

## Department 28 — 4-H SPACE TECH

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Champion and Reserve Champion will be awarded in each section. Grand Champion and Reserve Grand Champion will be awarded overall.

### Section 1– ASTRONOMY

Telescopes entered may be a kit or original design. Prefinished telescopes which require no painting are not acceptable exhibits. Telescopes designed by the exhibitor must be original, not a modification of an existing kit.

Telescopes are limited to no more than two feet in length. They must be placed on a stationary stand that does not allow the telescope to roll and/or fall over. The stand can not extend past two feet in length or width.

Each telescope exhibit must include a “4-H Astronomy Exhibit Information Form”, which should be attached to the outside of a 10”x13” manila envelope. You must include construction plans (or a photocopy) of the telescope and place it inside the manila envelope.

Two photographs showing telescope construction and operation are required. Photographs should be mounted on one side of an 8½”x 11” page. A brief caption should accompany each photograph. Place photos in the 10”x13” manila envelope.

The telescope must be properly assembled and painted with a smooth and uniform finish. Decals, if used, should be attached smooth and tight.

EDUCATIONAL DISPLAYS should be creative and showcase something specific you have learned in the Astronomy project during the current 4-H year. Follow copyright laws as you are preparing your exhibit. Educational displays are not to exceed a standard commercial 3’ x 4’ trifold display board. No card table exhibits will be allowed. Care should be taken to use durable materials that will withstand fair conditions. Exhibitor’s name, county or district, age and year(s) in project must be tagged or labeled in a prominent location on the telescope stand, educational display, notebook, and/or poster. Posters must be no larger than a 22” x 28” poster board. Notebooks must be organized in a 3-ring binder.

Class 2800 Telescope made from kit

Class 2801 Telescope made from original design

Class 2802 Educational exhibit

Class 2803 Notebook

Class 2804 Poster

### Section 2- ROBOTICS

Each robot must be free standing, without the need for additional supports in order to be moved or exhibited. Robot dimensions should not exceed 2’ high x 2’ wide x 2’ deep. Weight may not exceed 15 pounds.

All electronic components of the robot must be adequately covered or concealed with a protective enclosure. Paper is NOT considered an adequate enclosure or covering for electrical components.

Robots must be powered by an electrical, battery, water, or solar source only. Robots powered by fossil fuels/flammable liquids will be disqualified. All robots must include an on/off switch for operation. No remote control devices will be allowed.

Each Robot must be in operable working condition. The judges will operate each robot to evaluate its workmanship and its ability to complete the required tasks for the current 4-H year.

Each exhibitor is required to complete the “4-H Robotics Exhibit Information Form” which must be attached to the outside of a 10x13” manila envelope. The exhibit must include written instructions for operation, construction plans, one to three pages of project photographs or a 5 minute CD, DVD, or video presentation, and robot programming information, if applicable. This information should be placed inside the 10” x 13” manila envelope mentioned above. The exhibitor may enter their electronic project listed under the electric program as under the SpaceTech robotics project if the exhibitor so chooses. Robots that include weaponry of any kind will be disqualified.

Creativity, workmanship and functionality will be strong criteria in judging the “Robot designed by Exhibitor” classes.

Exhibitor’s name(s), and county or district must be tagged or labeled in a prominent location on the robot, educational display and or notebook.

Educational displays are not to exceed a standard 3’ x 4’ trifold display board. No card table exhibits will be allowed. Care should be taken to use durable materials that will withstand fair conditions. No electricity will be provided.

Team project notebooks must be organized in a 3-ring binder and should highlight information/roles of each team member, drawings, charts, photographs, goals and objectives of your robotics project, and all robotic competitions your team has competed in during the current 4-H year.

There are no county or district boundaries that must be adhered to in order to form a Kansas 4-H Space Tech Robotics team. However, each member must be currently enrolled in the 4-H Space Tech project.

Novice=1 or 2 years in project. Intermediate=3 to 4 years in project. Professional=4 or more years in project;

Class 2810 Robot made from a commercial (purchased) kit, novice

Class 2811 Robot designed and constructed by exhibitor, novice

Class 2812 Programmable robot made from a commercial (purchased) kit; novice.

Class 2813 Educational Display or Notebook, novice

Class 2814 Robot made from a commercial (purchased) kit, intermediate

Class 2815 Robot designed and constructed by exhibitor, intermediate. The robot must not be a mere modification of an existing robot kit or plan.

Class 2816 Programmable robot made from a commercial (purchased) kit, intermediate

Class 2817 Educational Display or Notebook, intermediate

Class 2818 Robot made from a Commercial (purchased) kit, professional

Class 2819 Robot designed and constructed by exhibitor, professional. The robot must not be a mere modification of an existing robot kit or plan.

Class 2820 Programmable robot made from a commercial (purchased) kit, professional

Class 2821 Educational Display or Notebook, professional

Class 2822 Robot designed and constructed by 2 or more 4-H SpaceTech project members. The robot must not be a mere modification of an existing robot kit or plan. The robot may be a programmable type that is made from a commercial (purchased) kit. This division is designed to encourage teamwork and cooperation among fellow 4-H SpaceTech members. As with many high tech projects today, no one person designs and builds a robot alone. It takes brainstorming, planning, problem solving and cooperation for an entire team to complete a robotics project.

Exhibitors in this class will be assigned a task for their robots to perform. The tasks are changed annually. Visit the SpaceTech website [www.Kansas4-H.org/spacetech](http://www.Kansas4-H.org/spacetech) for the current year.

Class 2823 Team Educational Robotics Display or Project Notebook.

### **Section 3- ROCKETRY**

GENERAL DEFINITIONS for all categories:

For exhibit to be eligible for the State and County Fair;

To exhibit in this division, the rocket must have been flown.

Rocket shoot will be Saturday, July 9 at 7:30 a.m. with a rain date on July 16 at 7:30 a.m. at the LaCrosse Airport.

#### **Exhibit rules for all rocketry categories:**

Purpose: These rules apply to how rockets are to be displayed at the fair and what those displays should and should not contain. These rules apply to all rockets displayed in the Space Tech division.

1. 4-H members must be currently enrolled in the 4-H Space Tech-Rocketry program to exhibit in this division.
2. Each exhibitor may enter up to two rocket exhibits that have been constructed during the current year. If two rockets are entered, one rocket must be either a ‘kit’ or a ‘rocketry educational exhibit’ and the second may be entered into any other applicable class. An exhibitor may not enter two rockets in the same class.
3. The report that accompanies the rocket must be limited to the 4-H Space Tech Rocket Exhibit Information Form which is affixed to a 10” x 13” envelope. This can be downloaded from <http://www.Kansas4-H.org/> or can be picked up the Extension Office.
4. Plans or a photocopy must be placed inside the envelope.
  - A. This includes original design rockets.
  - B. If a rocket kit has been modified structurally, notations need to be given indicating the changes made, either by notations on the Rocket Exhibit Information Form or by placing notes in the plans.

5. One or more photographs of the rocket at the launch site are required.
  - A. Photographs showing the rocket at the moment of ignition are preferred.
  - B. Photographs must be mounted on one side of 8½” x 11” page(s).
  - C. There must be at least 1 page of photos and no more than 5 pages of photos.
6. To exhibit in this division:
  - A. The rocket must have been flown.
  - B. Support rods must not extend past the tip of the highest nosecone on the model.
  - C. Support rods must remain in the upright position, 90 degrees to the display base, do not angle. If support rods are not perpendicular to the base, the judge should deduct two ribbon placings.
  - D. Each rocket must be able to stand freely by itself or be supported by a solid base, not to exceed ¼” thick and 8” square. The exhibitor’s name, county or district, and age must be labeled on the base.
  - E. If the model rocket is greater than 4 feet tall it can be displayed without a base, or displayed parallel to the ground with up to 3 notched blocks not to exceed 4” in height, width and depth. The exhibitor’s name, county or district, and age must be labeled on the base.
  - F. No model may be submitted on a launch pad.
7. Launches should not be conducted in winds above 20 MPH. and will constitute a disqualification of rocket exhibit.
8. The altitude achieved by the rocket is to be determined using a method other than estimation. Examples of accepted methods include altimeter, computer software, range finders, etc. If additional space is needed to show calculations of how the altitude was achieved one additional page may be added to the rocketry information pack.
9. Flight damage is to be documented by the participant on either the construction plans or the 4-H Space Tech Rocket Exhibit Information Form.
10. The judging of flight damage is to be secondary to all other aspects of the model and only then may it even be considered. However under no circumstance may flight damage be grounds for disqualification.
11. Engines and igniters, under any circumstance, ARE NOT permitted with the exhibit and constitute an immediate disqualification.
12. If an engine becomes stuck, jammed, wedged, or in any other way permanently affixed in or to a rocket and can not be removed from the rocket, the rocket will be subject to immediate disqualification. This is because it is not possible to make a full and immediate assessment of the safety of the rocket when it is being judged and safety is paramount.
13. Engines may not be used as display stands hollowed out or otherwise. This is a significant change from 2010 and previous year’s rules. Engines used as a display stand will be subject to immediate disqualification.
14. Rocket engines should not be used to join multi-stage rockets together.
  - A. Multi-stage rockets can be displayed without having the stages connected together.
  - B. The different stages must be included to complete the rocketry exhibit, incomplete exhibits will be deducted at least one ribbon placing.
  - C. Use of any engines to join the stages together will be subject to immediate disqualification.
15. Multi-stage rockets can be flown using just the final stage and be considered fully flown.
16. If a safety violation is noted by the judges, superintendent, or other staff, the exhibitor’s rocket, at the judges’ discretion, will receive a participation ribbon. All information necessary will be given to the NAR and TRIPOLI for investigation and possible revocation of membership.

#### **Construction Rules for ALL rocketry categories:**

1. Rockets are to be properly assembled according to the assembly instructions.
2. Beginner kits with prefabricated fin assemblies and pre-finished rockets requiring no painting are not acceptable at the Kansas State Fair. **THESE KITS ARE ACCEPTABLE AT THE COUNTY LEVEL ONLY.**
3. Angles of fins must fall within a plus or minus 2 degree variation using an approved fin alignment guide. An official fin guide is available from [www.Kansas4-H.org](http://www.Kansas4-H.org).
4. Fins should be rounded or streamlined to reduce drag.
5. Fins and body tubes are to be sealed with sanding sealer and/or primer to eliminate the appearance of body grooves and wood grain.
6. Fins and launch lugs are to be filleted to reduce drag and properly secure them to the model.
7. Any seams on plastic parts are to be sanded smooth.
8. The nose cone is to fit snugly but still allow for easy removal.
9. Exhibits must be uniformly painted and smoothly finished or finished as per rocket instructions, and have decals applied smoothly.
10. Non standard surfacing (such as textured paint) may be used if directed by the instructions, this includes scratch built rockets.

11. Models may not be judged based on their paint scheme (colors and placement on the rocket), with the exception of rockets that fit the definition of a 'scale model'. All other rockets do not have to follow the suggested paint scheme, allowing the 4-Her to display maximum creativity in the finishing of their rocket.

A. Under no circumstances is the weight given to the paint scheme to be sufficient enough, by itself, to move the model from one ribbon placing to another.

12. 'Scale models' may be judged based on their paint scheme. The judge may deduct up to one ribbon placing for not following the paint scheme.

13. Scale model rockets are to be finished and completed with a majority (greater than 70%) of decals.

#### ENGINES:

No rocket may be launched using larger than a D size, according to the NAR, unless it is a High Powered Rocket.

#### ALTERNATIVE SKIN GUIDELINES:

Alternative skins are an advanced construction technique that allows the builders of model rockets display maximum design and creativity in their models. Alternative skins are thin coverings over a supporting skeleton that serve as the finish of a rocket as opposed to painting. For more information on Construction and Operating Rules, contact the Extension Office.

#### HIGH POWERED ROCKET GUIDELINES:

Exhibitors must be at least 14 years of age by January 1 of current year. The NAR High Power Rocket Safety Code applies to construction and launching of all rockets displayed in this division and all exhibitors in this division must comply. For more information on Construction and Operating Rules contact the Extension Office.

#### **Junior, 7 - 12 years old**

#### **Senior, 13 - 18 years old**

Class 2830 Alternative skin rocket made from kit, include plans, **Junior**

Class 2831 Alternative skin rocket designed by exhibitor, not merely a modification of an existing kit, include original plans **Junior**

Class 2832 Alternative skin rocket made from kit, include plans, **Senior**

Class 2833 Alternative skin rocket designed by exhibitor, not merely a modification of an existing kit, include original plans, **Senior**

Class 2834 Alternative skin rocket designed by exhibitor that uses alternative skins, not merely a modification of an existing kit, include original plans, **Senior**

Class 2850 Single stage, skill levels 1 and 2, **Junior**

Class 2851 Single stage, skill levels 3 and 4, **Junior**

Class 2852 Multi stage, skill levels 1 and 2, **Junior**

Class 2853 Original design, not a kit modification, **Junior**

Class 2854 Pre-finished, pre-painted or pre-formed body parts, **Junior**, COUNTY ONLY

Class 2855 Single stage, skill levels 1 and 2, **Senior**

Class 2856 Single stage, skill levels 3 and 5, **Senior**

Class 2857 Multi stage, skill levels 1 and 2, **Senior**

Class 2858 Multi stage, skill levels 3 and 5, **Senior**

Class 2859 Original design, **Senior**

Class 2861 Launch pad or control, original constr., **Senior**

Class 2862 Rocket original design by a team, **Senior**

Class 2863 High power rocket made from a kit or original design, **Senior**

#### ROCKETRY EDUCATIONAL EXHIBITS - Posters, Notebooks and Display Boards

1. The rules for ALL categories apply.

2. Each State Fair Rocketry Educational exhibit must include a '4-H Educational Rocketry Exhibit Information Form', which should be attached to the outside of a 10" x 13" manila envelope.

3. Exhibits may not consist of only a rocket, but must contain substantial supporting educational material in the form of posters, notebooks, or display boards, etc.

4. Displays should be creative and showcase something specific you have learned in the rocketry project during the current 4-H year.

5. Follow copyright laws, citing all sources of information in a standard notation on the '4-H Educational Rocketry Exhibit Information Form'. Additional pages can be added inside the Information Packet and should be labeled 'Citations'.

6. Educational displays are not to exceed a standard commercial 3' x 4' tri-fold display board. No card board table exhibits will be allowed. Care should be taken to use durable materials that will withstand Rush County Fair conditions.
7. 'Construction Kits' that are part of educational displays must be contained in cases (tackle boxes, sealable containers, etc.) that may be no larger than 1' x 2' x 2' and must have a latch which securely keeps all components contained in the 'Construction Kits'. Other components are to adhere to appropriate dimensions as stated elsewhere.
8. Rocketry Educational Project notebooks must be organized in a 3-ring binder.
9. Educational posters must be no larger than a 22" x 28" poster board.
10. Engines and igniters ARE NOT permitted with the exhibit and constitute an immediate disqualification. This is for safety reasons and included both spent and live engines.
11. Exhibitor's name, county or district, age and year(s) in project must be tagged or labeled in a prominent location on the educational display, notebook, "Construction Kit" and/or poster.
12. Exhibits should possess the following qualities (in no particular order):
  - A. A central theme
  - B. What you want others to learn
  - C. Be designed and constructed in a manner befitting the exhibit.
  - D. Be something you are interested in
  - E. Be related to model or high power rocketry
  - F. And those characteristics described above

Junior 7 - 12 years old

Class 2864 Rocketry Educational Display

Class 2865 Rocketry Notebook

Class 2866 Rocketry Poster Board

Senior 13 - 18 years old

Class 2867 Rocketry Educational Display

Class 2868 Rocketry Notebook

Class 2869 Rocketry Poster Board

#### **Section 4- GPS/GIS**

1. The 4-H Geospace project teaches concepts related to GPS (Global Positioning Systems) and GIS (Geographic Information Systems), geospatial technology applications and future career opportunities.
  2. The 4-H members must be currently enrolled in the 4-H Space Tech project to exhibit in this division.
  3. Each exhibitor may enter one exhibit per class. Exhibit must have been completed during the current 4-H year and have been selected at the county level for entry at the State Fair level. Only purple ribbon GPS/GIS exhibits are eligible for State Fair.
  4. Educational display boards, posters and notebooks should be creative and showcase something specific you have learned in the GPS/GIS project during the current year. Follow copyright laws, as explained in the General Rules as you are preparing your exhibit(s).
  5. Educational posters must be no larger than 22" x 28" poster board.
  6. Educational displays are not to exceed a standard commercial 3' x 4' tri-fold display board. Commercially available 'Science Fair Presentation Boards' are encouraged. Exhibitors are encouraged to laminate all posters and maps or cover them with clear plastic film.
  7. Project notebooks must be organized in a 3-ring binder.
  8. Exhibitor's name, county or district, age, and year(s) in project must be tagged or labeled in a prominent location on the exhibit, educational display, notebook, and/or poster.
  9. Team exhibits are defined as developed by two or more 4-H members.
- Class 2870 Geocache Box. Include geocache box with contents, description and photograph of location in which box will be located. Check [www.geocaching.com](http://www.geocaching.com) for instructions on place and description.
- GPS/GIS Map. One map constitutes an entry. Map can be either informational or directional, computer generated or hand drawn. A map is a single product of the data gathering, manipulation and presentation skills. Multiple related maps should be entered under GPS/GIS Community Mapping Projects. Value is placed on youth that can model the learning process, or show how their skills have increased while completing the map.
- Class 2871 GPS/GIS Map, Individual
- Class 2872 GPS/GIS Map, Team

GPS/GIS Community Mapping Project. Two or more maps on a related project constitute an entry. Maps can be either informational or directional. Complete and attach a MapProject Description Sheet with entry. Community Mapping Projects consist of a detailed goal and multiple applications of either GPS or GIS skills. A conclusion is reached, a problem was evaluated or studies, a solution was found (or the problem was better defined). Value is placed on youth that can model the learning process, or show how their skills have increased while completing the project.

Class 2873 GPS/GIS Community Mapping Projects, Individual

Class 2874 GPS/GIS Community Mapping Projects, Team

Class 2875 GPS/GIS Educational Poster

Class 2876 GPS/GIS Display Board

Class 2877 GPS/GIS Notebook-May include, but not limited to, explanation of the parts of a GIS map, illustration of how GPS works, information on "Youth Favorite Places", etc.

Class 2878 Team Mapping Educational Display-Display should show and explain the project in detail including printouts of maps, pictures of the project being done, who was and how the project results have and will be utilized.

Exhibit must be labeled on the back with the following information for all participating members: Name, club, county, age as of January 1, and date display was created.

Class 2879 Geography Educational Poster

Class 2880 Geography Display Board

Class 2881 Geography Notebook-Exhibit should include what was learned and knowledge gained about geography.

Value is placed on youth that can model the learning process, or show how their skills have increased while completing the project.