



New Mexico FFA

Agricultural Mechanics

Career Development Event

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Revised: 8/1/23

PURPOSE

The State FFA Agricultural Mechanics Career Development Event recognizes students with agricultural mechanics competencies important to the modern workplace. The technical content and required skills continue to include all traditional areas of agricultural mechanics. Additionally, the operation of modern equipment, the application of new management strategies, and the mastering of advanced technologies are increasingly emphasized.

OBJECTIVES

- Mastery of the subject matter and skills common to the system areas
- Effective communication skills
- Superior problem solving techniques
- An understanding of modern technology
- The ability to function as team members working together and as individuals working alone.

COMMON CORE REFERENCES

7th Grade

CCSS.Math.Content.7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

8th Grade

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

9-10th Grade

CCSS.ELA-Literacy.SL.9-10.1c Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

11-12th Grade

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. CDE Advisors will establish a list of skill competencies specific to the current years' rotation for the State CDE officials to follow. Competencies will be posted ASAP.

1. **Team Members.** A team will consist of four members with the three highest total scores making the team score.

2. **Time Limit.** A reasonable time limit will be placed on each part of the Career Development Event.
3. **Safety Equipment.** Each participant will be responsible for all personal safety equipment including
 - a. **Industrial Quality Eye Protection.** No participant will be allowed to participate in the performance skills events of the CDE without approved eye protection (spectacles or goggles). **Safety Glasses must be Z87+**
 - b. **Clothing.** Each participant shall furnish and wear appropriate PPE with long sleeves and footwear for this event. Clothing must be in good repair and fit properly. Long sleeve clothing must be worn when welding or cutting.
 - c. **Specialized Equipment.** Welding equipment such as helmets, goggles, face shields and gloves will be furnished.
 - d. **Specialty Tools.** Specialty tools needed for skills events will be provided.
4. **Written Materials.** All written materials will be furnished for the CDE. Participants will be provided with clear plastic clipboards at the State Event.
5. **Calculators.** Calculators will be furnished by contest Superintendent at the State Event.
6. **Rotation System.** A rotational system will be used for the CDE. The subject matter for State Events is included in the rules book. Each of the divisions will have a value of 100 points.
7. **Problem Solving.** Each participant will complete 20 multiple choice problems from the three skill areas designated each year.

A problem solving activity involving the gathering or search of information, the use of logical solution process based on commonly accepted standards and available information to solve a problem specific to particular subject matter.
8. **Tool Identification.** The tool identification will include a maximum of 50 items selected from General Shop, Supplies and Materials, and Welding, plus the specific skill rotation tools of that year. From the items selected to be identified a 4 item multiple choice response
9. **Ag Mechanics/Construction Math.** Each contestant will complete 20, four item multiple choice questions. Questions will pertain to the designated skill areas for the year.
10. **General Knowledge.** Each contestant may complete up to 20, four item multiple choice questions pertaining to the designated skills areas for the year, and will be created only from the information gathered using the references listed for that year.

References

CDE Advisors will discuss resource lists with superintendents and update as needed by August 31 of the current year. Websites and web pages references must be specific.

2024 NM FFA Ag Mechanics CDE Resource Guide

A. Small Gas Engines

- a. Any Briggs and Stratton Single Cylinder Overhead Valve Repair Manual.

B. Lawn and Turf Irrigation

- a. Irrigation: Rainbird brand systems
- b. Basic Sprinkler Systems:
<https://www.rainbird.com/homeowners/all-about-sprinkler-systems>
- c. Drip Systems:
<https://www.rainbird.com/homeowners/drip-irrigation-basics>
- d. Installation:
<https://www.rainbird.com/homeowners/drip-irrigation-basics>
- e. Soil Types:
<https://www.rainbird.com/homeowners/understanding-your-soil>
- f. Irrigation Terms:
<https://www.rainbird.com/homeowners/glossary-irrigation-terms>
- g. Rainbird Catalog (online)
https://www.rainbird.com/sites/default/files/media/documents/2021-10/rb12898_catalog2021d-1.pdf

C. MIG, SMAW, and Oxy-fuel Cutting

- a. Victor Oxy-fuel Welding, Cutting, Heating Guide
- b. Welding:
<https://www.hobartbrothers.com/wp-content/uploads/2020/09/Helpful-Hints-Basic-Welding.pdf>
- c. Welding:
<https://www.lincolnelectric.com>
 - i. Click on Resources
 1. Resource Center
 - a. Welding Guides
 - i. Stick Electrode (SMAW) Welding Guide
 - ii. Click on Resources
 1. Resource Center
 - a. Welding How To's
 - i. How to strike and establish an arc
 - ii. Stick Welding – Creating High Quality Stick Welds

d. Welding:

<https://www.mylincolnelectric.com>

1. Click on Education

a. If asked, set your location to United States

b. Select Education tab at the top

c. Select My Education Portal

d. Either sign in, or fill out the New Registration if you don't have an account.

e. Inside your MyLincoln education portal account, scroll down to this

f. In the free guides and class materials, you can get classroom posters that will aid in better student understanding in English and Spanish!

e. Agricultural Mechanics Fundamentals and Applications textbook

i. Cutting with Oxyfuels and Other Gases chapter

ii. Selecting and Using Arc Welding Equipment chapter

iii. Arc Welding Mild Steel chapter – SMAW and GMAW only

D. Environmental and Natural Resources

a. Surveying

i. www.youtube.com

Todd Horton with the Illinois Professional Surveyors Association

1. Reading the Level Rod

2. Leveling, Part 1

3. Leveling, Part 2

4. Leveling, Part 3

ii. www.youtube.com

1. Stadia Hairs, Mark Zidon, Georgia Agriculture Education Curriculum & Technology

Committee Approved Agricultural Mechanics Skill Rotation

2024

Small Engines, single cylinder, overhead valve
Irrigation
MIG/SMAW/Oxy-fuel Cutting
Environmental and Natural Resources

2025

Carpentry (include basic surveying)
Concrete & Masonry
MIG/SMAW/Oxy-fuel Cutting
Environmental and Natural Resources

2026

Residential Wiring
Electric Motors/Controls
MIG/SMAW/Oxy-fuel Cutting
Shop Equipment & Maintenance can be incorporated into the contest areas

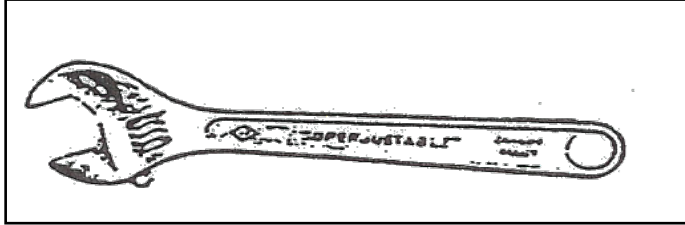
2027

Residential Wiring
Electric Motors/Controls (Team Activity)
MIG/SMAW/Oxy-fuel Cutting
Shop Equipment & Maintenance can be incorporated into the contest areas

Sample Tool Identification Test

Tool Identification: The identification will include a max of 50 items selected from those listed in all categories developed by New Mexico State University. (see attached list).

Example



Identify The Tool

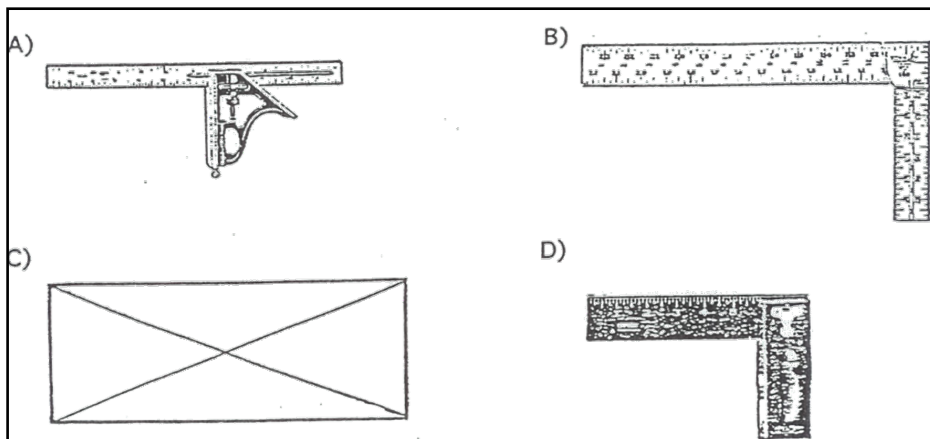
- A Crescent Wrench
- B Monkey Wrench
- C Adjustable Wrench
- D Adjustable Wrench

***Correct answer is "C"**

Sample - Problem Solving

A four-item multiple choice response will be used for each activity.

Example- The most accurate method of squaring a trailer frame is the use of :



***Correct Answer is "C"**

Committee Approved Scoring System

| | |
|--|------------|
| A. Exam (1 hour time limit) Includes: a. problem solving (20 questions), b. math (20 questions), and c. general knowledge (20 questions) | 200 Points |
| B. Individual Skill A (30 minute time limit) | 100 Points |
| C. Individual Skill B (30 minute time limit) | 100 Points |
| D. Individual Skill C (30 minute time limit) or Team Problem Solving (1 hour time limit, includes tool I.D.) | 100 Points |
| E. Tool I.D. (up to 50 tools) (30 minute time limit) | 100 Points |
| Total | 600 Points |

Optional Rotation for 3 individual skill areas could be:

| | |
|--------------------|---------|
| 1 Exam | 1 Hour |
| 2 Individual Skill | .5 hour |
| 3 Individual Skill | .5 hour |
| 4 Individual Skill | .5 hour |
| 5 Tool I.D. | .5 hour |

Optional Rotation for 2 individual skills and team activity could be:

| | |
|---------------------------|---------|
| 1 Exam | 1 Hour |
| 2 Individual Skill | .5 Hour |
| 3 Individual Skill | .5 Hour |
| 4 Team Activity/Tool I.D. | 1 Hour |

Invitational, district and state contests may choose one of the following options for skills and scoring:

- A. Traditional - three individual skills where the contestant works alone and receives a score for each skill area.
- B. Optional - Two individual skill activities where the individuals work alone and receive a score for each area, plus a team activity where the team member's work together to accomplish a task or tasks and receive a group score that will be reflected on each team member's scantron as if it were their third individual skill.

The optional team activity would evaluate the team while solving multi-system agricultural problem(s) selected from the skills and problem solving components of the competency areas for that particular year.

The team activity would be evaluated as follows:

- Teamwork process (assigning of duties, communication, ethics, time management, professionalism, etc.)

- Team written report (An example would be a form where the team may look up information, data, use tools to record measurements, or make recommendations based on their findings., etc.)
- Finished product (Example: Concrete mixed, poured and finished, or parts selected, prepared, & assembled for a plumbing application, etc.)

Here is an example of a team activity rubric used at the national level.

Team Activity Process Rubric

100 POINTS

| | Very strong evidence of skill 5–4 points | Moderate evidence of skill 3–2 points | Weak evidence of skill 1–0 points | Points Earned | Weight | Total Points |
|--|---|---|---|---------------|--------|--------------|
| Communication | All team members effectively communicate with each other throughout the entire activity. | Most team members communicate fairly effectively with each other during most of the activity. | Communication between team members is ineffective and sporadic during the activity. | | X4 | |
| Work distribution | Work was evenly distributed between all team members and all team members were employed at all times. | Work was distributed between two to three team members, and these members were employed most of the time. | Work was completed by only one team member with little employment of the other members. | | X8 | |
| Time management | All team members managed their time efficiently. | Most team members managed their time fairly efficiently. | One (or no) team member managed their time efficiently. | | X4 | |
| Team organization | Team started right away, had no down time and was not rushed at the end of the task. | Team was delayed in starting, had down time and was somewhat rushed at the end of the task. | Team delayed starting, had long down times and did not complete all tasks during the time allotted. | | X4 | |
| TOTAL POINTS EARNED OUT OF 100 POSSIBLE | | | | | | |

Sample
Skill Sheet - Agricultural Mechanics Contest
Score Sheet - Oxy Acetylene Cutting

| | <u>Possible Score</u> | <u>Earned Score</u> |
|--|---------------------------|-------------------------|
| Skill No. 1 Oxy Acetylene Cutting | | |
| 1 Safety and Operation of equipment----- Factors: setting of gauges, adjustment of flame, distance inner cone to base metal, speed of travel and angle of tip. | 12 | _____ |
| 2 Quality of 90 degree cut | | |
| A Smoothness of cut----- | 8 | _____ |
| B Squariness of Cut ----- (minus 1pt. For each 1/16" error) | 8 | _____ |
| C Freedom of slag----- | 4 | _____ |
| 3 Quality of bevel cut | | |
| A Smoothness of cut----- | 8 | _____ |
| B Uniformity of angle----- | 8 | _____ |
| C Freedom of slag----- | 4 | _____ |
| Total Cutting Score----- | | |
| Total Welding and Cutting Score----- | | |

Judge : _____

Sample
Skill Sheet - Agricultural Mechanics Contest
Shop Skills - Oxy Acetylene Cutting

Skill No. 2

Time Allotment - 10 Minutes

Cutting 1/2 Inch Mild Steel with Oxy Acetylene

Instructions:

1 Place a piece of mild steel 1/2" x 2" x 4" on the 16 ga. Support, over the wet sand spark trap, as shown in Fig 1.

2 The judge is observing and scoring your performance. Practice all safety precautions.

3 Attach a Victor cutting attachment to the Victor 100 torch handle.

4 Adjust the oxygen and acetylene pressures at the regulators for cutting 1/2" thick steel.

5 Light the torch tip and adjust the preheat flames

6 Make a 90 degree cut on the 4 inch side of the 1/2" x 2" x 4" piece of steel. Any number of passes may be made but not more than 1/2" of steel removed, see Fig. 2.

7 Make a 30 degree bevel cut on one end of the piece of steel. Any number of passes may be made but not more than 1/2" of steel removed. See Fig 2.

8 Turn off the flame, close the regulators, remove the cutting attachment and return all equipment to the place it was received.

9 Cool the plate of cuts.

10 Mark your contestant number on your plate of cuts and submit it to the judge for evaluation and scoring.

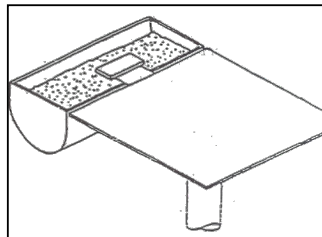


Figure 1

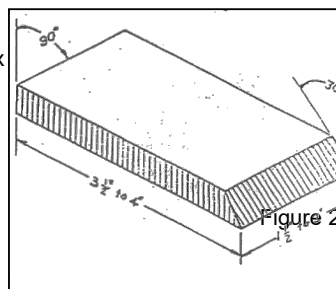


Figure 2