

<p style="text-align: center;">DEPARTMENT H – SCIENCE, ENGINEERING & TECHNOLOGY</p> <p style="text-align: center;">ELECTRICITY, SMALL ENGINES, WOODWORKING & WELDING</p>
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Sarpy County Fair Co-Superintendents:

Deb Albright

Elizabeth Pokorny

Junior Superintendent:

Josh Albright

4-H Staff Person Responsible – John Kilpatrick

Department H – Science, Engineering & Technology
Division 870 – Electricity

General Information

- A. Members with 4-H electric projects may enter articles in Electric and Electronics. All articles should be made by the club member exhibiting.
- B. All entries will be judged on the basis of the quality of workmanship.
- C. Entries for exhibit must be from the current year's work.
- D. Fix suitable hanger to the back of the board to facilitate hanging for exhibit.
- E. The name and county of each exhibitor should appear separately on the back of each board, article, or plans so that the owner of the exhibit may be identified if the entry tag is separated from the exhibit.
- F. **Number of entries: multiple, please refer to Exhibit Entries Rules and Regulations**
- G. Several classes require a display board which has a height of 24 inches and not to exceed 1/4 inch in thickness. A height of 23 7/8 inches is acceptable to allow for the saw kerf if two 24-inch boards are cut from one end of a 4' x 8' sheet of plywood. Nothing should be mounted within 3/4 inch of the top or bottom of the board.
- H. Fabricated board (ex. plywood, composition board, particle-type lumber) may be used for demonstration purposes.
- I. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
- J. Demonstration board should include an overall title for display, plus other necessary labeling.
- K. All reports should be clearly written or typed and enclosed in a clear, plastic cover. The reports should be attached securely to the display.
- L. **Premiums for Electricity projects are pay level 5.**

OMAHA PUBLIC POWER DISTRICT

As an incentive to promote more interest in the 4-H Electrical Program, Omaha Public Power District will award \$50.00 to the top electrical exhibitor selected from Division 870 - Electricity and Electronic.

ELECTRICITY- WIRED FOR POWER – UNIT 3

CLASS 1 ELECTRICAL TOOL/SUPPLY KIT

Create an electrical supply kit to be used for basic electrical repair around the house. Include a brief description of each item and its use. Container should be appropriate to hold items.

CLASS 2 LIGHTING COMPARISON

Display studying the efficiency of various lighting (incandescent, fluorescent, halogen, Light Emitting Diodes, etc.). Exhibit could be a poster display, or an actual item.

CLASS 3 ELECTRICAL DISPLAY/ITEM

Show an application of one of the concepts learned in the Wired for Power project. Examples include: re-wiring or building a lamp, re-wiring or making a heavy duty extension cord or developing an electrical diagram of a house. Exhibit could be a poster display, or an actual item.

CLASS 4 POSTER

Poster should exemplify one of the lessons learned in the Wired for Power Project. Posters can be any size up to 28" by 22".

ELECTRONICS – UNIT 4

CLASS 5 ELECTRICAL/ELECTRONIC PART IDENTIFICATION

Display different parts used for electrical/electronics work. Exhibit should show the part (either picture or actual item) and give a brief description, including symbol of each part and its function. Display should include a minimum of 10 different parts.

CLASS 6 ELECTRONIC DISPLAY

Show an application of one of the concepts learned in the Electronics project. Examples include: components of an electronic device (refer to p. 35 of the Electronic manual).

CLASS 7 ELECTRONIC PROJECT

Exhibit an electronic item designed by the 4-H'er or form a manufactured kit that shows the electronic expertise of the 4-H'er. Examples include: a radio, a computer, or a volt meter.

CLASS 8 POSTER

Poster should exemplify one of the lessons learned in the Entering Electronics Project. Posters can be any size up to 28" by 22".

*** FOLLOWING CLASSES ARE NOT ELIGIBLE FOR STATE FAIR CONSIDERATION***

ELECTRIC #1: MAGIC OF ELECTRICITY.

CLASS 901* UNIT 1 BRIGHT LIGHTS

Create your own flash light using items found around your house. Flash lights should be made out of items that could be recycled or reused. No kits please.

CLASS 902* UNIT 1 CONTROL THE FLOW: MAKE A SWITCH

Use the following items: D cell battery, battery holder, insulated wire, 2 or 2.5 volt light bulb, bulb holder, paper clip, cardboard, and two brass paper fasteners to create a circuit that you can open and close.

CLASS 903* UNIT 1 CONDUCTING THINGS

Make a circuit with a switch and a light bulb that can be used to test different household items for their ability to act as an insulator or conductor. You must find five items that are conductors and five items that are insulators. Create a table that illustrates your results.

CLASS 904* UNIT 1 IS THERE A FORK IN THE ROAD

Use the following items to construct one parallel and one series circuit. Items: D cell battery, battery holder, insulated wire, bulb holder and a 2 or 2.5 volt light bulb.

ELECTRIC #2: INVESTIGATING ELECTRICITY

CLASS 905* UNIT 2 CASE OF THE SWITCHING CIRCUIT

Use the following items: two D cell batteries, two battery holders, light bulb, bulb holder, a 3inch by 6 inch piece of cardboard, six brass paper fasteners and approx. two feet of 24 gauge insulated wire to build a three way switch. Write a short essay or create a poster that illustrates how three way switches function.

CLASS 906* UNIT 2 ROCKET LAUNCHER

Construct a rocket launcher out of the following materials: a plastic pencil box that is at least 4inches by 8inches, single pole switch, single throw switch, normally open push button switch, 40 feet of 18 or 22 gauge stranded wire, 4 alligator clips, 2-by 6-board 6 inches long, 1/8 inch diameter metal rod, rosin core solder, soldering iron or gun, wire stripper, small crescent wrench, pliers, small Phillips and straight blade screwdrivers, drill, 1/8 inch and 1/4 inch drill bits, rocket engine igniter, additional drill bits matched to holes for two switches. You must successfully build a rocket launcher and light two rocket igniter with your launcher. You DO NOT have to actually fire a rocket off of the launcher. Create a poster using photographs to show the "step by step process" you used to build your launcher.

CLASS 907* UNIT 2 STOP THE CRIME: BUILD AN ALARM

Use the following materials: On-off push button switch, mercury switch, buzzer-vibrating or piezoelectric, 9-volt battery holder, 4 inch by 4 inch by 1/8 inch Plexiglas board to mount circuit on; rosin core solder, soldering gun/iron, two feet of 22 gauge wire, wire strippers, hot glue sticks, hot glue gun and a plastic box with lid to mount your alarm circuit on. Create a poster using photographs to show the "step by step process" you used to build your alarm.

CLASS 920* OTHER ELECTRIC OR ELECTRONIC EXHIBIT

These should be exhibits that are made out of household, reusable or recyclable items. Possible project ideas could include, but are not limited to the following, non-wooden quiz box, non-wooden steady hand tester, a battery operated simple circuit, home made battery powered electric motor, etc. NO KITS ALLOWED

**Department H – Science, Engineering & Technology
Division 890 – Small Engines**

WARM IT UP – UNIT 2

CLASS 1 SMALL ENGINE DISPLAY/ITEM

Show an application of one of the concepts learned in the Warm It Up project. Examples include: comparison of engine oil types, transmissions, or safety related to engines. Exhibit could be a poster display, or an actual item.

TUNE IT UP – UNIT 3

CLASS 2 ENGINE DISPLAY/ITEM

Display/Item should exemplify one of the lessons learned in the Tune It Up Project. Examples include: diagnostic tools, fuel systems, ignition systems. If a complete engine is exhibited it will not be started. However, display needs to report process of building/rebuilding engine and how/where engine will be utilized (i.e. lawn mower, weed eater, snow blower, etc.).

**Department H – Science, Engineering & Technology
Division 911 & 912 – Woodworking**

Rules:

- A. Members enrolled in 4-H Woodworking projects are eligible to compete in this division.
- B. **Number of entries: multiple, please refer to Exhibit Entries Rules and Regulations**
- C. Entries must be the result of a project being carried during the current year.
- D. Fix suitable hanger to back of board to facilitate hanging for exhibit.
- E. **Include plans** or, on articles where applicable, make a list of procedures used for all entries.
- F. For articles made from the manuals, a photocopy is acceptable, but any changes in measurements must be marked on the plans.
- G. On the plans, include a list of tools used. Enter articles in the correct classes.
- H. **The copy of the plans used to make an article must be attached to the article and protected by clear plastic cover. No Kits Allowed.**
- I. A special premium is offered in the woodworking project.
- J. The exhibitor of the outstanding woodworking article from Department 760 will receive blue 1st place rosette.

- K. The exhibitor of the second place article will receive a red rosette. The exhibitor of the third place article will receive a white rosette.

Department H classes are paid at level 5 and advanced woodworking at pay level 3.

Department H – Science, Engineering & Technology Division 911 – Advanced Woodworking

NAILING IT TOGETHER – UNIT 3

CLASS 1 WOODWORKING ARTICLE

Item made using skills learned in the Nailing it Together manual. Examples include: bookcase, coffee table or end table.

CLASS 2 WOODWORKING DISPLAY

Display exemplifying one of the principles learned in the Nailing it Together Project. Examples include: measuring angles, wood lamination and joint types.

FINISHING UP – UNIT 4

CLASS 3 WOODWORKING ARTICLE

Item made using skills learned in the Finishing it Up Project. Examples include: dovetailing, making a pen using lathe, overlays, using a router, etc.

CLASS 4 WOODWORKING DISPLAY

Display exemplifying one of the principles learned in the Finishing It Up Project. Examples include: career opportunities, types of finishes, or dovetailing.

Department H – Science, Engineering & Technology Division 912 – Beginning Woodworking

MEASURING UP – UNIT 1

* FOLLOWING CLASSES ARE NOT ELIGIBLE FOR STATE FAIR CONSIDERATION*

CLASS 901* FIRST WOODWORKING ARTICLE:

Item made using skills learned in the Measuring Up Project Guide. Examples include: recipe holder, stilts or other skill level appropriate item. Items should be entered with construction plans.

CLASS 902* SECOND WOODWORKING ARTICLE

Item made using skills learned in the Measuring Up Project Guide. Examples include: recipe holder, stilts or other skill level appropriate item. Items should be entered with construction plans.

CLASS 903* THIRD WOODWORKING ARTICLE

Item made using skills learned in the Measuring Up Project Guide. Examples include: recipe holder, stilts or other skill level appropriate item. Items should be entered with construction plans.

Department H – Science, Engineering & Technology

Division 913 – Intermediate Woodworking

MAKING THE CUT – LEVEL 2

* FOLLOWING CLASSES ARE NOT ELIGIBLE FOR STATE FAIR CONSIDERATION*

CLASS 901* FIRST WOODWORKING ARTICLE

Item made using skills learned in the Making the Cut project guide. Examples include: birdhouse, foot stool, napkin or letter holder. Items should be entered with construction plans.

CLASS 902* SECOND WOODWORKING ARTICLE

Item made using skills learned in the Making the Cut project guide. Examples include: birdhouse, foot stool, napkin or letter holder. Items should be entered with construction plans.

CLASS 903* THIRD WOODWORKING ARTICLE

Item made using skills learned in the Making the Cut project guide. Examples include: birdhouse, foot stool, napkin or letter holder. Items should be entered with construction plans.

Department H – Science, Engineering & Technology

Division 920 – Welding

General Rules

- A. All metal welding process accepted
- B. All welds exhibited in class 1 or 2 must be mounted on a 12" high x 15" long display board of thickness not to exceed 3/8".
- C. Attach each weld on a wire loop hinge or equivalent, so the judge can look at the bottom side of the weld when necessary.
- D. Each weld should be labeled with information stated 1) type of welding process (stick, MIG, TIG, Oxy-Acetylene, etc.) 2) kind of weld, 3) welder setting, 4) electrode/wire/rod size, and 5) electrode/wire/rod ID numbers.
- E. Attach a wire to display board so it can be hung like a picture frame.
- F. NOTE: You must be in your third year of a welding project to exhibit welding at the State Fair.

CLASS 1 WELDING JOINTS

A display of one butt, one lap and one fillet weld.

CLASS 2 POSITION WELDS

A display showing three beads welded in the vertical down, horizontal and overhead positions.

CLASS 3 WELDING ARTICLE

Any shop article where welding is used in the construction. All plans and bill of materials must be attached to the article. Protect plans with a cover.

4-H Welding Project Tips and Suggestions

CLASS 1

1. All welds should be made with the same electrode/wire/rod size and number. 2. Welds should be made only on one side of metal so penetration can be judged. 3. Welds should be cleaned with chipping hammer and wire brush. Apply a coat of light oil (penetrating oil) to the metal to prevent rusting. Wipe off excess oil. 4. It is suggested that all welds be on the same size and thickness of metal. These pieces, referred to as coupons, should be 1.5 to 2 inches wide and 3.5 to 4 inches long. A good way to get this size is to buy new cold rolled strap iron and cut to length. The extra width is needed to provide enough metal to absorb the heat from the welding process and prevent the coupons from becoming too hot before the bead is completed. Narrower coupons will become very hot, making an average welder setting too cold at the bead start, just about right in the middle, and too hot at the end. The correct way to weld narrow strips is to make short beads and allow time to cool, however this project requires a full length bead. Stick welding Suggested coupon thickness- $\frac{1}{4}$ " if using $\frac{1}{8}$ " rod Suggested rod-AC and DC straight or reverse polarity- first E-7014, second E-6013 MIG welding Suggested coupon thickness-- $\frac{1}{4}$ " if using .035 wire and $\frac{1}{8}$ " if using .023 wire Oxy-Acetylene Suggested coupon thickness- $\frac{1}{8}$ " Suggested rod- $\frac{1}{8}$ " mild steel rod

CLASS 2

1. It is suggested that all welds be on same size and thickness of metal. These pieces are referred to as coupons. The welds can be on one coupon that is about 4" x 4" or on individual coupons that are about 2" X 4" inch and $\frac{1}{4}$ " thick. Suggested rods for this class of position welds for AC and DC straight or reverse polarity is, first E-6013, second E-7014 and E-6010 for DC reverse polarity only. 2. Welds should be cleaned with a chipping hammer and wire brush. Apply a coat of light oil (penetrating oil) to the metal to prevent rusting. Wipe off excess oil.

CLASS 3

1. All welds should be cleaned and protected from rust with paint or light oil. Plans are to be complete enough that if they were given to a welding shop, the item could be made without further instructions. Bill of materials should include a cost for all items used including steel, electrodes, paint, wheels, etc.