

## South Dakota FFA

### 2023 Ag Mechanics CDE Competencies

In the past the State and National Ag Mechanics CDE would rotate through themes such as plant production, livestock production, materials handling, etc. The last couple years the national competitions have not utilized these so these will not be followed at the state level this year.

The Ag Mechanics CDE is divided into five system areas.

- Machinery and Equipment Systems
- Electrical Systems
- Compact Equipment
- Structural Systems
- Environmental and Natural Resource Systems

The Individual Ag Mechanics CDE consists of three parts:

- Hands-On Operations
  - Each participant will complete 5 specific hands-on performance operations (1 from each area listed above).
  - 5 skills @ 20 points == 100 points
  
- Problems Solving
  - Each participant will complete 5 problem solving/skill development activities (1 from each area listed above). (5 problems @ 20 points == 100 points)
  
- Written Exam
  - Test should consist of 25 questions (around 5 questions from each of the five areas listed above).
  - 25 questions @ 2 points each == 50 points
  
- Team Problem
  - A problem-solving activity and/or team hands-on activity involving the gathering of information and the use of logical solutions based on commonly accepted standards.
  - 100 points
  - Team problem does NOT count toward individual scores.

Preparation Resources:

- Past State and National FFA CDE Exams
- Agricultural Technical Systems and Mechanics Textbook - American Technical Publishers
- Owners and Service manuals of machines listed.

## **MACHINERY/EQUIPMENT SYSTEMS:**

**Equipment – New Holland Roll Belt Baler – Model 450, 460 or 560**

Text Reference

- Chapter 2 – Safety and Health
- Chapter 28.1 – Mobile Power Equipment – Mechanical Drive Systems

### **Possible Skills:**

- ID parts and components of baler
- Know how to perform adjustments to equipment.
- Know meaning of safety stickers and symbols used on equipment.
- Identify safety colors and their applications.
- Identify PPE and appropriate applications for each type of PPE.
- Identify components of the NFPA Hazard Signal System.

### **Possible Problem Solving:**

- Use manual to determine capacities of the equipment.
- Use manual to match correct model with the specific job.
- Use model size to calculate bale size for storage/space requirements.
- Identify the recommended service and maintenance operations from the operator's manual.
- Know sources of professional safety regulations and standards.
- Know differences in fire extinguishers and fires.

# **ELECTRICAL SYSTEMS:**

## **Text Reference**

Agricultural Technical Systems and Mechanics Textbook--ATP

- Chapter 19 – Electrical Principles

## **Possible Skills:**

- Wire duplex receptacle.
- Wire split duplex receptacle.
- Wire single pole switch that controls a light.
- Use a ammeter to measure current.
- Use a multimeter to measure current, voltage, and resistance.
- Use a multimeter to test continuity of devices such as switches and fuses.

## **Possible Problem Solving:**

- Use Ohm's Law to calculate volts, amps, and resistance.
- Use the power formula to calculate power, voltage, and current.
- Use a wiring diagram to calculate volts, amps or resistance of a circuit.

## **COMPACT EQUIPMENT:**

***Equipment:* John Deere Compact Tractor**

**2 Series – Model 2025R, 2032R, 2038**

Text Reference

Agricultural Technical Systems and Mechanics Textbook--ATP

- Chapter 27 – Engine Operation and Maintenance
- Chapter 28.1 – Mobile Power Equipment – Mechanical Drive Systems

**Possible Skills:** (These skills can also apply to the baler)

- Identify belts used in mechanical drive systems.
- Identify chains used in mechanical drive systems.
- Identify gears used in mechanical drive systems.
- Identify bearing used in mechanical drive systems.

**Possible Problem Solving:**

- Use operators manual to determine service intervals.
- Use operators manual to determine capacity of tractor and/or loader.
- Identify safety components used on tractor and/or loader.

# **STRUCTURAL SYSTEMS:**

## **Building Materials and Concrete**

Text Reference:

- Chapter 6 – Materials – Section 6.1 Wood
- Chapter 10 – Concrete Principles
- Chapter 11 – Concrete Placing and Finishing

### **Possible Skills:**

- Identify concrete tools used for placing, finishing and detailing.
- Perform a slump test for concrete or measure the slump of concrete
- Mix workable batches of concrete.
- Identify methods of sawing lumber – plain, quarter, rift
- Identify defects warpages of lumber

### **Possible Problems:**

- Calculate cubic yards of concrete needed for a given area.
- Calculate materials needed for a volume of concrete.
- Calculate water-cement ratio.
- Interpret grade stamps for lumber and pressure treated lumber.

# **ENVIRONMENTAL AND NATURAL RESOURCES SYSTEMS:**

## **Surveying and GPS/GIS**

Text Reference – Chapter 9 – Surveying and GPS/GIS

### **Areas of Focus:**

### **Possible Skills:**

- Identify a builder's level, a transit-level, and a laser level.
- Level a transit and make a rod reading.
- Make a rod reading at 2 different locations and calculate difference in elevation.
- Use stadia hairs in transit to make a distance measurement.
- Identify the different types of leveling rods.
- Use rod reading and distance reading to determine slope.

### **Possible Problems:**

- Calculate difference in elevation between 2 points given rod readings.
- Calculate elevation at different points using differential leveling.
- Calculate cut and fill given elevations at different points on a profile.
- Read plats of surveys and plot plans.
- Use legal land description to identify parcels of land.