DEPARTMENT – BUILDING EXHIBITS

(Must be enrolled in SpaceTech, Astronomy; SpaceTech, Computers; SpaceTech, Geospatial GPS/GIS; SpaceTech Robotics; SpaceTech, Rocketry/Aerospace Projects)

SPECIAL RULES

1. Read ALL General AND Special Rules. Violation of any of the following rules may result in disqualification. All decisions will be made by a county agent and their decision is final.
2. Each exhibitor is limited to 1 entry per class. Exhibits must be the result of the current year's project work by 4-H member.
3. Exhibitors name, county, age, and year's in project must be tagged or labeled in a prominent location on all pieces of exhibit including educational display, poster and/or notebook.
4. Team exhibits are defined as developed by two or more 4-H members.

SECTION - 4-H SPACETECH - ASTRONOMY

1. Read Special and General Rules.
2. Telescopes entered in this division may be built from a kit or by original design. Pre-finished telescopes which require no construction or painting do not qualify for State Fair exhibits.
3. Telescopes are limited to no more than four 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 cannot extend past two feet in length or width.
5. Each telescope exhibit must include a "4-H Astronomy Exhibit Information Form" which must be attached to the outside of a 10' x 13' manila envelope. You must also include construction plans/original design plans (or a photocopy) of the telescope and place it inside the manila envelope. For notebooks, display boards and posters, no additional exhibit information is required; no manila envelope is needed for these exhibits.
6. See the last section for full details about exhibiting posters, display boards and notebooks
7. Two photographs showing telescope construction and operation are required. Photographs must be mounted on one side of an 81/2' x 11' page. A brief caption must accompany each photograph. Place photos in the 10' x 13' manila envelope.
8. The telescope must be properly assembled and painted with a smooth and uniform finish. Decals, if used, must be attached smooth and tight.
9. Telescopes designed by the exhibitor must be original, not a modification of an existing kit.
10. If a safety violation is noted by the judges, superintendent, or other staff, the exhibit will receive a participation ribbon (at the judge's discretion).

CLASSES – 5500: **Telescope made from kit**

Include plans.

5501: Telescope made from original design

By exhibitor, not merely a modification of a pre-existing kit.

SECTION - 4-H SPACETECH - COMPUTERS

The 4-H computer project teaches concepts related to computers, hardware knowledge, software programming and applications, internet safety, the building, maintenance and repair of computers and future career opportunities. Please note that the actual construction of computer hardware (i.e., building a computer, electronic devises with a mother-board based manipulation) will remain in the Energy Management division.

1. Read General and Special Rules.
2. The 4-H members must be currently enrolled in the 4-H SpaceTech 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.
4. Exhibitor's name, county or district, 4-H age, and years(s) in project must be tagged or labeled in a prominent location on the exhibit, educational display, notebook, and/or poster
5. See the last section for full details about exhibiting posters, display boards and notebooks.

6. If the notebook illustrates the creation, talks about, or shows the result of an app, application, executable, program, or other compiled /interpreted "source code," a copy of the source code should be included. (In other words if you created an app for a smart phone and you're illustrating that app, you should include the code you used to build the app). Failure to include a copy of the "source code" may result in up to one ribbon place deduction.
7. If a safety violation is noted by the judges, superintendent, or other staff, the exhibit will receive a participation ribbon (at the judge's discretion).

Computer Systems

The Kansas 4-H SpaceTech Computer Systems portion of the computer project is designed to allow 4-H members to explore how *information* is moved from one part of the computer to the other; how i*nformation* is moved between two or more computer systems (networking); how *information* is stored; or how *information* is acted on (programming).

Any item which is not a notebook, display board, or poster displayed in this class is considered a "computer system" exhibit and MUST follow the rules set forth below.

1. All exhibits must be:
   a. Self-contained on a USB drive (thumb drive, flash drive, jump drive, or other any other name for a small USB storage device; the rules will use "USB drive"). This means that a judge can plug in the USB drive into a computer and be able to run the exhibit as described below. OR
   b. System-On-A-Chip (SOC) (such as Raspberry Pi) or a Micro-Controller (such as an Arduino or Ozobot) AND is a compact (less than 4"X4"X4") system, which can be programmed AND requires minimal assembly to operate (e.g. connecting power, display, and keyboard/mouse cables). Referred to as a "chip system" through the rest of the rules.
2. Physical computers such as tablets, smart phones, laptops, or personal computers (PCs) will not be accepted as an exhibit.
3. "Chip systems" may use/include GPIO bread boards or HATs (Hardware Attached On Top) the size of which is not included in the size of the chip system, however the total size of the chip system and GPIO devices may not exceed 24"X24"X24" including any display cases.
4. Any attached GPIO devices are not judged for electrical construction or quality as this division is focused on the operational aspects of the systems that have automated reticulated structures (arms, wheels, grippers, etc.) which the exhibitor constructed, can be classified as a robot, and the exhibitor must decide which division to exhibit in as the exhibit may not be entered in the both divisions.
5. For chip systems, all electric components of the system must be adequately covered or concealed with a protective enclosure. Paper is NOT considered an adequate enclosure or covering for the electrical components.
6. All revisions of all forms previously released for the SpaceTech division either undated or dated prior to current year are void for use and new forms must be obtained and used that are dated by the Kansas State 4-H Office for the current year. Use of old forms will result in the loss of one ribbon placing for exhibits.
7. For all computer system entries (those entries not covered by the rules above) the following items are required as part of an exhibit packet:
   a. A manila envelope with the Computer Exhibit Form attached to the front, this form can be downloaded at www.KansasSpaceTech.com.
   b. A USB drive labeled with the 4-Hers name, county/district, and club; in a way that does not prevent it from being plugged into a computer.
   c. At least one (1) graphic (picture, screen shot/capture, slide, etc.) of the project must be printed out on an 8.5" X 11" sheet of standard computer paper, placed in a plastic sheet protector, to allow for proper display and recognition at the Kansas State Fair. The is what will be displayed during the fair, all other materials will be sent back to the county office. On the back side of the graphic the 4-Her's name, county, and club should be listed.

d. Instructions to run any part of the exhibit on the USB drive.
(There should be at least three (3) items in your manila envelope: USB drive, graphic and instructions).

8. Each exhibit must be accompanied by a "4-H Engineer's Journal." The engineer's journal should be typed. It can either be included electronically on the USB drive (preferred) or printed and placed in the manila envelope.
   a. The "4-H Engineer's Journal" should start with a dated entry describing what the 4-H member is trying to accomplish/build.
   b. The "4-H Engineer's Journal" should conclude with a dated entry describing what the 4-H member achieved in creating. (The start and end many times will be different. The judges are interested in the journey).
   c. Additional entries in the "4-H Engineer's Journal" should be made as progress occur describing successes and failures; as well as the steps done and any sources of information including links used.
   d. Pictures can also be included in the "4-H Engineer's Journal" but should not be more than 50% of the entries.
   e. The "4-H Engineer's Journal" should contain at least one graphic.
   f. The "4-H Engineer's Journal" must be at least 3 pages in length.
   g. An example of a "4-H Engineer's Journal" can be found at www.KansasSpaceTech.com.
   h. The "4-H Engineer's Journal" will comprise 50% of the overall exhibit score. Failure to include a "4-H Engineer's Journal" will result in the exhibit being disqualified.
9. If the exhibit is a program, application, app, web site, or requires any coding, the source code must be included on the USB drive.
10. Diagrams or decision trees showing the logical flow of the system must be included on the USB drive for all exhibits.
11. Since there is no conference judging at the Kansas State Fair, a set of instructions must be provided to run the computer system/application. These instructions should be printed off and included in the exhibit package and a copy should be included on the USB drive.
    a. FOR COUNTY FAIRS it is recommended that 4-Hers bring a computer that will run their project to the fair for judging as judges typically do not bring computers with them. Operating instructions are still required.
    b. Instructions should be written as though you were helping a less techy person, (like a grandparent) use the USB drive with a computer similar to what is described in rule 9 below. An example of instructions can be found at www.KansasSpaceTech.com.
12. Each exhibit must accomplish a specific automated task using a computer, a chip system, or virtual machine (VM).
13. Kanas State Fair Judge(s) in the computer systems division will have a physical computer with the following minimum configuration to test exhibits with an view files:
    a. Microsoft Windows®10
    b. Microsoft Office® Home 2010 (Excel, Power Point, & Word)
    c. Microsoft Internet Explorer®
    d. Mozilla Firefox® Browser
    e. Google Chrome® Browser
    f. Java for Windows
    g. Adobe Acrobat Reader®
    h. Apache OpenOffice®
    i. VMware Player Windows 64bit
    j. Scratch Desktop editor (offline version)
14. 4-Hers should not assume that the computers in rule 9 have Internet connectivity and that any parts of the exhibit that require Internet access will not work. It is strongly recommended that 4-Hers test exhibits on a computer with Internet connectivity disabled.
15. Kansas 4-H SpaceTech has made available Linux Virtual Machines (VMs) that can be downloaded and used to create projects on such as web servers, networking, and many other projects. For more information on how these VMs can be leveraged or to download them visit www.KansasSpaceTech.com. 4-Hers are not required to use the VMs in their projects. They are optional.

16. All licensing should be adhered to for any software used in the exhibit. Failure to do so will result in a reduction of one ribbon placing and may not be considered for best of show.
17. The creation of viruses, malware, malicious applications or code, defamatory language or graphics, bullying, or any material that is "mean," "dangerous," or harmful according to the judge's opinion will result in the exhibit being disqualified.
18. Pictures or still graphics created are not eligible for entry as a project in this division, and should be entered in the appropriate photography division.
19. Judging will be based on a score sheet which can be found at www.KansasSpaceTech.com. There are four (4) areas each exhibit will be judged on. They are:
    a. 4-H Engineers Journal (what I learned to make it work), 50% overall score
    b. Instructions (how I help others make it work), 25% overall score
    c. Functionality (does it work), 12% overall score
    d. Diagrams (and code if applicable) (how I think it works), 13% overall score
20. SpaceTech superintendent(s) will be present on Friday, September 11, 2015, at 5 p.m. to convey judging criteria and to answer questions for exhibitors. Consultation/interview judging is not available during judging on Friday.

5590: Computer Program

Application, app, script, or coded system that is new and unique (not merely a file run in program, such as a 'word document' or a picture drawn in 'Microsoft Paint.')

5591: Computer Presentation

(power point, web page/site, animated graphics, etc.)

5592: Single Computer System

(web server, database server, etc.)

5593: Networked System

Consisting of two or more computers

5594: Chip System – a small (4"x4"x4") programmed physical device that accomplishes a specific task

SECTION - 4-H SPACETECH - ROBOTICS

1. Read General and Special Rules. Member must be currently enrolled in SpaceTech.
2. Each exhibitor may enter one robot per class. Exhibit must have been constructed and/or completed during the current 4-H year. Only top blue or purple ribbon robot exhibits which meet State Fair guidelines should be selected for entry at the State Fair.
3. Each robot must be free-standing, without the need for additional supports in order to be moved or exhibited.
4. Robots must have automated reticulated structures (arms, wheels, grippers, etc.). Game consoles that display on a screen are not considered robots and should either be entered in computer systems division or energy management project. Robots requiring no assembly, just programming, such as Ozobots, are considered computer systems projects as the skill is focused on the programming not on the construction of the robot.
5. Robot dimensions should not exceed 2 feet high, by 2 feet wide, by 2 feet deep. Weight may not exceed 15 pounds. If displayed in a case (not required or encouraged) the outside case dimensions may not be more than 26 inches in height, width, or depth.
6. Materials including but not limited to obstacles, spare batteries, and mats for testing the robot may be placed in a separate container, which is not included in the robots dimensions, that container may not be larger than 576 cubic inches as measured along the outside of the container. (Examples: 4"X4"X36" or 4"X8"X18" or 6"X6"X16) The container, if used, and/or any large objects (such as mats or obstacles) should be labeled with the exhibitor's name(s) and county or district.
7. 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.

8. 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. Weaponry is defined as any instrument, possession or creation, physical and/or electrical that could be used to inflict damage and/or harm to individuals, animal life, and/or property.
9. Remote controlled robots are allowed under certain conditions provided that the robot is not drivable. Remote controlled cars, boats, planes and/or action figures, etc. are not allowed.
10. 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 current 4-H year. In the event the robot uses a phone, tablet, or similar device for programming AND control of the robot, a video will be used to evaluate the working condition of the robot.
11. Each exhibitor is required to complete the "4-H SpaceTech Robotics Exhibit Information Form" which is available through the Extension Office. This form must be attached to the outside of a 10" x 13" manila envelope. For the LVCO Fair, the construction plans must also be included in this manila envelope. Must comply with additional instructions if selected for the State Fair.
12. The exhibit must include written instructions for operation (the instructions should be written as if they were to tell a grandparent or elderly person how to operate the robot), construction plans, and one to three pages of project photographs. In addition, a 5 minute video presentation placed on a CD, DVD, USB drive, or similar removable storage device, if applicable. For robots that can be programmed, robot programming information must be included. 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. No exhibitor will be allowed to set up their robot in person.
13. In the event that the robot uses a device like a phone, iPad, or tablet for programming AND operation, DO NOT include the device (phone, tablet, etc.). The device's safety cannot be insured. Instead record a video demonstrating the instructions included for your robot. It should show, setting up the robot, starting the robot, the robot executing its task, and powering off the robot, just like the instructions are written.
14. Creativity, workmanship, and functionality will be strong criteria in judging the "Robot designed by Exhibitor" classes. All robots should have a purpose or intended function, examples include, but are not limited to: following a line, sweeping the floor, solving a rubix cube, sorting colors, or climbing stairs.
15. Exhibitors name(s) and county must be tagged or labeled in a prominent location on the robot.
16. See the last section for full details about exhibiting posters, display boards and notebooks.
17. If a safety violation is noted by the judges, superintendents, or other staff, the exhibitor's exhibit, at the judges' discretion, will receive a participation ribbon.

CLASSES – *Division A- NOVICE- One to Two years in Robotics Project.*

5505: NOVICE – Robot made from a commercial (purchased) kit

5506: NOVICE - Robot designed and constructed by exhibitor

Robot must not be a mere modification of an existing robot kit or plan.

5507: NOVICE - Programmable robot made from a commercial (purchased) kit

5519: NOVICE – Robot designed and constructed by exhibitor or from a commercial kit, that is operated by a remote controlled device

5543: NOVICE - Junk Drawer Robotics – based curriculum robot

Division B – INTERMEDIATE – Three to Four years in Robotics Project

5509: INTERMEDIATE - Robot made from a commercial (purchased) kit

5510: INTERMEDIATE - Robot designed and constructed by exhibitor

The robot must not be a mere modification of an existing robot kit or plan.

5511: INTERMEDIATE - Programmable robot made from a commercial (purchased) kit

5544: INTERMEDIATE - Junk Drawer Robotics – based curriculum robot.

5546 :INTERMEDIATE – Robot designed and constructed by exhibitor or from a commercial kit, that is operated by a remote controlled device.

Division C - PROFESSTIONAL – Five or More years in Robotics Project

5513: PROFESSIONAL - Robot made from a commercial (purchased) kit

5514: PROFESSIONAL - Robot designed and constructed by exhibitor

The robot must not be a mere modification of an existing robot kit or plan.

5515: PROFESSIONAL - Programmable robot made from a commercial (purchased) kit

5545: PROFESSIONAL - Junk Drawer Robotics - based curriculum robot.

5547: PROFESSIONAL –Robot designed and constructed by exhibitor or from a commercial kit, that is operated by a remote controlled device.

Division D – Team Robotics Project

5517: Robots designed and constructed by two or more

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. Please visit the Space Tech website www.kansasspacetech.com for the current year's task. Click on the KSF Packet Link.

SECTION - 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. All revisions of all forms previously released for the SpaceTech division either undated or dated prior to 2013 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.
2. Relevant documents may be obtained from the Extension Office or from the state website, www.KansasSpaceTech.com
3. NAR refers to the National Association of Rocketry and its governing board.
4. All NAR documents, with the exception of the "pink book," referenced herein can be found at http://www.nar.org.
5. If a fire 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.
6. Tripoli refers to the Tripoli Rocketry Association and governing board.

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 mid-powered rocket is defined as a rocket that uses an 'E', 'F', 'G', or equivalent engine for launch. In addition, rockets also qualify for mid-power if they meet 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) and do not use an engine(s) exciding 160.01 Newton seconds of total impulse (an 'H' engine equivalent or above).

   b. The total impulse of all engines used in the rocket is greater than 20.01 Newton-seconds and less than 160.01 Newton-seconds.

4. 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. Weighs more than 3.3125 pounds (53 ounces or 1500 grams) at the time of launch;
   b. Uses an "H" engine or larger to launch.
   c. The total impulse of all engines used in the rocket is greater than 160.01 Newton-seconds of thrust.
   d. Includes any airframe parts of ductile metal, though, the use of ductile metal is strongly discouraged.
   e. Models powered by rocket motors not classified as model rocket motors per NFPA 1122, e.g.:
   ii. Average thrust in excess of 80.01 Newtons
   iii. Contains in excess of 125 grams of propellant and are limited to only H and I motors
   iv. Uses a hybrid motor or a motor designed to emit sparks

1. High power certification is defined as having successfully completed a certification program for high-powered rocketry through the NAR and Tripoli, maintaining that certification. This applies to all membership levels in the NAR or Tripoli. Specifically, the "Formal Participation Procedure" for the "Junior HPR Level 1 Participation Program" as outlined by the NAR and the "Tripoli Mentoring Program (TMP) as outlined by Tripoli.

2. 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.

3. 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 selected for entry at the State Fair should receive a top blue or purple ribbon and meet Kansas State Fair guidelines.
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 a "model rocket kit" 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. The information form should be signed by the exhibitor. This may be downloaded from www.KansasSpaceTech.com 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, (which must provide all necessary details to

construct an original design rocket) 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. Such modifications require the rocket to be swing tested and documented to show a stable flight.

6. One or more photographs of the rocket during construction and 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 81/2" *x* 11" *page(s).*
   c. There must be at least 1 page of photos and no more than 5 pages' photos.
   d. Include at least one photo showing rocket construction, preferably with the exhibit 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.
   f. Pictures at the launch site are not required in the event of a burn ban.
7. To exhibit in this division:
   a. The rocket must have been flown, unless a burn ban is in effect.
   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 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.
15. Engines may not be used as display stands hollowed out or otherwise. Engines used as a display stand will be subject to immediate disqualification. This is a significant change from previous year's rules.
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. In that case, the final stage (the one with the nose cone) should be placed on the display stand, and other stages should be placed with a loop of string to the display strand.
   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 NAR and/or TRIPOLI for investigation and possible revocation of membership.

Construction Rule for all Rockets

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 in the State fair. (Exception is LVCO 7-8-year-old classes. See very end of rocket section.)
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.
   d. Fin assemblies that are printed using a 3D printer are excluded from this rule. Through detailed instructions on the creation of the fin assemblies must be provided and an additional page of photos may be included to show the creation/printing of fin assemblies.
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.KansaSpaceTech.com.
5. Fins should be rounded or streamlined according to instructions. If the other edges are rounded to reduce drag on all exposed sides, there should be no ribbon deduction, unless instructions indicate to leave flat.
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. Engine mounts are to be securely attached to the body tube.
9. Any seams on plastic parts are to be sanded smooth.
10. 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. However, foam my not be used for external body or other external rocket parts.
11. The nose cone is to fit snugly but still allow for easy removal.
12. Exhibits must be uniformly painted and smoothly finished or finished as per rocket instructions, and have decals applied smoothly.
13. Nonstandard surfacing (such as textured paint) may be used if directed by the instructions, this includes scratch built rockets.
14. 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. 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.
15. "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.
16. Scale Model Rockets are to be finished and completed with a majority (greater than 70%) of decals.
17. If a modification is made to the rocket, for example, adding a fin, a swing test must be conducted on the rocket, and the documentation provided. Failure to test and document flight stability following modifications will result in two ribbon placing deductions.

Model Rocketry Specific Guidelines (ages 9 and up):

Purpose: Model rockets are generally small-to-medium sized rockets that can be purchased at hobby stores that an individual(s) builds from parts similar to those found in model rocket kits.

1. Rockets classified as high or mid-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 base(s).
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 Specific Rocket Guidelines (ages 11 and up):

Purpose: To allow for youth to develop their own rockets (model, mid, 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. Other tests and calculations are encouraged. Exhibitors must include documentation of the swing test. Failure to swing test a rocket will result in a deduction of TWO ribbon placings.
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.

CLASSES – 5520: Rocket made from kit, 9-13 years old

Include plans.

5521: Rocket designed by exhibitor, 11-13 years old (9-10 year olds may NOT enter in this class) Not merely a modification of an existing kit. Include original plans.

5525: **Rocket made from kit ,14 years and older**

Include plans.

5526: Rocket designed by exhibitor, 14 years and older

Not merely a modification of an existing kit. Include original plans.

5527: Rocket designed by exhibitor - Alternative Skins, 14 years and older

That uses alternative skins; not merely a modification of an existing kit. Include original plans.

5530: Rocket designed by 2 or more exhibitors, 11 years and older

Not merely a modification of an existing kit. Include original plans. This class is designed to encourage teamwork among individuals and clubs to work on a rocket from the initial design to the finished product.

Mid-power Rocketry (2x'D' to 'G' Engines) Guidelines:

Purpose: To allow for improved safety and judging of rockets that meet the requirements of 4-H mid-power rockets.

1. Exhibitors must be at least 14 years of age by January 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/mid 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. Exhibitors in this division must hold memberships in either NAR or Tripoli organizations.
5. The NAR Model 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 Model Rocket Safety Code that is in effect as of October 1st of the current year. However in the event that there is a modification in this code the SpaceTech Action Team may review and implement the modified code.
6. All rockets in this division are to be launched under adult supervision by the 4-H member who constructed the rocket.
7. High power rockets as defined above ('H' or 'I' engines) may not be launched in this division.
8. 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.
9. Mid- Power rockets may be displayed without a supporting stand. If a supporting stand is used, it is 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 base.

5536: Mid-Power Rocket Made from Kit, or original design. Exhibitors 14 years and older

High Power Rocketry ('H' or 'I' Engines) 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 January 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. Exhibitors in this division must hold memberships in either NAR or Tripoli organizations.
5. 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 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.
6. All rockets in this division are to be launched under adult supervision by the 4-H member who constructed the rocket.
7. For rockets launched using an engine(s) that have 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 I 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 4-114" (four and one-quarter inch) thick and 8" square. The exhibitor's name, county and age must be labeled on the base.

5535: High power rocket made from kit or original design, 14 years and older

Rocket made from kit (7-8 years old) (Not a State Fair Class)

Prefabricated fins and pre-finished rockets requiring no painting are acceptable in this class only. Include plans.

SECTION - 4-H SPACETECH – UNMANNED AERIAL SYSTEMS

Purpose: The 4-H unmanned aerial systems or UAS project explores the world from above the trees and discovers new frontiers with UASs. UASs are commonly known as Unmanned Aerial Vehicles (UAVs) or drones. Members explore the uses and applications of unmanned aerial systems including how UASs link to other projects such as geology, robotics, electronics, crop science and many more.

1. The 4-H members must be currently enrolled in the 4-H SpaceTech project to exhibit in this division.
2. Each exhibitor may enter one exhibit per class. Exhibit must have been completed during the current 4-H year.
3. The information that accompanies the UAS must be limited to the 4-H SpaceTech Exhibit Information Form which is affixed to a 10” x 13” envelope. This envelope should NOT be attached to the UAS. This may be downloaded from www.KansasSpaceTech.com. Any UAS exhibit not including this completed envelope will receive an automatic participation ribbon.
4. Exhibitor’s name, county or district, age, and years(s) in project must be tagged or labeled in a prominent location on the exhibit, educational display, notebook, and/or poster.
5. Unmanned Aerial Systems that include or depict weaponry of any kind will be disqualified.
6. See the last section for full details about exhibiting posters, display boards and notebooks.
7. If modifications are made to the exhibit, a page should be attached noting those modifications.
8. If a safety violation is noted by the judge, superintendent, or other staff, the exhibit will receive a participation ribbon (at the judge’s discretion).

Division A – Junior, 9-13 years old

5701 Unmanned Aerial System designed and constructed by exhibitor that is operated by a remote controlled device. The UAS must not be a mere modification of an existing kit or plan. You may not exhibit a UAS that is purchased off the shelf in this class.

5702 Practical application of an Unmanned Aerial System constructed from a commercial (purchased) kit. This includes the UAS, plus one or more of the following: video, notebook, poster, display board, etc. This class is separate from educational exhibits. A tangible use would be mapping Russian olive trees, eroded soils, and bindweed in fields, etc. There are also many other non-agricultural UAS uses that would be appropriate for this class.

Division B – Senior, 14 years and older

5706 Unmanned Aerial Systems designed and constructed by exhibitor that is operated by a remote controlled device. The UAS must not be a mere modification of an existing kit or plan. You may not exhibit a UAS that is purchased off the shelf in this class.

5707 Practical application of an Unmanned Aerial System constructed from a commercial (purchased) kit. This includes the UAS, plus one or more of the following: video, notebook, poster, display board, etc. This class is separate from educational exhibits. A tangible use would be mapping Russian olive trees, eroded soils, and bindweed in fields, etc. There are also many other non-agricultural UAS uses that would be appropriate for this class.

4-H SPACETECH EDUCATIONAL EXHIBITS – POSTERS, NOTEBOOKS AND DISPLAY BOARDS

Purpose: To allow 4-Hers to explore SpaceTech outside the bounds of traditional projects for rockets, robotics, astronomy, computers and unmanned aerial systems. All posters, notebooks and display boards are listed in this section and have been removed from the individual sections to save space.

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 in posters, notebooks and display boards may not be just a static project, but must contain substantial supporting educational materials in the form of posters, notebooks, or display boards, etc.
4. Educational display boards, posters and notebooks should be creative and showcase details about the knowledge learned in the project during the current 4-H year. Value is placed on youth who can demonstrate how their skills have increased while completing the project. Each exhibit will be judged on uniqueness, creativity, neatness, accuracy of material, knowledge gained, and content. An exhibit judging score sheet will be available at www.kansasspacetech.com. For example, a rocket may have crashed and/or is highly damaged that can't be launched again may be made into an educational display or poster that tells a great story with many lessons learned.
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." Sources of scientific information must be cited on the front of your exhibit, including all posters and educational display boards.
6. Educational displays are not to exceed a standard commercial 3'x 4' tri-fold display board. Card board tables for display are not required but can be used at the county only level. 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 adhere to appropriate dimensions as stated elsewhere.
8. Educational Project notebooks must be organized in a 3-ring binder.
9. Educational posters must be no larger than a 20" X 30" poster board. Exhibitors are encouraged to laminate all posters and diagrams or cover them with clear plastic film. Any three dimensional display exhibits may not be thicker than 1".
10. Engines and igniters in rockets 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 notebook and/or "Construction Kit." For educational displays and/or posters, the exhibitor's name, county, age, and year(s) in project must be tagged or labels on the back of the exhibit. Failure to label an exhibit may result in <u>one ribbon placing deduction.</u>
12. Exhibits should possess the following qualities (in no particular order):
    - A Central theme
    - What you want others to learn
    - Be designed and constructed in a manner befitting the exhibit
    - Be something you are interested in
    - Be related to Computer Systems, Robotics, Rocketry, or Unmanned Aerial Systems
    - And those characteristics described above
13. If a safety violation is noted by the judge, superintendent, or other staff, the exhibit will receive a participation ribbon (exhibit at the judge's discretion).

Astronomy - Junior Division – 9-13 years old

5731 Junior Astronomy Educational Display
5732 Junior Astronomy Educational Notebook
5733 Junior Astronomy Educational Poster

Astronomy- Senior Division – 14 years and older

5736 Senior Astronomy Educational Display
5737 Senior Astronomy Educational Notebook
5738 Senior Astronomy Educational Poster

Rocketry Division F – Exhibitors 9 through 13 years old

5741 Rocketry Educational Display
5742 Rocketry Notebook
5743 Rocketry Poster Board

Rocketry Division G – Exhibitors 14 years and older

5746 Rocketry Educational Display
5747 Rocketry Notebook
5748 Rocketry Poster Board

Robotics Division A - Novice – One to Two Years in Robotics Project

5751 Robotics Educational Display
5752 Robotics Educational Notebook
5753 Robotics Educational Poster

Robotics Division B – Intermediate – Three to Four Years in Robotics Project

5756 Robotics Educational Display
5757 Robotics Educational Notebook
5758 Robotics Educational Poster

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

5761 Robotics Educational Display
5762 Robotics Educational Notebook
5763 Robotics Educational Poster

Robotics Division D – Team Robotics Project

5766 Team Robotics Educational Display
5767 Team Robotics Educational Notebook
5768 Team Robotics Educational Poster

Computers - Junior Division – 9-13 years old

5771 Junior Computer Educational Poster
5772 Junior Computer Display Board
5773 Junior Computer Notebook

Computers - Senior Division – 14 years and older

5776 Senior Computer Educational Poster
5777 Senior Computer Display Board
5778 Senior Computer Notebook

Unmanned Aerial Systems - Junior Division – 9-13 years old

5781 Junior Unmanned Aerial Systems Educational Poster
5782 Junior Unmanned Aerial Systems Display Board
5783 Junior Unmanned Aerial Systems Notebook

Unmanned Aerial Systems - Senior Division – 14 years and older

5786 Senior Unmanned Aerial Systems Educational Poster
5787 Senior Unmanned Aerial Systems Display Board
5788 Senior Unmanned Aerial Systems Notebook

Rocketry Educational Display (7-8 years old) (Not a Stat Fair Class)