

Basic Agricultural Technology & Mechanical Systems



CDE Handbook

Basic Agricultural Technology & Mechanical Systems

New for 2021

1. Purpose

The Basic Agricultural Technology and Mechanical Systems CDE is comprised of technical content and practical hands-on skills.

2. Objectives

The Basic Agricultural Technology & Mechanical Systems event provides the opportunity for the participant to:

- a. Master the identification and uses of various tools common in the mechanical industry.
- b. Show basic skill levels in carpentry.
- c. Demonstrate knowledge of plan reading.

3. Rules

- a. Each chapter may enter one participant who was in the 7th, 8th or 9th grade in the current school year. The student may not have entered this event before - Members can compete only once in this event. An individual may only participate in one Agriculture Mechanics event each year.
- b. The event will be held in cooperation with Agriculture Systems Management department at North Dakota State University.
- c. Participants will be furnished with all necessary tools and materials.
- d. Each participant must furnish his or her own safety glasses, coveralls/shop coat.
- e. Official dress is not required for this event. However official dress must be worn for awards.
- f. Personal eye protection and other safety precautions are a must during all phases of the shop work. (Proper hair protection, no neckties, appropriate shoes, etc.)
- g. All portions of this CDE will take place on ONE day. (The written test will not be held in the evening.)
- h. A maximum of 30 minutes will be allowed per practicum rotation, including the written test.
- i. Reference guide for technical information on themes and tool identification: Agricultural Technical Systems and Mechanics, 2nd Edition © 2019, ISBN: 978-0-8269-3680-6 or the 1st Edition.

4. Format

The Basic Agricultural Technology & Mechanical Systems CDE will consist of:

- a. Written Test—100 points: 100 questions, 1 point/question
- b. Tool Fitting, Maintenance, Identification, and Operation - Hand tools will be emphasized—100 points: 100 questions, 1 point/question

Hand Woodworking	Cold Metal Working	Measurement	Plumbing	General Tools/Supplies
Chisels	Taps and dies	Calipers	Wrenches	Wrenches
Hammers	Hammers	Micrometers	Vices	Pliers/Screwdrivers
Planes	Chisels	Rulers	Copper Working Tools	Clamps and Glues
Squares	Pop Riveter	Scales & Tapes	Fittings	Nails & Screws
Clamps	Saws	Feeler Gauges	Cutters	Sandpaper & Bolts
Saws	Files			

c. Carpentry – Small woodworking projects and reading directions and drawings. [View Rubric](#) – 100 Points

d. Bill of Materials – Prepare, interpret, and identify common types and kinds of materials and hardware. Prices and amounts included. 100 Points: [25 questions, 4 points/question](#)

5. Scoring

Activities	Points
Written Test	100
Tool Questions	100
Carpentry	100
Bill of Materials	100
Maximum Points	400

6. Awards

- a. Individual scores will be tabulated and ranked gold, silver or bronze.
- b. Gold individuals will receive gold medals and power tool awards as provided by sponsors.
- c. The high individual receives the "baby bison" trophy, a \$100 stipend, and possession of the high individual traveling trophy.



NORTH DAKOTA

Agricultural Technology and Mechanical Systems

Formulas

1 acre = 43,560 square feet

$$P = I \times E$$

$$Cr = \frac{Pd + CV}{CV}$$

$$I = \frac{P}{E}$$

$$E = I \times R$$

$$E = \frac{P}{I}$$

$$I = \frac{E}{R}$$

Power Used = Sum of Individual Loads

$$R = \frac{E}{I}$$

$$hp = \frac{S \times D}{375}$$

Electrical Energy = Power x Time

Cost = Electrical Energy x Rate

1 kW = 1,000 W

$$\% \text{ Efficiency} = \frac{\text{Power Output}}{\text{Power Input}} \times 100$$

$$D1 \times N1 = D2 \times N2$$

88 ft/min = 1 mph

$$T1 \times N1 = T2 \times T2$$

1.47 ft/sec = 1 mph

$$hp = \frac{2\pi T N}{33,000}$$

746 Watts = 1 hp

1 yd³ = 27 ft³

Area of a Circle = πr^2 or $(\pi D^2)/4$

$$Hp = \frac{T \times rpm}{5252}$$

Circumference of a Circle = $2\pi r$ or πD

Volume of a Cylinder = $\pi r^2 \times h$

$$\text{Field Capacity} = \frac{S \times W \times \text{Eff}}{8.25}$$

Square of Shingles = 100 sq. ft.

$$MC_{dry} = \frac{WW - DW}{DW} \times 100$$

1 kg = 2.2 lb

1 ha = 2.47 ac

$$MC_{wet} = \frac{WW - DW}{WW} \times 100$$

1 ft³ = 7.48 gal.



Name: _____

Chapter: _____

Contestant #: _____

ND FFA - Basic Agricultural Technology & Mechanical Systems Carpentry (Small Woodworking Project) Practicum Rubric

	Needs improvement (0-5 Pts)	Average (6-10 Pts)	Good (11-15 Pts)	Excellent (16-20 Pts)	# of Pts.	Comments
Cuts: All cuts are made in the correct areas, are clean, and square. No extra cuts.	Majority of cuts are chipped and lack squareness.	More than half of the cuts are chipped and/or lacking squareness.	Majority of the cuts few to no chips and are mostly square.	All boards are free of chipping and are cut square.		
Dimensions/Length: All parts the correct lengths.	Few or no pieces are correct lengths.	Half or less of pieces are correct lengths.	Majority of pieces are correct lengths.	All pieces are correct lengths.		
# of Pieces: All parts are accounted for and no extras are made.	Few or no parts are finished.	Half or less of parts are finished.	Majority of parts are accounted for and no extras are made.	All parts are accounted for and no extras are made.		
Assembly: All parts are assembled securely and squarely in the correct positions.	Little or no attention given to assembly of parts.	Half or less of the pieces are assembled squarely, securely, and in the correct positions.	Majority of pieces are assembled squarely, securely, and in the correct positions.	All pieces are assembled squarely, securely, and in the correct positions.		
Fasteners: Fasteners are properly utilized and in appropriate places.	Little or no attention given to best use of fasteners.	Half or less of the parts are fastened properly. Majority of the fasteners cracked the boards.	All boards are fastened securely few to no cracked boards.	Materials are used in the best way to minimize waste, scrap minimized, collected into large pieces, labeled.		

Total Points: _____ /100