

# Department H Science, Engineering and Technology

## Entomology

Pay Category 200

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

Entomology exhibits give 4-H'ers the opportunity to demonstrate their knowledge about insects and insect displays. This category has multiple projects that allows 4-H'ers to progress over numerous years. For help getting started with this project contact your county 4-H extension office.

### Rules

- Specimens in display collections should be mounted properly and labeled with location, date of collection, name of collector, and order name. Follow mounting and labeling instructions in the Nebraska 4-H Entomology Manual. Boxes are preferred to be 12" high X 18" wide, and landscape orientation, so they fit in display racks. Purchase of commercially -made boxes is allowed. All specimens must be from the collector.

**H800001 - Entomology Display, First-Year Project SF186** Collection to consist of 25 or more different kinds (species) of insects representing at least 6 orders. Limit of one box.

**H800002 - Entomology Display, Second-Year Project SF186** Collection to consist of a 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-Year or More Project SF186** Collection to consist of a 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 of 3 boxes.

**H800004 - Special Interest or Advanced Insect Display SF187** Educational display developed according to personal interests and/or advanced identification capability. This is also 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 SF186** 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 SF189** Subjects

should be insects, spiders or other arthropods, or any nests, webs or constructions they make. All exhibit prints should be either 8" x 10" or 8½" x 11" and mounted on rigid, black 11" X 14" poster or mat board. Either orientation is acceptable. No frames or mat board 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 board.

**H800007 - Insect Poster/Display Exhibits SF190**

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 (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 SF191** 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.

**County Only Class**

**H800901 - Insectigator**—Entries are to create an insect with insect characteristics. Insect creations may be constructed using any materials: including but not limited to: clay, egg cartons, paper, paper clips, packing peanuts, tape and glue, markers or paint, ribbon, beads, eyes, wire, yarn, pipe cleaners or plastic film. The created insect and display base if a base is used should be equal to or less than (12"x12") and no taller than 12". The created insect must be accompanied by a paper describing the created insect's anatomy such as legs and how they would use them to move; mouth parts and what they might eat; wings and how they might use them to fly; the coloration of the insect and why the coloration was selected for this insect to live with in its habitat.

**Veterinary Science**

Scoresheet SF119

Pay Category 200

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must

receive a Purple ribbon at county fair and be selected to advance to State Fair.

The purpose of a Veterinary Science exhibit is to inform the public about a common health problem of animals a veterinary science principle, or public health/zoonotic diseases. Do not confuse veterinary science exhibit topics with animal husbandry, history or production topics.

- **A Veterinary Science exhibit may consist of a poster, notebook or a display.** The exhibit may represent material from any of the Veterinary Science projects including entry level exhibits from Unit I.
- **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, animal first aid kits containing any drugs or medications will be immediately disqualified and not displayed. First Aid kits wishing to include medication information should instead utilize written descriptions, photographs, drawings, computer generated print-outs, or empty packaging of pharmaceuticals.
- **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. Plagiarism will result in a disqualification. Please study your topic and present the information to your audience in your own words.

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

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

## **Science, Engineering, & Technology (SET)**

Pay Category 200

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

### **General SET Rules**

- A. The name, class number 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.
- B. Each individual is limited to one exhibit per class.
- C. 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.
- D. 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.

### **Careers**

**H9309001 - Careers Interview (SF239)** – Interview someone who is working in any field associated with science, engineer and technology and research that career (i.e. computer programmer, architect, engineer, pilot, etc.). Interviews can either be written or in a multimedia format (CD/DVD). Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12-point font, and 1" margins. Multimedia reports should be between 3 to 5 minutes in length.

## **Aerospace (Rockets & Drones)**

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

This category gives 4-H'ers a chance to display the rockets and drones 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. For help getting started with this project contact your county 4-H office.

### **Rules**

#### **Must also follow General Set 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. 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.
3. 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.
4. 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.
5. 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.
  6. 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.
  7. Judging is based upon display appearance, rocket appearance, workmanship, design or capabilities for flight, number of times launched and report. Three launches are required to earn the maximum launch points given on the score sheets. For scoring for the State Fair, only actual launches count, misfires will not count towards one of the required three launches.
  8. 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.
  9. 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.
  10. 4-H Rocket project levels are not intended to correspond to National Association of Rocketry model rocket difficulty ratings

11. 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.

12. 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.

#### **Level 1**

Entry Level rockets, are made with plastic fins and plastic body tubes.

County Only Classes

**H850901 - Any skill level 1 rocket**

**H850902 - Level 1 rocket Display**

#### **Level 2 - 3 - 4**

**H850001 - Rocket SF92** Any Skill Level Rocket with wooden fins and cardboard body tubes painted by hand or air brush.

**H850002 - Aerospace Display SF93** 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".

**H850003 - Rocket SF92** Any Skill Level Rocket with wooden fins and cardboard body tubes painted using commercial application, for example: commercial spray paint.

#### **Self-Designed Rocket**

**H850004 - Rocket SF92** Any Skill Level Rocket with wooden fins or any self-designed rocket with wooden fins and cardboard body tubes.

## **Drones**

**H850005 - Drone Poster** Exhibit must be designed to educate yourself and others on one or more of the following topics: drone technologies, uses of drones, the different types of drones, types of training needed to operate drones, and the laws and regulations users must follow. Posters can be any size up to 28" by 22".

**H850006 - Drone Video**-Exhibit must demonstrate how the drone interacts with the outside world. Examples include: field scouting, surveying damage from natural disasters, drones used in commercial applications and settings, and drones used for structural engineering. Video should not exceed 5 minutes. Videos should be submitted to [macee,parrish@unl.edu](mailto:macee,parrish@unl.edu) by the Tuesday of fair week. (For State Fair; Videos should be submitted to Amy Timmerman at [atimmerman2@unl.edu](mailto:atimmerman2@unl.edu) by Aug 15th. Videos should also be uploaded to a video streaming application and exhibitors must provide a hard copy QR code for viewing.)

## **Computer Mysteries**

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

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. For help getting started with this project contact your county 4-H extension office.

### **Rules**

**Must also follow General Set 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. Premier 4-H Science Award is available in this area.
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.

### **Booting Up-Unit 1**

**H860901 - Poster SF022** Create a poster on a lesson learned in Unit 1. Examples might include: hardware, software programs, how to take care of a computer and operating systems.

**H860902 - Computer Designed Announcement/ Greeting Card-SF023** Card should be created using a commercially available graphics program. Tell which software program was used. Prefabricated cards from commercially available card programs will NOT be accepted. No theme required. Put cards in some type of protective cover.

**H860903 - 4-H Promotional Flier SF024-** Exhibit should be created on an 8 1/2" 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. Display on appropriate size paper or poster board, not to exceed 24" x 24".

**H860904 - Cybercard SF025-** (For ages 8-12)- Exhibit will consist of two cyberspace greeting cards sent to the office e-mail address. Exhibit will be a printout of each card and a one page text telling the steps taken to complete and send the cybercards and how you may be able to use cybercards.

**H860905 - Utilizing the Internet- SF026** Exhibit will be a notebook of web sites used to plan a real or fictitious vacation. Notebook will consist of at least four different web sites illustrating the following: 1) airfare and/or directions to drive to destination, 2) hotels/ motels in the area, 3) things to do (i.e. baseball game, Disney World, amusement park) and, 4) a maximum of one- page text telling the steps taken to plan the vacation. List web sites for each site and tell how you may be able to use the web to plan or research other things in the future.

## **Computer Mysteries - Unit 2**

### **H860001 - Computer Application Notebook**

**SF227** 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.

### **H860002 - Produce a Computer Slideshow**

**Presentation SF276** Using presentation software a 4-H exhibitor designs a multimedia computer presentation on one topic related to youth. All slide shows for fair should be emailed to macee.parrish@unl.edu by the Tuesday of fair week. (For State Fair; Videos should be submitted to Amy Timmerman at atimmerman2@unl.edu by Aug 15th.) 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 up loaded.

### **Computer Mysteries - Unit 3**

#### **H860003 - 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. All presentations for fair should be emailed to macee.parrish@unl.edu by the Tuesday of fair week (For State Fair videos should be submitted to Amy Timmerman at atimmerman2@unl.edu before August 15) or the presentation can be uploaded to a video streaming application and exhibitors must provide a hard copy QR code for viewing. 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 printout of all the slides should be submitted. 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.

#### **H860004 - 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 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.

**H860005 - Create a Web Site/Blog or App SF275**

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 flash drive -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.

1. **H860006 - 3D Printing SF1050** 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. Must include design notebook that addresses the following questions.

2. What was the motivation for your design or the problem you were solving with your design? I.e. Is your item a functional or decorative piece?
3. 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.
4. 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)?
5. What materials were selected for your project?
6. If your final design has any moving parts, define how you determined appropriate allowance in your design.
7. Identify any changes that you would make to improve your design.

**H860007 – Maker Space/Digital Fabrication**

**SF1050** 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:

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
7. Changes you would make if you remade the project

### **Robotics**

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

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. For more resources and materials in this category refer to the resource section at the bottom of the page.

### **Rules**

#### **Must also follow General Set Rules**

1. 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.
2. 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.

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. 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.
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.

**H861001 - Robotics Poster SF236** Create a poster (28" X 22") communicating a robotics theme such as "Junk Drawer Robotics Level 3 & 4", "Robotics Engineering," "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 SF237** 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, any of the topics suggested in Class 001 or junk drawer robotics level 3 and 4.

**H861004 - Robotics /Careers Interview SF239**

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 SF241** Write pseudo code with a loop which includes at least one sensor activity. Include the code written and explain the code function.

**H861007 - Kit Labeled Robot and Notebook (cannot be programmed.) SF243** 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." If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases.

**H861008 - 3D Printed Robotics Parts SF244** This class is intended for youth to create parts, through 3D printing, to 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.

## **Electricity**

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

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. For more resources and materials in this category refer to the resource section at the bottom of the page.

### **Rules**

#### **Must also follow General Set 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. 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**

**H870911 - Bright Lights SF226** 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. Magic of Electricity Unit 1(BU-06848): 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.

**H870912 - Conducting Things SF226** 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.

**H870913 - Is There a Fork in the Road? SF226** 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**

**H870921 - Case Of Switching Circuit SF226** 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. 2' 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.

**H870922 - Rocket Launcher SF226** 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' of 18 or 22 gauge stranded wire, 4 alligator clips, 2- by 6- board 6" long, 1/8" diameter metal rod, rosin core solder, soldering iron or gun, wire stripper, small crescent wrench, pliers, small phillip's 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 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.

**H870923 - Stop the Crime SF226** 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" by 1/8" Plexiglas board to mount circuit on; rosin core solder, soldering gun/iron, 2' of 22 gauge wire, wire strippers, hot glue sticks, hot glue gun and a plastic box with a lid to mount your alarm circuit on. Create a poster using photographs to show the "step by step process" you used to build your alarm.

### **Wired for Power - Unit 3**

**H870001 - 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.

**H870002 - 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.

**H870003 - 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

**H870004 - 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**

**H870005 - 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.

**H870006 - 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).

**H870007 - Electronic Project SF230** Exhibit an electronic item designed by the 4- Her 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.

**H870008 - 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".

### **Geospatial**

SET Geospatial is a diverse category that includes a variety of exhibits 4-H'ers can get involved in. Through participation in this category 4-H'ers will gain more knowledge about Nebraska's rich history and diverse geography. Take close note of the rules to ensure your exhibit qualifies.

#### **Rules**

##### **Must also follow General Set 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. 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. Please refer to the General Rules for the policy regarding firearms, items with a blade, and other related items.
4. Please refer to the General Rules for the policy regarding use of copywritten images.
5. Premier 4-H Science Award is available in this area.

**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 SF299** 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](http://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 were 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 SF300** 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/](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)

**H880008 - GIS Thematic Map SF302** Using any GIS software, create a thematic. Thematic maps can utilize any subject of interest to the 4-H'er. Example map would be Amelia Earhart's or Sir Francis Drake's voyage population density maps, water usage maps or 4-H project in Nebraska. Create GIS Map using data from books, and or internet. Use reliable data, (U.S. Center or U.S. Census Bureau etc.) Map any size from 8.5" x 11" up to 36" x 24", should include Title, Base Map, Neat Line, North Arrow, and Legend. Identify the source of your information on the back of map.

### **Physics / Power of Wind**

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

This category provides 4-H'ers a way to present their ideas about renewable energy resources. Through participation in this category 4-H'ers will

learn more about physics, friction, energy, and elasticity. In addition, participants will make a display to go along with their findings. For more resources and materials in this category refer to the resource section at the bottom of the page. For help getting started with this project contact your county 4-H office.

### **Rules**

#### **Must also follow General Set 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 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.
2. 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.

#### **H900001 - Create and Compare Energy**

**Resources Poster SF307** 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 SF305** 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 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 the sun. Examples include solar ovens, solar panels, etc.

**H900004 - Water 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 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.

**H900006 - Other Nebraska Alternative Energy SF306** 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.

### **Woodworking**

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

In this category 4-H'ers have the opportunity to create exhibits about varying levels of woodworking. In addition, participants can also create

informational exhibits about their woodworking projects. Through involvement in this category 4-H'ers will be better educated about the topic and better their woodworking skills. For more resources and materials in this category refer to the resource section at the bottom of the page.

### **Rules**

#### **Must also follow General Set 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. 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.
3. 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.
4. 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.
5. All outside projects MUST have entry tag and supporting information placed in a protective bag to prevent damage from weather events such as rain and be ATTACHED to projects with string, zip ties, etc.

### **Measuring Up - Unit 1 Scoresheet SF91**

#### **County Fair Only Classes**

**H911911 - Article** item made using skills learned in the Measuring Up project. Examples include: recipe holder, stilts or other skill level appropriate item.

**H911912 - Display** exemplifying one of the principles learned in the Measuring Up project. Examples include: safety, tools and proper way to use them, etc.

### **Making the Cut - Unit 2 Scoresheet SF91**

#### **County Fair Only Classes**

**H911921 - Article** - item made using skills learned in the Making the Cut project. Examples include: birdhouse, foot stool, napkin or letter holder.

**H911922 - Display** exemplifying one of the principles learned in the Making the Cut project. Examples include: woodworking careers, different wood species, sanding, types of finishes, etc.

### **Nailing it Together - Unit 3**

**H911001 - Woodworking Article SF91** Item made using skills learned in the Nailing it Together manual. Examples include: bookcase, coffee table or end table.

**H911003 - Recycled Woodworking Display SF95**  
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?)

**H911004 - Composite Wood Project SF96** 60% of the project must be wood and 40% made from other materials such as metal, rubber, resin, etc. All plans and plan alternations 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.

**H911005 - Outdoor Wood Project made with Treated Wood SF97** Treated wood projects DO NOT have to have a finished coating. All plans and plan alternations must be attached to the article. Protect plans with a cover. If project is designed to be outside. Examples include: picnic tables, planters, outdoor furniture, etc.

#### **Finishing Up - Unit 4**

**H911006 - 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.

**H911008 - Recycled Woodworking Display SF91** Article made from recycled, reclaimed or composite wood. Article must be appropriately finished and/or sealed and

utilize one or more woodworking techniques from page 2 of the Unit 4 manual. Exhibit must include the woodworking plan and a minimum one-page report of how the design and engineering process was used to develop the woodworking plan.

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?)

### **Welding**

All entries must be pre-entered on a General Entry Form at the York County Extension Office by the first Friday of July. All Exhibits will be judged on Wednesday of fair week in Ag Hall. Entries must receive a Purple ribbon at county fair and be selected to advance to State Fair.

This category helps 4-H'ers learn the basics of welding. In addition, 4-H'ers get the opportunity to present their knowledge on the topic and display what they have made. Involvement in SET Welding gives participants a first-hand experience in a skill

that can be used for a lifetime. For help getting started with this project contact your county 4-H office.

## **Rules**

### **Must also follow General Set 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. 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/rode size
  5. Electrode/wire/rod ID numbers

Attach a wire to display board so it can be hung like a picture frame. No picture frame hangers accepted.

1. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
2. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
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. If no plans are included with welding art, welding article, welding furniture or composite weld project item will be disqualified.
5. All outside projects MUST have entry tag and supporting information placed in a protective bag to prevent damage from weather events such as rain and be ATTACHED to projects with string, zip ties, etc.
6. 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. No picture frame hangers accepted.** If no plans are included with welding article or welding furniture, item will be disqualified.

#### **Suggestions for: 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.

5. **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
6. **MIG welding:** Suggested coupon thickness - 1/4" if using .035 wire and 1/8" if using .023 wire
7. **Oxy-Acetylene:** Suggested coupon thickness - 1/8". Suggested rod- 1/8" mild steel rod 4-H

#### **Suggestions for: 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.

#### **Suggestions for: Class 3 & 4**

1. All welds should be cleaned and protected from rust with paint or light oil. Plans are to be complete enough that if they were given to a welding shop, the item could be made without further instructions. Bill of materials should include a cost for all items used including steel, electrodes, paint, wheels, etc.

## **Classes**

- H92001 - Welding Joints SF281** a display of one butt, one lap and one fillet weld.
- H92002 - Position Welds SF281** a display showing three beads welded in the vertical down, horizontal and overhead positions.
- H92003 - Welding Art SF283** any art created using tack welds to hold the metal pieces together ( examples include horseshoe projects). Type of welder, welder settings, all plans, plan alternations, and a bill for material 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.
- H92004 - Welding Article SF281** any shop article where welding is used in the construction. 60% of item must be completed by 4-Her and notes regarding laser welding or machine welding must be included. Type of welder, welder settings, all plans, plan alternations, and a bill for material 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.
- H92005 - 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. Type of welder, welder settings, all plans, plan alternations, and a bill for material 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.
- H92006 - Plasma Cutter/Welder Design SF279**  
Plasma cutters/welders allowed for detailed design (s) to butt cut into metal. 4-

H members will create a notebook describing the design process to create the "artwork" to butt cut into metal. In the notebook include:

- A photo (front and back) of the finished project. Instructions on how the design was created (include software used) , this allows for replication of the project.
- Lessons learned or improvements to the project
- Steps to finish the project.

**H92007 - Composite Weld Project SF280** 60% of the project must be welded and 40% made from other materials such as wood, rubber, etc. Type of welder, welder settings, all plans, plan alternations, and a bill for material 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.

## NOTES