Rocketry and 4-H SPACETECH
Dept. RO
4-H SPACETECH-ROBOTICS

1. 4-H members must be currently enrolled in the Kansas 4-H SpaceTech project to exhibit in this division.
2. Each exhibitor may enter one robot per class. Exhibit must have been constructed and/or completed during the current 4-H year.
3. Each robot must be free-standing, without the need for additional supports in order to be moved or exhibited.
4. Robot dimensions should not exceed 2 feet high, by 2 feet wide, by 2 feet deep. Weight may not exceed 15 pounds.
5. All electric 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.
6. Robots may be powered by an electrical, battery, water, air or solar source only. Junk drawer robots may be powered by a non-traditional power source. Robots powered by fossil fuels/flammable liquids will be disqualified. Robots that include weaponry of any kind will be disqualified. No remote control devices will be allowed.
7. 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 this current 4-H year.
8. Each exhibitor is required to complete the "4-H SpaceTech Robotics Exhibit Information Form" which is available through your local K-State Research and Extension office. This form must be attached to the outside of a 10" x 13" manila envelope. For notebooks, display boards, and posters, no additional exhibit information is required; no manila envelope is needed for these exhibits.
9. 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. However, no exhibitor will be allowed to set up their robot in person. 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.
10. Creativity, workmanship, and functionality will be strong criteria in judging the "Robot designed by Exhibitor" classes.
11. Exhibitor's name(s) and county or district must be tagged or labeled in a prominent location on the robot, educational display, notebook and/or poster board. Remember to site your sources of scientific information on your exhibit, when appropriate.
12. 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 State Fair conditions. No electricity will be provided.
13. 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.
14. There are no county or district boundaries that must be adhered to in order to form a Kansas 4-H SpaceTech Robotics team. However, as mentioned in #1, each team member must be currently enrolled in the Kansas 4-H SpaceTech project.

Division A - Novice - One to Two Years in Robotics Project
5505 - Robot made from a commercial (purchased) kit.
5506 - Robot designed and constructed by exhibitor. The robot must not be a mere modification of an existing robot kit or plan.
5507 - Programmable robot made from a commercial (purchased) kit.
5543 - Junk Drawer Robotics-based curriculum robot
5508 - Robotics Educational Display
5528 - Robotics Educational Notebook
5529 - Robotics Educational Poster

Division B - Intermediate - Three to Four Years in Robotics Project
5509 - Robot made from a commercial (purchased) kit.
5510 - Robot designed by exhibitor. The robot must not be a mere modification of an existing robot kit or plan.

5511 - Programmable robot made from a commercial (purchased) kit.
5544 - Junk Drawer Robotics-based curriculum robot
5512 - Robotics Educational Display
5536 - Robotics Educational Notebook
5537 - Robotics Educational Poster

Division C - Professional - Five or More Years in Robotics Project

5513 - Robot made from a commercial (purchased) kit
5514 - Robot designed by exhibitor. The robot must not be a mere modification of an existing robot kit or plan.
5515 - Programmable robot made from a commercial (purchased) kit.
5545 - Junk Drawer Robotics-based curriculum robot
5516 - Robotics Educational Display
5538 - Robotics Educational Notebook
5539 - Robotics Educational Poster

Division D - Team Robotics Project

5517 - Robot designed and constructed by two 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 the brainstorming, planning, problem solving, and cooperation of an entire team to complete a given robotics project. Exhibitors in this division will be assigned a task for their robots to perform. The Tasks are changed annually. To participate in the KSF Robotics Challenge, you must also enter Class 5542 listed in Division E. Please visit the Space Tech www.kansasspacetech.com for the current year's task. Click on the KSF Packet Link.
5518 - Team Robotics Educational Display
5540 - Team Robotics Educational Notebook
5541 - Team Robotics Educational Poster

4-H SPACETECH - ROCKETRY

The Kansas 4-H SpaceTech Rocketry program is designed to allow 4-H members to explore aerospace through rockets of various sizes. Kansas 4-H has adopted the National Association of Rocketry's rules, regulations, and safety guidelines.

Exhibit Information for ALL rocketry categories:

1. Consultation/interview judging will be held Thursday.
2. All revisions of all forms previously released for the SpaceTech division either undated or dated prior to 2015 are void for use and new forms must be obtained and used that are dated by the State 4-H Office for the current year. Use of old forms will result in the loss of one ribbon placing for exhibits.
3. Relevant documents may be obtained from County Extension Offices or from www.KansasSpaceTech.com
4. NAR refers to the National Association of Rocketry and its governing board.
5. All NAR documents, with the exception of the "pink book," referenced herein can be found at http://www.nar.org.
6. If a fire burn ban is in effect for any county in Kansas, exhibitors in any Kansas County are not required to launch their rocket(s). All requirements for the launching of rockets for the state fair and the documenting of the launching are suspended for the duration of the ban.

Exhibit Definitions for ALL rocketry categories:

1. As defined by the National Association of Rocketry (NAR), a scale model is "any model rocket that is a true scale model of an existing or historical guided missile, rocket vehicle, or space vehicle." The intent of scale modeling is, according to the NAR, "to produce an accurate, flying replica of a real rocket vehicle that exhibits maximum craftsmanship in construction, finish, and flight performance." (NAR "Pink Book" 50.1 4-1)
2. Adult supervision is defined as being under the direct supervision of someone 18 years of age or older.
3. For the purposes of Kansas 4-H SpaceTech a high powered rocket is defined as a rocket that meets any of the following criteria:

a) Is 2 inches or greater in diameter (not including fins) and taller than 3 feet (36 inches including fins)
b) Weighs more than 3.3125 pounds (53 ounces or 1500 grams) at the time of launch;

c) Uses an ‘E’ engine or larger to launch (2D’s, 4C’s, 8B’s, etc.);
d) The total impulse of all engines used in the rocket is greater than 20.01 Newton-seconds of thrust.
e) Models powered by rocket motors not classified as model rocket motors per NFPA 1122, e.g.:
i) Average thrust in excess of 80.01 Newtons
ii) Contains in excess of 2.2 ounces (62.5 grams) of propellant and are limited to only H and I motors.
4. High power certification is defined as having successfully completed a certification program for high-powered rocketry through the NAR and maintaining that certification. This applies to all membership levels in the NAR. Specifically the “Formal Participation Procedure” for the “Junior HPR Level 1 Participation Program” as outlined by the NAR.
5. NAR rules for launching and construction of all rockets are assumed to be used by all 4-H SpaceTech exhibitors and will be considered during judging.
6. For the purposes of Kansas 4-H SpaceTech, No rocket may be launched using engines totaling more than an ‘I’ impulse engine or 640 Newton-seconds of total thrust.

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 SpaceTech division.
1. 4-H members must be currently enrolled in the 4-H SpaceTech-Rocketry program to exhibit in this division.
2. Entries will be selected at the county level for entry at the State Fair. Purple ribbon entries are eligible to exhibit at the state fair. Members must be age 9 and older by Jan 1 of the current year.
3. 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.
4. The report that accompanies the rocket must be limited to the 4-H SpaceTech Rocket Exhibit Information Form which is affixed to a 10” x 13” envelope. This envelope should NOT be attached to the rocket stand or rocket. This may be downloaded from http://www.Kansas4-H.org/. Any rocket exhibit not including this completed envelope will receive an automatic participation ribbon.
5. 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.
6. 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 8 ½” x 11” page(s).
c) There must be at least 1 page of photos and no more than 5 pages of photos.
d) Include at least one photo showing rocket construction, preferably with the exhibitor included.
e) Do not include photos of members catching their rockets as they return to earth. This is an unsafe practice, and we do not recommend or condone this practice.
7. 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) No model may be submitted on a launch pad.
8.Launches should not be conducted in winds above 20 mph, and will constitute a disqualification of rocket exhibit.
9. All rockets must have a safe method of recovery, e.g., parachute, streamer or tumble recovery. Any rocket without a recovery system will be disqualified.
10. 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.
11. Flight damage is to be documented by the participant on either the construction plans or the 4-H SpaceTech Rocket Exhibit Information Form.

12. 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.
13. Engines and igniters, under any circumstance, ARE NOT permitted with the exhibit and constitute an immediate disqualification.
14. If an engine becomes stuck, jammed, wedged, or in any other way permanently affixed in or to a rocket and cannot 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.
15. Engines may not be used as display stands hollowed out or otherwise. This is a significant change from previous year's rules. Engines used as a display stand will be subject to immediate disqualification.
16. 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.
17. Multi-stage rockets can be flown using just the final stage and be considered fully flown.
18. 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.
Purpose: These rules apply to the construction of all rockets displayed in the SpaceTech division.
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, and will be disqualified at the state fair.
3. Plastic snap together fins and prefabricated fin assemblies that do not require fin alignment are not acceptable, and will be disqualified.
a) This rule does not apply to plastic fins that must be manually aligned and do not utilize a fin alignment mechanism, including, but not limited to fin alignment rings or spacing blocks.
b) This rule does not apply to fiberglass, Kevlar, extruded foam, composite, or wood fins; especially when used for "through-the-wall" fin attachment techniques that are common in larger rockets.
c) In addition, plastic parts for decorative and mechanical purposes (i.e. decorative nozzles and moving landing struts) are not considered fins and can consist of plastic. Decorative nozzles, etc. need to be securely fastened and not pose a safety hazard.
4. Angles of fins must fall within a plus or minus 2 degree variation using an approved fin alignment guide (such as KSSTAC10). An official fin guide is available from www.KansasSpaceTech.com.
5. Fins should be rounded or streamlined to reduce drag.
6. Fins and body tubes are to be sealed with sanding sealer and/or primer to eliminate the appearance of body grooves and wood grain.
7. Fins and launch lugs are to be filleted to reduce drag and properly secure them to the model.
8. Any seams on plastic parts are to be sanded smooth.
9. Body tubes/airframes/engine mounts can be made from suitable materials, including, but not limited to: reinforced paper, cardboard, phenolic resin, specialized polymer resins, fiberglass, Kevlar, or other suitable structural materials.
10. The nose cone is to fit snugly but still allow for easy removal.
11. Exhibits must be uniformly painted and smoothly finished or finished as per rocket instructions, and have decals applied smoothly.

1. Non-standard surfacing (such as textured paint) may be used if directed by the instructions, this includes scratch built rockets.
2. 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.
3. "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.
4. Scale Model Rockets are to be finished and completed with a majority (greater than 70%) of decals.

Model Rocketry Guidelines (ages 9 and up):
Purpose: Model rockets are generally small-to-medium sized rockets that can be purchased at hobby stores or are small-to-medium sized model rockets that an individual(s) builds from parts similar to those found in model rocket kits.
1. Rockets classified as high powered may not be entered in this category.
2. Each rocket must be able to stand freely by itself or be supported by a solid base, not to exceed 4-1/4" (four and one quarter inch) thick and 8" square. The exhibitor's name, county or district, and age must be labeled on the top of the base. Rod materials should be sturdy and not made of flimsy materials, such as coat hangers.
3. 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 top of the base.
4. All exhibitors must comply with the NAR Model Rocket Safety Code that is in effect as of October 1st of the current 4-H year. However in the event that there is a modification in this code, the SpaceTech Action Team may review and implement the modified code.

Original Design Rocket Guidelines (ages 11 and up):
Purpose: To allow for youth to develop their own rockets (model and high powered) in a safe manner that displays maximum craftsmanship.
1. Original design rockets cannot be a modification of a pre-existing kit and must be of original design.
2. Original design rockets must be designed by the exhibitor(s).
3. Original design rockets must include detailed instructions, so that someone could construct the original designed rocket just like a kit purchased at a store. Instructions can be as many pages as needed to convey full and complete construction techniques.
4. Original design rocket instructions should not include copies of instructions in part or in whole from existing kits.
5. For a rocket entered in the original design classes, describe in the summary how the rocket was tested for stability prior to flying. Swing testing of the rocket is required, must include documentation.
6. Up to 4 additional pages can be added to the rocketry information pack detailing the test(s) performed to insure stability. 4-Her's are strongly encouraged to provide as much detail as possible. Failure to provide adequate written documentation will result in a disqualification.

Alternative Skins (ages 14 and up):
Purpose: Alternative skins are an advanced construction technique that allows the builders of model rockets to 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.
Construction and Operating Rules and Guidelines:
1. The General exhibit rules for ALL categories apply.
2. Use of alternative skins used for model aircraft is permitted on rockets of original design provided adequate provisions are made to prevent the rocket from catching fire during all phases of flight.
3. When used in construction these alternative skins should not be used as primary structure for the rocket. The rocket should still be of sound design and construction to insure safety for personnel performing launch activities as well as others who are in the nearby vicinity.

Types of Covering:
1. Plastic shrink type coatings used for radio control model aircraft are permitted. These can be obtained from various manufacturers and hobby suppliers.
2. Other types of fabric coverings such as cloth types using coatings for stiffness are permitted as long as all of the rules set forth above are met.

Quality of Finish: When the above finishes are used the following judging criteria will apply in addition to those for judging other rocketry divisions.
1. Seams and transition areas will be uniform and even when they are needed in the construction.
2. Gaps and holes are not permitted in the covering especially where the fins or other stabilizing devices meet the main body
of the rocket.
3. Omission of these skins from the bottom of the rocket is permissible. Paints and other types of coatings currently used for rocketry may be substituted in these areas.

4. Alternative skins in this section may also be used in conjunction with paints on the rocket. However, care shall be taken to insure that edges of the alternative skins will not peel off in flight.
Pre-Division A - Exhibitors 7 - 8 years old or those members 1st and 2nd year in Rocketry – No state fair class
2600 - Pre-finished rocket with no-painting and fixed fins
2601 - Rockets made from a kit, include plans.
2602 - Factory Rocket kit, pre-assembled materials
Division A - Exhibitors 9 through 13 years old
5520 - Rocket made from kit. Include plans.
Division B - Exhibitors 11 through 13 years old (9-10 year olds may not enter in this class)
5521 - Rocket designed by exhibitor: not merely a modification of an existing kit. Include original plans.
Division C - Exhibitors 14 years and older
5525 - Rocket made from kit. Include plans.
5526 - Rocket designed by exhibitor: not merely a modification of an existing kit. Include original plans.
5527 - Rocket designed by exhibitor: that uses alternative skins; not merely a modification of an existing kit. Include original plans.
Division D - Exhibitors 11 years and older
This class is designed to encourage teamwork among individuals and clubs to work on a rocket from the initial design to the finished product.
5530 - Rocket designed by 2 or more exhibitors: not merely
a modification of an existing kit. Include original plans.
High Power Rocketry Guidelines:
Purpose: To allow for improved safety and judging of rockets that meet the requirements of 4-H high power rockets.
1. Exhibitors must be at least 14 years of age by Jan 1 of the current year.
2. The rules for ALL categories apply.
3. In addition to the information packet completed for all rockets, a high power information form is to be completed and placed inside of the information packet. This may be downloaded from http://www.Kansas4-H.org/. Click on KSF Packet link.
4. The NAR High Power Rocket Safety Code applies to the construction and launching of all rockets displayed in this division. As such all exhibitors must comply with the NAR High Power Rocket Safety Code that is in effect as of Oct 1st of the current 4-H year. However, in the event that there is a modification in this code the SpaceTech Action Team may review and implement the modified code.
5. All rockets in this division are to be launched under adult supervision by the 4-H member who constructed the rocket.
6. If a rocket is launched using an engine(s) that has 160.1 ('H' engine or equivalent amount of smaller engines) Newton's-seconds or larger, adult supervision must be provided by an individual having at least a level 1 high power certification.
a) The 4-H member should also hold or be attempting to attain their level 1 high power certification, and should include supporting documentation of such (a copy of Level 1 card is sufficient).
7. If according to Federal Aviation Regulations Part 101, a waiver is required to fly the rocket, a copy of that waiver is to be attached to the High Power Information Form. In the case where the launch was a public event a substitute to a copy of the waiver is the Range Safety Officers (RSO's) contact information.
8. High Power Rockets may be displayed without a supporting stand. If a supporting stand is used, it is not to exceed 41/4" (four and one-quarter inch) thick and 8" square. The exhibitor's name, county or district, and age must be labeled on the base.
Division E - Exhibitors 14 years and older
5535 - High power rocket made from kit or original design.

Rocketry Educational Exhibits - Posters, Notebooks and Display Boards
Purpose: To allow 4-Hers to explore rocketry and aerospace outside the bounds of traditional modeling.
1. The General Exhibit rules for ALL categories apply.
2. For notebooks, display boards, and posters, no additional exhibit information is required; no manila envelope is needed for these exhibits.
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.” Site your sources of scientific information on your exhibit, when appropriate.
6. Educational displays are not to exceed a standard commercial 3’x 4’ tri-fold display board. Care should be taken to use durable materials that will withstand Fair conditions.
7. “Construction Kits” that are part of Educational displays must be contained in cases (tackle boxes, sealable containers, etc.) that may not be 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 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 includes 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.

Division F - Exhibitors 7 through 13 years old
5522 - Rocketry Educational Display
5523 - Rocketry Notebook
5524 - Rocketry Poster Board

Division G - Exhibitors 14 years and older
5531 - Rocketry Educational Display
5532 - Rocketry Notebook
5533 - Rocketry Poster Board

4-H SPACETECH - UNMANNED AERIAL SYSTEMS

4-H members interested in updated KSF guidelines for unmanned aerial systems please contact the extension office.