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**WELCOME TO
2019 MERRICK COUNTY FAIR
JULY 27-31
4-H, FFA & OPEN CLASS EXHIBITS**

**YOUR MERRICK COUNTY AGRICULTURAL
AND FAIR ASSOCIATION**

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Isaac Jefferson.....Vice President
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Steve Melvin, Extension Educator
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Merrick County Fairboard Office-308-940-0884

Merrick County Extension Office-308-946-3843

**RULES AND REGULATIONS
MERRICK COUNTY'S 66th
FREE FAIR**

1. Exhibits will get their entry card at each department where they wish to enter articles.
2. Open Class entries should be made Sunday, July 28, 1:00 - 4:00 p.m.
3. 4-H exhibits will be entered on Sunday, July 28, 1:00 p.m. - 4:00 p.m.
 - Youth hogs must be in place by 11:00 a.m.
 - Youth poultry and rabbits must be in place by 1:00 p.m.
 - Youth sheep and goats must be in place by 1:00 p.m.
 - Youth market beef must be in place by 3:00 p.m.
 - Youth breeding beef and bucket calves must be in place by 4:00 p.m.
4. Individuals or firms will be permitted to enter as many animals as they wish in any one Open Class.
5. No ribbon will be given out until animals are properly checked-in with the superintendent of that area. Animals judged according to merit.
6. All livestock owners will have their pens cleaned by 7:00 a.m. each day and put pen cleanings in the designated area.
7. Articles or livestock shown at previous fairs or not handcrafted by the exhibitor will not be eligible for exhibit.
8. Exhibit building will be open Monday, Tuesday and Wednesday from 8:00 a.m. - 10:00 p.m.
9. 4-H and Open Class exhibits will be released from 7:00 a.m. - 10:00 a.m. on Thursday. Premiums will be paid at that time for Open Class only.

IF YOU WANT SPACE

Either for exhibits or commercial booths, arrangements must be made at once! Even if you had a booth or exhibit last year, you must make a new reservation this year. Contact Laurie Johnson (308-940-3121) at once!

4-H AND FFA DEPARTMENT

1. It is the policy of the University of Nebraska - Lincoln, Institute of Agriculture and Natural Resources and Merrick County 4-H Council not to discriminate on the basis of sex, age, handicap, race, color, religion, marital status, veteran status, national or ethnic origin or sexual orientation.
2. All exhibits are at the exhibitor's risk. The Merrick County Ag Society and Merrick County 4-H Council are not responsible for any damage, loss or death to an exhibit or animal.
3. If a project item or animal is shown at another county fair as a 4-H, FFA or Open Class project it is NOT eligible for competition in Merrick County. It will be disqualified.
4. Judges will place awards on the basis of merit. They will be instructed to use the group method similar to the plan followed by the Nebraska State Fair, whereby exhibits of nearly equal merit will receive equal ribbons.

Purple - Superior
Orange- Flops

Blue - Excellent
Lime Green- Afterschool Project

Red - Good

White - Needs Improvement

- The judges decision will be final in all classes. Awards will be given according to the rules and regulations set forth in this premium list.
5. 4-H AGE REGULATIONS - The age regulations for Merrick County 4-H membership as determined by the Merrick County 4-H Executive Council shall be that a member must be 8 years of age before Jan. 1 of the current year (turn 9 during the current year) and the last year of eligibility is 4-H age 18 on Jan. 1 (or the calendar year the member becomes 19).
 6. FFA members may exhibit livestock until the age of 21.
 7. 4-H and FFA members show together in livestock, crops and plant science. The total number of animals shown is indicated at the beginning of each species area. 4-H and FFA will follow the rules according to this fairbook.

CLOVER KIDS GUIDELINES:

- a) The 4-H Clover Kid Program is for youth between the ages 5 - 7 years old by January 1 of the current calendar year. 4-H Clover Kid exhibitors must be enrolled as a 4-H member by June 15..
- b) Clover Kid animal exhibits are to be no more than six months of age and no more than 350 pounds at time of show, with the exception of small animals (dog, cat, etc.) Age, size, and temperament of animal projects must be appropriate for the exhibitor's age and size. Clover Kids will only show in showmanship classes, no market or breeding classes. The horse project is not available for Clover Kids.
- c) Clover Kids may exhibit at the county fair and participate in 4-H contests receiving special ribbons with a premium of \$1.00. However, they will not be eligible for participation in the Livestock Sale, and will not be considered for any incentive, championship, trophy, medal or plaque competition on an individual basis. They will be considered as part of a club or group competition in such activities as booth, herdsmanship or performing arts contest.
- d) Clover Kids have a section where all of the projects are appropriate for their age, this section can be found on page 63.

ELIGIBILITY REQUIREMENTS FOR EXHIBITORS: An exhibitor must be a 4-H member enrolled in the project they are exhibiting.

8. All 4-H exhibits that do not conform to the specifications, rules and regulations set forth in this premium list will drop one ribbon placing.
9. Be sure to check the number of entries per project and entry number for each division. **All divisions and sections other than livestock have only one entry per class number.**
10. Premiums will be paid when the 4-H member submits a completed Record Book/Career Portfolio to the Extension Office. Records are DUE in the Extension Office, October 1. Premium money will be available at the year-end 4-H Achievement Celebration. If premium money is not picked up by December 1, monies will be turned back to the Merrick County Ag Society.
11. An * indicates an exhibit is eligible for State Fair. All items eligible for State Fair must receive a purple ribbon. In classes where presence of the 4-Her is required for judging purposes, such as animal exhibits, judging contests, presentations, and fashion show, a 4-H member must be 10 years of age by January 1, of the current year, or become 11 years of age during the current year. The last year of eligibility is the calendar year the member becomes 19 years of age.
12. All exhibitors showing beef, dairy, meat goat, sheep, hogs, rabbits, poultry, cats, dogs and other small animals are required to wear the required 4-H/FFA T-Shirt. Exhibitors in the horse show will wear a white long sleeve shirt or blouse, and a 4-H armband. The 4-H armband may be purchased for \$3.00. Exhibitors of beef, dairy, meat goat, sheep, hogs, dogs, rabbits, poultry, cats and other small animals will show without any hats, caps or other headgear.
13. An exhibit or exhibitor must be at least blue ribbon quality before a rosette or award is awarded, and the judge must deem it worthy of the award.
14. Substance Abuse - Use or possession of tobacco, alcoholic beverages or drugs (except for medical purposes) by any exhibitor who is participating in 4-H/FFA at the Merrick County Fair will result in immediate disqualification of that exhibitor's entry.
15. PROTESTS
 - a. The respective division superintendent has the authority to make appropriate decisions based on the Premium List, and these will be adhered to by all.
 - b. A committee shall be appointed to serve as a protest group. They will meet daily if needed to act upon concerns. All protests must be submitted in writing and signed.
 - c. Written protests must be submitted to the Extension Educator. He/She will then convene the committee for their deliberation.
 - d. The written protest must include:
 - i. Names of persons involved.
 - ii. Nature of concerns.
 - iii. Situation and documentation.
 - iv. Recommendations for correction.
 - v. Specific action, rule, etc. in question.
 - vi. Additional persons committee may contact for further clarification.
 - vii. Procedures and/or steps carried out by person involved prior to submission to the Extension Educator.
 - e. The committee will review the written protest. They may discuss the situation with affected persons and show official to include county fair management if appropriate, to make a final decision. The committee will recommend appropriate action to management in writing. The recommendations will be followed and communicated both verbally and in writing to the group or individual affected.

- f. In case of protest the exhibitor may be allowed to show, but results of showing will be subject to change based on the outcome of the protest process. This allows for smooth operation of the show and facilitates appropriate processing.
- g. The management reserves the right to withhold premium and/or award. The exhibitor may also be excluded from the show if action warrants.
- h. The appeals process is limited to the 4-H exhibitor, parent or volunteer leader.
- i. Protests will not be accepted after the exhibit is released from the 4-H Division.

4-H PRE-FAIR ACTIVITIES AND 2019 MERRICK COUNTY FAIR

Feb. 7 (Thurs.)	6:00 p.m.	Junior Indoor Archery Contest - 4-H Building
Feb. 14 (Thurs.)	6:00 p.m.	Intermediate & Senior Indoor Archery Contest - 4-H Building
April 8 (Mon.)	6:30 p.m.	Public Speaking & PSA Contest - 4-H Building
April 14 (Sun.)	4:00 p.m.	BB Gun, Air Rifle and Air Pistol Contests - 4-H Building
April 15 (Sun.)	5:00 p.m.	DUE State Fair/Ak-Sar-Ben Market Beef DNA Envelopes - Extension Office
April 27 (Sat.)	1:00 p.m.	Shotgun Contest - Sportsman's Club
May 10 (Fri.)	5:00 p.m.	DUE State/District Horse Entry Forms, ID's and Levels Testing - Extension Office
May 20 (Mon.)	6:00 p.m.	Performing Arts & Presentation Contests - Cottonwood Estates, Central City
June 14 (Fri.)	5:00 p.m.	DUE ALL State Fair Livestock DNA Envelopes (except Market Beef) - Extension Office
	5:00 p.m.	DUE ALL Required County Animal ID's, YQCA (Youth for the Quality Care of Animals) - Extension Office
July 10 (Wed.)	5:00 p.m.	DUE ALL Static, Animal, Clothing Pre-entries - Extension Office
July 13 (Sat.)	8:00 a.m.	Hunting Skills Contest - Fairgrounds
July 13 (Sat.)	9:00 a.m.	Outdoor Archery Contest - Fairgrounds
July 20 (Sat.)	9:00 a.m.	Bicycle Rodeo Contest - Fairgrounds
	1:00 p.m.	Ice Cream Roll Contest - 4-H Building
	3:00 p.m.	Culinary Challenge (Favorite Foods Revue) Contest - 4-H Building
July 23 (Tue.)	8:00 a.m.	Clothing Construction & Fashion Show Judging - 4-H Building
	7:30 p.m.	4-H Night - 4-H Building
July 27 (Sat.)	7:00 a.m.	4-H Horse Show - Indoor Arena
July 28 (Sun.)	8 a.m.-11 a.m.	Hog Weigh-in & Check-in
	11 a.m.-1 p.m.	Poultry & Rabbit Check-in
	11 a.m.-1 p.m.	Sheep & Goat Weigh-in & Check-in
	1 p.m.-3 p.m.	Market Beef Weigh-in & Check-in
	1 p.m.-4 p.m.	Static Exhibit Check-in
	1 p.m.-4 p.m.	Bucket Calf Check-in, DUE Clover Kids Record/Story
	1 p.m.-4 p.m.	Breeding Beef Check-in, DUE Beef Production Books
	5:00 p.m.	Livestock Judging Contest
July 29 (Mon.)	7:30 a.m.	Hog Show: 4-H Showmanship, Clover Kids, FFA Showmanship, Market, Breeding - Indoor Arena
	9:00 a.m.	Rabbit Show, Poultry Show immediately following - Poultry & Rabbit Barn
	1:30 p.m.	Sheep Show: 4-H Showmanship, Clover Kids, FFA Showmanship, Market, Breeding - Indoor Arena
		Meat Goat Show immediately following: 4-H Showmanship, Clover Kids, FFA Showmanship, Market, Breeding - Indoor Arena
	4:00 p.m.	Dairy Show: 4-H Showmanship, Clover Kids, FFA Showmanship, Breeding - Indoor Arena
July 30 (Tue.)	7:30 a.m.	Beef Production Judging - Extension Office & Livestock Barn
	8:00 a.m.	Beef Show: 4-H Showmanship, FFA Showmanship, Clover Kids, Bucket Calves, Market, Feeder Calves, Breeding, Fitting Contest - Indoor Arena
July 31 (Wed.)	8:00 a.m.	4-H Dog Show - Check in begins in the Annex Building
	9:30 a.m.	FFA Tractor Driving Contest - Northwest corner of Fairgrounds
	11:00 a.m.	County Kid's Pet Show Sponsored by Merrick County 4-H Jr. Leaders. Any child may bring any pet to show. Show will be held on the concrete of the indoor arena. Please register pet 15 minutes prior to the show. Pets must be taken home immediately after the show.
	1:00 p.m.	Frog/Toad Jumping Contest Sponsored by Merrick County 4-H Jr. Leaders in front of old 4-H Building
	2:00 p.m.	4-H Cat Show, 4-H Companion Animal Show immediately following - Indoor Arena
	4:00 p.m.	4-H Overall Livestock Showman Contest - Indoor Arena
	5:45 p.m.	4-H & FFA Member Group Picture - Indoor Arena
	6:00 p.m.	Livestock Sale - Indoor Arena
August 1 (Thur.)	1 a.m.-10 a.m.	Release ALL Livestock
	6 a.m.-10 a.m.	Release ALL Poultry & Rabbit
	7 a.m.-8:30 a.m.	FREE EXHIBITOR & FAMILY BREAKFAST sponsored by Central City Area Chamber of Commerce
	8 a.m.-10 a.m.	Release ALL Static Exhibits
August 2 (Fri.)	8 a.m.-5 p.m.	Fair Recovery Extension Office Closed
Tentatively September 7 (Sat)	8:30 a.m.	Small Bore Rifle (.22) Contest and Pistol Pistol (.22) Contest - Sportsman's Club

SUPERINTENDENTS

Foods – TBD

Beyond the Needle – TBD

STEAM Clothing 1 & 2 – Candice Muller

STEAM Clothing 3 & Quilt Quest – Darcy Ray

Fashion Show – Kendra Jefferson & Jamie Wright

Home Environment – Lana Bushhousen & Sydney Bushhousen

Consumer & Family Sciences – Janice Stuhmer

Clover Kids – Nikki Ferraro

Agriculture, Environmental Science, Plant Science – Larry & Tracy Myers, Doug & Kelly McHargue

Horse – Russ & Carolyn Kucera

Trail Class – Violet Crouch

Hogs – Brian Jefferson & Isaac Jefferson

Sheep & Meat Goat – Craig Nelson & Jon Root

Beef – Kane Brandes & Ryan Kucera

Poultry & Rabbits – Gaylene & Wayne Bennett

Herdsmanship – Dylan Ferris

Cats & Companion Animal – Gaylene & Wayne Bennett

Dog – Kim & Travis Stuhmer

Overall Livestock Showman – Mikaela Wilshusen & Sara Umstead

Bicycle Rodeo – Brian Jefferson

BB Gun & Rifle – Ryan Zmek & Aaron Wells

Air Pistol & .22 Pistol – Brock Ekhoﬀ & Buck Umstead

Shotgun – Craig Nelson & Aaron Heins

Indoor Archery – Sara Umstead, Mike Siwinski & Aaron Blanchard

Outdoor Archery – Aaron Blanchard & Scott Goyette

Hunting Skills – Renee Ekhoﬀ

FFA Tractor Driving Contest – Gary Maresh

Livestock Judging Contest – Dennis Mottl, Juliana Kroeger, Darcy Ray & Jen Myers

FFA – Gary Maresh, Dennis Mottl, Juliana Kroger & Jessica Brondel

Air Pistol & Small Bore - Brock Ekhoﬀ & Buck Umstead

Indoor Archery - Sara Umstead, Mike Siwinski & Aaron Blanchard

Outdoor Archery - Aaron Blanchard & Scott Goyette

BB Gun & Rifle - Aaron Wells & Ryan Zmek

Hunting Skills - Renee Ekhoﬀ

Shotgun - Craig Nelson & Aaron Heins

**THANK YOU TO THE FOLLOWING BUSINESSES AND INDIVIDUALS FOR
SPONSORING TROPHIES, INCENTIVES AND SPECIAL AWARD**

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- Bill's Volume Sales
- Brandes Brothers
- Brian and Kendra Jefferson
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- Central City Sportsman's Club
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- Greenway Funeral Home
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- Grosshans Inc.
- Husman Angus Farms
- In memory of Dan Samuelson
- In memory of Donna Ferris
- In memory of Earl Meyer
- In memory of Lois Schank
- In memory of Lyle Reiken
- J & S Meter & Seed
- JAG Acres
- Kent and Lynda Frenzen
- Lone Tree Antique Tractor Club
- Marilyn Heins
- Lone Tree Towing
- Matt and Becky Mottl
- Merrick County 4-H Council
- Mid Nebraska Feeds
- Mr. K Angus, Kurt Kuhn
- NNTC Clarks
- Palser Service, Inc
- Silver Creek Insurance
- Subway
- Sullivan Agency

SCIENCE, ENGINEERING & TECHNOLOGY

Superintendents Larry and Tracy Myers & Doug and Kelly McHargue

GENERAL RULES

- A. The name of the exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of exhibit may be identified if the entry tag is separated from the exhibit.
- B. Each individual is limited to one exhibit per class.
- C. Several classes require a display board which should be a height of 24 inches and not to exceed 1/4" in thickness. A height of 23 7/8" is acceptable to allow for the saw kerf (width) if two 24 inch boards are cut from one end of a 4' X 8' sheet of plywood. Nothing should be mounted within 3/4" 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.

HARD LUCK CLASS SCIENCE, ENGINEERING & TECHNOLOGY

HL-900-001. An exhibit and a written story about any exhibit that did not turn out the way it was planned. Include what happened, what you learned and what you will do differently next time.

CAREERS INTERVIEW

PREMIUM: Purple \$3.00; Blue \$2.50; Red \$1.50; White \$1.00

***H-930-001.** Careers Interview—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). 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

WOODWORKING - one entry per class number.

Requirements:

- 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 alterations 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.
- ONLY exhibits in Unit 3 or Unit 4 will be considered for State Fair.
- All projects must have appropriate finish.
- If the project (i.e. picnic tables, wishing wells, swings, chairs, bridges, dog houses, etc.) is designed to be used outside, it may be displayed outside.

Woodworking Wonders 1 – Measuring Up

PREMIUM: Purple \$2.00; Blue \$1.50; Red \$1.00; White \$.50

H-911-020. Article: Item made using skills learned in the Measuring Up manual

Woodworking Wonders 2 – Making the Cut

PREMIUM: Purple \$2.00; Blue \$1.50; Red \$1.00; White \$.50

H-911-030. Article: Item made using skills learned in the Making the Cut manual.

Woodworking Wonders 3 – Nailing It Together

PREMIUM: Purple \$2.50; Blue \$2.00; Red \$1.50; White \$1.00

***H-911-001.** Article: Item should be made using either joints, hinges, dowels, or a dado joining made using skills learned in the Nailing It Together manual. Item is required to be appropriately finished. Examples include: bookcase, coffee table or end table.

***H-911-002.** Display: Display exemplifying one of the principles learned in the Nailing It Together project. Examples include: measuring angles, wood lamination and joint types.

***H911-003.** Recycled Display – 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

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

Woodworking Wonders 4 – Finishing Up

PREMIUM: Purple \$2.50; Blue \$2.00; Red \$1.50; White \$1.00

***H-911-004.** Article: Item made using skills learned in the Finishing It Up manual. Examples include dovetailing, making a pen using lathe, overlays, using a router, etc. Item is required to be appropriately finished

***H-911-005.** Display: Display exemplifying one of the principles learned in the Finishing It Up project. Examples include: career opportunities, types of finishes, or dovetailing.

***H-911-006.** Recycled Display – 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

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

WELDING- All metal welding processes accepted.

RULES:

1. The name 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.
2. 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.)
3. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
4. Demonstration boards should be sanded and finished to improve their appearance.
5. Demonstration boards should include an overall title for the display, plus other necessary labeling.
6. 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.

ARCS AND SPARKS- one entry per class number.

- All welds exhibited in class 1 or 2 must be mounted on a 12" high x 15" long display board of thickness not to exceed 3/8".
- Attach each weld on a wire loop hinge or equivalent, so the judge can look at the bottom side of the weld when necessary.
- 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 numbers. 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.
- Protect 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.
- 4-H Welding Project Tips and Suggestions: Class 1
 - 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 1.5 to 2 inches wide and 3.5 to 4 inches 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 cold 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. Stick welding: Suggested coupon thickness -1/4" if using 1/8" rod. Suggested rod-AC and DC straight or reverse polarity-first E-7014, second E-6013. MIG welding: Suggested coupon thickness -1/4" if using .035 wire and 1/8" if using .023 wire. Oxy-Acetylene: Suggested coupon thickness -1/8". Suggested rod-1/8" mild steel rod.
- 4-H Welding Project Tips and Suggestions: Class 2

- 1) It is suggested that all welds be on 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.
 - 4-H Welding Project Tips and Suggestions: Class 3 & 4
- 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.

PREMIUM: Purple \$2.00; Blue \$1.50; Red \$1.00; White \$.50

***H-920-001.** Welding Joints -a display of one butt, one lap, and one fillet weld.

***H-920-002.** Position Welds - a display showing 3 beads welded in the vertical down, horizontal and overhead positions.

***H-920-003.** Welding Article - any shop article or piece of furniture where welding is used in the construction. 60% of item must be completed by 4Her and notes regarding laser welding or machine welding must be included. All plans, plan alterations and a bill for materials must be attached to the article.

***H-920-004.** Welding furniture – any furniture with 75% welding is used in the construction. 60% of item must be completed by 4Her and notes regarding laser welding or machine welding must be included. All plans, plan alterations, dimensions and a bill for materials must be attached to the article.

H-920-005. Plasma Cutter/Welder Design – Plasma cutters/welders allowed for detailed design(s) to buttcut into metal. 4Hers will create a notebook describing the design process to create the “artwork” to butt cut into the metal. In the notebook include: a) 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.

H-920-006. Other - Forging, Welding, Blacksmithing, etc.

ELECTRICITY - one entry per class number. You must be in your third year of an electricity project to exhibit in electricity classes at the State Fair.

PREMIUM: Purple \$2.00; Blue \$1.50; Red \$1.00; White \$.50

Electric Excitement – Magic of Electricity

H-870-020. Bright Lights - Create your own flashlight using items found around your house. Flash lights should be made out of items that could be recycled or reused. No kits please.

H-870-021. Control the Flow - Make a switch. Use the following items: D cell battery, battery holder, insulated wire, 2 or 2.5 volt light bulb, bulb holder, paper clip, cardboard, and two brass paper fasteners to create a circuit that you can open and close.

H-870-022. Conducting Things - 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.

H-870-023. Is There a Fork in the Road - Use the following items to construct one parallel and one series circuit. Items: D cell battery, battery holder, insulated wire, bulb holder and a 2 or 2.5 volt light bulb.

H-870-024. Other project using skills from Unit I. May be combined with another project (ex. farmstead display, etc.)

Electric Excitement – Investigating Electricity

H-870-025. Case of the Switching Circuit - Use the following items: two D cell batteries, two battery holders, light bulb, bulb holder, a 3" x 6" piece of cardboard, six brass paper fasteners and approx. 2' of 24 gauge insulated wire to build a three way switch. Write a short essay or create a poster that illustrates how three-way switches function.

H-870-026. Rocket Launcher - Construct a rocket launcher out of the following materials: a plastic pencil box that is at least 4" x 8", single pole switch, single throw switch, normally-open push button switch, 40 feet of 18 or 22 gauge stranded wire, 4 alligator clips, 2x6 board 6" long, ½ inch diameter metal rod, rosin core solder, soldering iron or gun, wire stripper, small crescent wrench, pliers, small Phillips and straight blade screwdrivers, drill, 1/8 and 1/4 inch drill bits, rocket engine igniter, additional drill bits matched to holes for two switches. You must successfully build a rocket launcher and light two rocket igniters with your launcher. Create a poster using photographs to show the “step by step process” you used to build your launcher.

H-870-027. Stop the Crime - Build an ALARM using the following materials: On-off push button switch, mercury switch, buzzer-vibrating or piezoelectric, 9-volt battery, battery holder, 4" x 4" x 1/8" Plexiglass board to mount circuit on; rosin core solder, soldering gun/iron, 2' of 22 gauge wire, wire strippers, hot glue sticks, hot glue gun and a plastic box with a lid to mount your alarm circuit on. Create a poster using photographs to show the “step by step process” you used to build your alarm.

Electric Excitement – Wired for Power

***H-870-001.** Electrical Tool/Supply Kit - 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.

***H-870-002.** Lighting Comparison - Display studying the efficiency of various lighting (incandescent, fluorescent, halogen, Light Emitting Diodes, etc.). Exhibit could be a poster display, or an actual item.

***H-870-003.** Electrical Display/Item - 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.

***H-870-004.** Poster - Poster should exemplify one of the lessons learned in the Wired for Power Project. Posters can be any size up to 28" x 22".

Electric Excitement – Entering Electronics

***H-870-005.** Electrical/Electronic Part Identification - 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 contain a minimum of 10 different

parts.

***H-870-006.** Electronic Display - Show an application of one of the concepts learned in the Electronics project. Examples include: components of an electronic device (refer to page 35 of the manual).

***H-870-007.** Electronic Project - Exhibit an electronic item designed by the 4-Her or from a manufactured kit that shows the electronic expertise of the 4-Her. Examples include: a radio, a computer, or a voltmeter.

***H-870-008.** Electronic Poster - Poster should exemplify one of the lessons learned in the Entering Electronics Project. Posters can be any size up to 28" x 22".

H-870-009. Toy Electric Motor from Pre-Manufactured Kit - Working model of an electric motor. The motor should have the major parts labeled. A short, written description of how the motor works is to be included in a clear protective cover.

H-870-010. Electronic Equipment made from a purchased pre-manufactured kit. Include a report explaining purpose of item, operating instructions, and wiring diagrams. Include items needed to demonstrate operation of equipment if possible.

AEROSPACE - one entry per class number.

RULES:

1. The name 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.
 2. 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.)
 3. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
 4. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
 5. Demonstration boards should include an overall title for the display, plus other necessary labeling.
 6. 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 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 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 rocket 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.
 - Rockets entered with live engines, wrong base size or sideboards will be disqualified.
 - A report, protected in a clear plastic cover, must include:
 - ◆ Rocket specification (include original or photo of manufacture packaging stating rocket skill level)
 - ◆ A flight record for each launching (weather, distance and flight height)
 - ◆ Number of launchings
 - ◆ Flight pictures
 - ◆ Safety (how did you choose your launch site? Document safe launch, preparations, and precautions)
 - ◆ Objectives learned
 - ◆ Conclusions
 - The flight record may 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 at State Fair.
 - 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 maximum launch points given on the score sheet. For scoring for the State Fair, only actual launches count, misfires will not count towards one of the required three launches.
- 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 increase 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

PREMIUM: Purple \$2.00; Blue \$1.50; Red \$1.00; White \$.50

Aerospace 1

H-850-030. Rocket: Any skill level 1 rocket with wooden fins painted by hand or air brush.

H-850-031. Rocket Kit - Some assembly required. Rocket can be any size (Minimum of two launches). Plastic fins acceptable in this class.

Aerospace 2

***H-850-001.** Rocket: Any skill level 2 rocket with wooden fins painted by hand or air brush.

***H-850-002.** Display: 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".

***H-850-003.** Rocket: Any Skill Level 2 Rocket with wooden fins painted using commercial application (example commercial spray paint).

Aerospace 3

***H-850-004.** Rocket: Any skill level 3 rocket with wooden fins painted by hand or air brush.

***H-850-005.** Display: 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. Display can be any size up to 28" x 22".

***H-850-006.** Rocket: Any Skill Level 3 rocket with wooden fins painted using commercial application (example commercial spray paint).

Aerospace 4

***H-850-007.** Rocket: Any skill level 4 rocket with wooden fins or any self-designed rocket. 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.

***H-850-008.** Display: 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".

***H-850-009.** 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".

ROBOTICS - one entry per class number.

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

PREMIUM: Purple \$2.00; Blue \$1.50; Red \$1.00; White \$.50

***H-861-001.** Robotics Poster - 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-Her.

***H-861-002.** Robotics Notebook – 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 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.

***H-861-003.** Robotics Video - 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.

***H-861-004.** Robotics Careers Interview - 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.

***H-861-005.** Robotics Sensor Notebook - Write pseudocode which includes at least one sensor activity. Include the code written and explain the code function.

***H-861-006.** Build a Robot (may use kit) - Include a robot and notebook including the pseudocodes for at least one program you have written for the robot, the robot's 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, we recommend that you submit the project under class H-861-003-Robotics Video.

***H-861-007.** Kit Labeled Robot (cannot be programmed) – 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, we recommend that you submit the project under class H-861-003-Robotics Video.

JUNK DRAWER ROBOTICS - one entry per class number.

- All exhibits should be original designs made with everyday objects and materials.
- Exhibits should be based on directions in the Junk Drawer Robotics Notebook.
- Projects should include designs and worksheets from the manual and information.

Junk Drawer Robotics 1 – Give Robots a Hand

H-865-001. Marshmallow Catapult – Build a catapult that will launch a marshmallow.

H-865-002. Balance Beam Design – Modify catapult to be used as a balance beam.

H-865-003. Robot Arm – Design and build a robotic arm using levers to pick up and move a weight from one spot to another location.

H-865-004. Gripper – Design and build a gripper to pick up a ping pong ball, plastic golf ball, plastic egg or toy block.

H-865-005. Put It All Together – Combine the work of the robot arm, power source and gripper into one robot.

Junk Drawer Robotics 2 – Robots on the Move

H-865-006. Clip Mobile – Design and build a vehicle that can carry a box of paper clips down a ramp using items listed in robotics notebook.

H-865-007. Can-Can Robot – Design and build an electric motor powered robot made from a paper or plastic cup. The robot should be able to draw or make marks on a piece of paper.

H-865-008. Es-Car-Go – Design and build a vehicle that is powered by a motor and battery and uses a gear train to make it go slow and climb a ramp.

H-865-009. Underwater ROV – Design and build an underwater ROV that can be powered to go up and down in a tank of water.

Junk Drawer Robotics 3 – Mechatronics

H-865-010. Switch – Design and build a single pole double throw switch to control two different lights at the same time.

H-865-011. Robot – Build a robot that will travel around an object or wall using a sensor for control.

H-865-012. Breadboard – Create a working electronic circuit using a solderless breadboard.

H-865-013. Robot – Build a robot that will perform a specific task.

GEOSPATIAL- One entry per class number.

Youth enrolled in Geospatial or GEAR TECH21 may exhibit in any class within this division.

PREMIUM: Purple \$2.50; Blue \$2.00; Red \$1.50; White \$1.00

***H-880-001.** Poster- Create a poster (not to exceed 14” x 22”) 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.

***H-880-002.** 4-H Favorite Places or Historical Site Poster–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. Poster size should not exceed 14” X 22”.

***H-880-003.** GPS Notebook-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. 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.

***H-880-004.** Geocache-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 trinket, geo-coins, 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.

***H-880-005.** Agriculture Precision Mapping–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.

***H-880-007.** 4-H History Map/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://www.4-hhistorypreservation.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. (a minimum of one paragraph)

***H-880-008.** GIS Thematic Map – Using any GIS software, create a thematic. Thematic maps can utilize any subject of interest to the 4-Her. Example map would be Amelia Earhart’s or Sir Francis Drake’s voyage population density maps, water usage “x 11” 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.

***H-880-010.** Careers Interview–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 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.

PHYSICS/POWER OF WIND- one entry per class number.

PREMIUM: Purple \$2.50; Blue \$2.00; Red \$1.50; White \$1.00

***H-900-001.** Create and Compare Energy Resources Poster–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. Posters can be any size up to 28” by 22.”

***H-900-002.** Experiment Notebook–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.

***H-900-003.** Solar as Energy Display-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.

***H-900-004.** Water as Energy Display-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.

***H-900-005.** Wind as Energy Display –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 wind.

***H-900-006.** Other Nebraska Alternative Energy –Notebook should explore Nebraskan 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.

Resources:

<https://4-h.org/parents/national-youth-science-day/wired-for-wind/>
<http://web.cals.uidaho.edu/biodiesel/4-h-curriculum-for-ages-8-12/>

<https://4-h.org/parents/national-youth-science-day/biofuel-blast/>
<http://extension.oregonstate.edu/clackamas/energy-education-curriculum-lessons>

COMPUTERS- one entry per class number.

The name of 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.

Demonstration boards should include an overall title for the display, plus other necessary labeling.

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.

PREMIUM: Purple \$2.50; Blue \$2.00; Red \$1.50; White \$1.00

Computer Mysteries Unit 2

***H-860-001.** Computer Application Poster– 4-H exhibitor should use computer application to create a graphic notebook utilizing computer technology. 4-Her may create any of the following: greeting card (5 different cards such 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.

***H-860-002.** Produce a Computer Slideshow Presentation – Using presentation software like Microsoft PowerPoint 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 the 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.

Computer Mysteries Unit 3

***H-860-004.** Produce an Audio/Video Computer Presentation – 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.

***H-860-005.** How to STEM (Science, Technology, Engineering and Math) Presentation- 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.

***H-860-006.** Create a Website/Blog or App – Design a simple Website 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 website, 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.

***H-860-007.** 3D PRINTING Unique Items: 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:

- 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

***H-860-008.** 3D Pen Creation- 3D pens rapidly melt and cool plastic filament allowing the 4-H member 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.

*** H-860-009.** 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