

DEPARTMENT H SCIENCE, ENGINEERING AND TECHNOLOGY

GENERAL INFORMATION

- A. The name and county of each exhibitor should appear separately on the back of each board or articles and, a set of plans so owner of 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" in thickness. A height of 23 7/8 inches 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" of the top or bottom of the board. (Example Woodworking, & Electricity.)
- D. Fabricated board such a 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** clearly written or typed and 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. Please see General Rules for more details.**

DIVISION 850 – AEROSPACE

Premiums: \$2.50, \$2.25, \$2.00, \$1.75

Rockets must be supported substantially to protect it from breakage. Rockets should be mounted on base that has dimensions equal or less than 12"x12" 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 adding 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, 2) a flight record for each launching (weather, distance, flight height), 3) number of launchings, 4) flight pictures 5) statistics, 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 9 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.

4-H Rocket project levels are not intended to correspond to National Association of Rocketry model rocket difficulty ratings or levels.

*** Designates County Project Only – not eligible for State Fair Competition.**

LIFT OFF – UNIT 2

- *H850901 ROCKET** Any skill level rocket with plastic fins .
- H850001 ROCKET** Any skill level 2 rocket with wooden fins painted by hand or air brush.
- H850002 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. Display can be any size up to 28” by 22”.
- H850003 ROCKET** Any Skill Level 2 Rocket with wooden fins painted using commercial application example commercial spray paint

REACHING NEW HEIGHTS – UNIT 3

- H850005 ROCKET** Any skill level 3 rocket with wooden fins painted by hand or air brush.
- H850006 DISPLAY** Display exemplifying on 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”.
- H850007 ROCKET** Any Skill Level 3 Rocket with wooden fins painted using commercial application example commercial spray paint.

PILOT IN COMMAND – UNIT 4

- H850010 ROCKET** Any skill level 4 rocket with wooden fins or any self designed rocket
- H850011 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” x 22”.

CAREERS

H850009 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 uses must follow. Posters can be any size up to 28” by 22”

DIVISION 860 – COMPUTERS
Premiums: \$2.50, \$2.25, \$2.00, \$1.75

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 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. All static exhibits must have received a purple ribbon at the county fair to advance to the State Fair.
- C. Demonstration boards should include an overall title for the display, plus other necessary labeling.
- D. 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 and enclosed in a clear plastic cover. The reports should be attached securely to the display.
- E. 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 and enclosed in a clear, plastic cover. The reports should be attached securely to the display.
- F. Please refer to the General Rules for the policy regarding firearms, items with a blade, and other related items. Premier 4-H Science Award is available in this area. Please see General Rules for more details.

Team Entries: To qualify for entry at the Nebraska State Fair team materials entered in H860009 – Digital Fabrication is clearly the work of a team instead of an individual must have at least 50% of all team members enrolled in 4-H. Additionally, all enrolled 4-H members on the team should complete and attach an entry tag to the materials. A supplemental page documenting the individual contributions to the project should be included. The entry will be judged as a team, with all team members receiving the same ribbon placing.

***H860902 INTERNET WEBSITE CREATION** Exhibit will be a notebook of the documentation and print out of the Website. The notebook should include: 1) cover page; 2) print out of the Website; 3) summary page 4) completed general record book.

- *H860903 COMPUTER DESIGNED GREETING CARD** Exhibit will consist of the six greeting cards, each for a different occasion/holiday. Exhibit should be created on 8½ x 11” paper using a commercially available graphics program and a color printer/plotter or single color printer/plotter. The cards should vary in folds and design. Prefabricated cards from commercially available card programs will NOT be accepted. No theme required.
- *H860904 POWER POINT PRESENTATION** Exhibit will be a notebook of the printouts using the program. Create at least ten different slides using a minimum of four layouts with the same background on all slides. The notebook will consist of the following: 1) Cover page; 2) Printouts of the program created; 3) Description of the different features used in the program; and 4) How you plan to use this program in the future
- *H860905 DIGITAL CAMERA DISPLAY** Exhibit will consist of a series of pictures showing how you used computer software to enhance or change a single digital camera picture. Exhibit should explain what hardware and software was used and how software was used to change each picture.

COMPUTER MYSTERIES – UNIT 2

- H860001 COMPUTER APPLICATION DEMONSTRATION** – 4-H 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 should 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 (I-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 (8.5x11 inches) which should include a, (1) a 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 and (2) print out of your project. Project may be in color or in black and white.
- H860002 PRODUCE A COMPUTER SLIDESHOW PRESENTATION** Using presentation software. All slide shows for county fair should be emailed to Colleen Pallas cpallas1@unl.edu before July 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing. A notebook with a printout of all the slides should be submitted. 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

- H860004 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.

H860005 How to STEM (Science, Technology, Engineering and Math) Presentation (SF276) Youth design a fully automated 2 to 5 minute 4-H “how to” video. Submissions should incorporate a picture or video of the 4-Her, 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. .

H860006 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 either software programs such as an HTML editor like Microsoft’s FrontPage or Macromedia’s Dreamweaver, and image editor like IrfanView 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.

H860007 3D PRINTING Unique Items: 3D printing uses plastic or other materials to build a three-dimensional (3D) 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 of material and print settings
- d. Material choice (PLA, PVA, ABS, etc.)
- e. In-fill density
- f. Moving parts

H860008 3D Pen Creation – 3D pens rapidly melt and cool plastic filament allowing the 4-H member 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.

- H860009 Digital Fabrication** – This project is a computer generated projected 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:
- What motivated you to create this project
 - Software and equipment used
 - Directions on how to create the project
 - Prototype of plans
 - Cost of creating project
 - Iterations or modifications made to original plans
 - Changes you would make if you remade the project

DIVISION 870 - ELECTRICITY

Premiums: \$2.50, \$2.25, \$2.00, \$1.75

*** Designates County Project Only – not eligible for State Fair Competition.**

MAGIC OF ELECTRICITY – UNIT 1

- *H870901 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.
- *H870902 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.
- *H870903 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.
- *H870904 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. For classes 115- 117 please refer to 4-H manual Electric 2 Investigating Electricity.
- *H870905 Quiz board or steady hand tester-** game will be judged for usefulness, craftsmanship and wiring skill. Include battery or power supply to operate exhibit. Questions on the quiz board can deal with any topic. For instructions, contact the extension office.
- *H870906 Poster** - should exemplify one of the lessons learned in the Magic of Electricity project. Posters can be any size up to 28" x 22".

INVESTIGATING ELECTRICITY – UNIT 2

- *H870907 Case of the Switching Circuit:** Use the following items: two D cell batteries, two battery holders, light bulb, bulb holder, a 3" x 6" 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.
- *H870908 Rocket Launcher:** Construct a rocket launcher out of the following materials: a plastic pencil box that is at least 4" x 8", 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" and 1/4" 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.
- *H870909 Stop the Crime: Build an ALARM** using 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.
- *H870910 Poster** - should exemplify one of the lessons learned in the Magic of Electricity project. Posters can be any size up to 28" x 22".

ELECTRICITY-WIRED FOR POWER –UNIT 3

- H870001 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.
- H870002 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.
- H870003 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.

H870004 **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

H870005 **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.

H870006 **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).

H870007 **ELECTRONIC PROJECT** Exhibit an electronic item designed by the 4-Her or from a manufactured kit that shows the electronic expertise of the 4-Her. Examples include: a radio, a computer, or a volt meter.

H870008 **ELECTRONIC POSTER** should exemplify one of the lessons learned in the Entering Electronics Project. Posters can be any size up to 28" x 22".

CAREERS

H870010 **CAREERS INTERVIEW (SF239)**

Interview someone who is working in the field of electricity 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

DIVISION 880 – GEOSPACIAL

Premiums: \$3.00, \$2.75, \$2.50, \$2.25

H880001 **POSTER (SF299)** 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.

H880002 **4-H FAVORITE PLACES OR HISTORICAL SITE POSTER (SF272)** – 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".

H880003 **GPS NOTEBOOK (SF300)** 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.

- H880004** **GEOCACHE** (SF301) 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, include a print-out of its registry.** The entry may include a photograph of the cache in its intended hiding place.
- H880005** **AGRICULTURE PRECISION MAPPING** (SF302) – 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 are applications can be purchased is acceptable) A report of how the analysis of the various data will be used to make a management decision.
- H880007** **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/1bvGogV> For more information about 4-H history go to http://www.4-hhistorypreservation.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. (a minimum of one paragraph)
- H880010** **CAREERS INTERVIEW (SF239)** Interview someone who is working in a Geospatialfield 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 – POWER OF WIND
Premiums: \$3.00, \$2.75, \$2.50, \$2.25

- H900001** **Create and Compare Energy Resources Poster** (SF...) 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.”
- H900002** **Experiment Notebook** (SF...) Notebook will explore the scientific method involving alternative/renewable energy sources. Information required. 1.) Hypothesis 2.) Research 3.) Experiment 4.) Measure 5.) Report or Redefine Hypothesis.

- H900003** **Solar as Energy Display** (SF....) 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 the sun. Examples include solar ovens, solar panels, etc.
- H900004** **Water as Energy Display** (SF....) 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.
- H900005** **Wind as Energy Display** (SF308) 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.
- H90006** **Other Nebraska Alternative Energy** (SF.) Notebook should explore Nebraskan 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 890 – SMALL ENGINES

Premiums: \$3.00, \$2.75, \$2.50, \$2.25

*** Designates County Project Only – not eligible for State Fair Competition.**

UNIT 1

- *H890901** **SMALL ENGINE DISPLAY** should show parts or systems of a small engine, cut-aways of engine or systems, worn or broken parts, step by step procedure of how to perform repairs or maintenance, etc. Use needed labeling, short written description or explanations, drawings, etc., to explain what you are showing. Mount on 1/4" thick board, 24" x 32" wide (22" space will be accepted if extra space is not required).

WARM IT UP – UNIT 2

- H890902** **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

- H890903** **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.)

DIVISION 911 – WOODWORKING

Premiums: \$3.50, \$3.25, \$3.00, \$2.75

WOODWORKING - 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.

Rules

1. 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 owner of the exhibit may be identified if the entry tag is separated from the exhibit.
2. Each individual is limited to one woodworking exhibit per class. All static exhibits must have received a purple ribbon at the county fair to advance to the State Fair.
3. Several classes require a display board which should be a height of 24 inches and not to exceed 1/4-inch thickness. A height of 24 7/8 inches is acceptable to allow for the saw kerf (width) if two 24 inch boards are cut from one end of a 4 foot by 8-foot sheet of plywood. Nothing should be mounted within 3/4 inch of the top or bottom of the board. (Example: Woodworking & Electricity.)
4. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
5. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
6. Demonstration boards should include an overall title for the display, plus other necessary labeling.
7. 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 and enclosed in a clear plastic cover. The reports should be attached securely to the display.

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. Requirements: All articles exhibited **must include a plan (with drawings or sketch or blueprints)** 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.** Part of the score depends on how well

the project matches the plans. If the plans are modified, the 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.

8. 4-H'ers must be in **Unit 3 or Unit 4** for the exhibit to be considered for State Fair. All projects must have appropriate finish. If the project (i.e. picnic tables, wishing wells, swings, chairs, bridges, doghouses, etc.) is designed to be used outside, it will be displayed outside. .

* Designates County Project Only – not eligible for State Fair Competition.

UNIT 1

***H911901 WOODWORKING ARTICLE(SF91)** Item made using skills learned in Unit 1 manual.

***H911902 WOODWORKING DISPLAY(SF91)** Display exemplifying one of the principles learned in Unit 1 project.

H911903 Recycled Woodworking Display (SF91) – Article made from recycled, reclaimed or composite wood. Article must be sanded and sealed and utilize one or more woodworking techniques from page 2 of the Unit 1 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.

Engineering Design Process

- 1) State the problem (Why did you need this item?)
- 2) Generate possible solutions (How have others solved the problem? What other alternatives or designs were considered?)_
- 3) Select a solution (How does your 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 your item?)
- 5) Evaluate (How does your item solve the original need?)
- 6) Present results (How would you do this better next time?)

UNIT 2

- *H911904 WOODWORKING ARTICLE (SF91)** Item made using skills learned in Unit 2 manual.
- *H911905 WOODWORKING DISPLAY (SF91)** Display exemplifying one of the principles learned in Unit 2 project.
- H911906 Recycled Woodworking Display (SF91)** – Article made from recycled, reclaimed or composite wood. Article must be sanded and sealed and utilize one or more woodworking techniques from page 2 of the Unit 2 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.

Engineering Design Process

- 1) State the problem (Why did you need this item?)
- 2) Generate possible solutions (How have others solved the problem? What other alternatives or designs were considered?)_
- 3) Select a solution (How does your 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 your item?)
- 5) Evaluate (How does your item solve the original need?)
- 6) Present results (How would you do this better next time?)

UNIT 3

- H911001 WOODWORKING ARTICLE** Item **should be made using either joints, hinges, dowels, or a dado joining** made using skills learned in Unit 3 manual. **Item is required to be appropriately finished.** Examples include: Bookcase, coffee table or end table.
- H911002 WOODWORKING DISPLAY** Display exemplifying one of the principles learned in Unit 3 project. Examples include: measuring angles, wood lamination and joint types.
- H911003 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.

Engineering Design Process

- 1) State the problem (Why did you need this item?)
- 2) Generate possible solutions (How have others solved the problem? What other alternatives or designs were considered?)_
- 3) Select a solution (How does your 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 your item?)
5. Reason for article finish (What type of finish, how did you finish or why you choose this finish?)
- 6) Evaluate (How does your item solve the original need?)
- 7) Present results (How would you do this better next time?)

UNIT 4

- H911004 WOODWORKING ARTICLE** Item made using skills learned in Unit 4 manual. Examples include: dovetailing, making a pen using a lathe, overlays, using a router, etc. **Item is required to be appropriately finished.**
- H911005 WOODWORKING DISPLAY** Display exemplifying one of the principles learned in Unit 4 project. Examples include: career opportunities, types of finishes, or dovetailing.
- H911006 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 engineering design process was used to develop the woodworking plan.

Engineering Design Process

- 1) State the problem (Why did you need this item?)
- 2) Generate possible solutions (How have others solved the problem? What other alternatives or designs were considered?)_

- 3) Select a solution (How does your 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 choose this finish?)
- 5) Build the item (What was your woodworking plan, and what processes did you use to build your item?)
- 6) Evaluate (How does your item solve the original need?)
- 7) Present results (How would you do this better next time?)

CAREERS

H911010 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.

DIVISION 920 – WELDING **Premiums: \$2.50, \$2.25, \$2.00, \$1.75**

All Welds in class 1 or 2 must be mounted on a 12" high by 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 stating 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 wire to display board so it can be hung like a picture frame. If no plans are included with welding article or welding furniture, item will be disqualified.

ARCS AND SPARKS

H920001 WELDING JOINTS (SF281) Display one butt, one lap and one fillet weld.

H920002 POSITION WELDS (SF281) A display showing three beads welded in a vertical down, horizontal and overhead positions.

H920003 WELDING ARTICLE (SF281) Any shop article or piece of furniture 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 alternations, and a bill for materials must be attached to the article. Protect with cover. If projected is designed to be

outside it is required to have appropriate outdoor finish because project may be displayed outside.

H920004 WELDING FURNITURE (SF282) 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 alternations, 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

H920005 Interview Plasma Cutter/Welder Design (SF239SF...) – 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 but 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

4-H Welding Project Tips and Suggestions

H920001

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 x 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 wide 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.

1. 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

2. MIG welding

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

3. **Oxy-Acetylene**

Suggested coupon thickness - 1/8"

Suggested rod - 1/8" mild steel rod

H920002

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" in 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.

H920003 & H920004

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.

**DEPARTMENT H-
ROBOTICS, Division 861
Premiums: \$3.00, \$2.75, \$2.50, \$2.25**

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.

Team Entries: To qualify for entry at the Nebraska State Fair team materials entered in robotics classes that are clearly the work of a team instead of an individual must have at least 50% of all team members enrolled in 4-H. Additionally all enrolled 4-H members on the team should complete and attach an entry tag to the materials. A supplemental page documenting the individual contributions to the project should be included. The entry will be judged as a team, with all team members receiving the same ribbon placing.

Creating a video of your robot in action would be helpful for the judges but is not mandatory present as a CD Rom with your robot entry

H861001 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.

H861002 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 exploration, or any of the topics suggested in Class 1.

- H861003 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 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.
- H861004 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.
- H861005 ROBOTICS SENSOR NOTEBOOK** Write pseudo code which includes at least one sensor activity. Include the code written and explain the code function.
- H861006 BUILD A ROBOT (may use kit)**Include a robot and notebook including the pseudocodes for at least one program you have written for the robot , the robots 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. We recommend that you submit the project under class H861003 – Robotics Video.
- H861007 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. We recommend that you submit the project under class H861003 – Robotics Video.

DIVISION 921 – BICYCLE

Premiums: \$2.50, \$2.25, \$2.00, \$1.75

*** Designates County Project Only – not eligible for State Fair Competition.**

***H921901 BICYCLE DEMONSTRATION DISPLAY** to be exhibited by an individual. Exhibit may include (1) parts or system of a bicycle (2) worn or broken parts or (3) a step by step procedure of how some repair or service job is performed. A limited number of photographs are acceptable. Actual parts or cut-aways of parts are recommended. The exhibit is to be prepared on a 2" high x 32" wide board not to exceed 1/4" thickness.

DIVISION 922 – ROPES
Premiums: \$2.50, \$2.25, \$2.00, \$1.75

All rope exhibits must be mounted on 1/4" plywood or equivalent board, 24" high x 32" wide. Nothing should be mounted within 3/4" of top or bottom of board. All items placed on demo-boards in classes 5, 6, and 7 must be made according to instructions found in the 4-H Rope Manual. Either manila or synthetic rope may be used. When halters are exhibited, the tie rope, plus a required second piece of rope must show any of the following items: 1) end whipping, 2) eye splice, 3) crown splice, 4) rosebud knot, 5) Matthew Walder knot, or 6) diamond knot. * Designates County Project Only – not eligible for State Fair Competition.

- *H922901 ROPE DISPLAY**, at least 10 and not more than 12 knots, hitches and splices (include two splices) made of 3/8" rope. Label and mount on plywood board. The ends of all ropes must be whipped.
- *H922902 SINGLE LOOP OR DOUBLE LOOP HALTER** sheep and goats use 3/8" rope. See above requirements for halter exhibits.
- *H922903 SINGLE LOOP OR DOUBLE LOOP HALTER** cattle and horses use 5/8" or 3/4" rope. See above requirements for halter exhibits.

ENTOMOLOGY

Specimens should be mounted properly and labeled location and date of collection, name of collector, and order name. Follow mounting and labeling instructions in the old edition of the Nebraska 4-H Entomology Manual online as a PDF file.. (<http://4h.unl.edu/web/4hcurriculum/entomology>) Purchased insects and other insects not collected by the participant can be included, but must have accurate labels and will not be counted in meeting minimum requirements for the exhibit.

Boxes are preferred to be not more than 12" high x 18" wide, so they fit in display racks.

DIVISION 800 - ENTOMOLOGY
Premiums: \$2.50, \$2.25, \$2.00, \$1.75

- H800001 ENTOMOLOGY DISPLAY – FIRST YEAR** project to consist of collection of 25 or more different kinds (species) of insects, representing at least six orders. Limit of one box.
- H800002 ENTOMOLOGY DISPLAY – SECOND YEAR** project to consist of minimum of 50 kinds (species) of insects representing at least 8 orders. Replace damaged or poorly mounted specimens. At least 25 species must be present from after July 1 of the previous year. Limit 2 boxes.
- H800003 ENTOMOLOGY DISPLAY – THIRD OR MORE YEAR** project to consist

- of minimum of 75 kinds (species) of insects representing at least 10 orders. Replace damaged or poorly mounted specimens. At least 25 species must be present from after July 1 of previous year. Limit 3 boxes.
- H800004** **SPECIAL INTEREST DISPLAY OR ADVANCED INSECT**—Display developed according to personal interests and/or advanced identification capability. This also is an opportunity to highlight favorite insects in a creative arrangement. Insects should conform to pinning and mounting standards as in Classes 1-3 and be protected in an insect box. Each specialty display should include names of the insects, interesting information about them, and why the display was made. Advanced identification collections should have insects grouped with labels that correspond with identification level (e.g. family, genus , species). A specialty collection may consist of insects by taxonomic group (e.g. butterflies, grasshoppers, dragonflies, scarab beetles) or by host, subject or habitat (e.g. insect pests of corn, aquatic insects, insect mimicry, insect galls, insects from goldenrod, insect pollinators, etc.).
- H800005** **INSECT HABITATS** - Habitats consist of any hand-crafted objects, made of natural or artificial materials, placed outdoors, which promote or conserve insects in the environment. Insects may include bee pollinators, butterflies, beneficial insects, etc. A one-page report describing activities must accompany the exhibit.
- H800006** **MACROPHOTOGRAPHY** -Subjects should be insects, spiders or other arthropods, or any nests, webs or constructions they make. All exhibit prints should be 8½" x 11" and mounted on rigid, black 11" X 14" poster or matt board. Either orientation is acceptable. No frames or matboard framing is allowed. A caption of a few sentences should explain the subject, and be printed on white paper and, glued below the print on the poster or board.
- H800007** **INSECT POSTER/DISPLAY EXHIBITS**
Exhibits can be posters or three-dimensional displays, and artistic creativity is encouraged. Posters should be no larger than 22" x 28". They should be instructional and can be attractive and have pictures, drawings, charts, or graphs. Posters and displays may show any aspect of insect life, habitat, or related conservation or management. Examples include life history and other facts about an insect; insect anatomy; how to manage insects in a farm, home, lawn, or garden setting; experiences rearing one kind of insect; survey of an important insect; insect behavior (ex. nesting, finding food, mobility, defenses, etc.); habitats (ex.e.g. forests, grasslands, wetlands, rivers, or lakes) and what insects are found there, etc. Three-dimensional displays, such as dioramas, sculptures, models or decorative boxes should have a page of explanatory information accompanying them **and fit within a 22" x 28" area.**
- H800008** **REPORTS OR JOURNALS**
Reports and journals should be in a 3-ring binder. A report may be informational, that is, an original article about a favorite insect, a history of insect outbreaks, diseases caused by insects, insects as food, etc. Or, it may be a research report about an investigation or experiment done in a scientific manner. It then should have a basic introduction of the insect

studied, methods used, observations, and results of the project. Tables, graphs and images are helpful to include. A journal is an observational study over a period of time with personal impressions. It may cover watching changes in kinds of butterflies over the summer, rearing a specific insect from egg to adult, managing a bee hive, observations of insects in a specific habitat, accounts of insect behavior in a forest or flower garden, etc.

DIVISION 840 - VETERINARY SCIENCE

Premiums: \$2.50, \$2.25, \$2.00, \$1.75

The purpose of a Veterinary Science exhibit is to inform the public about a common health problem of animals or a veterinary science principle. Do not confuse veterinary science exhibit topics with animal husbandry or production topics. **A Veterinary Science exhibit may consist of a poster, notebook or a display.** The exhibit may represent material from exhibitors enrolled in Animal Diseases or Animal Health. If photographs are to be part of the exhibit, remember that they will be viewed by the public. Make sure that the photographs are in good taste and will not be offensive to anyone. Graphic photographs of excessive bleeding, trauma or painful procedures are not appropriate. For exhibits related to veterinary surgical procedures, aseptic techniques need to be shown, for example, use of drapes, use of sterile procedures, wearing of gloves, and other appropriate veterinary medical practices.

First-Aid Kits: Because of public safety concerns and risk of theft of first-aid kit contents (veterinary drugs/equipment) with perceived potential for drug abuse, **NO ANIMAL FIRST AID KITS WILL BE PERMITTED.** Animal first aid kits submitted will be immediately disqualified and not shown.

Veterinary Science Posters: This exhibit presents the viewer with a design that is simple and direct, unlike a display that usually presents more information. A poster should not exceed 22" x 28" and may be either vertical or horizontal.

Veterinary Science Displays: A display may include but is not limited to: a 3-dimensional exhibit, a scale model, the actual product (for example: skeleton; teeth; samples of leather, fur, or dried skin damaged by disease or parasites) or a notebook. A display is not a poster. A display may be mounted on poster board not to exceed 22" x 28" or on 1/4" plywood or equivalent that does not exceed 24" high or 32" wide or in a three ring binder or another bound notebook format.

Appropriate Veterinary Science Topics:

- Maintaining health
- Specific disease information
- Photographic display of normal and abnormal characteristics of animals
- Animal health or safety
- Public health or safety
- Proper animal management to ensure food safety & quality
- Efficient and safe livestock working facilities

- Or a topic of the exhibitors choosing related to veterinary medicine or veterinary science

*****Remember, since these are science displays, all references and information needs to be properly cited. Proper sources include but are not limited to: Professional journals and publications, professional AVMA accredited websites, interviews with Veterinarians and excerpts from Veterinary Educational Literature**

H840001 4-H Veterinary Science Large Animal Poster, Notebook or Display

H840002 4-H Veterinary Science Small Animal/Pet Poster, Notebook or Display