

Outdoor Power Equipment Career Development Event

Effective August 1, 2007

Purpose

The Outdoor Power Equipment Career Development Event (CDE) is an extension of the Agricultural Education classroom and laboratory. Additionally, this CDE serves as an authentic assessment designed to evaluate students' knowledge in recognizing and repairing malfunctions in Outdoor Power Equipment. The skills Agricultural Education students employ in this CDE are the same skills required by outdoor power equipment technicians.

Date and Location

District: Set annually by the respective District

State: Set annually by the Agricultural Education Service

CDE Rules

1. The District CDE must be operated using the state rules and regulations.
2. Each school must have a team of three students. Each student will participate independently, except for the team event.
3. The top two teams from each district will participate in the State Outdoor Power Equipment CDE (the top two individuals in each district, if not on the top two winning teams, may participate at the state level as individuals).
4. There will be a minimum of five stations; one of which must be a troubleshooting station (e.g. four skill stations and one troubleshooting station); a 20-question general knowledge written test; and a team event (e.g. a problem solving pre-delivery scenario).
5. Ten minutes will be allowed for each of the aforementioned stations with the exception for the written test and team activity where 20-minutes will be allotted.
6. All Outdoor Power Equipment used at the troubleshooting station will include but will not be limited to Briggs & Stratton, Tecumseh or Kohler.
7. The troubleshooting station may include any of the activities listed under the header "Skill Areas" later in this document.
8. A manual must accompany the companion outdoor power equipment at troubleshooting station.
9. Contestants may provide their own digital multi-meter as long as it has a minimum of 10M Ω impedance (e.g. Fluke 88 Automotive Meter). One will be provided.
10. Contestants can use non-programmable calculators, steel rules and pencils. No other tools are to be brought to the CDE.
11. All outdoor power equipment must be less than 29 horsepower and less than 10 years old.
12. Judges will observe the progress of contestant repairs but will not interfere with them unless such repairs are damaging to the engine or are threatening to the safety of the contestants.
13. Tied team scores will be resolved based on the following criteria:
 - a. First criteria: Best Combined Exam Score
 - b. Second criteria: Best combined team troubleshooting score
 - c. Third criteria: Best combined pre determined station
14. Tied individual scores will be resolved based on the following criteria:
 - a. First criteria: Exam score
 - b. Second criteria: Troubleshooting score
 - c. Third criteria: Pre determined station
15. Contestants must be dressed appropriately, including but not limited to clear, non-tinted safety glasses with side shields (Z87.1) and work shoes (no athletic or open-toed shoes are permitted). A trouble diagnosis guide will be useful in preparing contestants. The guide may be used in the CDE. A service instruction manual will be available to all contestants at the troubleshooting station.
16. A team must participate in the District Outdoor Power Equipment CDE to be eligible to participate in the State Outdoor Power Equipment CDE.

Outdoor Power Equipment CDE Host Instructions

NOT FOR DUPLICATION OR DISTRIBUTION

1. The host of the District CDE is responsible for supplying all outdoor power equipment, tools (special and hand), fire extinguishers, replacement parts, manuals, scorecards and judges.
2. Discretion should be used in selecting skills requiring specialized equipment.
3. The host must provide any other items necessary to conduct the CDE.
4. The host or judges may require additional sheets for evaluation of certain skills.
5. At least 10 days prior to the date of the State Outdoor Power Equipment CDE, the names of the schools representing each district must be forwarded to the Agricultural Education Service by the district's CDE Advisory Committee Member

Skill Areas

Skill areas include but are not limited to the following areas performance:

Contestants may be required to explain the use of and take measurements using the following:

- | | |
|--|-------------------|
| 1. Cylinder bore telescoping gauge | 5. Feeler gauge |
| 2. Dial Caliper | 6. Micrometer |
| 3. Dial indicator | 7. Plastigauge |
| 4. Digital multi-meter ($\geq 10M\Omega$ impedance) | 8. Plug gap gauge |

Contestants may be asked to explain and demonstrate the use of following:

- | | |
|--------------------------|--------------------------|
| 1. Ring Compressor | 4. Piston Groove Cleaner |
| 2. Piston Ring Expander | 5. Ignition Tester |
| 3. Cylinder Ridge Reamer | 6. Battery Tester |

Contestants may be asked to explain, measure and calculate the following:

- | | |
|--------------------------|---------------------------------|
| 1. Bore and stroke | 7. Engine RPM |
| 2. Coil capacity | 8. Ring end gap |
| 3. Crank endplay | 9. Ring side clearance |
| 4. Cylinder out-of-round | 10. Valve steam guide clearance |
| 5. Cylinder taper | 11. Valve tappet clearance |
| 6. Engine displacements | |

Contestants may be asked to identify, explain and demonstrate the use of the following:

- | | | |
|---|------------------------------------|---------------------------|
| 1. Outdoor power equipment nuts and bolts | | |
| 2. Outdoor power equipment parts | | |
| 3. Fuels, lubricants and coolants | | |
| 4. Tools and special equipment (including but not limited to the following) | | |
| Battery tester | Gasket and Carbon Scraper | Stack Pulley Removal Tool |
| Battery Tester | Housing Holder | Starter Clutch Remover |
| Carburetor/Crankcase | Ignition Tester | Starter Rewind Tool |
| Pressure Gauge | Ignition tester | Tachometer |
| C-Clamp Pliers | Inline spark tester | Three-Jaw Gear Puller |
| Compression Tester | Internal-External Snap Ring Pliers | Throttle Wire Bend Tool |
| Condenser Tool | Key Puller | Torque Wrench |
| Crankshaft Wrench | Piston Groove Cleaner | Valve Grinder |
| Cylinder Hone | Piston Ring Expander | Valve Lapper |
| Cylinder Ridge Reamer | Plug gap gauge | Valve Lapping Compound |
| Feeler gauge | Pocket Screw Driver | Valve Refacer |
| Flywheel Holder | Ratchet Starter Remover | Valve Seat Cutter |
| Flywheel Knocker | Ring Compressor | Valve Seating Tool |
| Flywheel Puller | Snap ring pliers | Valve Spring Compressor |
| Flywheel Wrench | Spindle Bearing Removal Tool | |

Contestants may be asked perform the following skills:

- | | |
|-----------------------------------|---|
| 1. Complete work orders | 8. Check heads for warpage |
| 2. Check for spark | 9. Set armature and air gaps |
| 3. Check for proper valve seating | 10. Clean air cleaner |
| 4. Install piston rings | 11. Adjust and set carburetor linkages |
| 5. Install pistons | 12. Use parts manuals or internet websites to make recommendations for ordering parts or recommending specifications and tolerances |
| 6. Time crank and cams | |
| 7. Set mechanical governors | |

13. Check cylinder compression (leak down test)

14. Explain engine specifications

15. Test electrical starter/generator/alternators

References

1. General Theories of Operation, Briggs & Stratton Corporation.(current edition)
2. Repair Instructions, Briggs & Stratton Corporation - (current editions)
3. Tecumseh Mechanics Manual (current edition)
4. I & T Small Engines Service Manual (current edition)
5. Small Engines by R. Bruce Radcliff and Dann L. Roark. ISBN 0-8269-0012-7. American Technical Publishers, Inc, Homewood, Il 60430
6. Small Engines Workbook by R. Bruce Radcliff. ISBN 0-8269-0013-5. American Technical Publishers, Inc, Homewood, Il 60430
7. Small Engines Workbook Answer Key. ISBN 0-8269-0014-3. American Technical Publishers, Inc, Homewood, Il 60430
8. Small Gas Engines by Alfred C. Roth (book, workbook & instructor's manual). ISBN 1-59070-183-6. The Goodheart-Wilcox Company, Inc.- Tinley Park Il 60430
9. John Deere FOS Manuals
10. Online industry parts reference sites (e.g. Briggs and Stratton)

Scoring

Individual score

Four (4) skill stations (20 points per station).....	80 points
One (1) troubleshooting station.....	20 Points
General Knowledge Exam (20 questions at one point each).....	<u>20 points</u>
Total Individual Score (per participant).....	120 points

Team Score

Three (3) individuals x 120 points	360 points
Team Activity.....	<u>100 points</u>
Total Team Possible Score.....	460 points

Outdoor Power Equipment Troubleshooting Scorecard

Team: _____

Student Name: _____

Student Number: _____

Instructions: Points are awarded to teams for the following categories and tasks completed. Maximum points per item are listed, but fewer points may be awarded.

Safety (5 points)

Points Scored

1. Safety glasses (1 pts.) _____
2. Safety procedures (1 pts.) _____
3. Safe equipment operation (1 pts.) _____
4. Communication with judge (1 pts.) _____
5. Cleanliness (1 pts.) _____

Total Safety Points _____

Use of Tools/Equipment (5 points)

1. Proper use of tools (1 pts.) _____
2. Proper use of the service manual/related material (2 pts.) _____
3. Proper use of diagnostic equipment (2 pts.) _____

Total Tools/Equipment Points _____

Diagnostics (10 points)

1. Diagnostic procedure (2 pts.) _____
2. Location of problems (3 pts.) _____
3. Proper repair of problems (3 pts.) _____
4. Explanation of faults to the scorer (2 pts.) _____

Total Diagnostics Points _____

Subtotal Points _____

Instructions: This section may **deduct** points for unsafe or unapproved diagnostic or repair methods. This includes unsafe oil or fuel handling techniques. Point deductions may be up to the maximum listed for each.

Unsafe or Unapproved Methods (10 points)

1. Fluid systems (4 pts.) _____
2. Electrical/Electronic systems (4 pts.) _____
3. Cleanliness (e.g. using manual with dirty hands) (2 pts.) _____

Total Points Deducted for Unsafe or Unapproved Methods { - _____ }

Bonus Points:

One point for each unused full minute (under 10 minutes) per station. Outdoor power equipment must operate per judge's satisfaction before time points are allowed.

Time Started _____ Time Finished _____ Unused Minutes _____

Total Bonus Points _____

Judges: _____

Total Station Points

Judges: _____

BUTION