

DEPARTMENT SCIENCE, ENGINEERING, AND TECHNOLOGY

General Information/Rules:

- A. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so the owner of the exhibit may be identified if the entry tag is separated from the exhibit.
- B. Each individual is limited to one exhibit per class.
- C. Several classes require a display board which should be a height of 24 inches and not to exceed 1/4 inch in thickness. A height of 24 7/8 is acceptable to allow for the saw kerf (width) 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. (Example: Woodworking & Electricity.)
- D. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
- E. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
- F. Demonstration boards should include an overall title for the display plus other necessary labeling. .
- G. Reports should be written using the scientific method whenever possible (Background, the question or hypothesis, what you plan to do and what you did. Method used and observations, Results: what you learned. All reports should be computer generated, enclosed in a clear, plastic cover. The reports should be attached securely to the display.H. Premier 4-H Science Award is available in this area.

CAREERS (Science, Engineering, Technology - SET)

H930-001 Careers Interview Interview someone who is working in any field associated with science, engineering and technology and research that career (i.e., computer programmer, architect, engineer, pilot, etc.) Interviews can either be written or in a multimedia format (CD/DVD). Written interviews should be in a notebook. Written reports should be 3-5 pages, double spaced, 12-point font, 1" margins. Multimedia reports should be between 3-5 minutes in length.

DIVISION 850 – AEROSPACE / ROCKETRY

See General Information Department of Science, Engineering and Technology

Rockets must be supported substantially to protect the rocket from breakage. Rockets are to be mounted on a base that has dimensions equal or less than 12" x 12" and the base should be 3/4" thick. No metal bases. If the rocket fins extend beyond the edges of the required base (12" x 12"), then construct a base that is large enough to protect the fins. The base size is dictated by the size of the rocket fins. The rockets **must** be mounted vertically. Please do not attach sideboards or backdrops to the displays. In addition a used engine or length of dowel pin is to be glued and/or screwed into the board and extended up into the rockets engine mount to give added stability. Rockets must be equipped as prepared for launching, with wadding and parachute or other recovery system. Rockets entered with live engines, wrong base size or sideboards will be disqualified. A report, protected in a clear plastic cover, must include:

- 1) rocket specification, (include original or photo of manufacture packaging stating rocket skill level)
- 2) a flight record for each launching (weather, distance, flight height),
- 3) number of launchings, and
- 4) flight pictures,
- 5) safety. (How did you choose your launch site? Document safe launch, preparation and precautions)
- 6) objectives learned, and
- 7) conclusions.

The flight record should describe engine used, what the rocket did in flight and recovery success. Points will not be deducted for launching, flight or recovery failures described. This includes any damage that may show on the rocket.

Complete factory-assembled rockets will not be accepted at the State Fair. Judging is based upon display appearance, rocket appearance, workmanship, design or capabilities for flight, number of times launched and report. Three launches are required to earn the maximum launch points given on the score sheets. For scoring for the State Fair, only actual launches count, misfires will not count towards one of the required three launches. For **self-designed rockets only**, please include a digital recorded copy of one flight. In the documentation please include a description of stability testing before the rocket was flown.

Skill level of project is not determined by number of years in project. Skill level is determined by the level listed on the manufacturing packaging. 4-H Rocket project levels are not intended to correspond to National Association of Rocketry model rocket difficulty ratings or levels. High power rockets (HPR) are similar to model rocketry with differences that include the propulsion power and weight increase of the model. They use motors in ranges over "G" power and/or weigh more than laws and regulations allow for unrestricted model rockets. These rockets are NOT appropriate for 4-H projects and will be disqualified.

H850-901 Skill Level 1 Rocket (County entry only)

H850-902 Any Other Rocket

LIFT OFF - UNIT 2

H850-001* Rocket - Any Skill Level 2 Rocket with wooden fins painted by hand or air brush.

H850-002* Display - Display exemplifying one of the principles learned in the Lift Off project. Examples include: display of rocket parts and purpose, interview of someone in the aerospace field, or kite terminology. Include notebook containing terminology (definition) and what was learned. Display can be any size up to 28" by 22".

H850-003* Rocket - Any Skill Level 2 Rocket with wooden fins painted using commercial application example commercial spray paint.

H850-903 Any Other Rocket

REACHING NEW HEIGHTS - UNIT 3

H850-004* Rocket - Any Skill Level 3 Rocket with wooden fins painted by hand or air brush.

H850-005* Display – Display exemplifying one of the principles learned in the Reaching New Heights Project. Examples include: airplane instrumentation, kite flying, or radio-controlled planes. Display can be any size up to 28" by 22". Include notebook containing terminology (definition) and what was learned.

H850-006* Rocket - Any Skill Level 3 rocket with wooden fins painted using commercial application - example commercial spray paint.

H850-904 Any Other Rocket

PILOT IN COMMAND - UNIT 4

H850-007* Rocket - Any Skill Level 4 Rocket with wooden fins or any self designed rocket.

H850-008* Display – Display exemplifying one of the principles learned in the Pilot in Command Project. Examples include: flying lessons, or careers in aerospace. Display can be any size up to 28" by 22".

H850-905 Any Other Rocket

DRONES – UNIT 5

H850-009* Drone Poster – Exhibit must be designed to educate yourself and others on one or more of the following topics: drone technologies, uses of drones, the different types of drones, types of training needed to operate drones, and the laws and regulations users must follow. Posters can be any size up to 28" by 22".

DIVISION 860 – COMPUTERS

H860-901 Exhibit made in Unit 1 (county only exhibit – not eligible for State Fair)

COMPUTER MYSTERIES - UNIT 2

H860-001* Computer Application Poster - Exhibitor should use computer application to create a graphic notebook utilizing computer technology: 4-H'er may create any of the following: greeting card (5 different cards such as a birthday, wedding, anniversary, sympathy, get well or other); a business card (3 cards for 3 different individuals and businesses); menu (minimum of 2 pages including short description of foods and pricing); book layout (1-book); promotional flyer (3 flyers promoting 3 different events); newsletter (minimum 2 pages); or other: examples such as precision farming or family business logo etc. This exhibit consists of a notebook (8.5 x 11 inches) which should include a (1) detailed report describing: (a) the task to be completed, (b) the computer application software required to complete the task, (c) specific features of the computer application software necessary for completing the task (2) printout of your project. Project may be in color or black and white

H860-002* Produce a Computer Slide Show Presentation - Using presentation software. All slide shows for State Fair should be emailed to Amy Timmerman atimmerman2@unl.edu before August 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing. All county fair projects with a printout should be saved on a CD rom to be submitted for county fair. Slideshow should include a minimum of 10 slides and no more than 25. Incorporate appropriate slide layouts, graphics, animations and audio (music or voice and transition sounds do not count) . Each slide should include notes for a presenter. All slideshows must be uploaded.

COMPUTER MYSTERIES - UNIT 3

H860-004* Produce an Audio/Video Computer Presentation - Using presentation software a 4-H exhibitor designs a multimedia computer presentation on one topic related to youth. The presentation should be at least 2 minutes in length and no more than 5 minutes in length, appropriate graphics, sound and either a video clip, animation or voice over and/or original video clip. The presentation must be able to be played and viewed on a PC using Windows Media Player, Real Player, iTunes or QuickTime Player.

H860-005* How to STEM (Science, Technology, Engineering and Math) Computer Presentation - Youth design a fully automated 2 to 5 minute 4-H "how to" video. Submissions should incorporate a picture or video of the 4-H'er, as well as their name (first name only), age (as of January 1 of the current year), years in 4-H, and their personal interests or hobbies. Videos should be designed for web viewing. Any of the following formats will be accepted: .mpeg, .rm, .wmv, .mp4, .ov, .ppt, or .avi.

H860-006* Create a Web Site/Blog or App - Design a simple Web site/blog or app for providing information about a topic related to youth using software programs such as an HTML editor like Microsoft's FrontPage or Macromedia's Dreamweaver, and image editor like Irfan View or GIMP OR online using a WIKI such as Google Sites. If the Web site, Blog or App isn't live include all files comprising the Web site, Blog or App should be submitted on a CD-ROM in a plastic case along with the explanation of why the site was created. If developed using a WIKI or other online tool include a link to the website in the explanation of why the site was created.

H860-007* 3D Printing Unique Items: 3D printing uses plastic or other materials to build a 3 dimensional object for a digital design. Youth may use original designs or someone else's they have re-designed in a unique way. Exhibits will be judged based on the motivation and/or problem identified. For example 3D objects printed as part of the design process for robot or other engineering project or cookie cutter. Must include design notebook with motivation or problem statement the prototype was 3D printing will include a notebook with the following:

- a. Define motivation/problem solved
- b. Software used
- c. Document purpose or material and print settings.
- d. Material choice (PLA, PVA, ABS, etc)
- e. In-fill density
- f. Moving parts.

H860-008* 3D Pen Creation - 3D pens rapidly melt and cool plastic filament allowing the 4-H'er to draw in 3D. Youth may use original designs or use a template to create their 3D item. Exhibits will be judged based on the complexity of the design and shape. 3D pen creation will include a notebook with the following:

- a) Copy of the template if used and description of any changes the youth created.
- b) If no template used – an explanation of how the creation was built.
- c) Must include paragraph of what the youth learned while creating their project (i.e., way to improve their next creation)
- d) Paragraph on how 3D pens impact Science, Engineering and Technology.

H860-009* Digital Fabrication – This project is a computer generated project created using a laser cutter, vinyl cutter, heat press or CNC router, Vector or 3D based software such as corel draw or Fusion 360 would be an example of an appropriate software used to create your finished project. Project should include a notebook with the following:

- a) What motivated you to create this project.
- b) Software and equipment used.
- c) Directions on how to create the project.
- d) Prototype of plans,
- e) Cost of creating project.
- f) Iterations or modifications made to original plans
- g) Changes you would make if you remade the project.

DIVISION 861 – ROBOTICS

See General Information Science, Engineering and Technology

Youth enrolled in Virtual Robotics, Junk Drawer Robotics (Levels 1, 2 or 3), Robotics Platforms or GEAR TECH 21 may exhibit in any class within this division. Creating a video of your robot in action would be helpful but is not mandatory. Present as a CD Rom with your robot entry.

H861-001* Robotics Poster – Create a poster (14" x 22") communicating a robotics theme such as "Robot or Not", "Pseudocode", "Real World Robots", "Careers in Robots", or "Autonomous Robotics", "Precision Agriculture", or a robotic topic of interest to the 4-H'er.

H861-002* Robotics Notebook - Explore a robotics topic in-depth and present your findings in a notebook. Documentation should include any designs, research, notes, pseudocode, data tables or other evidence of the 4-H'ers learning experience. The notebook should contain at least three pages. Topics could include a programming challenge, a programming skill, calibration, sensor explanation, or any of the topics suggested in Class 1.

H861-003* Robotics Video - This class should be displayed in a notebook. The notebook should include a video clip on a CD/DVD that demonstrates the robot performing the programmed function. Include your pseudo code and screenshots of the actual code with a written description of the icon/command functions. All videos for State Fair should be mailed to Amy Timmerman

atimmerman2@unl.edu before August 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing.

H861-004* Robotics / Careers Interview – Interview someone who is working in the field of robotics and research the career in robotics. Interviews can either be written or in a multimedia format (CD/DVD). Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12 point font, and 1" margins. Multimedia reports should be between 3 to 5 minutes in length.

H861-005* Robotic Sensor Notebook - Write pseudo code which includes at least one sensor activity. Include the code written and explain the code function.

H861-006* Build a Robot (may use kit) - Include a robot and notebook including the pseudo codes for at least one program you have written for the robot, the robot's purpose, and any challenges or changes you would make in the robot design or programming. If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases. (State Fair) We recommend you submit the project under class H861003 – Robotics Video. Junk Drawer Robotics do not qualify. For State Fair, submit a video of robot in action to Amy Timmerman by 8/15. Files must be saved in a PC compatible format with county name and last name of participant before mailing.

H861-007* Kit Labeled Robot – (Cannot be programmed) This class is intended for explorations of robotic components such as arms or vehicles OR educational kits marketed as robots that do not have the ability to be programmed to "sense, plan and act." The exhibit should include a project the youth has constructed, a description of what it does and an explanation of how it is similar to and different from a robot. . If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases. (State Fair) We recommend you submit the project under class H861003 – Robotics Video.

DIVISION 870 – ELECTRICITY

See General Information Science, Engineering and Technology

H870-901 Bright Lights: Create your own flashlight using items found around your house. Flashlights should be made out of items that could be recycled or reused. No kits please.

H870-902 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.

H870-903 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.

H870-904 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.

INVESTIGATING ELECTRICITY - UNIT 2

- H870-905 Case of the Switching Circuit**: Use the following items: two D cell batteries, two battery holders, light bulb, bulb holder, a 3 inch by 6 inch piece of cardboard, six brass paper fasteners and approximately 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.
- H870-906 Rocket Launcher**: Construct a rocket launcher out of the following materials: a plastic pencil box that is at least 4 inch x 8 inch, single pole switch, single throw switch, normally-open push button switch, 40 feet of 18 or 22 gauge stranded wire, 4 alligator clips, 2 x 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 igniters, additional drill bits matched to holes for two switches. You must successfully build a rocket launcher and light two rocket igniters 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.
- H870-907 Stop the Crime: Build an ALARM** using the following materials: On-off push button switch, mercury switch, buzzer-vibrating or piezoelectric, 9-volt battery, 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 a 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.

WIRED FOR POWER - UNIT 3

- H870-001* 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.
- H870-002* 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.
- H870-003* 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 poster display, or an actual item.
- H870-004* Poster** - Poster should exemplify one of the lessons learned in the Wired for Power Project. Posters can be any size up to 28" x 22".

ELECTRONICS - UNIT 4

- H870-005* Electrical/Electronic Part Identification** - Display different parts used for electrical/electronic 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.
- H870-006* Electronic Display** - Show an application of one of the concepts learned in the Electronics project. Examples include: components of an electronic device (refer to page 35 of the Electronic manual).
- H870-007* Electronic Project** - Exhibit an electronic item designed by the 4-H'er or from a manufactured kit that shows the electronic expertise of the 4-H'er. Examples include: a radio, a computer, or a volt meter.
- H870-008* Poster** - Poster should exemplify one of the lessons learned in the Entering Electronics Project. Poster can be any size up to 28" x 22".

DIVISION 880 – GEOSPATIAL

Youth enrolled in Geospatial or GEAR TECH 21 may exhibit in any class within this division.

- H880-001* Poster** – Create a poster (not to exceed 14" x 22") communicating a GPS theme such as How GPS or GIS works, Careers that use GPS or GIS, How to use GPS, What is GIS, GPS or GIS in Agriculture, Precision Agriculture, or a geospatial topic of interest.
- H880-002* 4-H Favorite Places or Historical Site Poster** – The 4-H exhibitor identifies a favorite place or historical site (including grave sites) in Nebraska. Exhibit should include latitude and longitude, digital picture, and local area map. Poster size should not exceed 14" x 22".
- H880-003* GPS Notebook** – Keep a log of at least 5 places visited using a GPS enabled device. At least one site should be from a community other than where you live. For each site, record the latitude, longitude and elevation. Also include a description of the site, a paragraph explaining what was interesting about the site or finding it. Photos of each site and/or cache are optional but encouraged.
- H880-004* Geocache** – Assemble a themed geocache. Each geocache should be a water-tight container. It should include a log book and pencil for finders to log their visits and may include small trinket, geocoins, etc. for the finders to trade. Documentation should include a title, teaser description and the geographic coordinates of intended placement. [Register the site at geocaching.com](http://www.geocaching.com), include a print-out of its registry. The entry may include a photograph of the cache in its intended hiding place.
- H880-005* Agriculture Precision Mapping** – 4-Hers will assemble a notebook that will include a minimum of 2 digital copies of various data layers that can be used in precision agriculture to identify spatial patterns and/or correlations (printed copies of websites where applications can be purchased is acceptable). A report of how the analysis of the various data will be used to make a management decision.
- H880-007* 4-H History Map** – Preserve 4-H History: Nominate a Point of Interest for the 4-H History Map Project. Include copy of submitted form in folder or notebook. To nominate a site for the 4-H history map please go to <http://arcg.is/lbvGogV> For more information about 4-H history go to http://4-historypreservation.com/History_Map/; For a step-by-step video on nominating a point, please go to this link: <http://tinyurl.com/nominate4h>. Write a brief description of historical significance of 4-H place or person.
- H880-008* GIS Thematic Map** – Using any GIS software, create a thematic. Thematic maps can utilize any subject of interest to the 4-H'er. Example would be Amelia Earhart's or Sir Francis Drake's voyage population density maps, water usage "8x11" maps or 4-H project in Nebraska. Create GIS Map using data from books and/or internet. Use reliable data (U.S. Center or U.S. Census Bureau

etc) Map any size from 8.5" x 11" up to 36" x 24" include Title, Base Map, Neat Line, North Arrow and Legend. Identify the source of your information on the back of the map.

H880-010* Careers Interview – Interview someone who is working in a Geospatial field and include research that career. Interviews can either be written or in a multimedia format (CD/DVD). Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12 point font, and 1" margins. Multimedia reports should be between 3 to 5 minutes in length.

DIVISION 900 – ALTERNATIVE/RENEWABLE ENERGIES (Formerly POWER OF WIND)

H900-001* Create and Compare Energy Resources Poster Poster should explore 2 alternative/renewable energy resources.

Compare and contrast the 2 resources including two of the following information: amount of energy created, costs of production, usability of the energy, pros/cons of environmental impacts, etc. Posters can be any size up to 28" by 22".

H900-002* Experiment Notebook Notebook will explore the scientific method involving alternative/renewable energy sources.

Information required. 1) Hypotheses, 2) Research, 3) Experiment, 4) Measure, 5) Report or Redefine Hypothesis.

H900-003* Solar as Energy Display Item should be the original design of the 4-Her. Include the item, or a picture if item is in excess of 6' tall or 2' x 2'. Include a notebook of why the item was designed and how it harnesses the power of water. Examples include solar ovens, solar panels, etc.

H900-004* Water as Energy Display Item should be the original design of the 4-Her. Include a notebook of why the item was designed and how it harnesses the power of water.

H900-005* Wind as Energy Display Item should be the original design of the 4-Her. Include the item, or a picture if item is in excess of 6' tall or 2' x 2'. Include a notebook of why the item was designed and how it harnesses the power of wind.

H900-006* Other Nebraska Alternative Energy Notebook should explore Nebraska as an alternative energy source besides wind, water and solar power. Include information on type of power chosen, infrastructure for distribution, what resources are needed to create this alternative resource, cost of production and potential uses of bio-products.

DIVISION 911 – WOODWORKING

See General Information / Rules at beginning of Department: Science, Engineering and Technology.

The ability to build objects as designed by another person is an important life skill. Professional woodworkers often are hired to build objects to exacting specifications as laid out in a written plan. All articles exhibited must include a plan (with drawings or sketch or blueprint) stating dimensions and other critical instructions a builder would need to know how to build the project. Plans may include narrative instructions in addition to the dimension drawings and include any alternations to the original plan. Score depends on how well the project matches the plan. If plans are modified, changes from the original need to be noted on the plans. All plans used for making the article must be securely attached and protected by a clear plastic cover.

MEASURING UP - UNIT 1

H911-901 Woodworking Article using skills learned in the Measuring Up Project.

H911-902 Woodworking Display – show an application of one or more of the concepts learned in the project. Display could be a poster or an actual item.

H911-903 One additional item made in the project

MAKING THE CUT - UNIT 2

H911-904 Woodworking Article using skills learned in the Making the Cut Project.

H911-905 Woodworking Display – show an application of one or more of the concepts learned in the project. Display could be a poster or an actual item.

H911-906 One additional item made in the project

NAILING IT TOGETHER-UNIT 3

H911-001* Woodworking Article - Item should be made using either joints, hinges, dowels or a dado joining made using skills learned in the Nailing it Together manual. Item is required to be appropriately finished. Examples include: bookcase, coffee table or end table.

H911-002* Woodworking Display - Display exemplifying one of the principles learned in the Nailing It Together project. Examples include: measuring angles, wood lamination and joint types.

H911-003* Recycled Woodworking Display - Article made from recycled, reclaimed or composite wood. Article must be appropriately finished and/or/sealed and utilize one or more woodworking techniques from page 2 of the Unit 3 manual. Exhibit must include the woodworking plan and a minimum one page report of how the engineering design process was used to develop the woodworking plan.

Engineer Design Process:

1. State the problem (Why did you need this item?)
2. Generate possible solutions (How have others solved this problem? What other alternatives or designs were considered?)
3. Select a solution (How does our solution compare on the basis of cost, availability and functionality?)
4. Build the item. (What was your woodworking plan, and what processes did you use to build our item?)
5. Reason for article finish (What type of finish, how did you finish or why you chose this finish?)
6. Evaluate (How does your item solve the original need?)
7. Present results (How would you do this better next time?)

H911-907 One additional item made in the project

FINISHING UP - UNIT 4

H911-004* Woodworking Article - Item made using skills learned in the Finishing It Up Project. Examples include: dovetailing, making a pen using a lathe, overlays, using a router, etc. Item is required to be appropriately finished.

H911-005* Woodworking Display - Display exemplifying one of the principles learned in the Finishing It Up Project. Examples include: career opportunities, types of finishes, or dovetailing.

H911-006* Recycled Woodworking Display - Article made from recycled, reclaimed or composite wood. Article must be appropriately finished and/or sealed and utilize one or more woodworking techniques from page 2 of the Unit 4 manual. Exhibit must include the woodworking plan and a minimum one page report of how the design and engineering process was used to develop the woodworking plan.

Engineer Design Process:

1. State the problem (Why did you need this item?)
2. Generate possible solutions (How have others solved this problem? What other alternatives or designs were considered?)
3. Select a solution (How does our solution compare on the basis of cost, availability and functionality?)
4. Reason for article finish (What type of finish, how did you finish or why you chose this finish?)
5. Build the item. (What was your woodworking plan, and what processes did you use to build our item?)
6. Evaluate (How does your item solve the original need?)
7. Present results (How would you do this better next time?)

H911-010* Careers Interview – Interview someone who is working in the field of woodworking and research that career. Interviews can either be written or in a multimedia format (CD/DVD). Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12 point font, and 1" margins. Multimedia reports should be between 3 to 5 minutes in length.

H911-908 One additional item made in the woodworking project

DIVISION 920 – WELDING

See General Instructions, Science, Engineering and Technology. All metal welding process accepted. 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". Attach each weld on a wire loop hinge or equivalent, so the judge can look at the bottom side of the weld when necessary. 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. Attach a wire to display board so it can be hung like a picture frame. If no plans are included with the welding article or welding furniture, item will be disqualified.

ARCS AND SPARKS

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 - 1/4" if using 1/8" rod.
- Suggested rod - AC and DC straight or reverse polarity - first E-7014, second E-6013

MIG Welding:

- Suggested coupon thickness - 1/4" if using .035 wire and 1/8" if using .023 wire.

Oxy-Acetylene:

- Suggested coupon thickness - 1/8". Suggested rod - 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" and 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 & 4:

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.

H920-001* Welding Joints - A display of one butt, one lap, and one fillet weld.

H920-002* Position Welds - A display showing three beads welded in the vertical down, horizontal, and overhead positions.

H920-003* Welding Article - Any shop article where welding is used in the construction. 60% of item must be completed by 4-Her and notes regarding laser welding or machine welding must be included. **ALL** plans, plan alterations and a bill for materials must be attached to the article. Protect plans with a clear cover. If project is designed to be outside, it is required to have appropriate outdoor finish because project may be displayed outside.

H920-004* Welding Furniture - Any furniture with 75% welding is used in the construction. 60% of item must be completed by 4-Her and notes regarding laser welding or machine welding must be included. All plans, plan alterations, dimensions and a bill for materials must be attached to the article. Protect plans with a cover. If project is designed to be outside, it is required to have appropriate outdoor finish because project may be displayed outside.

H920-005 Plasma Cutter/Welder Design - Plasma cutters/welders allowed for detailed design(s) to butt cut into metal. 4Hers will create a notebook describing the design process to create the "artwork" to butt cut into the metal. This exhibit is not eligible for entry at the State Fair.

In the notebook include:

- a) A photo (front and back) of the finished project. Also include detailed photographs of the project to allow judges to examine cuts.
- b) Instructions on how the design was created. This allows for replication of the project.
- c) Lessons learned or improvements to the project.

H920-901 One additional item made in the welding project