



2019 Scotts Bluff County Fair 4-H Fair Book



Science, Engineering & Technology

Only one entry per class. S_E Classes only are State Fair eligible.

All static exhibits must have received a purple ribbon at the county fair to advance to the State Fair

Aerospace Division 850

Rules

- A. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of the exhibit may be identified if the entry tag is separated from the exhibit.
- B. Each individual is limited to one exhibit per class. All static exhibits must have received a purple ribbon at the county fair to advance to the State Fair.
- C. Several classes require a display board which should be a height of 24 inches and not to exceed 1/4-inch thickness. A height of 24 7/8 inches is acceptable to allow for the saw kerf (width) if two 24 inch boards are cut from one end of a 4 foot by 8-foot sheet of plywood. Nothing should be mounted within 3/4 inch of the top or bottom of the board. (Example: Woodworking & Electricity.)
- D. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
- E. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
- F. Demonstration boards should include an overall title for the display, plus other necessary labeling.
- G. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.

Rockets must be supported substantially to protect the rocket from breakage. Rockets are to be mounted on a base that has dimensions equal or less than 12" x 12" and the base should be 3/4" thick. No metal bases. If the rocket fins extend beyond the edges of the required base (12" x 12"), then construct a base that is large enough to protect the fins. The base size is dictated by the size of the rocket fins. The rockets must be mounted vertically. Please do not attach side boards or backdrops to the display. In addition, a used engine or length of dowel pin is to be glued and/or screwed into the board and extended up into the rockets engine mount to give added stability. Rockets must be equipped as prepared for launching, with wadding and parachute or other recovery system. Rockets entered with live engines, wrong base size or sideboards will be disqualified. A report, protected in clear plastic cover, must include:

- 1) rocket specification (include original or photo of manufacture packaging stating rocket skill level),
- 2) a flight record for each launching (weather, distance, flight height),
- 3) number of launchings,
- 4) flight pictures,
- 5) safety (how did you choose your launch site? Document safe launch, preparations, and precautions),
- 6) objectives learned
- 7) conclusions

The flight record should describe engine used, what rocket did in flight and recovery success. Points will not be deducted for launching, flight or recovery failures described. This includes any damage that may show on the rocket. Complete factory assembled rockets will not be accepted.



2019 Scotts Bluff County Fair 4-H Fair Book



Judging is based upon display appearance, rocket appearance, workmanship, design or capabilities for flight, number of times launched, and report. Three launches are required to earn the maximum launch points given on the score sheets.

For scoring for the State Fair, only actual launches count, misfires will not count towards one of the required three launches. Counties are allowed a maximum of six entries for all rocketry.

For self-designed rockets only, please include digital recorded copy of one flight. In the documentation please include a description of stability testing before the rocket was flown.

Skill level of project is not determined by number of years in project. Skill level is determined by the level listed on the manufacturing packaging.

4-H Rocket project levels are not intended to correspond to National Association of rocketry model rocket difficulty ratings or levels.

High power rockets (HPR) is similar to model rocketry with differences that include the propulsion power and weight of the model. They use motors in ranges over "G" power and/or weigh more than laws and regulations allow for unrestricted model rockets. These rockets are NOT appropriate for 4-H projects and will be disqualified.

Unit 1 – See Clover Kid projects

Unit 2 - Lift Off

S_FClass 1 Rocket: (Scoresheet SF92) Any Skill Level 2 rocket with wooden fins painted by hand or air brush.

S_FClass 2 Display: (Scoresheet SF93) Display exemplifying one of the principles learned in the Lift Off Project. Examples include: display of rocket parts and purpose, interview of someone in the aerospace field, or kite terminology. Include notebook containing terminology (definition), and what was learned. Display can be any size up to 28" x 22".

S_FClass 3 Rocket: (Scoresheet SF92) Any Skill Level 2 rocket with wooden fins painted using commercial application example commercial spray paint.

Unit 3 - Reaching New Heights

S_FClass 4 Rocket: (Scoresheet SF92) Any Skill Level 3 rocket with wooden fins painted by hand or air brush.

S_FClass 5 Display: (Scoresheet SF93) Display exemplifying one of the principles learned in the Reaching New Heights Project. Examples include: airplane instrumentation, kite flying, or radio-controlled planes. Display can be any size up to 28" x 22". Include notebook containing terminology (definition), and what was learned.

S_FClass 6 Rocket: (Scoresheet SF92) Any Skill Level 3 Rocket with wooden fins painted using commercial application example commercial spray paint.

Unit 4 - Pilot in Command

S_FClass 7 Rocket: (Scoresheet SF92) Any Skill Level 4 rocket with wooden fins or any self-designed rocket.

S_FClass 8 Display: (Scoresheet SF93) Display exemplifying one of the principles learned in the Pilot in Command Project. Examples include: flying lessons, or careers in aerospace. Display can be any size up to 28" x 22".

Unit 5- Drones

S_FClass 9 Drone Poster—Exhibit must be designed to educate yourself and others on one or more of the following topics: drone technologies, uses of drones, the different types of drones, types of training needed to operate drones, and the laws and regulations users must follow. Posters can be any size up to 28" by 22".



2019 Scotts Bluff County Fair 4-H Fair Book



Computers Division 860

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- B. Each individual is limited to one exhibit per class. All static exhibits must have received a purple ribbon at the county fair to advance to the State Fair.
- C. Demonstration boards should include an overall title for the display, plus other necessary labeling.
- D. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.
- E. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations. Results: What you learned. All reports should be computer generated and enclosed in a clear, plastic cover. The reports should be attached securely to the display.
- F. Please refer to the General Rules for the policy regarding firearms, items with a blade, and other related items.

Team Entries: To qualify for entry at the Nebraska State Fair team materials entered in H860009 – Digital Fabrication is clearly the work of a team instead of an individual must have at least 50% of all team members enrolled in 4-H. Additionally, all enrolled 4-H members on the team should complete and attach an entry tag to the materials. A supplemental page documenting the individual contributions to the project should be included. The entry will be judged as a team, with all team members receiving the same ribbon placing.

BOOTING UP– UNIT 1

On a 3" x 5" card state the purpose of the program, computer it was designed to run on, and new skills learned. All projects may be interview judged. Computer posters will be mounted on a 14" x 22" poster either in a vertical or horizontal arrangement. Computer poster should be based on a computer theme, such as "How a Computer Works", "How to Use a Computer" or "Computers in Action". Other topics created by computer graphic programs can be exhibited in Division 151 - Posters. Judging criteria for computers projects include design, use of fonts, graphics, tools like columns, tables, macros, etc.

- Class 11 Computer Art Poster (black/white or color) - Exhibit should be created on at least 8 ½" x 11" paper using a commercially available graphics software package and a single color printer/plotter.
- Class 12 Games - For example word searches, mazes, hangman, anagrams, etc.
- Class 13 Original Graphics Poster - Exhibit should be on an 8 ½" x 11" poster using original graphics developed by the 4-Her.
- Class 14 Simple Spreadsheet Application - Personal finances, simple budget, etc. Exhibit should consist of printed input and output and a 3" x 5" card explaining the purpose of the spreadsheet and what software was used. (Example of programs include but not limited to Lotus 1-2-3, Excel, Quattro Pro, Works)
- Class 15 Simple database application - Mailing List, etc. Exhibit should consist of a database and what software was used. (Examples of software include but are not limited to Paradox, dBASE IV, Microsoft Access)
- Class 16 Simple macro(s) application within a commercial software package - Exhibit should consist of printed input and output and a 3" x 5" card explaining purpose of the macro(s), why the macro(s) would be implemented and what software was used.



2019 Scotts Bluff County Fair 4-H Fair Book



Class 17 Greeting Cards/Banners - Exhibit should be created using a commercially available software package.

COMPUTER MYSTERIES – UNIT 2

^S_FClass 1 **Computer Application Poster** – (Scoresheet SF...) 4-H exhibitor should use computer application to create a graphic notebook utilizing computer technology. 4-H'er may create any of the following: greeting card (5 different cards should as a birthday, wedding, anniversary, sympathy get well or other); a business card (3 cards for 3 different individuals and businesses); menu (minimum of 2 pages including short description of foods and pricing); book layout (I-book); promotional flyer (3 flyers promoting 3 different events); newsletter (minimum 2 pages); or other: examples such as precision farming or family business logo etc. This exhibit consists of a notebook (8.5x11 inches) which should include a (1) a detailed report describing: (a) the task to be completed, (b) the computer application software required to complete the task, (c) specific features of the computer application software necessary for completing the task (2) print out of your project. Project may be in color or black and white.

^S_FClass 2 **Produce a Computer Slideshow Presentation** – (Scoresheet SF277) Using presentation software. All slide shows for state fair should be emailed to Amy Timmerman atimmerman2@unl.edu before August 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing. A notebook with a printout of all slides should be submitted. Slideshow should include a minimum of 10 slides and no more than 25. Incorporate appropriate slide layouts, graphics, animations, and audio (music or voice and transition sounds do not count). Each slide should include notes for a presenter. All slideshows must be up loaded.

COMPUTER MYSTERIES – UNIT 3

^S_FClass 4 **Produce an Audio/Video Computer Presentation** – (Scoresheet SF276) Using presentation software a 4-H exhibitor designs a multimedia computer presentation on one topic related to youth. The presentation should be at least 2 minutes in length and no more than 5 minutes in length, appropriate graphics, sound and either a video clip, animation or voice over and/or original video clip. The presentation must be able to be played and viewed on a PC using Windows Media Player, Real Player, iTunes or QuickTime Player.

^S_FClass 5 **How to STEM (Science, Technology, Engineering and Math) Presentation** – (Scoresheet SF276) Youth design a fully automated 2 to 5 minute 4-H "how to" video. Submissions should incorporate a picture or video of the 4-H'er, as well as their name (first name only), age (as of January 1 of the current year), years in 4-H, and their personal interests or hobbies. Videos should be designed for web viewing. Any of the following formats will be accepted: .mpeg, .rm, .wmv, .mp4, .ov, .ppt, or .avi.

^S_FClass 6 **Create a Web Site/Blog or App** – (SF...) Design a simple Web site/blog or app for providing information about a topic related to youth using either software programs such as HTML editor like Microsoft's FrontPage or Macromedia's Dreamweaver, and image editor like Irfan View or GIMP OR online using a WIKI such as Google Sites. If the Web site, Blog or App isn't live include all files comprising the Web Site, Blog or App should be submitted on a CD-ROM in a plastic case along with the explanation of why the site was created. If developed using a WIKI or other online tool, include a link to the website in the explanation of why the site was created.

^S_FClass 7 **3D Printing Unique Items** – (Scoresheet SF...) 3D printing uses plastic or other materials to build a three-dimensional (3D) object for a digital design. Youth may use original designs or someone else's they have re-designed in a unique way. Exhibits will be judged based on the motivation and/or problem identified. For example, 3D



2019 Scotts Bluff County Fair 4-H Fair Book



objects printed as part of the design process for robot or other engineering project or cookie cutter. Must include design notebook with motivation or problem statement the prototype was 3D printing will include a notebook with the following:

a) Define motivation/problem solved. b) Software used. c) Document purpose of material and print settings. d) Material choice (PLA, PVA, ABS, etc.). e) In-fill density. f) Moving parts.

S_FClass 8 3D Pen Creation – (Score sheet SF...) 3D pens rapidly melt and cool plastic filament allowing the 4-Her to draw in 3D. Youth may use original designs or use a template to create their 3D item. Exhibits will be judged based on the complexity of the design and shape. 3D pen creation will include a notebook with the following: a) Copy of the template if used and description of any changes the youth created. b) If no template used – an explanation of how the creation was built. c) Must include paragraph of what the youth learned while creating their project (i.e. way to improve their next creation) d) Paragraph on how 3D pens impact Science Engineering and Technology.

S_FClass 9 Digital Fabrication – This project is a computer generated projected created using a laser cutter, vinyl cutter, heat press or CNC router. Vector or 3D based software such as corel draw or Fusion 360 would be an example of an appropriate software used to create your finished project. Project should include a notebook with the following: a) What motivated you to create this project. b) Software and equipment used. c) Directions on how to create the project. d) Prototype of plans. e) Cost of creating project, f) Iterations or modifications made to original plans. g) Changes you would make if you remade the project.

Robotics Division 861

Rules

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Youth enrolled in Virtual Robotics, Junk Drawer Robotics (Levels 1, 2, or 3), Robotics Platforms or GEAR TECH 21 may exhibit in any class within this division.



2019 Scotts Bluff County Fair 4-H Fair Book



Team Entries: To qualify for entry at the Nebraska State Fair team materials entered in robotics classes that are clearly the work of a team instead of an individual must have at least 50% of all team members enrolled in 4-H. Additionally all enrolled 4-H members on the team should complete and attach an entry tag to the materials. A supplemental page documenting the individual contributions to the project should be included. The entry will be judged as a team, with all team members receiving the same ribbon placing.

Creating a video of your robot in action would be helpful for the judges but is not mandatory present as a CD Rom with your robot entry.

- S_FClass 1 Robotics Poster** – (Scoresheet SF236) Create a poster (14" X 22") communicating a robotics theme such as "Robot or Not", "Pseudocode", "Real World Robots", "Careers in Robots" or "Autonomous Robotics", "Precision Agriculture" or a robotic topic of interest to the 4-H'er.
- S_FClass 2 Robotics Notebook** – (Scoresheet SF237) Explore a robotics topic in-depth and present your findings in a notebook. Documentation should include any designs, research, notes, pseudocode, data tables or other evidence of the 4-H'ers learning experience. The notebook should contain at least three pages. Topics could include a programming challenge, a programming skill, calibration, sensor exploration, any of the topics suggested in Class 1 or junk drawer robotics level 3 or 4.
- S_FClass 3 Robotics Video** – (Scoresheet SF238) This class should be displayed in a notebook. The notebook should include a video clip on a CD/DVD that demonstrates the robot performing the programmed function. Include your pseudo code and screenshots of the actual code with a written description of the icon/command functions. All videos for state fair should be emailed to Amy Timmerman atimmerman2@unl.edu before August 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing.
- S_FClass 4 Robotics Careers Interview** – (Scoresheet SF239) Interview someone who is working in the field of robotics and research the career in robotics. Interviews can either be written or in a multimedia format (CD/DVD). Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12 point font, and 1" margins. Multimedia reports should be between 3 to 5 minutes in length.
- S_FClass 5 Robotics Sensor Notebook** – (Scoresheet SF241) Write pseudo code which includes at least one sensor activity. Include the code written and explain the code function.
- S_FClass 6 Build a Robot (may use kit)** – (Scoresheet SF243) Include a robot and notebook including the codes for at least one program you have written for the robot, the robots purpose, and any challenges or changes you would make in the robot design or programming. If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases. We recommend that you submit the project under class 3 – Robotics Video. Junk Drawer Robotics do not qualify. For state fair should be emailed to Amy Timmerman atimmerman2@unl.edu before August 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing.
- S_FClass 7 Kit Labeled Robot (cannot be programmed)** – (Scoresheet SF243) This class is intended for explorations of robotic components such as arms or vehicles OR educational kits marketed as robots that do not have the ability to be programmed to "sense, plan and act". The exhibit should include a project the youth has constructed, a description of what it does and an explanation of how it is similar to and different from a robot. If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases. We recommend that you submit the project under class 3 – Robotics Video.