

SCIENCE, ENGINEERING, AND TECHNOLOGY

Department H

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Enter all exhibits in Exhibition Building on Wednesday from 4:00 p.m. - 7:00 p.m.

A. The name and county of each exhibitor should appear separately on the back of each board or articles so owner of exhibit may be identified if the entry tag is separated from the exhibit.

B. Several classes require a display board which has a height of 24" 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" 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.)

C. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.

D. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.

E. Demonstration boards should include an overall title for the display, plus other necessary labeling.

F. 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.

AEROSPACE

Department H, Division 850

Aerospace - (Model Rockets)

(Pay Category 1)

(900 Numbers Do Not Go To State Fair)

Rockets must be supported substantially to protect the rocket from breakage. Rockets are to 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 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. Flight Record for Each Launching, (weather, distance, flight height)
3. Number of Launchings
4. Flight Pictures
5. Statistics
6. Objectives Learned
7. Conclusions

Items #1 - #3 can be in a "table" form. 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 County Fair.

Judging is based upon display appearance, rocket appearance, workmanship, design or capabilities for flight, number of times launched and report. Three (3) launches are required to earn the 9 launch points given on the score sheet. Only intermediate and advanced levels will be eligible for State Fair competition. For scoring, only actual launches count, misfires will not count towards one of the required three launches.

CLASS NUMBER:

H900. Single-Stage Rockets. Single-stage rockets up to 15 inches (38.1 cm) in length (no plastic fins)

H901. Single-Stage Rockets. Single-stage rockets over 15 inches (38.1 cm) in length (no plastic fins)

LIFT OFF - Unit 2

H1. Rocket: Any Skill Level 2 Rocket with wooden fins painted by hand or air brush.

H2. 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" x 22"

H3. Rocket: Any Skill Level 2 Rocket with wooden fins painted using commercial application. Example: commercial spray paint.

REACHING NEW HEIGHTS - Unit 3

H4. Rocket: Any Skill Level 3 Rocket with wooden fins painted by hand or air brush.

H5. 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" x 22".

H6. Rocket: Any Skill Level 3 Rocket with wooden fins painted using commercial application. Example: commercial spray paint.

PILOT IN COMMAND - Unit 4

H7. Rocket: Any Skill Level 4 Rocket with wooden fins or any self-designed rocket.

H8. 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" x 22".

CAREERS

Class 20. Careers Interview. Interview someone who is working in the field of aerospace 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.

COMPUTERS

Department H, Division 860

(900 Numbers Do Not Go To State Fair)

Computers Mysteries - Unit 1

(Pay Category 3)

CLASS NUMBER:

H901. Computer Usage. Interview 2 people who have jobs that use a computer. Write a 1 page report on what you learned. Mount on a poster board or colored paper not to exceed 12" x 15".

H902. Web Sites. Create a poster using 4-H information you have printed off from the Nebraska

Extension in Otoe County, University of Nebraska - Lincoln, and National 4-H web sites. Poster can be any size up to 22" x 28".

H903. Birthday Greeting. Create a birthday greeting on 8 1/2" x 11" paper. Mount on poster board or colored paper not to exceed 12" x 15".

Computers Mysteries - Unit 2

(Pay Category 2)

CLASS NUMBER:

H1. Computer Application. 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 be 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 1/2" x 11") which should include: 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 black and white.

H2. Produce a Computer Slideshow Presentation. Using presentation software 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, animations and audio (music or voice and transition sounds do not count). 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.

Computer Mysteries - Unit 3

(Pay Category 2)

H4. 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 and no more than 5 minutes in length and have 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.

H5. How to STEM (Science, Technology, Engineering and Math) 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.

H6. 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.

H7. 3D Printing Unique Items. 3D printing uses plastic or other materials to build a 3 dimensional object from 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 complexity of the design and shape. 3D UNIQUE OBJECT: 3D objects printed for their own sake. May be an art design, tool, or other object. 3D printing

will include a notebook with the following: a) Software used to create 3D design; b) Design or, if using a re-design, the original design and the youth's design with changes; and c) Orientation on how the object was printed.

H8.Printing Prototypes. 3D printing uses plastic or other materials to build a 3 dimensional object from 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 complexity of the design and shape. 3D objects printed as part of the design process for robot or other engineering project or cookie cutter, be creative. Must include statement of what design question the prototype was supposed to answer and what was learned from the prototype. 3D printing will include a notebook with the following: a) Software used to creat 3D design; b) Design or, if using a re-design, the original design and the youth's design with changes; and c) Orientation on how the object was printed.

ELECTRICITY

Department H, Division 870

Electricity - Magic of Electricity - Unit 1

(Pay Category 3)

(900 Numbers Do Not Go To State Fair)

CLASS NUMBER:

H901. 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 allowed.

H902. 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.

H903. 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.

H904. Parallel Circuit. Use the following kinds of items to construct one parallel circuit. Items: D cell battery, battery holder, insulated wire, bulb holder and a 2 or 2.5 volt light bulb.

H905. Series Circuit. Use the following kinds of items to construct one series circuit. Items: D cell battery, battery holder, insulated wire, bulb holder and a 2 or 2.5 volt light bulb.

H906. Electrical Poster. Poster should exemplify one of the lessons learned in the Magic of Electricity Project. Posters can be any size up to 28" x 22".

Department H, Division 870

Electricity - Investigating Electricity - Unit 2

(Pay Category 2)

H907. 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 approximately 2 feet of insulated wire to build a three way switch.

H908. 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, normally open push button switch, 40 feet of stranded insulated wire, 4 alligator clips, 2" x 6" board (6" long), 1/8" 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 igniters, additional drill bits matched to holes for two switches. You may successfully build a rocket launcher and light two rockets igniters with your

launcher. You DO NOT have to actually fire a rocket off of the launcher.

H909. 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" x 4" x 1/8 plexiglass board to mount circuit on, rosin core solder, soldering iron or gun, 2 feet of insulated wire, wire strippers, hot glue sticks, hot glue gun and a plastic box with a lid to mount your alarm circuit on.

H910. Electrical Poster. Poster should exemplify one of the lessons learned in the Investigating Electricity Project. Posters can be any size up to 28" x 22".

Department H, Division 870

Electricity - Wired For Power - Unit 3

(Pay Category 1)

CLASS NUMBER:

H1. 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.

H2. 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.

H3. 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.

H4. 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".

Department H, Division 870

Electronics - Unit 4

(Pay Category 1)

H5. 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.

H6. 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).

H7. Electronic Project. Exhibit an electronic item designed by the 4-H'er or form a manufactured kit that shows the electronic expertise of the 4-H'er. Examples include: a radio, a computer, or a volt meter.

H8. Poster. Poster should exemplify one of the lessons learned in the Entering Electronics Project. Posters can be any size up to 28" x 22".

CAREERS

Class 10. Careers Interview. 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.

ROBOTICS

Department H, Division 861

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.

(Pay Category 1)

CLASS NUMBER:

H1. 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.

H2. 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.

H3. 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.

H4. 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.

H5. Robotics Sensor Notebook. Write pseudo code which includes at least one sensor activity. Include the code written and explain the code function.

H6. 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 it may not be displayed in locked cases. We recommend that you submit the project under class H861003 - Robotics Video.

H7. 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 it may not be displayed in locked cases. We recommend that you submit the project under class H861003 - Robotics Video.

GEOSPATIAL**Department H, Division 880****Geospatial**

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

(Pay Category 1)

H1. 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.

H2. 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".

H3. 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.

H4. Geocache. Assemble a themed geocache. Each geocache should be a watertight 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, included a print-out of its registry. The entry may include a photograph of the cache in its intended hiding place.

H5. Agriculture Precision Mapping. 4-H'ers 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.

H7. 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://4hhistorypreservation.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)

CAREERS

Class 10. Careers Interview. Interview someone who is working in a Geospacial 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.

POWER OF WIND

Department H, Division 900

Power of Wind

(Pay Category 2)

H1. Engineering Notebook. 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 the class should be a working engineering notebook, not a scrapbook. Please include your name, county, and age on the front cover.

H2. Wind Poster. Poster should exemplify one of the lessons learned in the Power of Wind project. Posters can be any size up to 14" x 22".

H3. 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.

H4. 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.

H5. Wind as Energy Display. Item should be the original design of the 4-H'er. 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.

H6. Alternative Energy. Poster should exemplify an alternative energy source besides wind. Posters can be any size up to 14" by 22".