Agricultural Technology and Mechanical Systems
2023 State CDE
Guidelines

Coordinator: Dr. Aaron J. Giorgi, West Virginia University
Committee Personnel: Jamison Smith, Seth Neal, Wendy Knopp

I. Purpose

To challenge FFA members to prepare for agricultural mechanics workplace expectations by developing skills and knowledge in applied physical sciences. This event allows students and teams to demonstrate subject matter and skill mastery, effective communication, problem solving techniques and the ability to function individually and as a team.

II. Overview

The 2024 area topics listed below will be followed for the CDE held in December 2023:

A. Compact Engines – String Trimmer
B. Machinery & Equipment – Grain Drills
C. Electrical Systems – DC Load and Distribution
D. Welding – SMAW – Fillet, Lap, or Pipe to plate
E. Environmental – Surveying
F. Team Activity – (Electrical) Wiring a wall and estimation.
G. Written Exam – 25 written questions

III. Rules

The rules governing the West Virginia FFA ATMS CDE are as follows:

A. All parts of the CDE will be completed on Thursday, December 7th.
   1. Participants shall report to the event site 30 minutes prior to posted start time so students can be placed in their rotational groups.
B. Teams will consist of four members. Team ranking is determined by combining the scores of all students from each team. Team members must all be from the same chapter.
C. Team ranking will include all four student scores and the team problem.
D. Each participant will participate in all phases of the event.
E. Students will be allowed to use a non-programmable calculator and will need a #2 pencil. Clipboards will be provided at the needed stations.
F. **Participants must supply and wear** Industrial Quality Eye Protection (Z87.1), or goggles during the skill phases of the event. Coveralls or a shop coat may be worn during the skill phases of the event. Appropriate closed-toed footwear is required. (Work boots or work shoes recommended. No sandals or cloth shoes are allowed.)
G. Necessary equipment such as basic welding helmets or goggles as required for welding, shields, gloves, welding leathers, hearing protection devices, etc., will be provided by event host.
H. Failure to wear appropriate safety protection or working in an unsafe manner could result in removal from that CDE area or disqualification from the CDE.
I. No cell phones will be permitted in the contest. Anyone found using one during the contest will be removed and will receive no scores.

IV. Event Activities

Three types of activities will be included in the ATMS event. These include: A) individual problem-solving/skill development activities and B) written exam questions and C) team activity.

J. Individual Problem-Solving/Skills – Each student is individually evaluated in each of the five systems areas. The specific activities occurring in each event are not publicized prior to the event. Each student is allowed 20 minutes to complete each of the five activities. Each activity is worth 30 points.

K. Written Examination – Each student completes an examination that consists of 25 multiple-choice questions. Each question is worth two points. There are 5 questions from each of the five agricultural mechanics systems areas. Students will have 60 minutes to complete this portion of the career development event. Written exam is worth 50 points.

L. Team Activity – Each team will work together and be evaluated as a team while solving complex, multi-system agricultural problems. The problem scenario is presented to the team on the day of the event and members utilize the materials and equipment provided to undertake and prepare a written solution. Teams organize themselves, assign duties and complete tasks together or separately depending on individual skills and abilities. The team activity will be evaluated as follows:

- Teamwork process: 125 points
- Problem solving, activity, and written report: 275 points combined.
- **Total for team activity: 400 points**

V. Event Scoring

The team score will be a combination of all individual scores and the team activity. Each individual receives 25.0% of the total team activity score and will be rounded to the nearest whole number.

INDIVIDUAL SCORING	
Written examination (25 questions at 2 points each)	50
Individual activities (5 at 30 points each)	150
Team activity (1/4 of total team activity score)	100
Total Possible Individual Score	***300***
TEAM SCORING	
All Written Examinations	200
All individual activities	600
Team activity	400
Total Possible Team Score	***1200***

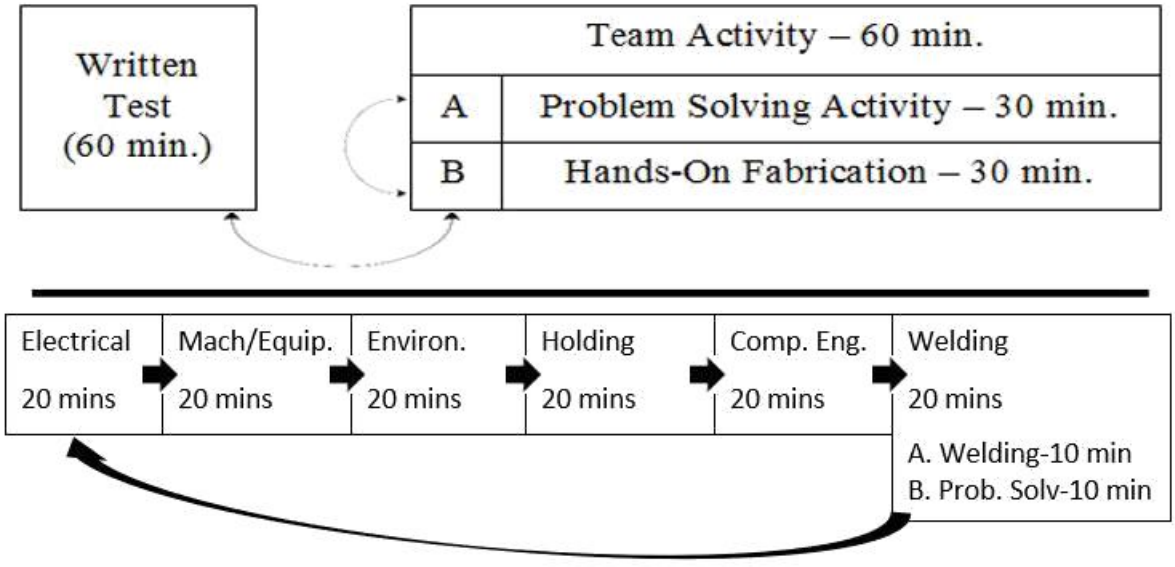
VI. Event Format

A. Team members will work independently on problem solving and skill development activities and on the written test. Individual scores and rankings will be based on these areas.

B. Team members will work together on a team problem solving activity. The team score will be a combination of all individual scores and the team activity. Each individual receives 25.0% of the total team activity score.

VII. Event Rotation

The following diagram is an example rotation scheme for the West Virginia ATMS CDE.



VIII. Tiebreakers

A. The team activity score will be used to break a tie in team ranking. It the tie remains, the combined written exam scores will be used.

B. Individual ties will be broken using written exam scores. If a tie still exists, the problem-solving/skill scores will be used (in the order identified in section X of this document).

IX. Resource Information

A. Suggested internet website links and text references for the West Virginia ATMS CDE will follow those of the National ATMS CDE and can be found at: http://web.missouri.edu/~schumacherl/natcon.html

X. Tentative Topics for Future West Virginia ATMS CDEs

**Year refers to the National Convention year that the winning team would compete*

CDE AREA	**2024**	2025
Electrical Systems	DC low voltage	TBD
Environmental/ Natural Resource Systems	Surveying	TBD
Machinery and Equipment Systems	Grain Drill	Sprayer, Boom type
Welding	SMAW	GMAW
Compact Engines	String Trimmer	TBD
Team Activity	Electrical	TBD

XI. Resources for West Virginia ATMS CDEs: The following is an expanded detail of resources made available for the individual/team problem-solving/skills activities.

2023 Electrical Systems Skill Activity - Electrical systems are widely used in agricultural systems, including applications in structures and machinery. Thus, agricultural technicians must be able to interpret manufacturers' schematics, plan and install, and troubleshoot these systems. With basic service entrance panels being pivotal components in electrical systems, technicians must be familiar with these and their accompanying switches. pivotal components in electrical systems, technicians must be familiar with these and their accompanying switches.

Specific competencies for this event may include:

1. Determining Watts, Amps, Volts, and Ohms.
2. Understanding of three-way switches that control light receptacles.
3. Troubleshooting electrical circuits, identification of electrical components.
4. Use appropriate standards for agricultural applications, including the National Electric Code (NEC).

Suggested References for Activity – In addition to the general references specified for the Agricultural Technology and Mechanical Systems CDE, the following references may be useful in preparing for the Electrical Systems Skill Activity. Note: Specific references are listed below, but others may be added at a later date.

1. Agricultural Mechanics: Fundamentals and Applications (6^{th}) Ed. By Ray V. Herren (2010).
2. 2017 NFPA 70 National Electrical Code (NEC) Wiring Handbook (ISBN-10: 1455912794).
3. Sample handbook: HD Supply Solutions

2023 Metals and Welding Systems Skill Activity –Simple repairs/metal fabrication are often required when dealing with agricultural production. The Metals and Welding Systems Skill Activity will be a hands-on and problem-solving based activity. Students will be allowed to use a basic calculator at this station, but no cell phone calculators will be allowed.

Specific competencies may include:

1. Understanding of SMAW processes and safety.
2. Ability to utilize one of the following rods: 6011, 6010, 6013, and/or 7018.
3. Ability to interpret standard weld symbols.
4. Understand how to set a SMAW machine to the proper amperage.
5. Using basic mathematic computations related to fabrication.

Suggested References for Activity – In addition to the general references specified for the Agricultural Technology and Mechanical Systems CDE, the following references may be useful in preparing for the Metals and Welding Systems Skill Activity. Note: Specific references are listed below, but others may be added at a later date.

1. http://www.lincolnelectric.com/assets/US/EN/literature/WC475.pdf
2. http://www.lincolnelectric.com/en-us/support/process-and-theory/Pages/aws-classifications-detail.aspx
3. http://www.lincolnelectric.com/en-us/education- center/welding-safety/Pages/welding-safety.aspx
4. https://www.millerwelds.com/resources/weld-setting-calculators

2023 Environment and Natural Resource Systems Skill Activity – When dealing with the management and production of agricultural products, it is important to have a comprehensive understanding of the land systems around them. Students will represent their ability to complete a land survey and make subsequent land usage decisions related to environmental management.

Primary competencies for this event include:

1. Use a topographic map to determine the slope of a location where a building will be constructed.
2. Lay out the 90-degree angle for one corner of the building.
3. Determine the elevation between two points and calculate the slope.

Suggested References for Activity – In addition to the general references specified for the Agricultural Technology and Mechanical Systems CDE, the following references may be useful in preparing for the Environment and Natural Resource Systems skills activity. Note: Specific references are listed below, but others may be added later.

1. https://viva.pressbooks.pub/physicalgeologylab/chapter/scale-and-slope/
2. https://viva.pressbooks.pub/physicalgeologylab/part/topographic-maps/

2023 Machine and Equipment Systems Skill Activity – The Machine and Equipment Systems area will utilize information pertaining to manure spreaders. Skill activities might include safety, knowledge of parts, calibration, and general adjustments. The skill activity will be as generic as possible so that students will not be put at a disadvantage if they do not have access to a particular manure spreader. When practicing for the event, remember that the skill activity is designed to be performed by an individual in a 20-minute time period. However, there will be an individual available to provide assistance for any student that may have a physical limitation.

Additional competencies for this event include:

1. Identify parts of a grain drill.
2. Determine equipment specifications.
3. Equipment troubleshooting.

Suggested References for Activity - In addition to general references specifies for the Agriculture Technology and Mechanical Systems CDE, the following references may be useful in preparing for the Machine and Equipment Systems skills activity.
Note: Specific references are listed below, but others may be added at slater date:

a. https://cdn-assets.greatplainsmfg.com/manuals/pdf/118-389m-a.pdf
b. Use all references: Parts list, Brochure, and Operators Manual

2023 Compact Engines Skill Activity – Agricultural systems often require the use of equipment with compact equipment. Compact equipment is defined as being 30 horsepower or less. This year's activity will revolve around string trimmers. Skill activities might include safety, knowledge of parts, engine specifications, hydraulic principles, and troubleshooting.

1. Identifying parts of a string trimmer.
2. Determine equipment specifications.
3. Troubleshooting engine problems.

Suggested References for Activity – In addition to the general references specified for the Agricultural Technology and Mechanical Systems CDE, the following references may be useful in preparing for the Compact Engines skills activity. Note: Specific references are listed below, but others may be added at a later date.

1. Briggs & Stratton Twin Cylinder "L" Head Repair Manual.

2023 Team Activity – All team members must wear safety glasses during the team event. To enter the CDE area, students must have safety glasses in their possession. Team members will work together to complete the activity in one hour. This team event is worth 400 points (100 points for the teamwork process and 250 points for the finished product). If a team member exhibits or performs any unsafe practice, points will be deducted from the total team score.

Equipment provided by the Team: Teams will be expected to provide appropriate personal protective clothing, pencils, and a calculator. If teams bring their own tools, duplicate tools that we provided will be removed from their workstation.

This year's topic is electrical, and students will be wiring a wall to a given scenario. Within the scenario, students will have to interpret electrical diagrams, make a materials cost list for the provided work order.

Suggested References for Activity – In addition to the general references specified for the Agricultural Technology and Mechanical Systems CDE, the following references may be useful in preparing for the Electrical Systems Skill Activity. Note: Specific references are listed below, but others may be added at a later date.

1. Agricultural Mechanics: Fundamentals and Applications (6th) Ed. By Ray V. Herren (2010).
2. 2017 NFPA 70 National Electrical Code (NEC) Wiring Handbook (ISBN-10: 1455912794).

Please understand that the event coordinator reserves the right to make necessary changes to this activity based on the availability of materials and resources to successfully conduct this activity.

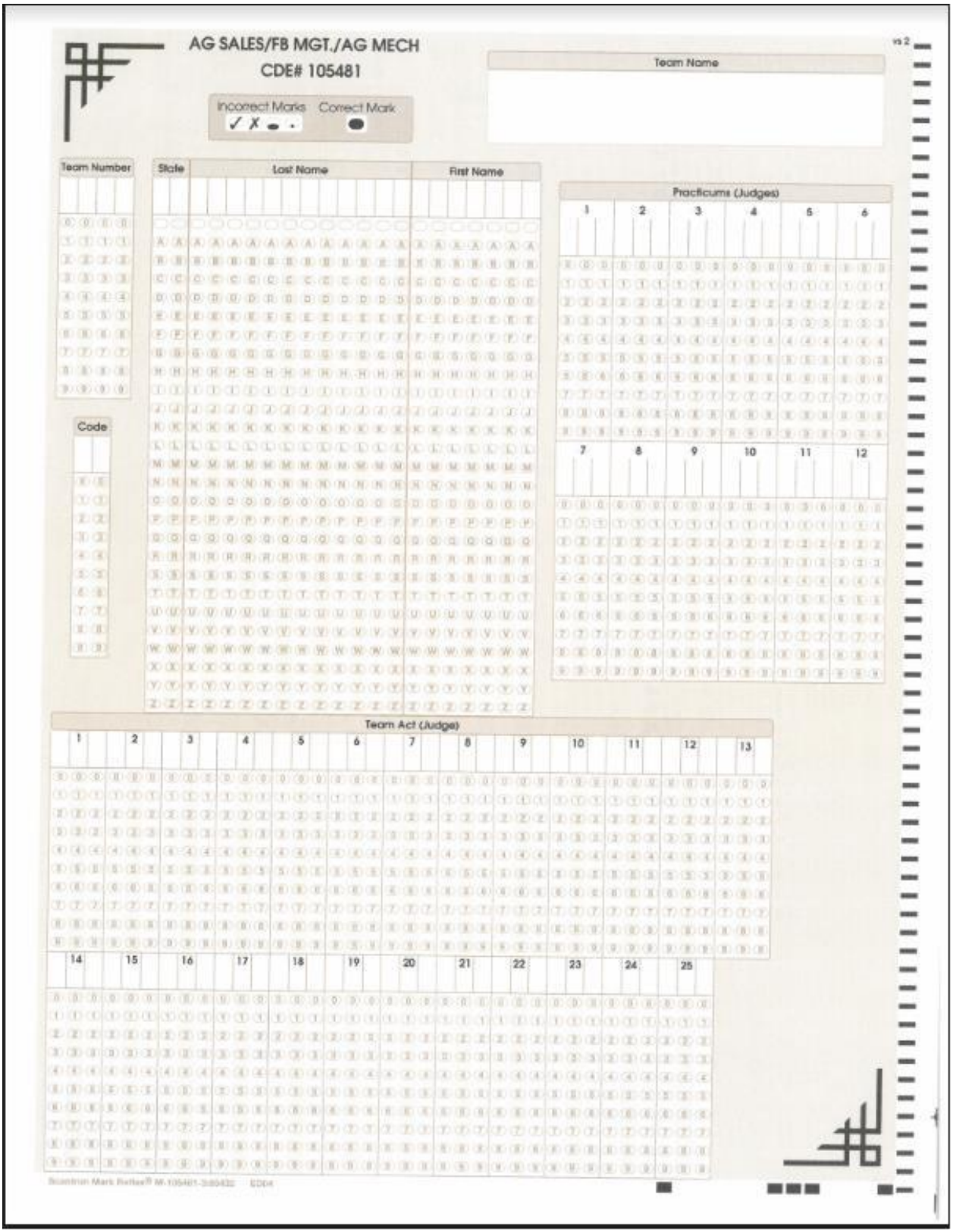
XII. Sample Rubric, Scantrons, and Score Cards

All rubrics will align as closely as possible to the national contest, at the discretion of the contest coordinator.

Team Activity Process Rubric
100 Points

	Very strong evidence of skill is present 10-8 points	Moderate evidence of skill is present 7-4 points	Strong evidence of skill is not present 3-0 points	Points earned	Weight	Total Points
Communications	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.		X2	
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.		X4	
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.	X2		
Team Organization	Team started right away, had no down time, 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.		X2	
				Total Points		

Agricultural Technology and Mechanical Systems
2023 State CDE
Guidelines



Agricultural Technology and Mechanical Systems
2023 State CDE
Guideline