

*****DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

***AREA: Science Engineering Technology (SET) Careers***

 AREA RULES – SET CAREERS

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2. 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.
	3. 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.

**DEPARTMENT H – DIVISION 93 – SET CAREERS**

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| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 93 | 001 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |

**SF) 001 Careers Interview** (SF239) – Interview someone who is working in any field associated with science, engineer and technology and research that career (i.e. computer programmer, architect, engineer, pilot, etc.). Interviews can either be written or in a multimedia format (CD/DVD).

**** *DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

**AREA: AEROSPACE**

 *CURRICULUM & RESOURCES*

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| Rockets Away | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg |  |
| Aerospace 2: Lift-Off | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg |  |  |
| Aerospace 3: Reaching New Heights |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg |  |
| Aerospace 4: Pilot in Command |  |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |

 GENERAL RULES – AEROSPACE

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2. 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.
	3. 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 sideboards or backdrops to the displays. 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.
	4. Rockets entered with live engines, wrong base size or sideboards will be disqualified.
	5. Complete factory assembled rockets will not be accepted
	6. Judging is based upon display appearance, rocket appearance, workmanship, design or capabilities for flight, number of times launched and report. Three launches are required.
	7. A report, protected in a 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, engine used, what the rocket did in flight and recovery status). Points will not be deducted for launching, flight or recovery failures described. This includes any damage that may show on the rocket.
		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
	8. For self-designed rockets only, please include a digital recorded copy of one flight. In the documentation please include a description of stability testing before the rocket was flown.
	9. Displays and posters should be no larger than 28”x22”.

**DEPARTMENT H – DIVISION 850 – AEROSPACE**

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| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 850 | 001-003, 009 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |
| 850 | 004-008 | 3 | $6.00 | $4.00 | $2.00 | $1.00 |

*LIFT OFF – UNIT 2*

**SF) 001 Rocket** (SF92) – Any skill level 2 rocket with wooden fins painted by hand or air brush.

**SF) 002 Display** (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.**

**SF) 003 Rocket** (SF92) – Any skill level 2 rocket with wooden fins painted using commercial application. Example: commercial spray paint.

*REACHING NEW HEIGHTS – UNIT 3*

**SF) 004 Rocket** (SF92) – Any skill level 3 rocket with wooden fins painted by hand or air brush.

**SF) 005 Display** (SF93) – Display exemplifying one of the principles learned in the Reaching New Heights Project. Examples include: airplane instrumentation, kite flying or radio-controlled planes.  **Include notebook containing terminology (definition), and what was learned.**

**SF) 006 Rocket** (SF92) – Any skill level 3 rocket with wooden fins painted using commercial application. Example: commercial spray paint.

*PILOT IN COMMAND – UNIT 4*

**SF) 007 Rocket** (SF92) – Any skill level 4 rocket with wooden fins or any self-designed rocket.

**SF) 008 Display** (SF93) – Display exemplifying one of the principles learned in the Pilot in Command Project. Examples include: flying lessons or careers in aerospace.

*DRONES – UNIT 5*

**SF) 009 Drone Poster** (SF\_\_) – 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.

**** *DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

***AREA: COMPUTERS***

 *CURRICULUM & RESOURCES*

 AREA RULES – COMPUTERS

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2.  **Youth can ONLY enter exhibits into ONE Computers Level.**
		1. Youth enrolled in clothing projects should continue their skill development. Once they have exhibited in a higher level, they are not eligible to exhibit in a lower level. Ex. Once you exhibit in Level 2, you are not eligible to exhibit in Level 1.
	3. 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.
	4. Posters can be any size up to 28” by 22”.

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| CPU 1: Inside the Box | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg |  |  |
| CPU 2: Peer to Peer |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg |  |
| CPU 3: Teens Teaching Tech |  |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |

**DEPARTMENT H – DIVISION 860 – COMPUTERS**

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| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 221 | 901-904 | 1 | $2.50 | $2.00 | $1.50 | $1.00 |
| 221 | 001-003 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |
| 221 | 004-009 | 3 | $6.00 | $4.00 | $2.00 | $1.00 |

*LEVEL 1*

**C) 901 Computer Art Poster** (SF278) – Exhibit should be created on 8 /12” x 11” paper using commercially available graphics software package and color or black and white paper. 4-H theme of your choice suggested.

**C) 902 Greeting Card** (SF278) – Develop a series of 4 of 6 greeting cards, each for a different occasion. Exhibit should be created on 8 ½” x 11” paper using commercially available graphics programs and a color or black and white paper. The cards should vary in fold and design. Tell what software package was used on the back. Pre-fabricated cards from commercially available card programs will NOT be accepted. Put cards in a protective plastic cover or notebook.

**C) 903 Booting Up Poster** (SF278) – Create a poster on a lesson learned in Booting Up, Unit 1. Examples might include: hardware, software programs, how to take care of a computer and operating systems.

*LEVEL* 2

**SF) 001 Computer Application Poster** (SF278) – Exhibit designed to educate yourself and others on the use of computer application/program or techniques of internet/social media safety. Examples of the computer application/program could include but are not limited to: how to download digital photos from a camera and create a usable way of storing and accessing them in the future; details of how to use instant messaging programs like Skype; or how to create a social networking page (ex. “Facebook,” “SnapChat,” “Instagram,” “Twitter,” “FaceTime,” etc). Examples of internet/social media safety include but not limited to identity theft, predator safety, internet etiquette, social networking pages precautions, etc.

**SF) 002 Produce a Computer Slideshow Presentation** (SF277) – Using presentation software create a presentation. Slideshow should include a minimum of 10 slides and no more than 25. Incorporate appropriate slide layouts, graphics, animations and audio. Each slide should include notes for a presenter.  **All county fair projects with a printout should be saved on a CD Rom to be submitted for county fair.**

**C) 904 Teach an Adult** (SF279) – The 4-H exhibitor writes a report between 1 and 3 pages describing a situation in which he or she has taught an adult(s) a computer skill.  **The report should include pictures of the 4-Her working with the adult(s).**

*LEVEL 3*

**SF) 004 Produce an Audio/Video Computer Presentation** (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.

**SF) 005 How to STEM (Science, Technology, Engineering and Math) Presentation** (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-Her, 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.

**SF) 006 Create a Web Site/Blog or App** (SF275) – Design a simple Web site/ blog or app for providing information about a topic related to youth using either software programs such as an HTML editor like Microsoft’s FrontPage or Macromedia’s Dreamweaver, and image editor like IrfanView 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.

**SF) 007 3D Printing Unique Items** (SF1050) – 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 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: (1) Define motivation/problem solved; (2) Software used; (3) Document purpose of material and print settings; (4) Material choice (PLA, PVA, ABS, etc.); (5) In-fill density; & (6) Moving parts.

**SF) 008 Pen Creation** (SF\_\_) – 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**: (1) Copy of the template if used and description of any changes the youth created OR If no template used – an explanation of how the creation was built; (2) Must include paragraph of what the youth learned while creating their project (i.e. way to improve their next creation); & (3) Paragraph on how 3D pens impact Science Engineering and Technology.

**SF) 009 Digital Fabrication** (SF\_\_) – 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: (1) What motivated you to create this project; (2) Software and equipment used; (3) Directions on how to create the project; (4) Prototype of plans; (5) Cost of creating project; (6) Iterations or modifications made to original plans; & (7) Changes you would make if you remade the project.

**** *DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

***AREA: ELECTRICITY***

 *CURRICULUM & RESOURCES*

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| Electricity 1: Magic of Electricity | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg |  |  |
| Electricity 2: Investigating Electricity | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg |  |
| Electricity 3: Wired for Power |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg |  |
| Electricity 4: Entering Electronics |  |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |

 AREA RULES – ELECTICITY

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2.  **Youth can ONLY enter exhibits into ONE Electricity Unit.**
		1. Youth enrolled in clothing projects should continue their skill development. Once they have exhibited in a higher level, they are not eligible to exhibit in a lower level. Ex. Once you exhibit in Unit 2, you are not eligible to exhibit in Unit 1.
	3. 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.
	4. Display or posters can by any size up to 28” x 22” x .25”. Nothing should be mounted within 3/4 inch of the top or bottom of the board or poster.
	5. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit. Demonstration boards should include an overall title for the display, plus other necessary labeling.

**DEPARTMENT H – DIVISION 870 – ELECTRICITY**

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| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 870 | 901-907 | 1 | $2.50 | $2.00 | $1.50 | $1.00 |
| 870 | 001-004 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |
| 870 | 004-008 | 3 | $6.00 | $4.00 | $2.00 | $1.00 |

*MAGIC OF ELECTRICITY – UNIT 1*

**C) 901 Bright Lights** (SF\_\_) – Create your own flash light using items found around your house. Flash lights should be made out of items that could be recycled or reused. No kits allowed.

**C) 902 Control the Flow** (SF\_\_) – Make a switch by creating a circuit that you can open and close.

**C) 903 Conducting Things**  (SF\_\_) – Make a circuit with a switch and a light bulb that can be used to test different household items for their ability to act as an insulator or conductor. You must find five items that are conductors and five items that are insulators. Create a table that illustrates your results.

**C) 904 Is There a Fork in the Road** (SF\_\_) – Using the following items to construct one parallel and one series circuit.

*INVESTIGATING ELECTRICITY – UNIT 2*

**C) 905 Case of the Switching Circuit**  (SF\_\_) – Build a three way switch. Write a short essay or create a poster that illustrates how three way switches function. (Investigating Electricity, p. 28)

**C) 906 Stop the Crime** (SF\_\_) – Build an alarm and create a poster using photographs to show the step by step process you used to build your alarm. (Investigating Electricity, p. 32)

**C) 907 Electrical Poster** (SF\_\_) – Poster should exemplify one of the lessons learned in the Investigating Electricity Project.

*WIRED FOR POWER – UNIT 3*

**SF) 001 Electrical Tool/Supply Kit** (SF224) – Create an electrical supply kit to be used for basic electrical repair around the house. Include a brief description of each item and its use. Container should be appropriate to hold items.

**SF) 002 Lighting Comparison** (SF225) – Display studying the efficiency of various lighting (incandescent, fluorescent, halogen, Light Emitting Diodes, etc.). Exhibit could be a poster display or an actual item.

**SF) 003 Electrical Display/Item** (SF226) – Show an application of one of the concepts learned in the Wired for Power project. Examples include: re-wiring or building a lamp, re-wiring or making a heavy duty extension cord or developing an electrical diagram of a house. Exhibit could be a poster display or an actual item.

**SF) 004 Electrical Poster** (SF227) – Poster should exemplify one of the lessons learned in the Wired for Power Project.

*ELECTRONICS – UNIT 4*

**SF) 005 Electrical/Electronic Part Identification** (SF228) – Display different parts used for electrical/electronic work. Exhibit should show the part (either picture or actual item) and give a brief description, including symbol of each part and its function. Display should include a minimum of 10 different parts.

**SF) 006 Electronic Display** (SF229) – Show an application of one of the concepts learned in the Electronics project. Example include: components of an electronic device (refer to p.35 of the Electronic manual).

**SF) 007 Electronic Project** (SF230) – Exhibit an electronic item designed by the 4-H’er or from a manufactured kit that shows the electronic expertise of the 4-H’er. Examples include: radio, a computer, or a volt meter.

**SF) 008 Electronic Poster** (SF231) – Poster should exemplify one of the lessons learned in the Entering Electronics Project.

**** *DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

***AREA: GEOSPATIAL***

 *CURRICULUM & RESOURCES*

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 AREA RULES – GEOSPATIAL

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2. 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.
	3. Posters can by any size up to 14” x 22”

**DEPARTMENT H – DIVISION 880 – GEOSPATIAL**

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| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 880 | 001-010 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |
| 880 | 901-903 | 1 | $2.50 | $2.00 | $1.50 | $1.00 |

**SF) 001 Poster** (SF299) – Create a poster communicating a GPS theme such as How GPS or GIS works, Careers that use GPS or GIS, How to use GPS, What is GIS, GPS or GIS in Agriculture, Precision Agriculture, or a geospatial topic of interest.

**SF) 002 4-H Favorite Places or Historical Site Poster** (SF272) – The 4-H exhibitor identifies a favorite place or historical site (including grave sites) in Nebraska. Exhibit should include latitude and longitude, digital picture, and local area map.

**SF) 003 GPS Notebook** (SF300) – Keep a log of at least 5 places visited using a GPS enabled device. At least one site should be from a community other than where you live. At least one site should be from a community other than where you live. For each site, record the latitude, longitude and elevation. Also include a description of the site, a paragraph explaining what was interesting about the site or finding it. Photos of each site and/or cache are optional but encouraged.

**SF) 004 Geocache** (SF301) – Assemble a themed geocache. Each geocache should be a water-tight container. It should include a log book and pencil for finders to log their visits and may include small trinkets, geocoins, etc. for the finders to trade. Documentation should include a title, teaser description and the geographic coordinates of intended placement. Register the site at geocaching.com; include a print-out of its registry. The entry may include a photograph of the cache in its intended hiding place.

**SF) 005 Agriculture Precision Mapping** (SF302) – 4-Hers will assemble a notebook that will include a minimum of 2 digital copies of various data layers that can be used in precision agriculture to identify spatial patterns and/or correlations (printed copies of websites were applications can be purchased is acceptable) A report of how the analysis of the various data will be used to make a management decision.

**SF) 007 4-H History Map** (SF302) – Preserve 4-H History: Nominate a Point of Interest for the 4-H History Map Project include copy of submitted form in folder or notebook. To nominate a site for the 4-H history map please go to http://arcg.is/1bvGogV For more information about 4-H history go to http://4hhistorypreservation.com/History\_ Map/ For a step by step video on nominating a point, please go to this link: http://tinyurl.com/nominate4h Write a brief description of historical significance of 4-H place or person.

**SF) 008 GIS Thematic Map** (SF302) – Using any GIS software, create a thematic. Thematic maps can utilize any subject of interest to the 4-H’er. Example map would be Amelia Earhart’s or Sir Francis Drake’s voyage population density maps, water usage maps or 4-H project in Nebraska. Create GIS Map using data from books, and or internet. Use reliable data, (U.S. Center or U.S. Census Bureau etc.) Map any size from 8.5” x 11” up to 36” x 24”, should include Title, Base Map, Neat Line, North Arrow, and Legend. Identify the source of your information on the back of map.

**SF) 010 Careers Interview** (SF239) – Interview someone who is working in a Geospatial field and include research that career. Interviews can either be written or in a multimedia format (CD/DVD). Written reports should be 3 to 5 pages. Multimedia reports should be between 3 to 5 minutes.

**C) 901-903 Other exhibit in GPS, GIS, or mapping.**

**** *DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

***AREA: ALTERNATIVE/RENEWABLE ENERGIES***

 *CURRICULUM & RESOURCES*

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| The Power of Wind Youth Guide |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg |  |

 AREA RULES – ALTERNATIVE/RENEWABLE ENERGIES

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2. 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.
	3. Posters can by any size up to 28” x 22”.

**DEPARTMENT H – DIVISION 900 – ALTERNATIVE/RENEWABLE ENERGIES**

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| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 900 | 001-006 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |
| 990 | 901-903 | 1 | $2.50 | $2.00 | $1.50 | $1.00 |

**SF) 001 Create and Compare Energy Resources Poster** (SF\_\_) – Poster should explore 2 alternative/renewable energy resources. Compare and contrast the 2 resources including two of the following information: amount of energy created, costs of production, usability of the energy, pros/cons of environmental impacts, etc.

**SF) 002 Experiment Notebook** (SF\_\_) – Notebook will explore the scientific method involving alternative/renewable energy sources. Information required. 1.) Hypothesis 2.) Research 3.) Experiment 4.) Measure 5.) Report or Redefine Hypothesis.

**SF) 003 Solar as Energy Display** (SF\_\_) **–** Item should be the original design of the 4-Her. Include the item, or a picture if item is in excess of 6’ tall or 2’ X 2’. Include a notebook of why the item was designed and how it harnesses the power of the sun. Examples include solar ovens, solar panels, etc.

**SF) 004 Water as Energy Display** (SF\_\_) – Item should be the original design of the 4-Her. Include the item, or a picture if item is in excess of 6’ tall or 2’ X 2’. Include a notebook of why the item was designed and how it harnesses the power of water

**SF) 005 Wind as Energy Display** (SF308) – Item should be the original design of the 4-H'er. Include the item, or a picture if item is in excess of 6’ tall or 2’ X 2’. Include a notebook of why the item was designed and how it harnesses the power of wind.

**SF) 006 Other Nebraska Alternative Energy** (SF\_\_) – Notebook should explore Nebraska an alternative energy source besides wind, water, and solar power. Include information on type of power chosen, infrastructure for distribution, what resources are needed to create this alternative resource, cost of production, and potential uses of bio-products.

**C) 901-903 County Only Display** – Any other item completed as part of this project

*****DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

***AREA: ROBOTICS***

 *CURRICULUM & RESOURCES*

 AREA RULES – ROBOTICS

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2. 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.
	3. Posters can by any size up to 14” x 22”.
	4. Team Entries: 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.
	5. Creating a video of your robot in action is recommend but is not mandatory. Present as a CD with your robot entry.

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| Virtual Robotics  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |
| Junk Drawer Robotics Level 1 | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |
| Junk Drawer Robotics Level 2 | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |
| Junk Drawer Robotics Level 3 | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |
| Robotics Platforms | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |

**DEPARTMENT H – DIVISION 861 - ROBOTICS**

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| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 861 | 001-007 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |
| 861 | 901-903 | 1 | $2.50 | $2.00 | $1.50 | $1.00 |

**SF) 001 Robotics Poster** (SF236) – Create a poster 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.

**SF) 002 Robotics Notebook** (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, or any of the topics suggested in Class 1 or junk drawer robotics level 3 and 4.

**SF) 003 Robotics Video** (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 pseudocode and screenshots of the actual code with a written description of the icon/command functions.

**SF) 004 Robotics Careers Interview** (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. Multimedia reports should be between 3 to 5 minutes.

**SF) 005 Rotation Sensor Notebook** (SF241) – Write pseudocode which includes at least one sensor activity. Include the code written and explain what the code function is and how you would change it to improve either the function or the code.

**SF) 006 Build a Robot (may use kit)** (SF243) – Include a robot and a notebook including the pseudo 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” wide and 20” tall they may not be displayed in locked cases. We recommend that you submit the project under class SF) 003 – Robotics Video. Junk Drawer Robotics do not quality.

**SF) 007 Kit Labeled Robot (cannot be programmed)** (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” wide and 20” tall they may not be displayed in locked cases. We recommend that you submit the project under class SF) 003 – Robotics Video.

**C) 901-903 County Only Display** – Any other item completed as part of this project

*****DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

***AREA: WELDING***

 *CURRICULUM & RESOURCES*

|  |  |  |  |
| --- | --- | --- | --- |
| Arcs and Sparks: Shielded Metal Arc Welding |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |

 AREA RULES – WELDING

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2. 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.
	3. Display or posters can by any size up to 28” x 22” x .25”. Nothing should be mounted within 3/4 inch of the top or bottom of the board or poster.
	4. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit. Demonstration boards should include an overall title for the display, plus other necessary labeling.
	5. Display Boards
		+ On display board attach each weld on a wire loop hinge or equivalent, so the judge can look at the bottom side of the weld when necessary. Attach a wire to display board so it can be hung like a picture frame.
		+ If no plans are included with welding article or welding furniture, item will be disqualified.
		+ Each weld should be labeled with information stated
			1. type of welding process (stick, MIG, TIG, Oxy-Acetylene, etc.)
			2. kind of weld
			3. welder setting
			4. electrode/wire/rod size
			5. electrode/wire/rod ID numbers.
	6. Welding Joints
		1. All welds should be made with the same electrode/wire/rod size and number.
		2. Welds should be made only on one side of metal so penetration can be judged.
		3. Welds should be cleaned with chipping hammer and wire brush. Apply a coat of light oil (penetrating oil) to the metal to prevent rusting. Wipe off excess oil.
		4. It is suggested that all welds be on the same size and thickness of metal. These pieces, referred to as coupons, should be 1 ½” to 2” wide and 3 ½” to 4” long. A good way to get this size is to buy new cold rolled strap iron and cut to length. The extra width is needed to provide enough metal to absorb the heat from the welding process and prevent the coupons from becoming too hot before the bead is completed. Narrower coupons will become very hot, making an average welder setting too sold at the bead start, just about right in the middle and too hot at the end. The correct way to weld narrow strips is to make short beads and allow time to cool, however this project requires a full length bead.
			1. Stick welding – Suggested coupon thickness is 1/4” if using 1/8” rod. Suggested rod AC and DC straight or reverse polarity-first E-7014, second E-6013
			2. MIG Welding – Suggested coupon thickness is 1/4” if using .035 wire and 1/8” if using .023 wire
			3. Oxy-Acetylene – Suggested coupon thickness is 1/8”. Suggested rod – 1/8” mild steel rod
	7. 2 Position Welds
		1. It is suggested that all welds be on the same size and thickness of metal. These pieces are referred to as coupons. The welds can be on one coupon that is about 4” x 4” or on individual coupons that are about 2” x 4” inch and ¼” thick. Suggested rods for this class of position welds for AC and DC straight or reverse polarity is, first E-6013, second E-7014 and E-6010 for DC reverse polarity only.
		2. Welds should be cleaned with a chipping hammer and wire brush. Apply a coat of light oil (penetrating oil) to the metal to prevent rusting. Wipe off excess oil.
	8. Welding Article
		1. All welds should be cleaned and protected from rust with paint or light oil. Plans are to be complete enough that if they were given to a welding shop, the item could be made without further instructions. Bill of materials should include a cost for all items used including steel, electrodes, paint, wheels, etc.

**DEPARTMENT H - DIVISION 920 – WELDING**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 920 | 001-005 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |
| 920 | 901-903 | 1 | $2.50 | $2.00 | $1.50 | $1.00 |

**SF) 001 Welding Joints** (SF281) – A display of one butt, one lap and one fillet weld.

**SF) 002 Position Welds** (SF281) – A display showing three beads welded in the vertical down, horizontal and overhead positions.

**SF) 003 Welding Article** (SF281) – Any shop article where welding is used in the construction. 60% of item must be completed by 4-Her and notes regarding laser welding or machine welding must be included. All plans, plan alternations, and a bill of materials must be attached to the article. Project plans with a cover. If project is designed to be outside it is required to have appropriate outdoor finish because project may be displayed outside.

**SF) 004 Welding Furniture** (SF282) - any furniture with 75% welding is used in the construction. 60% of item must be completed by 4-Her and notes regarding laser welding or machine welding must be included. All plans, plan alternations, and a bill for materials must be attached to the article. Protect plans with a cover. If project is designed to be outside it is required to have appropriate outdoor finish because item may be displayed outside.

**SF) 005 Plasma Cutter/Welder Design** (SF\_\_) – Plasma cutters/welders allowed for detailed design(s) to butt cut into metal. 4Hers will create a notebook describing the design process to create the “artwork” to butt cut into the metal. This exhibit is not eligible for entry at the State Fair. In the notebook include: A) photo (front and back) of the finished project. Also include detailed photographs of the project to allow judges to examine cuts. B) Instructions on how the design was created, this allows for replication of the project C) Lessons learned or improvements to the project

**C) 901-903 County Only Display** – Any other item completed as part of this project.

*****DEPARTMENT: SCIENCE, ENGINEERING, & TECHNOLOGY*

**AREA: WOODWORKING**

 *CURRICULUM & RESOURCES*

 AREA RULES – WOODWORKING

* 1.  **Entries which do not include required information or formatting requirements will be lowered one ribbon placing.**
	2.  **Youth can ONLY enter exhibits into ONE Woodworking Unit.**
		1. Youth enrolled in projects should continue their skill development. Once they have exhibited in a higher level, they are not eligible to exhibit in a lower level. Ex. Once you exhibit in Unit 2, you are not eligible to exhibit in Unit 1.
	3. All articles exhibited must include a plan (with drawings or sketch or blueprint) stating dimensions and other critical instructions a builder would need to know how to build the project. Plans may include narrative instructions in addition to the dimension drawings and include any alternations to the original plan. Part of the score depends on how well the project matches the plans. If the plans are modified, the changes from the original need to be noted on the plans. All plans used for making the article must be securely attached and protected by a clear plastic cover.

|  |  |  |  |
| --- | --- | --- | --- |
| Woodworking Wonders 1: Measuring Up | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg |  |  |
| Woodworking Wonders 2: Making the Cut | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\1.jpg |  |  |
| Woodworking Wonders 3: Nailing It Together |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\2.jpg |  |
| Woodworking Wonders 4: Finishing Up |  |  | C:\Users\kblack6\AppData\Local\Temp\Temp1_B.zip\3.jpg |

**DEPARTMENT H – 911 – WOODWORKING**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Division* | *Class* | *Pay* | *Purple* | *Blue* | *Red* | *White* |
| 911 | 901-908 | 1 | $2.50 | $2.00 | $1.50 | $1.00 |
| 911 | 001-002, 005 | 2 | $4.00 | $3.00 | $2.00 | $1.00 |
| 911 | 003, 004, 006, 010 | 3 | $6.00 | $4.00 | $2.00 | $1.00 |

*MEASURING UP – UNIT I*

**C) 901 Woodworking Article** (SF91) – Item made using skills learned in the Measuring Up manual. Examples include: recipe holder, stilts or other skill level appropriate item. Items should be entered with construction plans.

**C) 902 Woodworking Display** (SF91) – Display exemplifying one of the principles learned in the Measuring Up project.

**C) 903 Other Items: Unit I** (SF91) – Other article as shown in Woodworking Unit I manual or comparable.

*MAKING THE CUT – UNIT II*

**C) 904 Woodworking Article** (SF91) – Item made using skills learned in the Making the Cut Manual. Examples Include: birdhouse, foot stool, and napkin or letter holder. Items should be entered with construction plans.

**C) 905 Woodworking Display** (SF91) – Display exemplifying one of the principles learned in the Making the Cut project.

**C) 906 Other Items: Unit II** (SF91) – Other article as shown in Woodworking Unit II manual or comparable.

*NAILING IT TOGETHER – UNIT III*

**SF) 001 Woodworking Article** (SF91) – Item made using skills (joints, hinges, dowels, or a dado joining) learned in the Nailing it Together manual. Examples include: bookcase, coffee table or end table. Item is required to be appropriately finished.

**SF) 002 Woodworking Display** (SF91) – Display exemplifying one of the principles learned in the Nailing It Together project. Examples include: measuring angles, wood lamination and joint types.

**SF) 005 Recycled Woodworking Display** (SF91) – Article made from recycled, reclaimed or composite wood. Article must be appropriately finished and/or sealed and utilize one or more woodworking techniques from page 2 of the Unit 3 manual.  **Exhibit must include the woodworking plan and a minimum one-page report of how the engineering design process was used to develop the woodworking plan.**

Engineering Design Process

* State the problem (Why did you need this item?)
* Generate possible solutions (How have others solved the problem? What other alternatives or designs were considered?)
* Select a solution (How does your solution compare on the basis of cost, availability, and functionality?)
* Build the item (What was your woodworking plan, and what processes did you use to build your item?)
* Reason for article finish (what type of finish, how did you finish or why you choose this finish?)
* Evaluate (How does your item solve the original need?)
* Present results (How would you do this better next time?)

**C) 907 Other Items: Unit III** (SF91) – Other article as shown in Woodworking Unit III manual or comparable.

*FINISHING UP – UNIT IV*

**SF) 003 Woodworking Article** (SF91) – Item made using skills learned in the Finishing It Up Project. Examples include: dovetailing, making a pen using lathe, overlays, using a router, etc. Item is required to be appropriately finished.

**SF) 004 Woodworking Display** (SF91) – Display exemplifying one of the principles learned in the Finishing It Up Project. Examples Include: career opportunities, types of finishes or dovetailing.

**SF) 006 Recycled Woodworking Display** (SF91) – Article made from recycled, reclaimed or composite wood. Article must be appropriately finished and/or sealed and utilize one or more woodworking techniques from page 2 of the Unit 4 manual.  **Exhibit must include the woodworking plan and a minimum one-page report of how the design and engineering process was used to develop the woodworking plan.**

Engineering Design Process

* State the problem (Why did you need this item?)
* Generate possible solutions (How have others solved the problem? What other alternatives or designs were considered?)
* Select a solution (How does your solution compare on the basis of cost, availability, and functionality?)
* Reason for article finish (What type of finish, how did you finish or why you choose this finish?)
* Build the item (What was your woodworking plan, and what processes did you use to build your item?)
* Evaluate (How does your item solve the original need?)
* Present results (How would you do this better next time?)

**SF) 010 Careers Interview** (SF239) – Interview someone who is working in the field of woodworking and research that career. Interviews can either be written or in a multimedia format (CD/DVD). Written reports should be 3 to 5 pages. Multimedia reports should be between 3 to 5 minutes.

**C) 908 Other Items: Unit IV** (SF91) – Other article as shown in Woodworking Unit IV manual or comparable.