

DEPARTMENT STEM ROCKETS

GENERAL INFORMATION

- A. 4-H entries must be made according to the printed 2024 Custer County Fair Premium Book and entered online by 5:00 p.m. on June 28. Instructions for online entries will be emailed to 4-H families on approximately May 15. Entries will be interview judged on Wednesday, July 24, 10:00 a.m. - 4:00 p.m. at the 4-H Exhibit Hall.
- B. The name and county of each exhibitor should appear separately on the back of each board, poster, or article and on the front cover of the notebooks so owner of exhibit may be identified if the entry tag is separated from the exhibit.
- C. Each individual is limited to one exhibit per class.
- D. Rockets must be supported substantially in order to protect the rocket from breakage. Rockets are to be mounted on a base that has dimensions equal to 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. Rockets entered with the wrong base size or sideboards will be dropped one ribbon placing.
- E. 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.
- F. Rockets must be equipped as prepared for launching, with wadding and parachute or other recovery system. **Rockets entered with live engines will automatically receive a white ribbon.**
- G. 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.
- H. The flight record should describe the 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 be shown on the rocket. Complete factory assembled rockets will not be accepted. If plastic fins are included in the rocket kits, use the plastic fins as a pattern to trace onto balsa wood.
- I. 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. Only actual launches count; misfires will not count towards one of the required **three** launches.
 - For self-designed rockets only, please include a digital recorded copy of one flight. In the documentation, please include a description of stability testing before the rocket was flown.
 - ****The skill level of a 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.
- J. High power rockets (HPR) are 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 receive an automatic white ribbon.
- K. Posters can be any size up to 28" by 22" when ready for display. Example: Tri fold poster boards are not 28" x 22" when fully open for display.
- L. Entry level rockets, made with plastic fins and plastic body tubes, are county only project.
- M. Rockets not meeting specifications, will be dropped one ribbon placing.
- N. Rockets must be labeled with exhibitor's name, county, and years in the rocket project.
- O. Youth enrolled in Aerospace 2, 3, or 4 may exhibit in any class within this division.

Ribbons	P.	B.	R.	W.
	\$2.50	\$2.00	\$1.50	\$1.00

CLASS H850000 Beginner Level Single Stage Rockets up to 15 inches (38.1 cm) in length. Rockets must be supported substantially to protect the rocket from breakage. Rockets are to be mounted on a base that has dimensions equal or less than 12" x 12" and the base should be 3/4" thick. No metal bases. If the rocket fins extend beyond the edges of the required base (12" x 12"), then construct a base that is large enough to protect the fins. The base size is dictated by the size of the rocket fins. The rockets must be mounted vertically. Please do not attach sideboards or backdrops to the displays. In addition, a used engine or length of dowel pin is to be glued and/or screwed into the board and extended up into the rockets engine mount to give added stability. Rockets must be equipped as prepared for launching, with wadding and parachute or other recovery system. **Rockets entered with live engines will be disqualified.** It is suggested that rockets go through three (3) launches. The 4-H member should be prepared to explain to the judge the number of launchings, weather conditions at the time of the launches, how the weather may have played a factor in how high the rocket flew, and recovery success. Entries not eligible for State Fair.

CLASS H850001 Rocket: Any Skill Level Rocket with wooden fins and cardboard body tubes painted by hand or air brush.

CLASS H850002 Aerospace 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, explaining 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".

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

CLASS H850004 Self-Designed Rocket: Any self-designed rocket with wooden fins and cardboard body tubes.

CLASS 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".

CLASS 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. Computer equipment needed to show the judge the video at the county fair must be provided by the 4-H member. **Exhibits that qualify for State Fair will have some special instructions.**

DEPARTMENT STEM COMPUTERS

GENERAL INFORMATION

- A. 4-H entries must be made according to the printed 2024 Custer County Fair Premium Book and entered online by 5:00 p.m. on June 28. Instructions for online entries will be emailed to 4-H families on approximately May 15. Entries will be interview judged on Wednesday, July 24, 10:00 a.m. - 4:00 p.m. at the 4-H Building.
- B. The name and county of each exhibitor should appear separately on the back of each poster or article and on the front cover of the notebooks so owner of exhibit may be identified if the entry tag is separated from the exhibit.
- C. Each individual is limited to one exhibit per class.
- D. Demonstration boards should include an overall title for the display, plus other necessary labeling.
- E. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.

Ribbons	P.	B.	R.	W.
	\$1.25	\$1.00	\$.75	\$.50

COMPUTER MYSTERIES - UNIT 1 Entries not eligible for State Fair.

CLASS H859001 Booting Up, Unit 1 - 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.

COMPUTER MYSTERIES - UNIT 2

CLASS H860001 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 such 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 (1-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 (8½" x 11") 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.

CLASS H860002 Produce a Computer Slideshow Presentation - Using presentation software a 4-H exhibitor designs a multimedia computer presentation on one topic related to youth. A notebook with a printout of all the slides should be submitted. Slideshow should include a minimum of 10 slides and not 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 presentation. All slideshows must be uploaded. State fair qualified entries should be submitted to <https://go.unl.edu/2024nesfset> by August 10th, 2024. Or entries can be uploaded to a cloud sharing service and exhibitors MUST provide a hard copy QR code for viewing. Exhibitors should test their codes or links on several devices to check for appropriate permissions for public viewing.

Computer equipment needed to show the judge the multimedia report at the county fair must be provided by the 4-H member. **Entries selected for the State Fair will require special handling. Contact the Extension for more information.**

COMPUTER MYSTERIES - UNIT 3

CLASS H860003 Produce an Audio/Video Computer Presentation - Using presentation software a 4-H exhibitor designs a multimedia computer presentation on one topic related to youth, including audio and/or video elements. A notebook with a 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. State Fair qualified entries should be submitted to <https://go.unl.edu/2024nesfset> by August 10th, 2024. Or entries can be uploaded to a cloud streaming service and video streaming application and exhibitors MUST provide a hard copy QR code for viewing. Exhibitors should test their codes or links on several devices to check for appropriate permissions for public viewing.

CLASS H860004 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. State Fair eligible entries should be submitted to <https://go.unl.edu/2024nesfset> by August 10th, 2024. Or videos can be uploaded to a video streaming application and exhibitors MUST provide a hard copy QR code for viewing. Exhibitors should test their codes or links on several devices to check for appropriate permissions for public viewing.

CLASS H860005 Virtual Platform Presentation - Youth design a fully automated educational presentation using any current multimedia platform is appropriate. Ex. such as Tik Tok, YouTube, Canva, Canvas, etc. Submissions may include a notebook, poster, etc., explaining the process, experience, and/or presentation. All submissions must include a link to the virtual presentation. State Fair qualified entries should be submitted to <https://go.unl.edu/2024nesfset> by August 10th, 2024. Entries can also be uploaded to a cloud sharing service. and exhibitors MUST provide a hard copy QR code for viewing. Exhibitors are encouraged to test their codes or links on several devices to check for appropriate permissions for public viewing.

CLASS H860006 Create a Website/Blog or App - Design a simple website, blog, or app for providing information about a topic related to youth. Include an explanation of why the entry was created. (Any current website, blog, or app development platform is accepted such as Google Sites, iBuildApp, Wix, etc. If the website, blog, or app isn't live, include all files on a flash drive in a plastic case. State Fair qualified entries should be submitted to <https://go.unl.edu/2024nesfset> by August 10th, 2024. Entries can be uploaded to a cloud sharing service. Exhibitors MUST provide a hard copy QR code for viewing. Exhibitors are encouraged to test their codes or links on several devices to check for appropriate permissions for public viewing.

CLASS H860007 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)?
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.

CLASS H860008 Maker Space/Digital Fabrication - This project is a computer generated projected created using a laser cutter, vinyl cutter, heat press, or CNC router. Vector or 3D based software such as Corel Draw or Fusion 360 would be an example of an appropriate software used to create your finished project. Project should include a notebook with the following:

- a. What motivated you to create this project
- b. Software and equipment used
- c. Directions on how to create the project
- d. Prototype of plans
- e. Cost of creating project
- f. Iterations or modifications made to original plans
- g. Changes you would make if you remade the project

Team Entry Option for State Fair: To qualify for the State Fair in this class, the work must be clearly be that of a team instead of an individual. Contact the Extension Office if you are wishing to enter this class as a team.

DEPARTMENT STEM ELECTRICITY

GENERAL INFORMATION

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- B. The name and county of each exhibitor should appear separately on the back of each board, poster, or article and on the front cover of the notebooks so owner of exhibit may be identified if the entry tag is separated from the exhibit.
- C. Each individual is limited to one exhibit per class.
- D. Several classes require a display board which should be a height of 24", a width of 24", and not to exceed 1/4" in thickness. A height of 24 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.
- E. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
- F. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
- G. Demonstration boards should include an overall title for the display, plus other necessary labeling.
- H. 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.

Ribbons	P.	B.	R.	W.
	\$2.50	\$2.00	\$1.50	\$1.00

MAGIC OF ELECTRICITY - UNIT 1 Entries not eligible for State Fair.

CLASS H868001 Unit 1 Bright Lights - Create your own flashlight using items found around your house. Flashlights should be made out of items that could be recycled or reused. No kits please.

CLASS H868002 Unit 1 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.

CLASS H868003 Unit 1 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.

CLASS H868004 Unit 1 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 Entries not eligible for State Fair.

CLASS H869001 Unit 2 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' 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.

CLASS H869002 Unit 2 Rocket Launcher - Construct a rocket launcher out of the following materials: a plastic pencil box that is at least 4" x 8", single pole switch, single throw switch, normally-open push button switch, 40' 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 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 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.

CLASS H869003 Unit 2 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 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

CLASS H870001 Electrical Tool/Supply Kit - Create an electrical supply kit to be used for basic electrical repair around the house. Include a brief description of each item and its use. Container should be appropriate to hold items.

CLASS H870002 Lighting Comparison - Display studying the efficiency of various lighting (incandescent, fluorescent, halogen, Light Emitting Diodes, etc.). Exhibit could be a poster display, or an actual item.

CLASS H870003 Electrical Display/Item - Show an application of one of the concepts learned in the Wired for Power project. Examples include: re-wiring or building a lamp, re-wiring or making a heavy duty extension cord or developing an electrical diagram of a house. Exhibit could be a poster display, or an actual item.

CLASS H870004 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".

ELECTRONICS - UNIT 4

CLASS H870005 Electrical/Electronic Part Identification - Display different parts used for electrical/electronic work. Exhibit should show the part (either picture or actual item) and give a brief description, including symbol of each part and its function. Display should include a minimum of 10 different parts.

CLASS H870006 Electronic Display - Show an application of one of the concepts learned in the Entering Electronics project. Examples include: components of an electronic device (refer to p. 35 of the Entering Electronics manual).

CLASS H870007 Electronic Project - Exhibit an electronic item designed by the 4-H'er or from a manufactured kit that shows the electronic expertise of the 4-H'er. Examples include: a radio, a computer, or a voltmeter.

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