

- CLASS 8** **3D Printing Prototypes** - 3D printing uses plastic or other materials to build a three-dimensional object from 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 complexity of the design and shape. 3D objects printed as part of the design process for robot or other engineering project or cookie cutter, be creative. Must include statement of what design question the prototype was supposed to answer and what was learned from the prototype. 3D printing will include a notebook with the following: Software used to create 3D design; Design or, if using a re-design, the original design and the youth's design with changes; and Orientation on how the object was printed.
- CLASS 901** **Careers Interview** – Interview someone who is working in the field of computers and 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 three to five pages, double-spaced, 12-point font, and 1" margins. Multimedia reports should be between three to five minutes in length.

ELECTRICITY

ELECTRICITY RULES

1. **GENERAL RULES** – See GENERAL RULES – SCIENCE, ENGINEERING & TECHNOLOGY
2. **TOP EXHIBITS** - A top exhibit will be selected from those exhibits receiving purple ribbons in the electricity division.
3. **MANUALS** – Printed materials are available from the Johnson County Extension Office for all currently enrolled 4-H members in Johnson County.

DEPARTMENT H PREMIUM	DIVISION 870	ELECTRICITY
Purple \$2.50	Blue \$2.00	Red \$1.50
		White \$1.00

Electricity – Magic of Electricity – Unit 1

- CLASS 901** **Bright Lights** – Create your own flashlight using items found from around your house. Flashlights should be made out of items that could be recycled or reused. No kits allowed.
- CLASS 902** **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 you can open and close.
- CLASS 903** **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.
- CLASS 904** **Is There a Fork in the Road** – Using the following items to construct one parallel and one series circuit. Items: D cell battery, battery holder, insulated wire, bulb holder, and a 1.2 or 1.5 volt light bulb.
- CLASS 905** **Electrical Poster** – Poster should exemplify one of the lessons learned in the *Magic of Electricity* project. Posters can be any size up to 28" x 22".

Electricity – Investigating Electricity – Unit 2

- CLASS 906** **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 approximately 2 feet 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.
- CLASS 907** **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, normal open push button switch, 40 feet of 18 or 22 gauge stranded wire, 4 alligator clips, 2" x 6" board (6" long), 1/8" 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" drill bits, rocket engine igniters, additional drill bits matched to holes for two switches. You may successfully build a rocket launcher and light two rocket igniters with your launcher. You DO NOT have to actually fire a rocket off of the launcher. Create a poster using photographs to show the step-by-step process you used to build your launcher.
- CLASS 908** **Stop the Crime** – Build an alarm using the following materials: on-off push button switch, mercury switch, buzzer-vibrating or piezoelectric, 9 volt battery, 9 volt battery holder, 4" x 4" x 1/8" Plexiglas board to mount circuit on, rosin core solder, soldering iron or gun, 2 feet of 22 gauge wire, wire strippers, hot glue sticks, hot glue gun, and plastic box with 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.
- CLASS 909** **Electrical Poster** – Poster should exemplify one of the lessons learned in the *Investigating Electricity* project. Posters can be any size up to 28" x 22".

Electricity – Wired for Power – Unit 3

- CLASS 1** **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.
- CLASS 2** **Lighting Comparison** – Display studying the efficiency of various lighting (incandescent, fluorescent, halogen, Light Emitting Diodes (LED), etc.) Exhibit could be a poster display or actual item.
- CLASS 3** **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.
- CLASS 4** **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".

Electricity – Entering Electronics – Unit 4

- CLASS 5** **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 include a minimum of 10 different parts.
- CLASS 6** **Electronic Display** – Show an application of one of the concepts learned in the *Entering Electronics* project. Examples include: components of an electronics device (refer to page 35 of the project manual).
- CLASS 7** **Electronic Project** – Exhibit an electronic item designed by the 4-H exhibitor or from a manufactured kit that shows the electronic expertise of the 4-Her. Examples include: a radio, computer, or a volt meter.
- CLASS 8** **Poster** – Poster should exemplify one of the lessons learned in the *Entering Electronics* project. Posters can be any size up to 28" x 22".
- CLASS 10** **Careers Interview** – Interview someone who is working in the field of electricity and 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 three to five pages, double-spaced, 12-point font, and 1" margins. Multimedia reports should be between three and five minutes in length.

LEGO BUILDING

LEGO BUILDING RULES

1. **GENERAL RULES** – See GENERAL RULES – SCIENCE, ENGINEERING & TECHNOLOGY
2. **LABELING** – Each exhibit must have name and age attached.
3. **EXHIBITS** – The exhibits in Lego Building are educational exhibits.

LEGO BUILDING EXHIBIT (MODEL) – An exhibit that is made from a set design of plans or a model that includes directions on how to construct.
LEGO BUILDING EXHIBIT (ORIGINAL) – An exhibit that is original creation of the exhibitor and not is made from a set design of plans or a model.

4. **EXHIBITING** – All Lego exhibits must be displayed on a board so they may be moved easily.
5. **SUPPORTING INFORMATION** – All exhibits must include a half page describing what steps were taken to create the entry and what was learned in the process of creation. All exhibits lacking supporting information will be drop a ribbon placing.
6. **DISCLAIMER** – The Johnson County 4-H program and Extension Office will try to exhibit the models so they are safe but will not be responsible for lost items.
7. **TOP EXHIBIT** – A top exhibit will be selected from those exhibits receiving purple ribbons in the Lego building division.

DEPARTMENT H		DIVISION 881			LEGO BUILDING
PREMIUM	Purple \$2.50	Blue \$2.00	Red \$1.50	White \$1.00	
CLASS 901	Lego Model (500 pieces or less)				
CLASS 902	Lego Model (501 pieces or more)				
CLASS 903	Lego Original (500 pieces or less)				
CLASS 904	Lego Original (501 pieces or more)				

ROBOTICS

ROBOTICS RULES

8. **GENERAL RULES** – See GENERAL RULES – SCIENCE, ENGINEERING & TECHNOLOGY
9. **ENROLLMENT** – Youth enrolled in Robotics Explorer, Robotics Probe or GEAR TECH 21 may exhibit in any class within this division.
10. **TOP EXHIBIT** – A top exhibit will be selected from those exhibits receiving purple ribbons in the robotics division.
11. **MANUALS** – Printed materials are available from the Johnson County Extension Office for all currently enrolled 4-H members in Johnson County.

DEPARTMENT H		DIVISION 861			ROBOTICS
PREMIUM	Purple \$2.50	Blue \$2.00	Red \$1.50	White \$1.00	
CLASS 1	Robotics Poster – Create a poster (14" x 22") communicating a robotics theme such as "Robot or Not", "Pseudo Code", "Real World Robots", "Careers in Robots" or "Autonomous Robotics", "Precision Agriculture" or a robotic topic of interest to the 4-H exhibitor.				
CLASS 2	Robotics Notebook – Explore a robotics topic in-depth and present your findings in a notebook. Documentation should include any designs, research, notes, pseudo code, 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 (see above).				
CLASS 3	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.				
CLASS 4	Robotics Career Interview - Interview someone who is working in the field of robotics and 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 three to five pages, double-spaced, 12-point font, and 1" margins. Multimedia reports should be between three and five minutes in length.				
CLASS 5	Robotics Sensor Notebook – Write pseudo code which includes at least one sensor activity. Include the code written and explain the code function.				
CLASS 6	Build a Robot (may use kit) – Include a robot and 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.				
CLASS 7	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.				
CLASS 901	Other Exhibit – Other exhibit demonstrating the knowledge gained in this project.				

GEOSPATIAL

GEOSPATIAL RULES

1. **GENERAL RULES** – See GENERAL RULES – SCIENCE, ENGINEERING & TECHNOLOGY
2. **ENROLLMENT** – Youth enrolled in Geospatial or GEAR TECH 21 may exhibit in any class within this division.
3. **TOP EXHIBIT** – A top exhibit will be selected from those exhibits receiving purple ribbons in the geospatial division.
4. **MANUALS** – Printed materials are available from the Johnson County Extension Office for all currently enrolled 4-H members in Johnson County.

DEPARTMENT H		DIVISION 880			GEOSPATIAL
PREMIUM	Purple \$2.50	Blue \$2.00	Red \$1.50	White \$1.00	
CLASS 1	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.				
CLASS 2	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. Posters size should not exceed 14" x 22".				
CLASS 3	GPS Notebook – Keep a log of at least five places visited using a GPS enabled device. 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.				
CLASS 4	Geocache – Assemble a themed geocache. Each geocache should be a watertight container. It should include a logbook 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 geographic coordinates of intended placement. Register the site at http://geocaching.com , include a print out of its registry. The entry may include a photograph of the cache in its intended hiding place.				
CLASS 5	Agricultural 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.				
CLASS 7	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				