

## STEM AG MECHANICS

The Ag Mechanics project is starting with an emphasis on welding and smithing, it will expand as the project area grows. Please direct project feedback to Tony Foster. This project allows youth to explore areas of ag mechanics and metallurgy from repairing or repurposing items to the fabrication of new items. The intent is for this program start with foundational areas, some of which youth may already have, and allow them to continue to build on this knowledge becoming more experienced.

### Rules

1. 4-H members must be currently enrolled in the Kansas 4-H STEM Ag Mechanics (welding) project to exhibit in this division.
2. Each exhibitor may enter one exhibit per class. Exhibits must have been constructed or repaired during the current 4-H year. The exhibit must have been selected at the county level for entry at the State Fair. Counties or districts should select only top blue or purple ribbon Ag Mechanics exhibits which meet State Fair guidelines.
3. Wheeled exhibits must utilize a braking mechanism which prevents the exhibit from freely rolling while on display.
4. Exhibitors are responsible for providing sufficient braking or "chocks" for trailer exhibits to ensure that the exhibits do not move once positioned. If using a wheel "chocking" mechanism, the two individual blocks should be connected together as a pair of chocks, so they do not become separated. At least one pair of chocks should be placed on each side of the trailer to prevent movement.
5. For trailer exhibits the tongue of the trailer should have a locking mechanism (e.g. padlock) to prevent the trailer from being moved by unauthorized individuals while being displayed. A key for the locking mechanism should be left with the superintendent and labeled with the exhibitor's name, county, and phone number.
6. Each exhibit must be free-standing or sufficiently supported by an exhibitor supplied support system that is moveable and is part of the total demission's and weight of the exhibit as described previously. Exhibit display boards should have a portable and moveable base and examples should be firmly affixed to the board to ensure all parts of the display stay together. No exhibits may be staked to the ground for display.
7. Top heavy items should be braced or placed in a stand sufficient to prevent it from toppling over while on display.
8. Exhibits may not be bound, affixed, attached to the State Fair buildings, except by the superintendent, State Fair Staff, or State Fair Extension Staff.
9. Painting or spot painting is not allowed on projects after arrival on fairgrounds. If wet paint is detected by judges or superintendents one ribbon placing will be deducted.
10. Repair projects having adequate original finish need not be repainted.
11. Cutting surfaces, such as blades, are to have a protective covering over them to prevent injury. The covering should be easily removed and reinstalled for judging. Foam "pool noodles" and multiple layers of cardboard are acceptable.
12. Display cases for small exhibits are acceptable and must be easily opened so the item can be removed and examined as part of judging.
13. Exhibits that include weaponry of any kind will be disqualified. Weaponry is defined as any instrument, possession, or creation, physical and/or electrical that is intended to be used to inflict damage and/or harm to individuals, animal life, and/or property.

## Kansas State Fair 2023

14. Trailers and large exhibits (those larger than 5 feet in any dimension) may be displayed outside, and exhibitors with such exhibits are to contact the Kansas State 4-H office **NO LATER THAN August 24<sup>th</sup>** to arrange placement time and location.

15. If the exhibit is powered by flammable liquids (gas, propane, kerosene, etc.) the fuel tank and lines should be drained and allowed to dry, to avoid spills and potential fires.

16. Electric powered (battery, corded, solar, or alternative energy) should have a primary shutoff or disconnect switch.

17. If a safety violation is noted by the judges, superintendent, or other staff, the exhibitor's exhibit, at the judges' discretion, will receive a deduction in ribbon placement or a participation ribbon.

18. The exhibitor's name(s) and county or district must be tagged or labeled in a prominent location on the display.

19. Each exhibit, except for display boards, must include an Ag Mechanics information packet. Entry of just a packet without an accompanying exhibit is not a sufficient exhibit.

20. Each exhibitor is required to complete the "4-H STEM Ag Mechanics Exhibit Information Form" for each exhibit, except for display boards, which is available through your local K-State Research and Extension office or at [www.STEM4KS.com](http://www.STEM4KS.com). This form must be attached to the outside of a 10" x 13" manila envelope. Do not tie the envelope to the exhibit. All revisions of all forms previously released for the STEM division dated prior to current year 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.

21. Each exhibit information packet should include the following items: a. Bill of materials for the project with associated costs, scrap items used may be listed as having a \$0.00 cost.

b. 1 to 5 pages of photos showing work on the exhibit, preferably from a beginning state to final or completed state.

c. If appropriate schematics or working drawings relating to the creation or repair, this is not required for display boards.

d. If appropriate operating instructions.

22. Additionally, exhibitors may create an optional video (not required) about their project showing its operation and the work they have done. This allows judges to get a better understanding of the exhibit and allows the youth the opportunity to fully demonstrate their exhibit. The video should be no longer than 8 minutes and should be placed on a USB drive. These videos may also be considered for inclusion in a running video loop in the STEM area at the state fair after review by judges, superintendent(s), and extension staff. Adult guardians must complete the video release included with the exhibit form. If the release is not completed the video will not be included in the video loop on display in the STEM area at the Kansas State Fair. a. FOR COUNTY FAIRS with consultation judging, it is recommended that the video elements be waived in favor of talking with the exhibitor.

23. Ag Mechanics exhibits may be checked out for use in a Kansas State Fair 4-H demonstration or 4-H illustrated talk with prior permission. For permission, check with the superintendent or the information desk in 4-H Centennial Hall. The exhibit must be returned to display immediately after the demonstration/illustrated talk, or the exhibit will be disqualified. Exhibitors and/or their designees may not remove exhibits from 4-H Centennial Hall prior to the exhibit release time on Sunday evening, without the express consent of the State 4-H Staff. Any exhibit removed before release time will be disqualified.

**Eligibility** – Each exhibitor may enter one exhibit per class. Exhibits must have been constructed or repaired during the current 4-H year. The exhibit must have been selected at the county level for entry at the State Fair. Counties or districts should select only top blue or purple ribbon Ag Mechanics exhibits which meet State Fair guidelines.

**Scoresheets, Forms, and Contest Study Materials:** [www.STEM4KS.com](http://www.STEM4KS.com)

## STEM ARCHITECTURAL BLOCK CONSTRUCTION

The STEM ABC exhibit area focuses on using architectural blocks (“Legos”) to construct dioramas. This project allows youth to explore architectural design in a three-dimensional space. The intent for this program is to allow youth to explore the construct and gain knowledge through interaction with a common toy. This division is not intended for youth wishing to exhibit constructed kits. Kits and non-diorama displays should not be displayed in this division.

### Rules

1. 4-H members must be currently enrolled in the Kansas 4-H STEM – Architectural Block Construction project to exhibit in this division.
2. Each exhibitor may enter one exhibit. Exhibits must have been constructed during the current 4-H year. The exhibit must have been selected at the county

level for entry at the State Fair. Counties or districts should select only top blue or purple ribbon ABC exhibits which meet State Fair guidelines.

3. Counties are limited to FOUR exhibits to the state fair to insure sufficient space for all exhibitors.
4. Total exhibit dimensions may not exceed 2 feet high, by 2 feet wide, by 2 feet deep.
5. The minimum exhibit dimensions must be at least 6 inches wide and deep.
6. All exhibits should be placed in a sturdy see through enclosure with a top, bottom, and 4 sides. A clear tub turned upside down with the exhibit placed on the lid would be an acceptable enclosure. It may be desirable to place a cutting board or other hard surface between the lid and base plate of the exhibit to make it sturdy. This is to keep exhibit components from being “scattered to parts unknown” at the fair. The outer dimensions of the enclosure **do not count** towards the total exhibit dimensions but should not be excessive.
7. All components used in construction should be dust free, clean, free of chips, scuffs, or cracks
8. Gaps or cracks should not be visible between assembled blocks unless they fit with the story, for example an earthquake
9. The primary building component should be interlocking blocks, commonly referred to by the brand name of Lego®
10. Other components can be integrated into dioramas to illustrate architectural aspects that may be difficult to convey with traditional interlocking blocks, for example marbles for small round objects
11. The use of existing “store bought” sets for major elements of the display is not allowed, use of figurines from sets is allowed as are using individual bricks to create something different than the set it came from. The intent of this is to ensure fairness among exhibitors and encourage maximum creativity instead of just following a set of plans. a. COUNTY FAIRS may choose to add classes for kits, but exhibits in those classes are not eligible for the Kanas State Fair.
12. Diaoramas should be suitably complex and have multiple elements, for example, a camp site that has a log cabin, a tree fort, and a car.
13. All dioramas should have a story, which is part of the information pack, that describes what is happening in the diorama; this can be as simple (the nursery rhyme “Jack and Jill” for example) or comples as needed to explain to someone looking at the exhibit what is happening.
14. Vehicles that are intended to stay in a single place should be affixed to base plates with sticky tack, hot glue, or other method
15. Mechanical enhancements or motion elements that add motion to the diorama are acceptable and encouraged. For example, marry-go-rounds, doors, elevators, gears, marbles going down a channel, flapping wings, animatronics, etc. If included judges should be able to use them and instructions should be provided for operation either in the story or on a separate page.

## Kansas State Fair 2023

16. Artistic designs , for example recreating paintings like the “Mona Lisa” or “Stary Nights” and structers like “David” are not permitted as exhibits and one ribbon placing should be deducted, These exhibits should be displayed in Visual Arts.

17. The exhibitor’s name(s) and county or district must be tagged or labeled in a prominent location on the display, additionally the display case should have the exhibitor’s information attached to it as well, as the top part of the case may be separated from the display

18. Each exhibit must include an Architectural Block Construction information packet. Entry of just a packet without an accompanying exhibit is not a sufficient exhibit.

19. Each exhibitor is required to complete the “4-H STEM Architectural Block Construction Exhibit Information Form” which is available through your local K-State Research and Extension office or at [www.STEM4KS.com](http://www.STEM4KS.com). This form must be attached to the outside of a 10” x 13” manila envelope. Do not tie the envelope to the exhibit. All revisions of forms previously released for the STEM division 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.

20. Each exhibit information packet should include the following items: a. 1 to 5 pages of photos showing work on the exhibit, preferably from a beginning state to final or completed state, these help in determining where a part might go in case something comes loose.

b. If appropriate operating instructions for mechanical portions of the diorama.

21. Additionally, exhibitors are required to create a video about their project discussing their construction experiences and the architectural elements of the diorama (tell the story of what is happening in their exhibit). This allows judges to get a better understanding of the exhibit and allows youth the opportunity to fully explain their exhibit. The video should be no longer than 8 minutes and should be placed on a USB drive. These videos may also be considered for inclusion in a running video loop in the STEM area at the state fair after review by judges, superintendent(s), and extension staff. Adult guardians must complete the video release included with the exhibit form. If the release is not completed the video will not be included in the video loop on display in the STEM area at the Kansas State Fair. a. FOR COUNTY FAIRS with consultation judging, it is recommended that the video elements be waived in favor of talking with the exhibitor.

22. Architectural Block Construction exhibits may be checked out for use in a Kansas State Fair 4-H demonstration or 4-H illustrated talk with prior permission. For permission, check with the superintendent or the information desk in 4-H Centennial Hall. The exhibit must be returned to display immediately after the demonstration/illustrated talk or the exhibit will be disqualified. Exhibitors and/or their designees may not remove exhibits from 4-H Centennial Hall prior to the exhibit release time on Sunday evening without the express consent of the State 4-H Staff, any exhibit removed before release time will be disqualified

## STEM ASTRONOMY

The STEM exhibit area is designed to provide youth the opportunity to explore space through telescopes, research, and observation.

### Rules

1. The 4-H member must be currently enrolled in the 4-H STEM - Astronomy 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 and have been selected at the county level for entry at the State Fair level. Counties or districts should select only top blue or purple ribbon Astronomy exhibits which meet State Fair guidelines.
3. Telescopes entered in this division may be built from a kit or by original design. Pre-finished telescopes, which require no construction or painting are not acceptable exhibits.
4. Telescopes are limited to no more than six 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 State Fair telescope exhibit must include a "4-H Astronomy Exhibit Information Form," which is available through your local K-State Research and Extension office or at [www.STEM4KS.com](http://www.STEM4KS.com). This form must be attached to the outside of a 10" x 13" manila envelope. Do not tie the envelope to the exhibit. All revisions of forms previously released for the STEM division 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. You must also include construction plans (or a photocopy) for 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 should be mounted on one side of an 8 ½" x 11" page. A brief caption should 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.
9. Decals, if used, should be attached smooth and tight.
10. Telescopes designed by the exhibitor must be original, not a modification of an existing kit.
11. Exhibitor's name, county or district, age, and year(s) in project must be tagged or labeled in a prominent location on the telescope.
12. If a safety violation is noted by the judges, superintendent, or other staff, the exhibitor's exhibit, at the judges' discretion, will receive a participation ribbon.
13. Additionally, exhibitors may create an optional video (not required) about their project showing its operation and the work they have done. This allows judges to get a better understanding of the exhibit and allows the youth the opportunity to fully demonstrate their exhibit. The video should be no longer than 8 minutes and should be placed on a USB drive. These videos may also be considered for inclusion in a running video loop in the STEM area at the state fair after review by judges, superintendent(s), and extension staff. Adult guardians must complete the video release included with the exhibit form. If the release is not completed the video will not be included in the video loop on display in the STEM area at the Kansas State Fair. a. FOR COUNTY FAIRS with consultation judging, it is recommended that the video elements be waived in favor of talking with the exhibitor.
14. Astronomy exhibits may be checked out for use in a Kansas State Fair 4-H demonstration or 4-H illustrated talk with prior permission. For permission, check with the superintendent or the

## **Kansas State Fair 2023**

information desk in 4-H Centennial Hall. The exhibit must be returned to display immediately after the demonstration/illustrated talk, or the exhibit will be disqualified. Exhibitors and/or their designees may not remove exhibits from 4-H Centennial Hall prior to the exhibit release time on Sunday evening without the express consent of the State 4-H staff, any exhibit removed before release time will be disqualified.

## STEM COMPUTERS

The Kansas 4-H STEM Computer System 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 information is moved between two or more computer systems (networking); how information is stored; or how information is acted on (programming).

### Rules

1. 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.
2. The actual construction of computer hardware (i.e., building a computer, electronic devices with a motherboard-based manipulation) will remain in the Energy Management division.
3. 4-H members must be currently enrolled in the 4-H STEM – Computers project to exhibit in this division.
4. Each exhibitor may enter one exhibit per class. Exhibits 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. Counties or district should select only top blue or purple ribbon computer exhibits which meet State Fair guidelines.
5. 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.
6. See the last section for full details about exhibiting posters, display boards and notebooks.
7. If a safety violation is noted by the judges, superintendent, or other staff, the exhibitor’s exhibit, at the judges’ discretion, will receive a participation ribbon.
8. 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 run the exhibit as described below.  
b. OR 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 8”X 8”X 8”) 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.
9. Physical computers such as tablets, smart phones, laptops, or personal computers (PCs) will not be accepted as an exhibit.
10. “Chip system” 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 protective enclosures.
11. Any attached GPIO devices are not judged for electrical construction or quality as this division is focused on the operational aspects of the system that have automated articulated structures (arms, wheels, grippers, etc.) which the exhibitor constructed, some of these systems can also be classified as a STEM Robot, and the exhibitor must decide which division to exhibit in as the exhibit may not be entered in both divisions.
12. For chip system, 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.
13. All revisions of all forms previously released for the STEM 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 should result in the loss of one ribbon placing for exhibits.
14. For all computer system entries, the following items are required as part of an exhibit packet: a. A manila envelope with the Computer Exhibit Form, which is available through your local K-State

## Kansas State Fair 2023

Research and Extension office or at [www.STEM4KS.com](http://www.STEM4KS.com). This form must be attached to the outside of a 10" x 13" manila envelope. Do not tie the envelope to the exhibit.

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. For exhibits that are entered on USB drives, 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 paper, **placed in a plastic sheet protector**, to allow for proper display and recognition at the Kansas State Fair. Additionally, this graphic should be included on the USB drive and given the name "display graphic." This is what will be displayed during the fair, all other materials will be sent back to the county/district office. On the back side of the graphic the 4-Her's name, county/district, 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).

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.STEM4KS.com](http://www.STEM4KS.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.

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.STEM4KS.com](http://www.STEM4KS.com).

15. 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.

16. If the exhibit is a program, application, app, web site, or requires any coding, the source code must be included on the USB drive. Failure to include a copy of the "source code" may result in up to one ribbon place deduction.

17. Diagrams or decision trees showing the logical flow of the system must be included on the USB drive for all exhibits.

18. 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.

19. Each exhibit MUST include a video of the youth following their instructions for operation. For presentations, such as PowerPoint, this should include delivering the presentation. This allows judges to get a better understanding of the exhibit and allows the youth the opportunity to fully



## Kansas State Fair 2023

demonstrate their exhibit. The video should be no longer than 8 minutes and should be placed on the USB drive. These videos may also be considered for inclusion in a running video loop in the STEM area at the state fair after review by judges, superintendent(s), and extension staff. Adult guardians must complete the video release included with the exhibit form. If the release is not completed the video will not be included in the video loop on display in the STEM area at the Kansas State Fair. a. FOR COUNTY FAIRS with consultation judging, it is recommended that the video elements be waived in favor of talking with the exhibitor. 20. Each exhibit must accomplish a specific automated task using a computer, a chip system, URL, or virtual machine (VM).

21. Kansas State Fair Judge(s) in the computer system division will have a physical computer with the following minimum configuration to test exhibits with and view files: a. Microsoft Windows® 10 or Windows® 11

b. Microsoft Office® 365 (Excel, Power Point, & Word)

c. Microsoft Visual Studio®

d. Microsoft Edge Browser®

e. Mozilla Firefox® Browser

f. Google Chrome® Browser

g. Adobe Acrobat Reader®

h. Apache OpenOffice®

i. VMware Player Windows 64bit

j. Scratch Desktop editor (offline version)

22. The STEM judges will have internet access at the Kansas State Fair. Internet based content may be included in exhibits. Exhibitors should take great care and only go on-line with their guardian's permission. User names and passwords should not be included in exhibits. If they are required to view the content, a temporary user account and password should be created for judging at the Kansas State Fair, once judging is complete the user name and password should be disabled on the account. If a separate user account is not possible, the content should be included as part of the video. **YOU SHOULD NOT SHARE YOUR USER NAME OR PASSWORD WITH OTHERS.**

23. Kansas 4-H STEM 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.STEM4KS.com](http://www.STEM4KS.com). 4-Hers are not required to use the VMs in their projects. They are optional.

24. 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.

25. 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.

26. 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.

27. Judging will be based on a score sheet which can be found at [www.STEM4KS.com](http://www.STEM4KS.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

28. Computer exhibits may be checked out for use in a Kansas State Fair 4-H demonstration or 4-H illustrated talk with prior permission. For permission, check with the superintendent or the information desk in 4-H Centennial Hall. The exhibit must be returned to display immediately after

## **Kansas State Fair 2023**

the demonstration/illustrated talk, or the exhibit will be disqualified. Exhibitors and/or their designees may not remove exhibits from 4-H Centennial Hall prior to the exhibit release time on Sunday evening without the express consent of State 4-H staff, any exhibit removed before release time will be disqualified.

## STEM ROBOTICS

The Kansas 4-H STEM Robotics program is designed to allow 4-H members to explore robotics through robots of various designs.

### Rules

1. 4-H members must be currently enrolled in the Kansas 4-H STEM - Robotics project to exhibit in this division.
2. Each exhibitor may enter one robot per class. Exhibits must have been constructed and/or completed during the current 4-H year. The robot must have been selected at the county level for entry at the State Fair. Counties or districts should select only top blue or purple ribbon robot exhibits which meet State Fair guidelines.
3. Each robot must be free-standing, without the need for additional supports in order to be moved or exhibited. Each exhibit must include a robot, information packets are not a sufficient exhibit.
4. Robots must have automated articulated structures (arms, wheels, grippers, etc.). Game consoles that display on a screen are not considered robots and should either be entered in computer system division or energy management project. Robots requiring no assembly, just programming, such as Ozobots, are considered computer system 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 for the state fair, but strongly encouraged for county fairs) 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" x 4" x 36" or 4" x 8" x 18" or 6" x 6" x 16"). 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 is intended 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. Robotic arms (hydraulic or electric) are allowed. A remote is allowed, provided more than a single action happens when a single button is pressed on the remote, for example "a motor spins for 3 seconds, at which point an actuator is triggered, then the motor spins for 3 more seconds." Remote controlled cars, boats, planes and/or action figures, etc. are not allowed.
10. Each robot must be in working condition. The judges will operate each robot to evaluate its workmanship and its ability to complete its intended task. In the event the robot uses a phone, tablet, or similar device for both 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 STEM Robotics Exhibit Information Form" which is available through your local K-State Research and Extension office or at [www.STEM4KS.com](http://www.STEM4KS.com). This form must be attached to the outside of a 10" x 13" manila envelope. All revisions of all forms previously released for the STEM division either undated or dated prior to

## Kansas State Fair 2023

current year 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 should result in the loss of one ribbon placing for exhibits.

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. Robot programming information can be, but not limited to, source code, block diagrams, screen captures of the coding window, and other images that show the programming logic used. The exhibitor may enter their electronic project listed under the energy management program 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. Each exhibit MUST include a video of the youth following their instructions for operation. This allows judges to get a better understanding of the exhibit and allows the youth the opportunity to fully demonstrate their exhibit. The video should be no longer than 8 minutes and should be placed on the CD, DVD, USB drive, or similar. These videos may also be considered for inclusion in a running video loop in the STEM area at the state fair after review by judges, superintendent(s), and extension staff. Adult guardians must complete the video release included with the exhibit form. If the release is not completed the video will not be included in the video loop on display in the STEM area at the Kansas State Fair.

15. FOR COUNTY FAIRS with consultation judging, it is recommended that the video elements be waived in favor of talking with the exhibitor. 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.

16. Exhibitor's name(s) and county or district must be tagged or labeled on the robot such as on the bottom of the robot, exhibit cards are not an acceptable form of labeling

17. There are no county or district boundaries that must be adhered to in order to form a Kansas 4-H STEM Robotics team. However, as mentioned in #1, each team member must be currently enrolled in the Kansas 4-H STEM project.

18. Robotics exhibits may be checked out for use in a Kansas State Fair 4-H demonstration or 4-H illustrated talk with prior permission. For permission, check with superintendent or the information desk in 4-H Centennial Hall. The exhibit must be returned to display immediately after the demonstration/illustrated talk or the exhibit will be disqualified. Exhibitors and/or their designees may not remove exhibits from 4-H Centennial Hall prior to the exhibit release time on Sunday evening without the express consent of State 4-H staff, any exhibit removed before release time will be disqualified.

19. See the last section for full details about exhibiting posters, display boards and notebooks.

## STEM ROCKETRY

The Kansas 4-H STEM 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.

### Rules A. Exhibit Information for ALL rocketry categories

1. All revisions of all forms previously released for the STEM 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 State 4-H Office for the current year. Use of old forms should result in the loss of one ribbon placing for exhibits.
2. Relevant documents may be obtained from County Extension Offices or from [www.STEM4KS.com](http://www.STEM4KS.com)
3. Rocketry exhibits may be checked out for use in a Kansas State Fair 4-H demonstration or 4-H illustrated talk with prior permission. For permission, check with the superintendent or the information desk in 4-H Centennial Hall. The exhibit must be returned to display immediately after the demonstration/illustrated talk, or the exhibit will be disqualified. Exhibitors and/or their designees may not remove exhibits from 4-H Centennial Hall prior to the exhibit release time on Sunday evening without the express consent of State 4-H staff, any exhibit removed before release time will be disqualified.
4. NAR refers to the National Association of Rocketry and its governing board.
5. Tripoli refers to the Tripoli Rocketry Association and governing board.
6. All NAR documents, with the exception of the "pink book," referenced herein can be found at <http://www.nar.org>.
7. 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.
8. Exhibitors may create an **optional** video (not required) about their project and the work they have done. The video should be no longer than 8 minutes and should be placed on a USB drive. These videos may also be considered for inclusion in a running video loop in the STEM area at the state fair after review by judges, superintendent(s), and extension staff. Adult guardians must complete the video release included with the exhibit form. If the release is not completed the video will not be included in the video loop on display in the STEM area at the Kansas State Fair. a. FOR COUNTY FAIRS with consultation judging, it is recommended that the video elements be waived in favor of talking with the exhibitor.
9. See the last section for full details about exhibiting posters, display boards and notebooks.

### B. 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 STEM 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).

## Kansas State Fair 2023

- 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 STEM 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 a '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 airframes 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.:
      - i. Average thrust in excess of 80.01 Newtons
      - ii. Contains in excess of 125 grams of propellant and are limited to only H and I motors.
      - iii. Uses a hybrid motor or a motor designed to emit sparks
- 5. High power certification is defined as having successfully completed a certification program for high-powered rocketry through the NAR or Tripoli and maintaining that certification. This applies to all membership levels in the NAR and 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.
- 6. NAR rules for launching and construction of all rockets are assumed to be used by all 4-H STEM exhibitors and will be considered during judging.
- 7. For the purposes of Kansas 4-H STEM, NO rocket may be launched using engines totaling more than an 'I' impulse engine or 640 Newton-seconds of total thrust.

### C. Exhibit Rules for ALL rocketry categories

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 STEM division.

- 1. 4-H members must be currently enrolled in the 4-H STEM-Rocketry program to exhibit in this division.
- 2. Entries must have been selected at the county level for entry at the State Fair. Counties/Districts should select top blue or purple ribbon rocketry exhibits which 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" or 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 STEM 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.STEM4KS.com](http://www.STEM4KS.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.
    - 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).

## Kansas State Fair 2023

- 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.
- f. Pictures at the launch site are not required in the event of a burn ban.
- 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
- 6. One or more photographs of the rocket during construction and at the launch site are required:
- 7. To exhibit in this division:
- 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, an additional sheet of paper titled "flight damage" or the 4-H STEM 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. Engines used as a display stand will cause the exhibit to 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. In that case the final stage (the one with the nose cone) should be placed on the display stand, and other stages with a loop of string to the display stand.
- 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/or TRIPOLI for investigation and possible revocation of membership.

### D. Construction Rules for ALL Rockets

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 STEM division.



## Kansas State Fair 2023

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.
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. Though 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.STEM4KS.com](http://www.STEM4KS.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, or instructions say to round and rounding was not done.
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 may 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. Non-standard 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-H’er 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 a non-scale 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.



### **E. Model Rocketry Specific Guidelines (Ages 9 and older)**

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 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 71 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 STEM Action Team may review and implement the modified code.

### **F. Original Design Specific Rocket Guidelines (Ages 11 and older)**

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. A minimum of one additional page must be added to the rocketry information pack detailing the test(s) performed to insure stability. 4-Hers are strongly encouraged to provide as much detail as possible. Failure to provide adequate written documentation will result in a disqualification.

### **Recommended County Fair rules for Rocketry**

This is a reduced set of rules for use at county fairs. The use of these rules is optional and left to the discretion of the county fairs. These are more simplistic rules that cover the most common scenarios that are likely to appear at county fairs. Youth who are eligible for the Kansas State Fair should read the Kansas State Fair rules for this division as the State Fair rules expect more from youth and set a higher bar as it is a state-wide event exhibiting the best from across the State of Kansas.

1. 4-H members must be currently enrolled in the 4-H Rocketry program to exhibit in this division.
2. All rockets displayed in this division must be constructed during the current 4-H year
3. If a rocket qualified for the Kansas State Fair, exhibitors should read the State Fair rules for the Rocketry division as they may be different from those at the county fair.
4. 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", the second may be entered into any other applicable class. An exhibitor may not enter two rockets in the same class.

## Kansas State Fair 2023

5. 4-Hers are to complete and sign the rocketry information form, available from [www.STEM4KS.com](http://www.STEM4KS.com) or your local extension office and attach it to a 10" x 13" "manila" envelope. The envelope should contain:
  - a. Instructions on how to construct the rocket
  - b. Up to 5 pages of pictures from both construction and launch
  - c. Documentation of any flight damage that occurred
  - d. Any modifications made to the rocket
  - e. An additional page for altitude calculations if the space on the form is not enough.
  - f. Additionally, for original design rockets, also known as "scratch built" rockets:
  - g. 5 additional pages of photos are allowed
  - h. Documentation of how the rocket was tested for stability
6. 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.
7. Rockets are to be displayed upright on a display stand with a sturdy rod that does not extend past the top of the rocket or stand unassisted, unless the rocket is taller than 4 feet in which case no display stand is required and the rocket may be displayed on its side, rockets are not to be displayed on launch pads to save space and prevent someone from being poked in the eye.
8. Rockets ARE NOT to be displayed with used or unused rocket engines either in the rocket or as part of the stand, if rocket engines are included in the exhibit the judge may disqualify the exhibit.
9. Rockets should be flown unless there is an active burn ban in the county or conditions are too dangerous to safely launch the rocket. Just flying the last stage (the part with the nose cone) of a multi-stage rocket is acceptable.
10. Rockets, except those in the JR division, are not to be "beginner kits" or use prefabricated fin assemblies or pre-finished rockets requiring no painting, these are not acceptable outside the JR division, and should be disqualified
11. 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.STEM4KS.com](http://www.STEM4KS.com).
12. Fins and body tubes, except those in the introductory division, are to be filled and sealed with sanding sealer and/or primer or other suitable filler to eliminate the appearance of body grooves and wood grain.
13. Fins and launch lugs are to be filleted to reduce drag and properly secure them to the model.
14. Engine mounts are to be securely attached to the body tube.
15. Any seams on plastic parts are to be sanded smooth.
16. The recovery system (typically a parachute or streamer) should be attached according to the instructions
17. The nose cone is to fit snugly but still allow for easy removal.
18. Exhibits must be uniformly painted and smoothly finished or finished as per rocket instructions (for example, no painting required), and decals, if used, are applied smoothly.
19. Models may not be judged based on their paint scheme (colors and placement on the rocket), except for rockets that fit the definition of a 'scale model\*' and are entered in the scale model class. All other rockets do not have to follow the suggested paint scheme, allowing the 4-H'er 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 non-scale model from one ribbon placing to another.
20. "Scale models\*" entered in the scale model class may be judged based on their paint scheme. The judge may deduct up to one ribbon placing for not following the paint scheme.
21. "Scale Models\*" displayed in the scale model class are to be finished and completed with a majority (greater than 70%) of decals. For all other rockets the use of decals is optional.

## Kansas State Fair 2023

22. Original design rockets cannot be a modification of a pre-existing kit and must be of original design.
23. Original design rockets must be designed by the exhibitor(s).
24. Exhibitor(s) must be 11 years of age (4-H age) or older to enter an original design rocket.
25. 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.
26. 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.
27. A minimum of one additional page must be added to the rocketry information pack detailing the test(s) performed to insure stability. 4-Hers are strongly encouraged to provide as much detail as possible. Failure to provide adequate written documentation will result in a disqualification.
28. Rockets that use more than one 'D' engine or equivalent are considered mid or high-power rockets in 4-H.
29. Mid and High-Power exhibitors must be at least 14 years of age by January 1 of the current year.
30. 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 [www.STEM4KS.com](http://www.STEM4KS.com)
31. Exhibitors in the mid and high-power divisions must hold memberships in either NAR or Tripoli organizations.
32. The NAR High Power Rocket Safety Code applies to the construction and launching of all rockets displayed in this division. As such all mid and high-power rocketry 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.
33. All rockets in the mid and high-power divisions are to be launched under adult supervision by the 4-H member who constructed the rocket.
34. 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 1 high power certification. The 4-H member should also hold or be attempting to attain their level 1 high power certification if launching on this large of an engine.

**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)**