
SET GENERAL 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 exhibit per class.
3. 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.
4. 3. Posters can be any size up to 28" by 22" when ready for display. Example: tri fold poster boards are not 28" by 22" when fully open for display.
5. Please refer to the General Rules for the policy regarding firearms, items with a blade, and other related items.
6. Please refer to the General Rules for the policy regarding use of copywritten images.

AEROSPACE / ROCKETRY

This category gives 4-H'ers a chance to display the rockets they have created. Through participation in this category 4-H'ers will show judges what they learned about and how they adapted their exhibit throughout this project. Involvement in SET Aerospace gives participants a first-hand experience in modern technology.

Resources:

Aerospace 2 - Fly kites and launch rockets; Explore space; Experience disorientation.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/120

Aerospace 3 - Learn to fly an airplane; Make a shuttle on a string; Control flight directions.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/121

Aerospace 4 - Create an altitude tracker; Evaluate navigation systems; Explore pilot certification requirements. URL: https://4hcurriculum.unl.edu/index.php/main/program_project/122

Refer to **SET GENERAL RULES** for more information, at the top of page 1.

Rules:

1. 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.
2. 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.
3. 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.

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4. A report, protected in a clear plastic cover, must include: 1) rocket specification (include original or photo of manufacture packaging stating rocket skill level); 2) a flight record for each launching (weather, distance, flight height); 3) number of launchings; 4) flight pictures; 5) Safety (how did you choose your launch site? Document safe launch, preparations, and precautions); 6) objectives learned; and 7) conclusions.
5. 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 Fair.
6. Judging is based upon display appearance, rocket appearance, workmanship, design or capabilities for flight, number of times launched and report. Three launches are required to earn the maximum launch points given on the score sheets.
 - For 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.
 - Skill level of project is not determined by number of years in project. Skill level is determined by the level listed on the manufacturing packaging.
 - 4-H Rocket project levels are not intended to correspond to National Association of Rocketry model rocket difficulty ratings or levels.
7. High power rockets (HPR) is similar to model rocketry with differences that include the propulsion power and weight increase of the model. They use motors in ranges over “G” power and/or weigh more than laws and regulations allow for unrestricted model rockets. These rockets are NOT appropriate for 4-H projects and will be disqualified.
8. Posters can be any size up to 28” by 22” when ready for display. Example: tri fold poster boards are not 28” by 22” when fully open for display.
9. Entry level rockets, made with PLASTIC FINS and PLASTIC BODY TUBES, are COUNTY ONLY projects.
10. Youth Enrolled in Aerospace 2, 3, or 4, may exhibit in any class within this division.

H 850 001 ROCKET Any Skill Level Rocket with wooden fins and cardboard body tubes painted by hand or air brush.

H 850 002 DISPLAY Poster or display board that displays or exemplifies one of the principles learned in the Lift Off project. Examples include display of rocket parts and purpose, explains the parts of a NASA rocket or shuttle, interview of someone in the aerospace field, or kite terminology. Include notebook containing terminology (definition), and what was learned. Display can be any size up to 28” by 22”.

H 850 003 ROCKET Any Skill Level 2 Rocket with wooden fins and cardboard body tubes painted using commercial application, for example: commercial spray paint.

H 850 004 SELF-DESIGNED ROCKET Any self-designed rocket with wooden fins and cardboard body tubes.

Premiums: Purple \$1.60; Blue \$1.25; Red \$1.00; White \$0.75

COMPUTERS

This category gives 4-H'ers a chance to display their knowledge of computers. Through participation in this category 4-H'ers will develop presentations that show judges their knowledge in the different aspects of computer science. Involvement in SET Computers gives participants a first-hand experience in modern technology.

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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. Demonstration boards should include an overall title for the display, plus other necessary labeling.
3. 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.
4. 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.
5. Please refer to the General Rules for the policy regarding firearms, items with a blade, and other related items.
6. Please refer to the General Rules for the policy regarding use of copywritten images.
7. **Team Entries:** To qualify for entry at the Nebraska State Fair team materials entered in H860007 - Maker Space/Digital Fabrication must clearly be the work of a team instead of an individual, and 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.

Resources:

Computer Mysteries 1 - Learn about hardware and software; Discuss Internet safety; Create and save data.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/123

Computer Mysteries 2 - Use Internet search engines; Take apart a computer; Participate in a chat room; Create a newspaper or magazine.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/124

Computer Mysteries 3 - Build your own computer system; Design a Web site; Develop a multimedia presentation; Use spreadsheets.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/125

COMPUTER MYSTERIES – UNIT 1

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*Not eligible for State Fair

***H 860 901 4-H PROMOTIONAL FLYER** Exhibit should be created on 8" ½ x 11" page using a commercially available graphics software package. Flier can be color or black and white. Fliers can be a whole page or a folded flier.

***H 860 902 CYBERCARD** Exhibit will consist of two cyberspace greeting cards sent. Exhibit will be a printout of each card and a one page text telling the steps taken to complete and send the cyber cards and how you may be able to use cyber cards. One text will be for both cards.

***H 860 903 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.

***H 860 904 SCANNER DISPLAY** Exhibit will consist of one or more pictures scanned into your computer and printed on your printer. Exhibit should explain what hardware and software was used to create it.

***H 860 905 COMPUTER DESIGNED GREETING CARDS** Exhibit will consist of six greeting cards, each for a different occasion/holiday. Exhibit should be created on 8 ½ x 11 paper using a commercially available graphics program and a color printer/printer or single color printer/printer. The cards should vary in folds and design. Prefabricated cards from commercially available card programs will NOT be accepted. No theme required.

COMPUTER MYSTERIES – UNIT 2

H 860 001 COMPUTER APPLICATION NOTEBOOK 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 (2) print out of your project. Project may be in color or black and white.

H 860 002 PRODUCE A COMPUTER SLIDESHOW PRESENTATION Using presentation software a 4-H exhibitor designs a multimedia computer presentation on one topic related to youth. 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

H 860 003 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. A notebook with a printout of all the slides should be submitted.

H 860 004 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-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 or may be uploaded to a video streaming application and exhibitors can provide a hard copy QR code for public viewing. Any of the following formats will be accepted: .mpeg, .rm, .wmv, .mp4, .ov, .ppt, or .avi.

H 860 005 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 Website, Blog, or App isn't live include all files comprising the Website, Blog or App should be submitted on a flash drive, in a plastic case CD-ROM in a plastic case along with the explanation of why the site was created, or may be shared through a hard copy share link or QR code for viewing. If developed using a WIKI or other online tool include a link to the website in the explanation of why the site was created.

H 860 006 3D PRINTING 3D printing uses plastic or other materials to build a three-dimensional (3D) object from a digital design (including 3D Pen Creation). Youth may use original designs or someone else’s they have redesigned 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. Must include design notebook that addresses the following questions:

1. What was the motivation for your design or the problem you were solving with your design? ie. is your item a functional or decorative piece?
2. Please include a picture of original design, citation of designer/website OR if design is completely original (you created it using CAD software), then state that it’s original. If item was not completely original, indicate what you did to the original design to modify it to better meet the design problem stated in #1 above. Its design was modified multiple times, please indicate what change was made with each modification, and what prompted the need for the change. I.e. I printed it and the design was too fragile, so I resliced the print to make thicker external walls, or to have a denser infill.
3. Define your process for designing/printing. What software and/or hardware was used (indicate type of 3D printer or if item was created with 3D pen)?

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4. What materials were selected for your project?
5. If your final design has any moving parts, define how you determined appropriate allowance in your design.
6. Identify any changes that you would make to improve your design.

H 860 007 MAKER SPACE / DIGITAL FABRICATION This project is a computer-generated project created using a laser cutter, vinyl cutter, heat press or CNC router. Vector or 3D based software such as Corel Draw or Fusion 360 would be an example of an appropriate software used to create your finished project. Project should include a notebook with the following:

- 1) What motivated you to create this project?
- 2) Software and equipment used;
- 3) Directions on how to create the project;
- 4) Prototype of plans;
- 5) Cost of creating project;
- 6) Iterations or modifications made to original plans; and
- 7) Changes you would make if you remade the project.

PREMIUMS: Purple \$2.50; Blue \$2.20; Red \$1.75; White \$1.40

ROBOTICS

This category involves the many different aspects of Robotics. Participants will learn more about how robots are designed and developed as well as the mechanical and electronic elements of robots. Involvements in SET Robotics gives participants a first-hand experience in modern technology.

Resources:

Junk Drawer Robotics 1 - Discover the design and functions of robotic arms; Build a robotic arm that moves. URL: https://4hcurriculum.unl.edu/index.php/main/program_project/136

Junk Drawer Robotics 2 - Explore robot movement, power transfer, and locomotion; Design and build machines the roll, slide, draw or move underwater. URL: https://4hcurriculum.unl.edu/index.php/main/program_project/137

Junk Drawer Robotics 3 - Make the connection between the mechanical and electronic elements of robots; Explore sensors, write programs, build circuits and design your own robot. URL: https://4hcurriculum.unl.edu/index.php/main/program_project/138

Robotics Platforms - Use commercial robotics kits to explore the world of robotics; Learn to program your robot using sensors, loops and conditional statements. URL: https://4hcurriculum.unl.edu/index.php/main/program_project/139

Virtual Robotics - Learn how robots are designed and developed; Program your own virtual robots and test it in a variety of environments. URL: https://4hcurriculum.unl.edu/index.php/main/program_project/135

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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 the owner of the exhibit may be identified if the entry tag is separated from the exhibit.
2. 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.
3. Posters can be any size up to 28" x 22" when ready for display. Example: tri-fold poster boards are not 28" x 22" when fully open for display.
4. 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.
5. 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. Videos should be uploaded to a video streaming application and exhibitors should provide a hard copy QR code for viewing.

H 861 001 ROBOTICS POSTER Create a poster (14" X 22") communicating a robotics theme such as "Robot or Not", "Pseudocode", "Real World Robots", "Careers in Robots" or "Autonomous Robotics", "Precision Agriculture" or a robotic topic of interest to the 4-H'er.

H 861 002 ROBOTICS NOTEBOOK Explore a robotics topic in-depth and present your findings in a notebook. Documentation should include any designs, research, notes, pseudocode, data tables or other evidence of the 4-H'ers learning experience. The notebook should contain at least three pages. Topics could include a programming challenge, a programming skill, calibration, sensor exploration, or any of the topics suggested in Class 1.

H 861 004 ROBOTICS /CAREERS INTERVIEW Interview someone who is working in the field of robotics and research the career in robotics. Interviews can either be written or in a multimedia format (CD/DVD). Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12-point font, and 1" margins. Multimedia reports should be between 3 to 5 minutes in length.

H 861 005 ROBOTICS SENSOR NOTEBOOK Write pseudo code which includes at least one sensor activity. Include the code written and explain the code function.

H 861 007 KIT LABELED ROBOT (cannot be programmed) AND NOTEBOOK 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 notebook with the robot the youth has constructed. Uncluded in the notebook should be the following: 1) a description of what it does, 2) pictures of programs the robot can perform, 3) why they chose to build this particular form, and 4) how they problem solved any issues that they might have had during building and programming. A picture story of assembly is recommended. If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases.

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H 861 008 3D Printed Robotics Parts This class is intended for youth to create parts through 3D printing, that help create their robot or aid the robot in completing a coded function. Project should include notebook describing the process used to create the project, describe the success of your designed piece (did it work), intended use of the product and the modifications made to the item.

PREMIUMS: Purple \$2.50; Blue \$2.20; Red \$1.75; White \$1.40

ROBOTICS SHOWCASE

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.

PREMIUMS: Purple \$2.50; Blue \$2.20; Red \$1.75; White \$1.40

ELECTRICITY

In this category 4-H'ers have the opportunity to create informational exhibits about the different aspects of electricity. Through involvement in this category 4-H'ers will be better educated about electricity and be able to present their knowledge to others.

Resources:

Electric Excitement 1 - Explore electrical insulation; Learn about the effects of magnetism; Build and electromagnet and electric motor.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/126

Electric Excitement 2 - Decode circuit diagrams; Build circuits and test voltages; Build a rocket launcher and a burglar alarm.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/127

Electric Excitement 3 - Measure electrical usage; Replace electrical switches; Evaluate light bulbs and test for electrical power.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/128

Electric Excitement 4 - Explore LED's and SCR's, transistors, and the construction of an SCR intruder alarm; Learn the basics of solid-state electronics; Build a blinking" flasher and an amplifier" explore LED's and SCR's.

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/129

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2. 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.)
 - Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
 - Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
 - Demonstration boards should include an overall title for the display, plus other necessary labeling.
 - 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.

MAGIC OF ELECTRICITY – UNIT 1 *Not State Fair eligible

For classes 911-914, please refer to 4-H manual

***H 870 911 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.

***H 870 912 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.

***H 870 913 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.

***H 870 914 IS THERE A FORK IN THE ROAD** Use the following items to construct one parallel and one series circuit. Items: D cell battery, battery holder, insulated wire, bulb holder and a 2 or 2.5 volt light bulb.

INVESTIGATING ELECTRICITY – UNIT 2 *Not State Fair eligible

For classes 915 917, please refer to 4-H manual

***H 870 915 CASE OF THE SWITCHING CIRCUIT** Use the following items: two D cell

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

***H 870 916 ROCKET LAUNCHER** Construct a rocket launcher out of the following materials: a plastic pencil box that is at least 4inches by 8inches, single pole switch, single throw switch, normally open push button switch, 40 feet of 18 or 22 gauge stranded wire, 4 alligator clips, 2 by 6 board 6inches long, 1/8 inch diameter metal rod, rosin core solder, soldering iron or gun, wire stripper, small crescent wrench, pliers, small Phillips and straight blade screwdrivers, drill, 1/8 inch and ¼ inch drill bits, rocket engine igniters, additional drill bits matched to holes for two switches. You must successfully build a rocket launcher and light two rocket igniters with your launcher. You

DO NOT have to actually fire a rocket off of the launcher. Create a poster using photographs to show the “step by step process” you used to build your launcher.

***H 870 917 STOP THE CRIME** Build an ALARM using the following materials: On off push button switch, mercury switch, buzzer, vibrating or piezoelectric, 9volt battery, 9volt battery holder, 4 inch by 4 inch by 1/8 inch Plexiglas board to mount circuit on; rosin core solder, soldering gun/iron, two feet of 22 gauge wire, wire strippers, hot glue sticks, hot glue gun and a plastic box with a lid to mount your alarm circuit on. Create a poster using photographs to show the “step by step process” you used to build your alarm.

ELECTRICITY- WIRED FOR POWER – UNIT 3

H 870 001 ELECTRICAL TOOL/SUPPLY KIT Create an electrical supply kit to be used for basic electrical repair around the house. Include a brief description of each item and its use. Container should be appropriate to hold items.

H 870 002 LIGHTING COMPARISON Display studying the efficiency of various lighting (incandescent, fluorescent, halogen, Light Emitting Diodes, etc.). Exhibit could be a poster display, or an actual item.

H 870 003 ELECTRICAL DISPLAY ITEM Show an application of one of the concepts learned in the Wired for Power project. Examples include: re-wiring or building a lamp, re-wiring or making a heavy duty extension cord or developing an electrical diagram of a house. Exhibit could be a poster display, or an actual item

H 870 004 POSTER Poster should exemplify one of the lessons learned in the Wired for Power Project. Posters can be any size up to 28” by 22”.

ELECTRONICS – UNIT 4

H 870 005 ELECTRICAL/ELECTRONIC PART IDENTIFICATION Display different parts used for electrical/electronic work. Exhibit should show the part (either picture or actual item) and give

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a brief description, including symbol of each part and its function. Display should include a minimum of 10 different parts.

H 870 006 ELECTRONIC DISPLAY Show an application of one of the concepts learned in the Electronics project. Examples include: components of an electronic device (refer to p. 35 of the Electronic manual).

H 870 007 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.

H 870 008 POSTER Poster should exemplify one of the lessons learned in the Entering Electronics Project. Posters can be any size up to 28" by 22".

CAREERS

***H 870 010 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. *Not State Fair Eligible

Premiums: Purple \$1.60; Blue \$1.25; Red \$1.00; White \$0.75