

- **Team Entries:** To qualify for entry at the Nebraska State Fair team materials entered in robotics classes that are clearly the work of a team instead of an individual must have at least 50% of all team members enrolled in 4-H. Additionally all enrolled 4-H members on the team should complete and attach an entry tag to the materials. A supplemental page documenting the individual contributions to the project should be included. The entry will be judged as a team, with all team members receiving the same ribbon placing.
- Creating a video of your robot in action would be helpful for the judges but is not mandatory. Videos should be uploaded to a video streaming application. Exhibitors MUST provide a hard copy QR code for viewing. It is recommended to test codes or links on several devices to check for appropriate permissions for public viewing.

- Class 1 **Robotics Poster [SF236]:** Create a poster (28"x 22") communicating a robotics theme such as "Robot or Not", "Pseudocode", "Real World Robots", "Careers in Robots" or "Autonomous Robotics", "Precision Agriculture" or a robotic topic of interest to the 4-H Member.
- Class 2 **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 Members learning experience. The notebook should contain at least three pages. Topics could include a programming challenge, programming skills, calibration, sensor exploration, or any of the topics suggested in Class 1.
- Class 4 **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 such as a short video uploaded to a cloud sharing service. Include a QR code with your project to allow for judging access. Exhibitors MUST provide a hard copy QR code for viewing. Exhibitors are encouraged to test their codes or links on several devices to check for appropriate permissions for public viewing. 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.
- Class 5 **Robotics Sensor Notebook [SF241]:** Write pseudo code which includes at least three sensor activities. Include the code written and explain the code function. Codes can be submitted as a multimedia format uploaded to a cloud sharing service. Include a QR code with your project to allow judging access. Multimedia presentations should be 3-5 minutes in length. Exhibitors must provide a hard copy QR code for viewing. Exhibitors are encouraged to test their codes or links on several devices to check for appropriate permissions for public viewing.
- Class 7 **Kit Labeled Robot (cannot be free programmed) and Notebook [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 notebook with the robot the youth has constructed. Included in the notebook should be (1) a description of what the robot does, (2) pictures of programs the robot can perform, (3) why they chose to build this particular form, and (4) how they problem solved any issues they might have had during building and programming. A picture story of assembly is recommended. If robot is more than 15" wide by 20" tall they may not be displayed in locked cases.
- Class 8 **3D Printed Robotics Parts [SF244]:** This class is intended for youth to create parts through 3D printing, that help create their robot or aid the robot in completing a coded function. Project should include a notebook describing the process used to create the project, the success of your designed piece (did it work), intended use of the product, and the modifications made to the item.

WELDING

WELDING GUIDELINES

- Learn to cut metal with an arc solder; Weld high carbon, spring steel and alloy steels; Weld horizontal, vertical and overhead positions.
- This category helps 4-H Members learn the basics of welding. In addition, 4-H Members get the opportunity to present their knowledge on the topic and display what they have made. Involvement in STEM Welding gives participants a first-hand experience in a skill that can be used for a lifetime.
- 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 notebooks so owner of the exhibit may be identified if the entry tag is separated from the exhibit.
- 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 that the judge can look at the bottom side of the weld when necessary.
- Each weld should be labeled with information:
 - 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
- **Attach a wire to back of display board so it can be hung like a picture frame.** No picture frame hangers accepted.
- 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.
- Reports should be written using the scientific method whenever possible (Background; Question or Hypothesis; What you plan to do and What you did; Method Used and Observations; Results and What you learned). All reports should include 4-H Member's name and county, be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.
- If no plans are included with welding art, welding article, welding furniture or composite weld project, the item will be disqualified.
- All outside projects MUST have entry tag and supporting information placed in a protective bag to prevent damage from weather events such as rain and be ATTACHED to projects with string, zip ties, etc.
- Scoresheets, forms, contest study materials, and additional resources can be found at <http://go.unl.edu/he4hwelding>
- Educational resources can be found at: https://4hcurriculum.unl.edu/index.php/main/program_project/143

DEPT. H / DIV. 920

WELDING

GENERAL INFORMATION [Scoresheets SF279-SF283]:

- All welds should be made with the same electrode/wire/rod size and number.
- Welds should be made only on one side of metal so penetration can be judged.
- 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.
- It is suggested that all welds be of the same size and thickness of metal. These pieces, referred to as coupons, should be 1.5-2" wide and 3.5-4" long.
- The welds can be on one coupon that is about 4" x 4" or on individual coupons that are about 2" x 4" and 1/4" 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.
- A good way to get this size is to buy a new cold rolled strap iron and cut it 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.

- 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.
- Stick Welding
 - Suggested coupon thickness: ¼" if using 1/8" rod
 - Suggest rod: AC and DC straight or reverse polarity, first E-7014, second E-6013
- MIG Welding
 - Suggested coupon thickness: ¼" 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

- Class 1 Welding Joints [SF281]: A display of one butt, one lap, and one fillet weld.
- Class 2 Position Welds [SF281]: A display showing 3 beads welded in the vertical down, horizontal, and overhead positions.
- Class 3 Welding Art [SF283]: Any art created using tack welds to hold the metal pieces together (examples include horseshoe projects). Type of welder, welder settings, all plans, plan alternations, and a bill for material 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.
- Class 4 Welding Article [SF281]: Any shop article where welding is used in the construction. 60% of the item must be completed by 4-H Member and notes regarding laser welding or machine welding must be included. Type of welder, welder settings, all plans, plan alternations, and a bill for material 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 project may be displayed outside.
- Class 5 Welding Furniture [SF282]: Any furniture with 75% welding used in the construction. 60% of the item must be completed by 4-H Member and notes regarding laser welding or machine welding must be included. Type of welder, welder settings, all plans, plan alterations, and a bill for material 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 project may be displayed outside.
- Class 6 Plasma Cutter/Welder Design [SF279]: Plasma cutters/welders allowed for detailed design(s) to butt cut into metal. 4-H members will create a notebook describing the design process to create the "artwork" to butt cut into metal. In the notebook include:
1. A photo (front and back) of the finished project.
 2. Instructions on how the design was created (include software used), this allows for replication of the project.
 3. Lessons learned or improvements to the project
 4. Steps to finish the project
- Class 7 Composite Weld Project [SF280]: 60% of the project must be welded and 40% made from other materials such as wood, rubber, etc. Type of welder, welder settings, all plans, plan alternations, and a bill for material must be attached to the article. Protect plans with a cover. If project is designed to be outside, it is required to have an appropriate outdoor finish because project may be displayed outside.

WOODWORKING

WOODWORKING GUIDELINES

- Develop skills such as measuring, squaring, and cutting a board, driving nails, and using clamps and screws; Build a picture frame, a letter holder, a box, or an airplane; Measure, cut, sand, drill, and use advanced hand and power tools; Apply paint and use bolts and staples; Build a sawhorse, birdhouse, toolbox, or a stool; Practice measuring angles, cutting dado and rabbet joints; Use a circular saw, a table saw, and a radial arm saw; Sand and stain wood.
- In this category, 4-H Members have the opportunity to create exhibits for varying levels of woodworking. In addition, participants can also create informational exhibits about their woodworking projects. Through involvement in this category 4-H Members will be better educated about the topic and better their woodworking skills.
- The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of the exhibit may be identified if the entry tag is separated from the exhibit.
- **Requirements:** All articles exhibited must include a plan (with drawings, sketch, or blueprints) stating dimensions and other critical instructions a builder would need to know how to build the project and 4-H Member's name and county. 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.
- All projects must have appropriate finish.
- If the project (i.e. picnic tables, wishing wells, swings, chairs, bridges, doghouses, etc.) is designed to be used outside, it will be displayed outside.
- All outside projects MUST have entry tag and supporting information placed in a protective bag to prevent damage from weather events such as rain and be attached to projects with string, zip ties, etc.
- Scoresheets, forms, contest study materials, and additional resources can be found at <http://go.unl.edu/ne4hwoodworking>
- Educational resources can be found at: https://4hcurriculum.unl.edu/index.php/main/program_project/144

DEPT. H / DIV. 911

WOODWORKING

[Scoresheets SF91, SF95, SF97, SF284]

WOODWORKING 1 - MEASURING UP

(NOT Eligible for State Fair)

- Class 901 Creative Woodworking Item [SF91]: Exhibitor must be enrolled in the woodworking project and exhibit must be individual's own creative design and work. Any 4-H member between the ages 8-18 is eligible. **Plans are required.** Exhibitors may either interview judge on Saturday morning of the fair OR submit a written report at time of entry.
- Class 902 Display Board [SF91]: 24" high x 32" wide x 1/4" thick, rigid type material. Ten sample blocks of different kinds of wood, 2½" x 6" surface size and from 3/8" to 5/8" thick, to be mounted firmly on the board. Each sample must be identified with the following information: kind of wood, where grown, and main use or uses. Other articles related to woodworking can be displayed but will require a sample of at least 10 units. These might include types of wood fasteners, types or grades of sandpaper, types of wood