DEPARTMENT STEM ROBOTICS

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. Exhibits 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 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. 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" x 22" when fully open for display.
E. Creating a video of your robot in action would be helpful for the judges but is not mandatory. Videos should be uploaded to a video streaming application and exhibitors should provide a hard copy QR code for viewing. State Fair qualified videos 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 are encouraged to test their codes or links on several devices to check for appropriate permissions for public viewing.
F. Youth enrolled in Junk Drawer Robotics (Levels 1, 2, or 3) may exhibit in any class within this division.
G. Each individual is limited to one exhibit per class.

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

CLASS H861001 Robotics Poster - 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.

CLASS H861002 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, programming skills, calibration, sensor exploration, or any of the topics suggested in Class 1.

CLASS H861004 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 such as a short video uploaded to a cloud sharing service. Include a QR code with your project to allow for judging access. State Fair qualified videos 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 are encouraged to test their codes or links on several devices to check for appropriate permissions for public viewing. Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12-point font, and 1" inch margins. Multimedia reports should be between 3 to 5 minutes in length.

CLASS H861005 Robotics Sensor Notebook - Write pseudo code which includes at least three sensor activity. Include the code written and explain the code function. Codes can be submitted as a multimedia format uploaded to a cloud sharing service. Include a QR code with your project to allow judging access. Multimedia presentations should be 3 to 5 minutes in length. State Fair qualified videos should be submitted to https://go.unl.edu/2024nesfset by August 10th, 2024. Or videos can also be uploaded to a video streaming application 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 H861007 Kit Labeled Robot (cannot be free 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. Included in the notebook should be (1) a description of what the robot 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 they might have had during building and programming. A picture story of assembly is recommended. Robots may not be able to be displayed in a case.

CLASS H861008 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.

JUNK DRAWER ROBOTICS: All exhibits should be original designs made with objects and materials from your trunk of junk. Kits purchased commercially will not be accepted.

JUNK DRAWER ROBOTICS - LEVEL 1

CLASS H862001 Youth will exhibit **one** of the following from the level 1 manual.

- a self-designed balance beam you have created
- a self-designed mechanical arm that has at least two of the three axes of movement
- a self-designed gripper for your mechanical arm.

Not eligible for State Fair.

JUNK DRAWER ROBOTICS - LEVEL 2

CLASS H862002 Youth will exhibit **one** of the following from the level 2 manual.

- a can-can robot that will make drawings on paper
- a rover (Es-Car-Go) with a gear train that is able to climb a ramp
- a design for an underwater ROV that can be powered to go up and down in a tank of water.

Not eligible for State Fair.

JUNK DRAWER ROBOTICS - LEVEL 3

CLASS H862003 Youth will exhibit **one** of the following from the level 3 manual.

- a self-designed and built or modified machine that will travel forward and backward using electrical power
- a self-designed mechanism that will sense a barrier (both front and back) and change motor or wheel direction.
- build and compare at least two types of circuits.
- a self-designed original robot that can perform a specific task.

Not eligible for State Fair.

DEPARTMENT STEM GEOSPATIAL

GENERAL INFORMATION

A. STEM 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. For more resources and materials in this category refer to the resource section at the bottom of the page.
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C. 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.
D. Each individual is limited to one exhibit per class.
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.
F. NO FIREARMS, ITEMS WITH A BLADE (broad heads, knives, saws, etc.) or related items of any other kind, may be exhibited. This applies to actual items, replicated items and item parts.
G. USE OF COPYWRITTEN IMAGES - Copyrighted writing, artwork, videos, and images may be used in 4-H educational exhibits under Fair Use for educational purposes of Copyright Law. In order to qualify for Fair Use, 4-H'ers must: 1) only use a small amount of the copy-written work, 2) add new meaning to the work to make it original, 3) rework it and use it in a totally different way, and 4) use it for nonprofit purposes (not to make money). Giving credit to the original creator is also recommended.

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

CLASS H880001 Poster - Create a poster (not to exceed14" 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.

CLASS H880002 4-H Favorite Places or Historical Site Poster - The 4-H exhibitor identifies a favorite place or historical site (including grave sites) in Nebraska. Exhibit should include latitude and longitude, digital picture, and local area map. Poster size should not exceed 14" x 22".

CLASS H880003 GPS Notebook - Keep a log of at least 5 places visited using a GPS enabled device. At least one site should be from a community other than where you live. For each site, record the latitude, longitude and elevation. Also include a description of the site, a paragraph explaining what was interesting about the site or finding it. Photos of each site and/or cache are optional but encouraged.

CLASS H880004 Geocache - Assemble a themed geocache (physical geocache is **REQUIRED** with exhibit). Each geocache should be a water-tight container. It should include a logbook and pencil for finders to log their visits and may include small trinket, geo-coins, 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, include a print-out of its registry. The entry may include a photograph of the cache in its intended hiding place.

CLASS H880005 Agriculture Precision Mapping - 4-H'ers will assemble a notebook that will include a minimum of 2 digital copies of various data layers that can be used in precision agriculture to identify spatial patterns and/or correlations (printed copies of websites 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.

CLASS H880006 4-H History Map/Preserve 4-H History - Nominate a Point of Interest for the 4-H History MapProject. 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. For a step-by-step video on nominating a point, please go to this link: http://tinyurl.com/nominate4h. Write a brief description of the historical significance of 4-H place or person. (a minimum of one paragraph).

CLASS H880007 GIS Thematic Map - Using any GIS software, create a thematic map. 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", which should include Title, Base Map, Neat Line, North Arrow, and Legend. Identify the source of your information on the back of the map.

CLASS H880008 Virtual Geocache - Keep a log of at least 5 places visited using a virtual geocache platform. 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 highly encouraged.

DEPARTMENT STEM ENERGY

POWER OF WIND

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. Exhibits 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 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. 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" x 22" when fully open for display.
E. Renewal Energy Resources:
   - United States Department of Energy: https://www.energy.gov/clean-energy
   - U.S Energy Information Administration: https://www.eia.gov/energyexplained/renewable-sources/
   - Natural Resources Defense Council: https://www.nrdc.org/stories/renewable-energy-clean-facts
F. Each individual is limited to one exhibit per class.

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

CLASS H900001 Create and Compare Energy Resources Poster - 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."

CLASS H900002 Experiment Notebook - 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.

CLASS H900003 Solar as Energy Display/Poster - Item should be the original design of the 4-H'er. Include the item, or a picture if item is in excess of 6' tall or 2' x 2'. Include a notebook of why the item was designed and how it harnesses the power of the sun. Examples include solar ovens, solar panels, etc.

CLASS H900004 Water as Energy Display/Poster - Item should be the original design of the 4-H'er. Include the item, or a picture if item is in excess of 6' tall or 2' x 2'. Include a notebook of why the item was designed and how it harnesses the power of water.

CLASS H900005 Wind as Energy Display/Poster - Item should be the original design of the 4-H'er. Include the item, or a picture if item is in excess of 6' tall or 2' x 2'. Include a notebook of why the item was designed and how it harnesses the power of wind.

CLASS H900006 Other Nebraska Alternative Energy - Notebook should explore Nebraska an 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. Examples include geothermal, biomass, ethanol, bio-diesel, methane reactors, etc.

4-WHEELIN' PHYSICS FUN

GENERAL INFORMATION

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B. The name and county of the exhibitor should appear on the back of the poster.
C. Each individual is limited to one exhibit. Entries not eligible for State Fair.

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

CLASS H895001 Poster - Poster should exemplify one of the lessons learned in the 4-Wheelin' Physics Fun project. Posters can be any size up to 28" x 22".