

Magic of Electricity

A to Z's and One, Two, Threes



Jackie L. Helton

Extension Assistant: Curriculum

Department of 4-H Youth Development
and Family & Consumer Sciences

Agenda for the Day

- 10:00 Welcome and Agenda Review
- 10:20 Begin activities
- 11:00 Break
- 11:15 Continue activities
- 12:30 Lunch
- 1:15 Finish Magic of Electricity activities
- 2:15 Break
- 2:30 NC 4-H Electric Program Overview
- 4:30 Adjourn

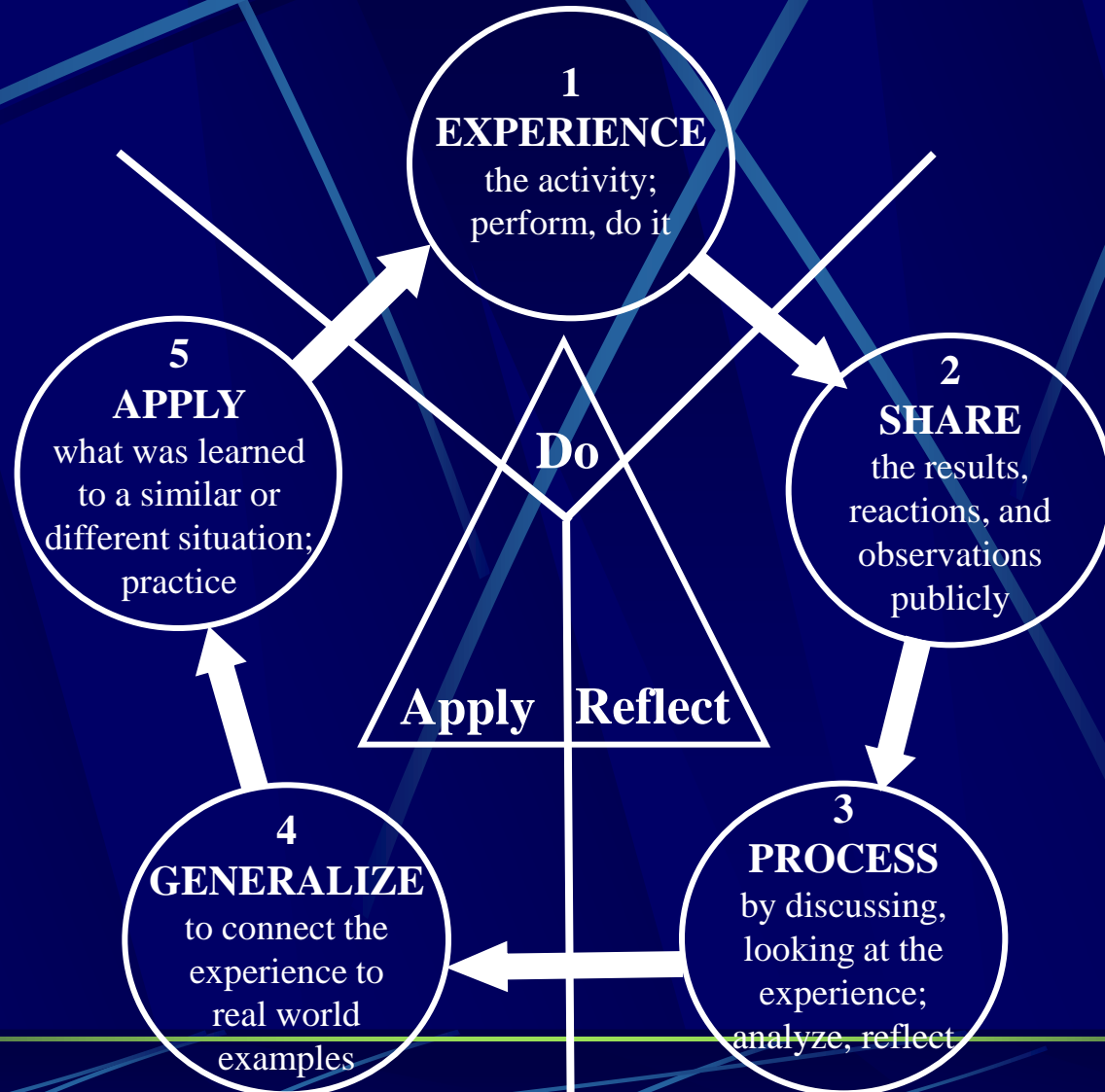
4-H Curriculum History

- Corn clubs for boys
- Tomato clubs for girls
- Demonstration projects
- Research based content
- Subject matter
- Hands on learning

4-H Curriculum Present

- Experiential learning model
- Juried process
- Learner focused
- Experience
- Balance between life skills & subject matter in curriculum
- Many different delivery strategies

Experiential Learning Model



Adapted from Kathleen Jamison, Virginia 4-H Specialist, Curriculum & Learning

Magic of Electricity

Fast Facts

- Level 1 of 4 Electric series member manuals
- Is supported by a Helper's Guide
- Designed for 4th and 5th grade youth
- Has 14 activities that you will complete today
- NC 4-H has developed kit to support (MOE)
- Can open door to entire 4-H Electric program for your club members

Activities 1-5

- Act. 1 Plugging In - Identify how you use electricity
- Act. 2 Getting It Together - Buying your supplies
- Act. 3 Bright Lights - Build a flashlight
- Act. 4 Control the Flow – Build & test a switch
- Act. 5 Conducting Things – Identify conductors of electricity

Activities 6-9

- Act. 6 Circuit Sense – Identify closed and open circuits
- Act. 7 Is There a Fork in the Road – Discover parallel series circuits
- Act. 8 May the Force Be With You – Test & classify materials
- Act. 9 A Passing Force – Test materials for magnetism

Activities 10-14

- Act. 10 Attract or Repel - Determine the north and south poles of magnets
- Act. 11 Earth Attractions - Build and test a compass
- Act. 12 Electric Attractions - Build an electromagnet
- Act. 13 Sense the Current - Build a galvanometer
- Act. 14 Make It Spin – Build an electric motor

Magic of Electricity Kit

- Designed to support up to 25 youth working in groups of 5
- Contains mostly non-consumables so that it can be used many times
- Contains 6 member's manuals and 1 leader's guide
- Has kit content sheet for entire kit and by activity

Plugging In

- Work in your groups and right down your 10 favorite things to do.
- Use the chart on page 6 and complete the questions asked.
- How many of the activities did you list used electricity?
- How would your favorite things be affected if you were without power for 5 days?
- Any questions?

Getting It Together

- Gathering the materials for all of the activities.
- Does your county have a kit you can check out?
- Learn the vocabulary. Gauges, stranded wire, solid core, wire stripper etc.
- Then begin looking for materials you already have. Pencil, aluminum foil, etc.
- Brainstorm local electronic stores that would carry the needed supplies and take your list with you.
- Any questions?

Bright Lights

- Materials needed are:
 - D cell battery, light bulb, aluminum foil
- Know definitions
- Make the bulb light-up
- Ask the processing questions during the activity so it doesn't seem like a test at the end.
- Why is this important?
- What's the science in the lesson?
- Any questions related to this activity?

Control the Flow

- Materials needed are:
 - Two metal paper fasteners, one metal paper clip, two pieces of wire, wire stripper, 2"x2" cardboard, D-cell battery/battery holder, one light bulb/bulb holder, and pencil
- Know definitions
- Make a switch and test it
- Draw your with as opened and closed circuits.
- List 10 things you use everyday that have switches.
- Why is this important?
- What's the science in the lesson?
- Any questions?

Conducting Things

- Materials needed are:
 - Switch from activity 4, 5 or more items like coat hangers, rubber bands, paper clips, aluminum foil, glass cup, pencil, cloth, string, etc.
- Know definitions
- Make/test hypothesis: conductors or insulators?
- Why is this important?
- What's the science in the lesson?
- Any questions?

Circuit Sense

- Materials needed are:
 - Wire, wire stripper, two D-cell batteries, two D-cell battery holders, two light bulbs, two light bulb holders, pencil
- Know definitions
- Predict open or closed circuits
- Build each circuit and test.
- Record results
- Why is this important?
- What's the science in the lesson?
- Any questions?

Is There a Fork in the Road?

- Materials needed are:
 - Two D-cell batteries, two D-cell battery holders, two light bulbs, two light bulb holders, wire, wire stripper
- Know definitions
- Make/test your predictions
- Why is this important?
- What's the science in the lesson?
- Any questions?

May the Force Be With You

- Materials needed are:
 - Magnet, 10 items including wood, metal, cloth, paper, plastic, etc.
- Know your definitions
- List items to test for magnetism
- Predict whether items will attract
- Test the items and record results
- Why is this important?
- What's the science in the lesson?
- Any questions?

A Passing Force

- Materials needed are:
 - Magnet, paper clips, string or thread, tape, one glass cup, one plastic cup, one hardback book, large non metal bowl, water
- Know your definitions
- Make your predictions
- Do the experiments and record your results
- Why is this important?
- What's the science in the lesson?
- Any questions?

Attract or Repel

- Materials needed are:
 - two magnets, two pieces of one foot long string or thread, compass
- Know your definitions
- Make your predictions
- Test your predictions and record results
- Why is this important?
- What's the science in the lesson?
- Any questions?

Earth Attractions

- Materials needed are:
 - Big sewing needle, magnet, bowl of water, styrofoam (size of quarter), and compass
- Know your definitions
- Build a compass
- Compare to purchased compass
- Was you compass accurate?
- Why is this important?
- What's the science in the lesson?
- Any questions?

Electric Attractions

- Materials needed are:
 - A 3" to 4" nail, a 30" piece of insulated wire, two D-cell batteries, two battery holders, several metal paper clips, switch from activity 4, pencil, iron nails in several sizes
- Know your definitions
- Build an electromagnet
- Test strength of magnet related to number of turns wire around nail and record results.
- Why is this important?
- What's the science in the lesson?
- Any questions?

Sense the Current

- Materials needed are:
 - small compass, 3 feet of insulated wire, 1" x 2" piece of cardboard, two brass fasteners, one D-cell battery, scissors, tape, one D-cell battery holder
- Know your definitions
- Build and test a galvanometer
- Why is this important?
- What's the science in the lesson?
- Any questions?

Make It Spin

- Materials needed are:
 - Two-foot piece of 22-26 gauge enamel coated (magnet) wire, D-cell battery, D-cell battery holder, one-foot 12 gauge solid core cooper wire, wire stripper, rectangular magnet, masking tape, sandpaper, sheet of paper, hard surface for sanding, pencil
- Know your definitions
- Build your electric motor and test it
- Why is this important?
- What's the science in the lesson?
- Any questions?

What Happened? (Sharing)

- Activities 1-14

What's Important? (Processing)

- Activities 1-14

So What? (Generalizing)

- Activities 1-14

Now What? (Applying)

- Activities 1-14

Now Lets Visit the...

BAE-4-H - Windows Internet Explorer

http://www.bae.ncsu.edu/programs/extension/4-h/

BAE-4-H


NC STATE UNIVERSITY
"We Bring Engineering to Life"


Biological and Agricultural Engineering

Sponsors:
Duke Energy
Progress Energy
Dominion NC Power
NC Association of Electric Cooperatives

4-H Hotlinks

- [NC 4-H Youth Development](#)
- [National 4-H Council](#)
- [4-H in the USA](#)
- [www.4-h.org](#)
- [CAL 4-H Development](#)
- [4-H Scholarships](#)
- [NC 4-H Publications](#)
- [NC 4-H Camps](#)


4-H
Electric Program



Electric Program

- [Electric Program Overview](#)
 - [Awards](#)
 - [Leader Responsibilities](#)
 - ["Electric Program Overview" Power Point](#)
- [2007 Electric Kit and Other Projects](#)
- ["Remote Control Nightlight Kit" Power Point](#)
- ["Electric Awards Overview" Power Point](#)
- [Project Kit Request Form](#) (.pdf format)
- [Soldering and Troubleshooting Tips](#) (.pdf format)
[Basic Soldering Technique](#)

61st 4-H Electric Congress
(July 14-16, 2008; UNC-Asheville)

- [2007 Bus Schedules](#) (.pdf format)
- [Delegate Registration and Reporting Forms](#)
- [Medical Form](#) (.pdf format)
- [Code of Conduct Form](#) (.pdf format)
- [Media Release Form](#) (.pdf format)
- [2006 Sponsor Addresses](#)
- [Program Example \(2005\)](#)
- [Electric Congress Pictures](#)

Internet 100%



4-H ELECTRIC PROGRAM OBJECTIVES

- Develop effective 4-H leadership, character, and citizenship
- Develop life skills
- Learn more about electricity and its safe efficient use
- Create an awareness of the amount of energy used in and around the home or farm
- Learn about energy conservation
- Generate enthusiasm for Science and Technology

4-H ELECTRIC ORGANIZATIONAL STRUCTURE

The 4-H Electric Project is conducted by the North Carolina Cooperative Extension Service and its professional 4-H Agents and Volunteer Leaders located in the 100 counties and Cherokee Reservation. These 4-H Agents and Volunteer Leaders participate in training sessions on electric projects, tour power plants, camps, and visit businesses. Typically, 4-H Agents train their Volunteer Leaders to organize and deliver electric activities for youth in their counties. Approximately 30 counties have 4-H Master Electric Volunteer Leaders who train other leaders on the electric project. Training materials used by 4-H Agents and Volunteer Leaders are obtained from the Power Company representatives and Department of Biological and Agricultural Engineering Specialist responsible for the Electric Program. There are over 33,000 Adult and Youth Volunteers involved in providing educational learning opportunities for youth in the total 4-H program.

NORTH CAROLINA 4-H ELECTRIC CONGRESS

North Carolina 4-H Electric Congress is an educational event designed to recognize excellence in the Electric Program throughout the state. Electric Congress travels from region to region of the state, thus allowing for a variety of programming opportunities for everyone. Four-H members participate in workshops, meet their Power Company Representatives, and interact with other electric winners. Special outings are planned to help the young people learn about their state. Whether in the mountains rafting on the Nantahala River, riding the waves at the beach, or somewhere in-between, the free afternoon at Electric Congress is fun for all participants.

Electric Congress is held for county winning 4-H'ers who participate in the Electric Project, electric project cumulative record book participants, and 4-H recruiters in the electric program. To attend, one must be 11 years of age (by Jan. 1st). Two county project winners, 2 cumulative record book participants, and 1 electric program recruiter are allowed to attend congress per county. Details for each delegate status are discussed below. Recruiting awards are presented to 4-H'ers in each county who recruit new members into the Electric Project. Adult volunteers, agents, and program assistants, are also encouraged to participate in North Carolina's Electric Congress. New 4-H agents or program assistants are especially encouraged to attend, which is an excellent opportunity for them to experience and learn more about this program.

4-H ELECTRIC CONGRESS DELEGATES AND PROGRAM AWARDS

APRIL 15th: DEADLINE FOR SUBMITTING INFORMATION FOR ELECTRIC CONGRESS DELEGATES ON ALL OF YOUR ATTENDING COUNTY DELEGATES AND ADULTS.

- ALL CUMULATIVE REPORTS (**MARCH 1** in state 4-H office)
- NAMES AND ADDRESSES FOR TWO COUNTY WINNER DELEGATES
- NAMES AND ADDRESSES FOR TWO COUNTY CUMULATIVE RECORD DELEGATES

61st 4-H ELECTRIC CONGRESS: JULY 14-16, 2008 @ UNC-Asheville

(NOTE: TRANSPORTATION Will BE ARRANGED BY YOUR RESPECTIVE POWER COMPANY)

1. ELECTRIC CONGRESS DELEGATE STATUS

a. CUMULATIVE RECORD BOOK DELEGATE (2)

Two (2 maximum per county) 4-H'ers per county that submit a [CUMULATIVE ELECTRIC RECORD BOOK](#) on the state competition level are eligible to attend 4-H Electric Congress. The cumulative record books are typically submitted to the state 4-H office by March 1st. Cumulative record book participants must register through their county 4-H Agent and submit required information prior to the April 15th deadline.

b. COUNTY DELEGATE (2)

County delegates are the two 4-H members with the best electric project records from each county and have not previously attended Electric Congress more than once. *You can only attend electric congress as a county delegate twice.* The member must complete a current electric project book and submit an electric report which lists the current year's electric activities in which they completed to qualify for this trip. The [COUNTY DELEGATE'S REPORT FORM](#) and registration form should be submitted.

c. RECRUITING DELEGATE (1)

One 4-Her per county that promotes the 4-H Electric Project by recruiting the most new members into the electric project beyond the minimum requirements. The minimum requirements are eight (8) new members if attending Electric Congress as a first year recruiting delegate and a minimum of 16 as a second year recruiting delegate. Eight additional new members will be the required for each additional trip to Electric Congress, i.e. 24 for a third trip and so on. *Only new recruiting electric project members who complete and turn in their record can be counted. The same new member can only be counted by one recruiting delegate.* Minimum requirement example: A member attends Electric Congress as a county delegate (once or twice), the minimum requirement is eight; another member has attended as a county delegate (once or twice), and as a recruiting delegate once, the minimum requirement is 16. Recruiting delegates are to submit a [RECRUITING DELEGATE REPORT FORM](#), which summarizes workshops or activities performed to win the recruiting award trip. Recruiting delegates are still required to complete the recruiting registration form, as well as, the report form. *You must have attended Electric Congress at least once before qualifying for Recruiting Award status.*

d. AT-LARGE RECRUITING AWARD

Up to ten at-large (total of 10 for entire state) recruiting awards invitations will be awarded to members doing outstanding recruiting work in addition to the regular recruiting awards above. The selection of the ten at-large recruiting delegates will take place at the state level in the event more than ten qualify. The same minimum requirements apply as stated above for the regular recruiting award. The potential at-large recruiting delegates must complete the [RECRUITING REPORT FORM](#), in order to qualify. Please remember that in order to qualify, you must have previously attended as a regular delegate, have exhausted the county delegate status and lost to another recruiting delegate winner from your county.

e. ADULT LEADERS and COUNTY EXTENSION PERSONNEL (Maximum of 3 Adults per County)

The number of Adult leaders that can attend is based on the total number of youth attending from your county;

3 or less youth, one Adult leader plus the 4-H Agent or Program Associate.

4 or more youth, two Adult Leaders plus the 4-H Agent or Program Associate.

An Adult Leader can not take the place of the 4-H Agent or Program Associate if they are not attending.

The Electric Congress delegate registration forms are to be completed and submitted by mail, fax, or email no later than April 15th to:

Grant Ellington-Extension Associate
NC State University
Biological & Agricultural Engineering
Campus Box 7625
Raleigh, North Carolina 27695-7625

2. TERRITORIAL AWARDS

The Territorial Award winners will be selected from the *Cumulative Electric Project Books* that are submitted in early March for the state judging competition. First, second, and third place winners are selected from each territory (Duke Power, Progress Energy, and Dominion NC Power) and are recognized at Electric Congress. Territorial winner selection is based primarily on the knowledge, accomplishments, and skills learned in the electric project. The record book must also be well organized and formatted in accordance with the State 4-H guidelines for completing a cumulative record book. There are no age divisions for the territory awards. The 4-H members that submit a cumulative electric book are competing for the following prizes:

a. **FIRST PLACE - 20-inch COLOR TV with VCR/DVD Player** to the 4-H member with the best Cumulative Electric Record book in each utility territory (area) that has not previously won first place territorial or state award in the Electric Project.

b. **SECOND PLACE - iPod-Mini** to the 4-H member with the second best Cumulative Electric Record book in each utility territory (area) that has not previously won a first or second place territorial or state award in the Electric Project.

c. **THIRD PLACE - iPod-Shuffle** to the 4-H member with the third best Cumulative Electric Record book in each utility territory (area) that has not previously won a first, second, or third place territorial or state award in the Electric Project.

(Note: Territorial prizes may vary from year to year.)

In addition to individual awards, counties that turn in a *Group Cumulative Electric Book* are competing for the three traveling plaques and one permanent plaque. A traveling plaque is awarded to the best group book in each territory. The overall permanent plaque is given to the best of the three territorial winners.

d. **TRAVELING PLAQUE** - To the county with the most outstanding group electric program and achievements in each territory. The traveling plaque is awarded for one year, then returned and awarded to the current year winner.

e. **PERMANENT PLAQUE** - To the best of the three territorial group winners.



3. STATE and DISTRICT AWARDS

a. Partial Scholarship (\$75) to 4-H Congress for district presentation winners, all age groups (9-10, 11-13, 14-18).

b. All district level winners will receive a certificate. State cumulative winners will receive savings bonds in the following amounts:

Ages 13 - 15	Ages 16 - 19
1st Place - \$200	1st Place - \$300
2nd Place - \$100	2nd Place - \$200
3rd Place - \$ 50	3rd Place - \$100

Why Experience-based Learning?

Consider that we remember:

- 20% of what we read.
- 20 % of what we hear.
- 30% of what we see.
- 50% of what we see and hear.
- 70% of what we see, hear, and discuss; and
- 90% of what we see, hear, discuss, and practice.

Remember to...

Focus on Learning and Leading Experientially
when working with 4-H Youth

We're co-learners in a youth-generated, adult facilitated
service for our future.

Any Questions so far?



Thank you!