Science, Engineering and Technology

4-H Electricity

North Dakota 4-H Project Sheet

The 4-H electricity project is designed to help you learn and practice electrical skills, science process skills and life skills.

- Develop the knowledge of safe practices and procedures.
- Develop an understanding of the basic principles and theories of electricity.
- Increase knowledge and concern regarding the generation, transmission and distribution of electric energy.

Here's what you can do all year!

Level 1 Magic of Electricity	Level 2 Investigating Electricity	Level 3 Wired for Power	Level 4 Entering Electronics
• Identify how you use electricity. • Identify electrical materials. • Wire a simple circuit. • Understand open and closed switches. • Test materials for electric conductivity. • Recognize closed and open circuits. • Trace the path electrons follow. • Understand magnetism and magnetic poles. • Demonstrate a magnetic field when electricity is present. • Build an electric motor.	• Identify alternating and direct current circuits. • Record data collected using a Volt-Ohm meter. • Learn about Ohm's Law. • Identify conductors and insulators. • Learn basic symbols used in circuit diagrams. • Measure voltage in various light bulbs and batteries. • Build a circuit with a momentary switch and three-way switch. • Build a burglar alarm.	• Understand local electrical code. • Learn to read an electrical meter. • Evaluate different light bulbs. • Read appliance nameplate information. • Measure electricity usage. • Identify three receptacles. • Test for electrical power. • Test grounded outlets. • Locate your home wiring system. • Calculate the correct wattage for a circuit. • Replace a wall switch.	• Identify electrical and electronic parts and devices. • Find needed electronic parts at a low cost. • Solder a neat, strong connection. • Choose the correct part for a circuit. • Demonstrate how a diode controls current flow. • Assemble circuits. • Understand polarity and voltage limits of LEDs. • Learn how to use a light-sensitive semiconductor in a control circuit. • Show how an SCR triggers an alarm.

Pass it on!
Now that you know how, share it with others. Here are ideas to get you started.

Communication

- Present a demonstration at your 4-H club or local communication arts contest.
- Give a speech about electrical safety to your school class, local community group or 4-H club.

Citizenship

- Check friends' homes for electrical safety issues.
- Volunteer to be a judge's assistant for the engineering and technology exhibits at your local 4-H achievement days/ fair.

Leadership

- Organize a safety workshop.
- Plan, conduct and participate in an electric quiz bowl.

Entrepreneurship

- Build quiz boards for local schools and community groups.
- Job shadow an electrician or electrical engineer.

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Learn more at www.ndsu.edu/4h/ or contact your county NDSU Extension office.

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Opportunities to explore electricity:

- Give a presentation or working exhibit at your club meeting and county communication event.
- Ask your club leader to check out the Electronic Snap Kits Educational Trunk.
- Plan, conduct and participate in an electric quiz bowl or skillathon.
- Tour a electrical facility.
- Contact your local power supplier for educational opportunities.
- Interested in a college education in electrical engineering or other fields related to electricity? Schedule a visit with North Dakota State University's Engineering Department, www.ndsu.edu.

4-H Resources

- National 4-H Electricity Curriculum:
  - Level 1: Magic of Electricity (HCE151)
  - Level 2: Investigating Electricity (HCE152)
  - Level 3: Wired for Power (HCE153)
  - Level 4: Entering Electronics (HCE154)
  - Electricity Leader Guide (HCE251)
- Educational Trunk
  - Electronic Snap Kits

  (Reserve through your county Extension office)

Other Resources

- ND State Electrical Board
- US Energy Information Administration
- Virginia Cooperative Extension 4-H Electricity School Enrichment Program
- Activity Lessons from Wisconsin 4-H
  - Bright Lights
  - Circuit Sense
  - Control the Flow
  - Earth Attractions
  - Fork in the Road

Recordkeeping

- ND 4-H Project Plan (PA093)
- Planning for My Project Adventure (PA095) *(Ages 8-10)*
- ND 4-H Plan of Action (PA096) *(Ages 11-18)*
- ND 4-H Participation Summary for 11- to 19-year-olds (PA098)

Exhibit Ideas

- Build a homemade flashlight.
- Create a simple switch.
- Build a circuit with two batteries and a light bulb.
- Build an electromagnet, galvanometer or compass.
- Create circuit diagrams with explanations.
- Build a circuit or switch.
- Display a soldered connection.
- Display electrical tools and supply kit.
- Create a display of symbols on wires and cables and their meanings.
- Create a display of light bulbs and the jobs they do best.
- Create a poster on how to read an appliance nametag.
- Develop a chart showing the electrical usage of appliances.
- Create a poster on how to replace a switch.
- Build a diode or transistor.
- Build an LED flasher or light meter.
- Build a photocell alarm or silicon-controlled rectifier (SCR) intruder alarm.
- Build a 6- to 8-watt amplifier with an integrated circuit.

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