

# 2010 Nebraska State Fair Department H Science, Engineering, and Technology

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## GENERAL INFORMATION

- 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 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" 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.
- 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. All reports should be clearly written or typed and enclosed in a clear, plastic cover. The reports should be attached securely to the display.

## DEPARTMENT H-AEROSPACE, Division 850

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, 2) a flight record for each launching (weather, distance, flight height), 3) number of launchings, and 4) flight pictures. 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 (i.e., plastic fins) will not be accepted at the State Fair. Judging is based upon display appearance, rocket appearance, workmanship, design or capabilities for flight, and number of times launched. Three launches are required to earn the 25 launch points given on the score sheets. Counties are allowed a maximum of eight entries for all rocketry. (Score Sheet SF 92/rev04). 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 digital recorded copy of one flight. In the documentation please include a description of stability testing before the rocket was flown.

### **LIFT OFF – UNIT 2**

**Class 1. Rocket (SF92)** - Any Skill Level 2 Rocket with wooden fins painted by hand or air brush.

**Class 2. Display (SF93)**- 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".

**Class 3 Rocket (SF92)**- Any Skill Level 2 Rocket with wooden fins painted using commercial application example commercial spray paint

### **REACHING NEW HEIGHTS - UNIT 3**

**Class 5. Rocket (SF92)**- Any Skill Level 3 Rocket with wooden fins painted by hand or air brush.

**Class 6. Display (SF93)**- 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".

**Class 7 Rocket (SF92)** - Any Skill Level 3 Rocket with wooden fins painted using commercial application example commercial spray paint.

### **PILOT IN COMMAND - UNIT 4**

**Class 10. Rocket (SF92)**- Any Skill Level 4 Rocket with wooden fins or any self designed rocket.

**Class 11. Display (SF93)**- 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".

## **DEPARTMENT H-COMPUTERS, Division 860**

### **COMPUTER MYSTERIES – UNIT 2**

**Class 1. Computer Application Demonstration (SF278)**– 4-H exhibitor demonstrates how to accomplish a task using a computer application software such as a spreadsheet, database, publishing, graphic design, accounting or precision farming program. This exhibit consists of a

notebook (8.5x11 inches) which should include a (1) cover page, (2) 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 (d) other tasks that can be accomplished using the computer application software and (3) print out of your project.

Examples: design a logo for your school; enhance a digital image for a newspaper story; manage a checking account; create a poster to publicize an event; or to design scrapbook pages, or other.

**Class 2. Produce a Computer Slideshow Presentation (SF277)** – Using presentation software like Microsoft PowerPoint and following the *Checklist for Creating Your Next PowerPoint Presentation* located at <http://cit.information.unl.edu/info0806.htm> the 4-H exhibitor develops a slideshow about a topic related to youth. The slideshow should include a minimum of 10 slides and no more than 25. Incorporate appropriate slide layouts, graphics and animations. Each slide should include notes for a presenter. The exhibit includes a copy of the presentation saved to a CD-ROM along with a printout of the notes pages in a clear plastic cover. Slide presentation should relate to one topic.

**Class 3. Teach an Adult (SF279)**– The 4-H exhibitor writes a report between 1 and 3 pages describing a situation in which he or she has taught an adult(s) a computer skill. The report should include pictures of the 4-H'er working with the adult(s). The report should be in a clear plastic cover.

### **COMPUTER MYSTERIES – UNIT 3**

**Class 5. Produce an Audio/Video Computer Presentation (SF276)** – 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.

**Class 6. Know How Know Now Computer 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-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. Submissions in this category will be put on the web, so must include a permission form which can be downloaded at <http://www.pawnee.unl.edu/knowhowknownow> .

**Class 7. Build a Web Site (SF275)** – Design a simple Web site 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 isn't live include all files comprising the Web site 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 teh explanation of why the site was created.

**DEPARTMENT H-ELECTRICITY, Division 870**

### **ELECTRICITY- WIRED FOR POWER – UNIT 3**

**Class 1. Electrical Tool/Supply Kit (SF224)** - 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 (SF225)** - 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 (SF226)** - 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 (SF227)** - 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 (SF228)** - 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 (SF229)** - 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 (SF230)** - 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 (SF231)** - Poster should exemplify one of the lessons learned in the Entering Electronics Project. Posters can be any size up to 28" by 22".

DEPARTMENT H – Division 895, 4-Wheelin'

Class 1. Poster. Poster should exemplify one of the lessons learned in the 4-Wheelin' project. Posters can be any size up to 28" by 22".

DEPARTMENT H-ROBOTICS, Division 861

ROBOTICS - ROBOTIC EXPLORER - UNIT 1

**Class 1. Robot or Not Poster (SF236)** - Create a poster (14" X 22") demonstrating how to determine whether an object is a machine, a computer or a robot. Poster should include at least 2 - 4 objects.

**Class 2. Pseudo code Display Poster (SF237)** – Poster (14" X 22") should display the pseudo code written for the robot to perform at least four functions and utilize at least two modifiers. Include the pseudo code, and a written description of the icon functions.

**Class 3. Robotics Explorer Video (SF238)** – 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 a written description of the icon functions.

**Class 4. Robotics Explorer Interview (SF239)** – Interview someone who is working in the field of 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.

**Class 5. Careers in Robotics (SF240)** – Research a career in robotics. Your report can be either written or in a multimedia CD/DVD format. Written reports 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.

## **ROBOTICS - ROBOTIC PROBE - UNIT 2**

**Class 6. Rotation Sensor Notebook (SF241)** – Write pseudo code which includes at least one rotational sensor activity. Include the code written and explain what the code function is and how you would change it to improve either the function or the code.

**Class 7. Robotics Probe Notebook (SF242)** – Youth should follow one of the following activities in the project manual: Go the Distance, Tighten Your Belts, or Do the Time. Based upon the activity you select, replicate and complete the chart. Your notebook should include the chart and the answer to the following questions: 1. What did you learn about gears and gear ratios? 2. What are the benefits of using belts and pulleys? 3. What is the relationship between gear ratio and speed?

**Class 8. Build a Robot (may use kit) (SF243)** – Include a robot and a notebook which includes any code/pseudo code that you have written for the robot, the robots purpose, and any challenges or changes you would make in the robot design or programming.

**Class 9. Life Skills Notebook (SF244)** – Using the Life Skills Model (available through your local extension office), develop a notebook that explains which life skills you developed while enrolled in the robotics project and how they will influence you in the future.

**Class 1. Mapping a Historical Site Within Nebraska Poster (SF271)** – Using a global positioning system (GPS) device and preprinted map, pinpoint a historical site within Nebraska. Add 1-3 digital images of the historical site to the map and a brief explanation of the image and surrounding area, brief explanation of how photo was taken, camera, etc. . Latitude and Longitude of the site, map datum used, position format used and a brief explanation of why you chose this site. Exhibit will include: 2-4 pg. report on the map itself enclosed in a clear plastic cover attached to poster. The poster size should not exceed 22” X 30”.

**Class 2. Mapping a Historical Site within Nebraska (SF271)** – Using a global positioning system (GPS) device and a geographic information system (GIS) computer software application create a map at least 8 ½” X 11” and no larger than 26” X 24” (plotter map size) GIS map. The historical site must be in Nebraska. Map should include title, base map, neat line, north arrow, and legend. Identify 1-3 points of interest, using a GPS device, collect the GPS data and take a digital image of each point. Place the 1-3 points in the exact location on your map and ensure the GPS data is within the map or the legend. Place the digital images on your map in an appropriate location.

**Class 3. Hand Drawn or Pre-printed Hurricane Tracking Map (SF273)** – Create a hand drawn or pre-printed map of the Atlantic Ocean, the Pacific Ocean or the Gulf of Mexico. Blank hurricane base maps can be downloaded from The National Oceanic and Atmospheric Administration (NOAA) (<http://www.nhc.noaa.gov/>). The tracking maps must have at least 1-5 hurricanes from the same hurricane season or historical hurricane statistics. Each hurricane must be plotted with points showing the location of the storm and connecting lines to show the path of the storm. Plotting points and the line must be the same color. The plotting point will be every 12 or 24 –hour increments and must be identified with a shape (dot, square, triangle etc.). Hurricane data is located at this youth friendly website <http://www.wunderground.com/tropical/>. Exhibit will be 8.5” X 11” and mounted in a simple picture frame with hardware for hanging.

**Class 4 GIS Hurricane Tracking Map (SF273)** – Create a GIS map with a geographic information system (GIS) computer software application of the Atlantic Ocean, Pacific Ocean, or the Gulf of Mexico. The map should appear similar to the National Oceanic and Atmospheric Administration (NOAA) (<http://www.nhc.noaa.gov/>). The map should include title, base map, neat line, north arrow, and legend. The tracking map must have 1-5 hurricanes from the same season or historical hurricane statistics. Each hurricane must be plotted with points showing the location of the storm and connecting lines to show the path of the storm. Plotting points and line should identify the category of the Hurricane with the same color. Plotting points should indicate the date, latitude, and longitude of the point. The line should show the wind speed of the storm. The plotting point will be every 12 or 24-hour increments and must be identified with a GIS point shape (dot, square, triangle, etc.). Hurricane data is located at this youth friendly website (<http://www.wunderground.com/tropical/>). Exhibit will be an 8.5” X 11” to the maximum size of 36” X 24” (plotter map size) GIS map. Map can be laminated and should not be placed in picture frame.

**Class 5. Hurricane Tracking Poster (SF273)** – Exhibit will consist of a poster presentation using the approved National oceanic and Atmospheric Administration (NOAA) hurricane tracking maps. Go to the National Hurricane Center to print a hurricane tracking map at

<http://www.nhc.noaa.gov/> . Poster can be of the Eastern Atlantic, the Full Pacific or the Western Atlantic using different colors and different plotting shapes for each hurricane. The plotting point must be identified with a shape (dot, square, triangle, etc) and must be connected by a line showing the progression of the storm. Plot points every 12- 24 hours. Hurricane data can be located at: <http://www.wunderground.com/tropical;>. Include title, name of hurricane, date hurricanes begins and ends, distance traveled, minimum and maximum wind speeds, types of categories and latitude and longitude, etc. Poster size should not exceed 22" X 30".

**Class 6. 4-H Youth Favorite Places (SF272)** – The 4-H exhibitor visits his or her favorite place in Nebraska. Using a Global Positioning Systems (GPS) receiver he/she records the latitude and longitude of his/her favorite place. The exhibitor also takes a digital picture of the favorite place. The exhibitor then uploads the data and picture to the 4-H Youth Favorite Places Web site at <http://www.youthfavoriteplaces.org/index.php>. Up to three sites can be included in the state fair exhibit which is to consist of a folder/notebook explaining the steps involved in entering the data to the 4-H Youth Favorite Places Web site. Fair exhibit will include: A folder/notebook including a report for each site visited and at least one and no more than five digital photos and captions of each site visited. The reports should explain how the 4-H'er participated in the national 4-H Youth Favorite Places project, recording the information and then uploading it to the Web site. Each report should include (1) the nearest city or town, (2) the county where the site is located, (3) the latitude and longitude of the favorite place, (4) an explanation of why this is their favorite place and why other people should visit the place and (5) a list the steps for entering the data on the Web site for the national project. A printed copy of the Web site posting of each favorite place uploaded should also be included with the report in the folder. **NOTE:** 4-H exhibitor should choose a public location that others can visit; not their personal residence.

**Class 7 GIS Thematic Poster (SF271)** – Create a thematics poster using pre-printed or hand copies maps on any subject. Examples of Maps might be Emilia Earhart journey, Sir Francis Drake's Voyage, population density maps, water usage maps, and voter poll results, disease outbreaks in animals/humans or 4-H projects in Nebraska. Create a 1-3 page report on why you choose the subject and map(s), how you created the map(s) and the source of your data (use reliable sources such as the US Center for Disease Control or the US Census Bureau). Poster should include a Title and size should not exceed 22" X 30". Place report in plastic cover attached to poster.

**Class 8 GIS Thematic Map (SF271)** - Using any GIS software, create a thematic map. Thematic maps can utilize any subject of interest to the 4-Her. Maps could be of Amelia Earhart's journey, Sir Francis Drake's voyage, population density maps, water usage maps, or 4-H projects in Nebraska (examples). Create a GIS Map using data from books and/or internet. Use reliable date, ex. U.S. Center for Disease Control or U.S. Census Bureau. Map any size for 8.5" X 11" up to 36" X 24", should include Title, Base map, Neat Line, North Arrow, and Legend. Identify the source of your information on the back of the map.

**DEPARTMENT H, Division 900  
POWER OF WIND**

Class 1. Engineering Notebook – Your engineering notebook may include sketches of designs, notes of engineering questions you have, or answers to questions posed within the project manual, pictures as you complete exercises within this project, or big ideas you have while participating in this project. The notebook submitted in this class should be a working engineering notebook, **not a scrapbook**. Please include your name, county, and age on the front cover.

Class 2. Wind Poster – Poster should exemplify one of the lessons learned in the Power of Wind project. Posters can be any size up to 28" by 22".

Class 3 . Mini Turbine Blade Energy Display – Develop a pinwheel display that demonstrates the working power of wind. Follow guidelines on page 18 and 19 of your manual. Display should include a notebook description of the effectiveness of at least three different designs or materials. Please do not include pennies with your display.

Class 4. Wind Art or literature written piece – Item should illustrate or represent wind turbines, wind power, or something from the power of wind curriculum, for example a pinwheel **or item may be original story or poem written by the exhibitor about wind**

Class 5. 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.

## **DEPARTMENT H, Division 890 SMALL ENGINES**

### **WARM IT UP – UNIT 2**

**Class 1. Small Engine Display/Item (SF222)** - 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 (SF222)** - 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, Division 911  
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.**

Requirements: **All articles exhibited must include a plan stating dimensions and other critical instructions a builder would need to know to build the project. Plans may include narrative instructions in addition to the dimension drawings. Part of the score depends on how well the project matches the plans.** If 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.

4-H'ers must be in advanced woodworking projects for the exhibit to be considered for State Fair.

**NAILING IT TOGETHER – UNIT 3**

**Class 1. Woodworking Article (SF91) -** Item made using skills learned in the Nailing it Together manual. Examples include: bookcase, coffee table or end table.

**Class 2. Woodworking Display (SF91) -** 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 (SF91) -** 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 (SF91) -** Display exemplifying one of the principles learned in the Finishing It Up Project. Examples include: career opportunities, types of finishes, or dovetailing.

**DEPARTMENT H, Division 920  
WELDING (All metal welding process accepted.)  
ARCS AND SPARKS**

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. NOTE: You must be in your third year of a welding project to exhibit welding at the State Fair.

**CLASS 1 Welding Joints (SF281)** -a display of one butt, one lap and one fillet weld.

**CLASS 2 Position welds (SF281)** -a display showing three beads welded in the vertical down, horizontal and overhead positions.

**CLASS 3 Welding article (SF281)** -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- 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" inch 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**

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.

