MIDDLE TENNESSEE FFA AGRICULTURAL MECHANICS SKILLS CAREER DEVELOPMENT EVENTS

Revised 2013

FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)
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Preface
Revised: 2013

The intent of these skills is to be a part of the instructional program in Agricultural Education. All skills are part of the State Board of Education approved “Vocational Agricultural Curriculum Framework, 1985.” The intent of the FFA Skills contest is to use the competitive events as a motivator for students to perform better. The competitive events also are to serve as a reward for the students that excel in the agricultural mechanics skill areas as a result of the instructional program.

The following are changes from the previous rules dated 12/2010:
1. A committee consisting of the host advisor and advisor from each section – north and south will be established by the host advisor prior to the start of the event to settle any issues that may arise. Decisions made by majority of that committee will be final.
2. A district that sends a single chapter from that district to the Middle Tennessee Regional competition, must bring at least two advisors from that district to help in judging the CDEs. The single team’s advisor may make arrangements with competent advisors from any district to serve as judges if they cannot find enough from their own district. Any chapter/district’s total points will be penalized for not having enough advisors by 10 pts per missing advisor.
3. No “easy read” tape measures or any measuring tools that have fractions printed on them will be allowed in any of the skill areas.
4. Bronze Welding/cutting – Procedures – Contestant will only use oxy-acetylene torches/equipment provided by host chapter.
5. Small Gasoline Engine - Reference Manual for exam is changed. The 4/02 edition is no longer available. That part number 272147 has been revised to include only Vanguard engines. The new manual is Part number 276781 and includes engines except Vanguard. The host chapter will provide copies for each contestant if needed. (These manuals are available through local TN Farmer’s Co-op, small engine shop for approximately $20. They may also be available through Briggs and Statton and other outlets)
6. Small Gasoline Engine - Top Operating speed is factory set based on the application of the engine or what it is to be used on. For CDE purposes, the top operating RPM will be set to a range of 3500 to 4000. This is added to procedures and score sheet.
7. Small Gasoline Engine - (Low) Idle speed should be set at 1750 plus/minus 50 This is added to procedure and score sheet.
8. Three-way Switch – The length of 14/3 cable is changed to 6 feet to allow for the longest of the three possible wiring problems.

The following general rules are still in effect from previous revisions:

The host chapter must be notified in advance of special needs for any contestant involved in a CDE. This will allow the host chapter to make arrangements to secure an individual to assist the member. (example: reading handicap)

Safety Glasses must be OSHA Approved and have side protection shields. Prescription glasses will not be sufficient for safety glasses.

The Middle Tennessee FFA Agricultural Mechanics Skills CDE Rules and Regulations may be found on the Middle TN FFA Website. http://www.middletnffa.ffanow.org
Agricultural Mechanics CDE Regulations
(Revised February 2013)

1. **“READ” ALL INSTRUCTIONS, DIAGRAMS, CODES, ETC. PRIOR TO CDE CONTEST FOR EACH CDE.**

2. It is strongly suggested to place the *Agricultural Mechanics CDE Rules and Regulations* inside a *page protector* and file in a *three ring binder with section dividers*. This will allow for quick reference and replacement of only the pages involved in the event of a revision.

3. **Contestants must provide all tools and supplies needed for their respective skills.** Refer CDE "Materials Needed" section.

4. No “easy read” tape measures or any measuring tools that have fractions printed on them will be allowed in any of the skill areas.

5. Only active FFA members (currently enrolled in Agricultural Education) will be eligible to compete.

6. An FFA member may participate in only one skill.

7. The Individual DISTRICT First Place winner in each skill will participate in the Regional CDE. In case the winner cannot participate, The **First Place Advisor** for that event will notify the **Second Place winner’s Advisor** and also their District Advisor.

8. Each contestant must remain in the area designed for his skill until he is released by the person in charge of the skill.

9. No one may coach or give assistance to contestants. Judges may disqualify a contestant when assistance has been given.

10. Ag Ed teachers will serve as judges in the regional contest. Districts will be responsible for procuring their own judges.

9. A district that sends a single chapter from that district to the Middle Tennessee Regional competition, must bring at least **two** advisors from that district to help in judging the CDEs. The single team’s advisor may make arrangements with competent advisors from **any** district to serve as judges if they cannot find enough from their own district. **Any chapter/district’s total points will be penalized for not having enough advisors by 10 pts per missing advisor.**

11. In REGIONAL Competition, Judges will rank the contestants **through twelve places**.

12. **POINTS** toward the Awards Trophy will be allowed as follows:

   ![Points Table]

13. A certain maximum amount of time will be allotted to each skill. No additional time will be given a contestant for being late. A notification will be given at end of time for each skill and all work must stop immediately. Unfinished products will be judged.

   *FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)*
14. A winner of a skill in the *Regional* Contest will not be allowed to participate in the *same skill* in following contests.

15. Each contestant must register prior to the contest in his/her skill and *no substitutes, or additions*, will be allowed after registration.

16. All contestants must wear safety glasses that are *OSHA Approved and have side protection* during competition and at all times that they are in the contest area *except for students competing in land measuring and land elevation*. Prescription Glasses *will not* be sufficient for safety glasses.

17. The contestant will be disqualified for the removal of safety glasses except when cleaning the lens.

18. The host chapter is to be notified *in advance* of special needs for any contestant involved in a CDE. This will allow the host chapter to make arrangements to secure an individual to assist the member. (example: reading handicap)

19. A committee consisting of the host advisor and advisor from each section – north and south will be established by the host advisor prior to the start of the event to settle any issues that may arise. Decisions made by majority of that committee will be final.

- Suggest to place CDE Materials in a *three ring notebook*
Laying Block
(revised 11/16/2001 & 7/9/2003 Crimson Clover District)

Materials to furnished at site of contest:
1. Rating Sheets
2. Hose
3. Water
4. Tar paper or suitable area covering (if desired)

Materials to be furnished by contestant:
1. Three CORNER and Three STRETCHER Blocks
2. Mortar boards
3. Pails (if needed)
4. Wheel barrow
5. Hoe
6. Soapstone
7. Square-nosed, short-handled shovel
8. Enough Sand for laying 6 blocks
9. Enough Dehydrated Lime for laying 6 blocks
10. One trowel
11. One level
12. One “S” jointer
13. One six-foot folding ruler
14. One carrying bag (if desired)
15. One pencil
16. One framing Square
17. One Brush or Burlap Sack to clean blocks
18. Safety Glasses must be worn while performing task or the contestant will be disqualified. Exception is only when cleaning the lens of their safety glasses.

Procedure for student doing skill:
1. Mix Sand and Dehydrated Lime “on site” for the block laying exercise.
2. Square corner on concrete shop floor, driveway, or other existing suitable hard surface. (covered with tar paper if desired)
3. Lay a corner masonry unit using three 8” x 8” x 16” corner blocks and three 8” x 8” x 16” stretcher blocks. (two- or three-core blocks may be used)
4. Joint the blocks.
5. Clean the blocks with the use of a brush or burlap bag.

Procedure for judging:
1. Judges will be present to observe the proceeding of the entire contest.
2. Observe the thickness of the mud mixture.
3. Observe the correctness of design, neatness, speed, block and tool manipulation.
4. Observe the correctness of height, level, plum, square, uniform joints.
5. Contestants will be allowed one hour to complete the exercise.

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*FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)*
INFOGRAPHIC

3-CORE STRETCHER BLOCK**
* The actual measurement of an 8 x 8 x 16 inch block is 7 5/8 x 7 5/8 x 15 5/8 inches. If the block is laid with a 3/8 inch mortar joint, the height area will be 8 inches and the length area 16 inches.

2-CORE STRETCHER BLOCK**

CORNER BLOCK **

LAY CORNER BLOCK

ALIGNING FIRST COURSE

CORNER BLOCK EXERCISE

APPLY MORTAR TO FOUNDATION AND BLOCKS

LEVEL BLOCKS

Refer to Vocational Instructional Services Texas A & M College Station, Texas V-E-1 Basic V.A. IV for an excellent unit on masonry

FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)
Rafter Cutting
(Revised 2/5/02 & 7/9/2003 by Crimson Clover District)

Materials to be furnished at site of contest:

1. Two 2” x 4” x 8’ or 10’ for Rafter Ties
2. Two 2” x 6” x 8’ (square edge) for Rafter Plates to nail Rafters
3. Plates provided at proper distance (determined by judge)
4. Four Blocks to elevate the Rafter Plate Frame off of floor

Procedure for students in doing skill:

1. Layout and make pair of rafters including:
   - Upper Plumb Cut
   - Bird’s Mouth
   - Horizontal Projection (overhang).
2. Contestants will measure Span set up by Judge(s).
3. Judge(s) will give contestants the following specifications:
   - Rise per Foot of Run
   - Horizontal Projection (overhang)
4. Bird’s Mouth is to be 2” from top line of rafters, measured perpendicular from the top of the rafter.
5. Safety Glasses must be worn while performing task or the contestant will be disqualified. Exception is only when cleaning the lens of safety glasses.
6. Saw Rafters using tools from the lists below.
7. Nail pair of rafters together at Upper Plumb Cut. Then nail to the plates.
8. Contestant may get another contestant in Rafter Construction to hold rafters while nailing.
9. Maximum time allowed for skill is One (1) Hour.

Materials to be Provided by Contestant

1. Safety Glasses
2. Clear Clipboard, clean paper, pencil, calculator (writing information given by judge and figuring exercise)
3. Provide two 2”x4”x8’ (with square edge) for cutting Rafters
4. Power tools that may be used are as follows:
   - Circular Saw
   - Jigsaw
   - Reciprocating Saw
   - Power Miter Saw
   - Extension cord
5. Hand tools that may be used are as follows:
   - Handsaw
   - Rule or Tape Measure
   - Calculator
   - Framing Square
   - Saw Horse(s)
   - Clamp
   - Claw Hammer
   - Nails

Procedure for Judging:

1. Observe length and cuts.
2. Observe erected pair of rafters as to fit at:
   - Upper Plumb Cut
   - Ridge
   - Bird’s Mouth
3. Observe the rise.
4. Observe as to horizontal projection (overhang) and lower plumb cut.

FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)
Rafter Cutting Score Card

<table>
<thead>
<tr>
<th>Contestant Number</th>
<th>General Appearance</th>
<th>Placement of Bird's Mouth</th>
<th>Length of Rafter</th>
<th>Accuracy of Cuts</th>
<th>Horizontal Projection</th>
<th>Total Points</th>
<th>Contestant Rank</th>
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(1) All points are divided by 2, then applied to Each Rafter.
(2) 3 points are deducted for each 1/16” off from 2” Workline.
(3) 3 points are deducted for each 1/4” difference from correct length. (Minimum)
(4) 10 points are given for each cut (Bird's mouth, lower and upper plumb's). One point is deducted for 1/16” difference. 0 Minimum
(5) 5 Points are deducted for each 1/4” from correct Horizontal Projection measurement.

NOTE: In case of tie, use 1/32” and 1/16” in place of 1/16” and 1/4” respectively, with same point weights.
NOTE: Contestant will be disqualified for the removal of safety glasses except when cleaning glasses.

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BOARD FITTING
(Revised 11/16/02 by Crimson Clover District)

Eligibility:
The skill is for enrolled first-year Agriculture Education students. If a Junior High and a Senior High FFA Chapter both exist for a school, and since the Senior High is ineligible to participate, the Senior High Chapter will receive the points earned by the Junior High Chapter.

Materials to be furnished at site of contest:
Area for CDE to be conducted

Materials to be furnished by contestant:
1. A 2” x 6” x 24” board with uneven ends checked by judge.
2. Tools allowed:
   - handsaw (no miter saw or backsaw)
   - square
   - rule or tape measure (without fraction labels)
   - pencil
   - saw horse
   - clamp
3. Safety Glasses

Procedure for student in doing the skill:
1. Cut board to length determined by judge.
2. Only one (1) cut may be made on each end.
3. The clamp may be used to hold board steady.
4. No jig of any type may be used.
5. Time limit shall be thirty (30) minutes.
6. Safety Glasses must be worn while performing task or contestant will be disqualified. Exception is only when cleaning lens of glasses.

Procedure for judging:
1. Length 40 points
2. Horizontal Squareness (6”) 20 points (10 points each end)
3. Vertical Squareness (2”) 20 points (10 points each end)
4. Correct use of tools 20 points
BOARD FITTING
SCORE SHEET

***Contestant will be Disqualified for the Removal of Safety Glasses *Except* when Cleaning Them.

*Length: Deduct 1 Point for Each 1/16” off**

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PLUMBING
(Revised 8/8/2010 by Parks District)

Procedure for Skill:

1. Contestant will measure template board once and record the distance center to center of nails for the upright position of the copper and plastic, pvc, pipe. (E)
2. Galvanized tee shall be centered between the copper and plastic pipes and centered on the template at centering nail and upright copper and plastic pipe will lay between the nails contestant measured. (copper pipe on left and plastic pipe on right)
3. Cut all pipe to required lengths.
4. Prepare pipe: ream, thread, remove burrs, clean, and apply cement, solder, Teflon tape, or joint compound.
5. Assemble according to exercise plan.
   a. Leave 1 to 1 ½ threads showing past galvanized fittings.
   b. Plastic and Copper adapters tighten until a secure joint is achieved.
   c. Use Teflon tape or joint compound on all male fittings attaching to galvanized fittings.
   d. Use copper crimp rings for pex tube
6. Lengths of pipes A, B, C, and D are the same (minimum of 10 inches long) to be given by the judge.
7. Contestants will be allowed a maximum of one hour to complete the project.
8. Contestant will be disqualified for the removal of safety glasses except when cleaning safety glasses lenses.
9. Refer to Illustration Page for exercise example.

Procedure for Judging:

1. Check pipe measurements by using template. 25 points
2. Check assembly to see if according to plan 10 points
3. Check general appearance 15 points
4. Check for water leaks by applying 100 p.s.i. air pressure to fixture while submerging in a bucket of water. 50 points

Materials to be provided by host:

1. Template, 1” x 10” x 24”, for laying out fitting exercise.
2. Five, eight-penny finishing nails for setting
3. Air Hose and source.
4. Shut off valve with pressure gauge to attach to fixture. (refer to Illustration for Valve construction)

Template set-up by judge:

1. Judge drive two pairs of eight penny nails into the board and in a straight line from each other at predetermined distance.
2. This predetermined distance shall be 12”, or more, apart.
3. Place 5th finishing nail three (3) inches below two paired nails to center Galvanized Tee
4. The nails for the Copper tubing side shall be ¾” apart
5. The nails for the CPVC tubing shall be ¾” apart. (this will need to be 1” for PVC pipe.)
Materials to be furnished by contestant:

1. **Galvanized pipe and tools:**
   a. 18" of ½" galvanized pipe
   b. One ½" galvanized tee
   c. Pipe joint compound or Teflon tape
   d. Pipe vise
   e. Pipe cutter.
   f. ½" pipe thread die and ratchet
   g. Pipe Reamer
   h. Pipe Wrench
   i. File

2. **Copper pipe and tools:**
   a. 18" of ½" hard copper tubing
   b. One ½" copper elbow
   c. One ½" copper cap
   d. One ½" copper to galvanized adapter
   e. Copper tube cutter or hack saw
   f. Steel wool or emery cloth
   g. Paste or acid flux for copper sweating
   h. “Lead Free” and “Acid Free” silver bearing solder
   i. Butane torch or any other source of heat
   j. Clean wiping cloth

3. **Plastic pipe and tools:**
   a. 18" of hard CPVC or PVC plastic pipe
   b. One ½” CPVC/PVC elbow
   c. One ½” CPVC/PVC cap
   d. One ½” CPVC/PVC plastic to galvanized adapter
   e. Hacksaw or Tubing Cutter
   f. Sandpaper or emery cloth for dressing cuts
   g. Plastic pipe cleaner
   h. Purple Primer
   i. Plastic Pipe cement

4. **Pex tube and Tools:**
   a. 18” of pex tube 5/8” OD (should be ½” ID)
   b. One ½” pex to galvanized adapter
   c. One ½” pex to air manifold adapter
   d. Two copper crimp rings
   e. Tubing cutter
   f. Sandpaper or emery cloth for dressing cuts
   g. Crimping tool

5. **Tools & Equipment**
   a. Safety Glasses
   b. Adjustable Wrench or combination wrench for adapters
   c. Lubricating Oil
   d. Can or tub to catch excess lubricating oil when threading pipe
PLUMBING
SCORE SHEET

*Water Leaks will be tested by Judge attaching valve to Galvanized pipe of exercise.

*100 p.s.i. of Air Pressure will be applied and placed in a bucket or tub of water where leaks will be evident.

***No student is to be involved in administering this test.***

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FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)
Attach to plumbing exercise at ½” pex pipe
FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)
Materials to be Furnished at Contest Site

1. AC Welders
2. Welding Tables
3. Machinist Vise and Shop Hammer to Test Welds

Materials to Furnished by Contestant

1. Safety Glasses
2. Six pieces of Mild Steel ¼” x 3” x 4”
3. Welding helmet
4. Chipping hammer
5. Wire brush
6. Welding gloves
7. Electrodes of choice
8. Square
9. Soap Stone
10. Vise Grips / Clamps

Procedure for Contestant Doing Skill

1. Safety Glasses must be worn (refer to Rules and Regulations)
2. Contestant check welder
3. Turn on welder
4. Run trial bead on one piece of metal
5. Make any adjustment necessary to amperage
6. Center top, upright piece of metal length wise to bottom piece of Mild Steel – “T” (refer to illustration)
7. Run single Horizontal 1/4” Fillet Weld on one side of “T” pieces of metal
8. Chip off slag with chipping hammer and wire brush weld
9. Turn in to Judge
10. Repeat steps 3 – 4 – 5
11. May Tack Weld ONLY “T” in Horizontal Position to secure pieces for Vertical Weld
12. Run single Vertical 1/4” Fillet Weld, bottom up, on one side of “T” pieces of metal (lap weld)
13. Chip off slag with chipping hammer and wire brush weld
14. Turn in to Judge
15. Turn Welder off and remove any tools and equipment belonging to contestant
16. No Touching Up of Either Weld

Procedures for Judging

Explain the use of the specific welder to all contestants

Safety - Safety Glasses Must be Worn!!!! Lack of use will result in disqualification!!
1. Technique in use of equipment
2. Efficiency and Speed
3. General appearance as evidenced by smoothness, lack of splattering, etc.
4. Strength of weld as evidenced by penetration, leg length, and lack of under cutting leg (refer to illustration concerning bending exercise over to test strength and penetration)
5. Horizontal and Vertical Welds centered

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Exercise Illustrations

- Top piece of metal centered to width of bottom piece
- Make it look like a “T”
- Use same format for Horizontal and Vertical Welds
- Contestant may tack weld the Vertical exercise in Horizontal Position

- Place Horizontal and Vertical Exercises in Vise and bend over with hammer to test *Strength of Welds*

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DIFFERENTIAL FARM LEVEL
(Revised August 2003 Red River District)

Preparation of Contest Site

1. Prior to the contest, an accurate method will be used to determine the difference in elevation between two points.
2. Selection of points should allow the judges to determine elevation with one instrument setup.
3. Correct readings should be insured by waving the rod or by making sure it is perfectly vertical.
4. The starting and ending points will be designated on permanent bench marks such as concrete steps, walks, or fire hydrants.
5. Blank Field Note forms for field notes will be provided at site.
6. For Official Results, it is strongly recommended to use the UT Extension Service, Soil Conservation, or Professional Land Surveyor.

Procedure for completing CDE Exercise

1. Safety Glasses are not required for this contest.
2. A three or four screw Bostrom Level or one of equal quality and magnifying power will be used.
3. **Auto-Leveling (Self-leveling without contestant’s assistance)** instruments and **instruments which assist** in leveling **will not** be used. **Definition of Self-Assisted Leveling** is when the Level is rotated upside down by hand there is a "Clicking Sound" made. This is the Mirror making adjustment for level position inside the Level itself. **This Level still requires leveling by 3 or 4 Screws, but will make final compensation by "floating" mirrors.**
4. Calculators that are not programmable nor graphing may be used.
5. Clear Clipboards and paper should be free of notes.
6. Only Field Note Forms will be provided at contest site.
7. Contestants should bring all equipment needed to complete the contest.
8. The judges will indicate that “Station A” has an Elevation of 100’.
9. Judges will show the layout of the course.
10. Each team will be required to set up Instrument a “Minimum of 3 Times”.
11. A team may run the course only one time.
12. Each team has a time limit of one hour to run course and turn in results.
13. All Field Notes will be turned in on the form provided.
14. Notes should be recorded on the Field Note Form in Feet to the nearest Hundredth. **Not in feet & inches!**
15. A **Positive or Negative Difference** in elevation between “Station A” and “Station B” is to be determined by each team.
16. Each team is to answer the additional question at the bottom of the Field Note Form.

Scoring

80 Points – Accuracy of difference in elevation between Station A and Station B
10 Points – Proper set up procedures, care of equipment, and use of instrument
10 Points – Accuracy, neatness, and legibility of field notes
100 Points Total
Differential Farm Level Field Notes

Two Pages may be issued if needed for longer runs.

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Contestant Name: ______________________________

Contestant Name: ______________________________

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Difference in Elevation in nearest Foot/Feet and Hundredths - ______________________________

Is there an Increase or Decrease in Elevation? ______________________________
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*FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)*
**General Instructions**

The skill will be performed by one contestant. The skill will consist of troubleshooting and repairing an engine which has been faulted by the judges. Each contestant is to deliver their engine to the judge prior to the start of the CDE. The engine will be labeled so that each contestant will work on their own engine. If the judge “faults” the engine with the replacement of non-functional parts, the contestant must ask for replacement parts. Points will be deducted if the wrong part is asked for. The engine must run properly after the faults are corrected. Contestants will take an exam while the judge faults the engines.

**Materials to be furnished at the Contest Site**

1. Provide a crankshaft
2. Engine with ring inserted in cylinder before contest
3. Piston with compression rings
4. Gasoline for Engines

These items are to be separate from any running engines that the contestant brings to contest.

**Suggested Tools Contestants are to Furnish**

1. One six-inch or eight-inch clamp for securing engine to the bench when starting
2. Suggested Basic Tools:
   - Soft or plastic faced hammer, brass hammer, needle nose pliers, 6” adjustable wrench, spark plug sockets, ¼” socket set, socket wrench for flywheel nut, Phillips standard screwdriver, Phillips standard screwdriver, carburetor screwdriver (B&S Stratton Special Tool), spark plug wire gauge and bender, leaf type feeler gauge, and dial caliper. **NOTE: digital dial caliper will not be used**
3. Tachometer
5. Part number 276781_ Briggs and Stratton Service and Repair Manuel, Official Repair Manuel for CDE
6. Spark tester
7. Pencil and Clipboard for Exam
8. Tool, or home-made too, to secure crankshaft while loosening and tightening Flywheel Nut to help reduce chance of breaking cooling fins on flywheel.

**Engine Specifications**

**NOTE: The engine should be mounted on a board or stand that can be clamped to a table.**

1. Briggs and Stratton 5 ½ hp overhead valve engine (OHV)
2. Must have Horizontal crankshaft
3. Straight power shaft (no gear reductions)
4. Recoil starter
5. Crankcase properly filled with oil
6. No Gasoline in the tank
7. Engine should not have any missing or broken parts
8. No parts are to be marked or labeled in any manner
Engine Faults Limited to:

1. Flywheel key removed
2. Flywheel pressure washer removed
3. Flywheel nut loose
4. Carburetor discharge nozzle removed or other such equipped high speed metering device
5. Idle adjustment changed
6. Ignition system grounded
7. Air cleaner restricted
8. Spark plug gap closed or changed
9. Armature air gap changed
10. Kill switch wire short
11. Magnatron may be inverted (will not run if inverted, looks similar on both sides)

Judging and Scoring

I Observation of Work
   a. Safety, dress and work habits 20 Points
   b. Proper use of tools 20 Points

II Evaluation of Engine's Performance: For the accuracy of speed adjustment, the contestant’s tachometer will be used by the judge.
   a. Idle Speed Accuracy 1750 RPM 15 Points
   b. Top Operating Speed Accuracy range 3500 - 4000 15 Points

NOTE: Idle Speed should be within Plus or Minus 50 rpm’s of Manufacturer’s specifications

III Measurements: Checking for Most Wear

   Dial Caliper Use
   No DIGITAL Calipers!!
   a. Caliper reading of Crankshaft PTO end 10 Points
   b. Caliper reading of Crankshaft Crankpin 10 Points
   c. Caliper reading of Crankshaft Magneto End 10 Points

   Feeler Gauge Use
   a. Feeler Gauge reading of Ring Groove 10 Points
   b. Feeler Gauge reading of Ring Gap 10 Points

IV Exam

   Exam Possible Points 100 Points

V Time

The judge will record the time and order which students finish. Time will be used to break a tie in points only!

FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)
## SMALL GASOLINE ENGINE
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*FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)*
LAND AREA MEASURING
(Revised August 2003)

Materials to Furnished at Contest Site

1. Plot of Land a minimum of ½ Acre in size
2. Stakes
3. Official Answer Extension Service, Soil Conservation, Certified Land Surveyor

Materials to be Furnished by Contestants

1. 100 foot tape measure marked in feet and inches, or feet and tenths
2. Clear Clipboard, pencil and non-programmable, nor graphing calculator
3. Flags, rods, pencil, etc. to mark their pulls greater than 100’ between stakes
4. These contestant markers are to be removed as measurements are taken

Procedure for Contestants in Doing Skill

1. Measure plot of land that has been staked off by the judges
2. Measurements will be made from the center of the stakes
3. Measure one time only
4. 1 Hour to complete CDE Event
5. Two students will work together on this skill
6. Use only a 100 foot tape measure marked in feet and inches, or feet and tenths
7. Answer will be to the nearest ten thousandths of an acre
8. Figure will be divided into three triangles by contestants
9. The Heron Method will be used for calculation of each triangle’s square footage
10. A Calculator may be used
11. Programmable Calculators are not to be used

Procedure for Judging

1. Official will stake off area and calculate acreage to the nearest ten thousandths of an acre
2. Dimension lines are to be straight and will include five sides, no more, no less
3. Plot will be ½ acre or more including at least one 90-degree angle
4. Corners will be marked by a maximum ½" diameter metal posts
5. Measurements will be made at ground level
6. The posts should be marked with flags on top for visibility
7. The judge must identify the perimeter for contestants

Heron Method

Figure the Area for Each Triangle using the Following Method

\[ S = \frac{A + B + C}{2} \]

Use this formula for each Triangle

Take the Square Root of \( S(S-A)(S-B)(S-C) \) for each Triangle

Add All Three Areas of the figure and divide by 43,560 Square Feet to get Acreage

FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)
LAND AREA MEASURING
SCORE SHEET

*Teams Measure Course one time only
*Time Must be Kept on each team
**Time will be used to Break Ties Only**

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<th>Time Started</th>
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FFA-A national student organization chartered by Congress as an integral part of instruction in Agricultural Education Courses. (Public Law 740)
BRONZE WELDING AND CUTTING
(Revised February 2013)

Materials to Furnished at Contest Site

1. Necessary Oxy-acetylene equipment with selection of tip sizes both, Brazing and Cutting. Contestant will only use oxy-acetylene torches/equipment provided by host chapter.
2. Table
3. Tip Cleaner

Materials to be Furnished by Contestant

1. Three pieces of 16 gauge mild steel 2” x 6” (1 for heat setting, 2 for skill)
2. One piece of ¼” x 3” x 4” Mild Steel for cutting. One additional like piece may be used for adjusting equipment and practice
3. 3/32” Manganese Bronze rods either coated or bare
4. Welding Goggles
5. Brazing Flux (if using bare rods)
6. Welding Gloves
7. Safety Glasses – Contestant will be disqualified if safety glasses are not worn while chipping & cleaning exercise
8. Brazing/Cutting Goggles
9. Wire Brush
10. Pliers

Procedure for Doing Skill

*Judge will explain the use of welding equipment to all contestants.

1. Student check gas welding equipment
2. Clean welding tip if necessary
3. Use one piece of metal for adjusting flame
4. Make Bronze Weld in fillet position with two pieces of metal
5. Braze on one side only while in upright position (cannot lay in “V” format)
   NOTE: Some sort of support may be used to hold vertical piece upright for tacking only! Then it must be removed while performing the skill!
6. The student will cut down the center of a ¼” x 3” x 4” piece of mild steel. A like practice piece may be used to adjust equipment. The practice piece will not be used for score.
7. Contestant may use a soapstone for centering line for guide only, no jig
8. A separate station will be provided for cutting if necessary
9. Time limit of 30 Minutes

Performing Test on Braze

1. View for inspection from front side and end
2. Test joint strength by placing on anvil and flattening it down exposing the root side of the weld
3. If joint is penetrated into corner, there will be no separation of plate at the root
4. If joint is not penetrated, the plates will separate at the root
## BRONZE WELDING AND CUTTING
### SCORE SHEET

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TOOL IDENTIFICATION
(Added August 2002)

Eligibility

1. This skill is limited to FFA Members who are Freshmen and Sophomores.
2. A student may enter this skill two years.
3. If student wins the Middle Tennessee Regional Competition as a Freshman, they are not eligible to compete in this skill again their Sophomore year.

Preparations for District CDE

2. The Tools to be Identified will come from Unit 7.
3. The Tool ID Exam will come from Unit 7.
4. Examples of materials include: different types of pipe fittings, different types of screws, and different types of nails.
5. All selections will be made from textbooks and other resources commonly available to instructors for training.
6. The Written Exam will ask students questions about the use of the tools and materials on the list.

Materials Furnished at Contest Site

1. Host will select 10 tools and 5 materials from Unit 7.
2. These will be numbered and placed on a table or other workspace for identification.
3. Judge will be arranged by host chapter.

Materials Furnished by Contestant

1. Clear, Clipboards (must be clean and no writing on them)
2. Pencils
3. No Paper or other Materials allowed
4. Bring Safety Glasses
5. Judge will determine if they are needed in the Environment of CDE

Procedure

1. Use Test Sheet Provided taken from Unit 7.
2. Five (5) Minutes will be allowed to Identify the Tools and Materials.
3. Only the Name from the list will be accepted because of “common” names.
4. Students will compete separately.
5. No “Word Bank” or “Memory Aid” will be used.
6. Time needed by each contestant for identification will be kept by judge.
7. Students will be given a maximum of Ten (10) Minutes for the Written Exam.
8. Exact time used for Written Exam is not needed.
9. Papers collected at the time limit for each section.

Scoring

1. 100 Points Total Score – 90 for Tool Identification & 10 for Written Exam.
2. Tool Identification Time will be used as a Tie Breaker.
3. Contestant will not be penalized for spelling errors.
4. Written Exam will be Multiple Choice.
5. Contestant suspected of cheating will be disqualified.

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Agricultural Education Courses. (Public Law 740)
TOOL IDENTIFICATION
EXAM SHEET

Contestant Number: ________

Chapter: _________________________

Contestant Name: _________________________

You will be given Five Minutes to complete the Tool Identification. Please have materials ready and ask any questions you may have before the time begins. Time for the Tool Identification will be used only to break a tie.

Each tool is numbered. Write the Name of the Tool beside the matching number. Turn in your paper as soon as you complete it.

1. ______________________________________

2. ______________________________________

3. ______________________________________

4. ______________________________________

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15. ______________________________________
### TOOL IDENTIFICATION
#### SCORE SHEET

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Options for Wiring

Person in charge of CDE shall determine by lot, which of the three types of 3-Way Switch is to be constructed.

1. Light between switches, source of energy at light
2. Light before the switches, source of energy at light
3. Light beyond the switches, source of energy at switch most distant from light (8” from base)

Minimum Materials to be Furnished by Contestant

1. Safety Glasses: Contestant will be disqualified for not wearing Safety Glasses during CDE, except when cleaning them.
2. Two Plastic wall boxes 3” x 2” x 3” or comparable; One for Switch, One for Duplex (mount to frame before CDE)
3. One Metal wall box 3” x 2” x 3” or comparable (mount to frame before CDE)
4. One Duplex Receptacle with green screw
5. One Pre-Fabricated Power Source Cord for Duplex Receptacle.
6. One 4” plastic or metal ceiling box (mount to frame before CDE, must be large enough for the number of wires in the box)
7. One Porcelain light Receptacle
8. 14/3 non-metallic sheathed cable with ground 6 Feet Long; 14/2 non-metallic sheathed cable with ground 8 feet long.
   (judges note: students should not be penalized for using #12 wire since this could be a 15 amp or 20 amp circuit. However, only one size wire can be used throughout the circuit)
9. Sufficient number of Solderless Connectors to fit above listed wires and green pigtails for grounding metal boxes
10. Two Switch Box Covers
11. One Duplex Receptacle Cover
12. Wood Frame according to drawing
13. Required number of ½” non-metallic sheath cable fasteners
14. Necessary Tools to complete this CDE (power drivers are acceptable)

Materials Furnished at Contest Site

1. Extension Cord six feet or longer for plugging male end of Duplex Receptacle Power Cord for testing lights
2. Tables to mount Frames to for Event

Procedure for CDE Exercise

1. This skill is designed to teach Electric Principles rather than Carpentry.
2. Mount all electrical boxes on specified Frame before CDE
3. BEFORE CDE EVENT: Construct an 18”, 14/2 non-metallic sheathed with ground, Male Plug on one end and 8” of sheath stripped on other end for insertion into the Duplex Box to serve as “Source” (should be 12/2 if using #12 wire in rest of the circuit).
4. Male plug will plug into the Extension Cord for testing. Note to your students that this is not an acceptable wiring practice for codes, but is used in this exercise for safety reasons when connecting the project to an electrical source in the contest)
5. Frame must be secured to table with clamp before contest begins
6. All work must be completed with frame clamped to the table right side up
7. Run a 14/2 cable with ground from the duplex receptacle box, through the 5/8” hole pre-drilled in stud
8. Proceed to run 14/2 cable to designated for the source wire to enter (either the light, or switch box)
9. Install wires in boxes (see score sheet for measurements)
10. Connect wires to switches and to receptacles and line
11. Solderless connectors (ie. wire nuts) used, wires in Solderless Connectors must be twisted together
12. Connect and exit the 18” pre-fabricated “Source Cable with Male Plug” from the left side of the Duplex Receptacle box
13. 1 Hour Time Limit to complete this CDE Event

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NOTE: Refer to Illustration of Frame Construction, Box Placement and 5/8” Hole locations and measurements.
3-WAY SWITCH INSTALLATION
SCORE SHEET

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NOTE: Subtract one to five points from the above Total for each deficiency below.

OUTSIDE APPEARANCE

1. Boxes properly installed (1/2” past wall stud)
2. Wires properly installed in boxes.
   (Outside insulation goes under Romex connectors)
3. Neat corner bends. (very little daylight between wire and wall stud)
4. Wires properly installed (staple hold wires firmly in place but does not cut into outside insulation)
5. Wires going into plastic box must be stapled within 8” of the box

INSIDE APPEARANCE

1. Insulation properly stripped (1/2” to 5/8”). Inside insulation should come up to terminal but not go under terminal
2. Terminal attachment (wires wrapped clockwise)
3. No nicked or cut insulation
4. Splices properly turned (clockwise)
5. Insulation under Solderless connectors
   (no bare wire exposed)
6. Loose wires (wires held tight under terminal)
7. Grounding screws installed properly
8. Length (sheathing stripped to no less than ¼” from the inside back of the box but no more that ¾”. Unsheathed wires should extend at least 8” from the inside back of the box)
9. Grounding wires in plastic wall box must be spliced together with Solderless connectors
10. Grounding wires in metal boxes must be spliced together with Solderless connectors with one wire connected to each metal box with screw and green pigtail
11. A single ground wire in the plastic wall box must be grounded to the switch

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