fees.
- (c) Discuss with your counselor five ways in which your family can conserve energy.

Materials Needed:

N/A

Instructional Goal:

Scouts will be able to complete basic maintenance and services for electrical components, as well as have a fundamental understanding of most electronic components.

Monday

Requirements:

Electronics

1. Describe the safety precautions you must exercise when using, building, altering, or repairing electronic devices.

Electricity

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.
 - (b) Demonstrate how to rescue a person touching a live wire in the home.
 - (c) Describe how to safely get out of a car in an accident if you suspect a utility wire is on the car.
 - (d) Show how to render first aid to a person who is unconscious from an apparent electrical shock.
 - (e) Show how to treat an electrical burn.
 - (f) Explain what to do in the event of an electrical fire.
 - (g) Explain what to do if caught out in the open during an electrical storm.

Electricity

9. Explain the following:
 - (a) Electrical terms - Current, energy, power, resistance, voltage
 - (b) Units of measure - Ampere (amps), ohms, volts, watts, watt-hours
 - (c) Electrical conditions - 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, wind turbine.

Electricity

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

Tuesday

Requirements:

Electricity

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.
- (b) Explain three ways that electricity is produced.

Electricity

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

Electricity

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.

Electronics

2. Do the following:

- (a) Draw a simple schematic diagram. It must show resistors, capacitors, and transistors or integrated circuits. Use the correct symbols. Label all parts.
- (b) Tell the purpose of each part.

Wednesday

Requirements:

Electricity

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.
- (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.
- (c) Explain why a fuse blows and 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.

Electronics

3. Do the following:

- (a) Show the right way to solder and desolder.
- (b) Show how to avoid heat damage to electronic components.
- (c) Tell about the function of a printed circuit board. Tell what precautions should be observed when soldering printed circuit boards.

Thursday

Requirements: Electronics

5. Do the following:

- (a) Show how to solve a simple problem involving current, voltage, and resistance using Ohm's law.
- (b) Tell about the need for and the use of test equipment in electronics. Name three types of test equipment. Tell how they operate.
- (c) Demonstrate to your counselor how to read the colored bands of a resistor to determine its resistance value.
- (d) Explain the differences between Through Hole and Surface Mount assembly technologies and give three advantages of each.

Electronics

4. Do the following:

- (a) Discuss each of the following with your counselor:
 - 1. How to use electronics for a control purpose
 - 2. Explain the basic principles of digital logic.
 - 3. How to use electronics for three different analog applications.
- (b) Show how to change three decimal numbers into binary numbers and three binary numbers into decimal numbers.
- (c) Choose ONE of the following THREE projects. For your project, find or create a schematic diagram. To the best of your ability, explain to your counselor how the circuit you built operates.
 - 1. A control device

Friday

Requirements:

Electronics

6. Identify three career opportunities that would use skills and knowledge in Electronics. 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.

Electricity

10. Do TWO of the following:

- (a) Connect a buzzer, bell, or light with a battery. Have a key or switch in the line.
- (c) Build a simple rheostat. Show that it works.

Electricity

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.