

CATA 2018 Curricular Code Change Proposal – Small Engines

Contest:	Small Engines	
Proposed By: (Name, School, Email)	Rich Wolfe (Beyer); Wolfe.R@monet.k12.ca.us Dave Segna (Hilmar); DSegna@hilmar.k12.ca.us	
Issue: (Describe the reason/rationale for the proposed change.)	<p>There are three primary reasons behind the proposed changes as follows:</p> <ol style="list-style-type: none"> 1. Improve clarity in the areas of Tiebreakers, Tools, Engine Parts ID and Score Sheet Judging Criteria with language cleanup. 2. Improve Troubleshooting scoring consistency by judges with clarifications to Pre Start Checks, Procedurals, System Diagnostics and RPM Adjustments. 3. Enhance the Work Order document by adding a Labor Hours billed component based on a Flat Rate Labor Repair Chart. 	
Please check ALL the boxes that apply to your proposed change.		
This proposal will require a contest to open out of rotation.	No	
The change will affect General Rules.	Yes	
The change will affect the awards needed.	No	
The proposed change will affect tabulations.	No	
The proposed change will affect contest forms.	Yes	
The proposed change will affect contest hosting site. (e.g. additional facilities, new sections, additional scoring, etc.)	No	
<p>If you answered yes to any of the above questions, please explain. <i>*It is recommended that you, or a representative, are in attendance at the pre-conference governing board to answer any questions regarding proposed curricular code changes to contests that are requested to be opened out of rotation.</i></p>	<p>General Rule changes are primarily language cleanup to improve clarity.</p> <p>Forms changes to the Troubleshooting Score Sheet are designed to improve clarity for judges and the Work Order changes add a Labor Hours billed component that aligns with industry time management practices along with clarification on how the Labor, Parts, Tax & Totals areas are scored.</p> <p>Both revised forms are included with this proposal.</p>	
Description: (Describe what is changing.)	<ol style="list-style-type: none"> 1. General Rules – Tiebreaker language 2. Section VI – Tools 3. Appendix I – Identification Lists 4. Appendix II – Troubleshooting General Information 5. Appendix III – Troubleshooting Score Sheet 6. Appendix IV – Work Order 7. Appendix V – Score Sheet Judging Criteria <p>See Pages 2-3 below for change summary information or the Small Engines Curricular Code - 2018 Revisions v4.pdf attachment for additional detail.</p>	

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<p>Proposed CATA Code Change #1: (Only include the section that the proposed change pertains to – do not include the entire contest. Reference numbered section. If editing text show new text with old text in parenthesis. For large changes set track changes in the Word document and attach the file, with edits, to this document when submitting.)</p>	<p>Tiebreaker – page 1</p> <ol style="list-style-type: none"> 1. Individual and team ties will be broken by individual's/team's scores on problem solving. 2. If a tie persists it will be broken by score on technical skills test. 3. If a tie persists it will be broken by score on theory test. 4. If a tie persists it will be broken by score on identification test. 5. If a tie persists it will be broken by the flip of a coin. <p><i>*In the Qualifying rounds of Theory and Identification, ties will be broken by individual/team scores on theory. If a tie persists, follow 3 and 4 then 5 above.</i></p>
<p>Proposed CATA Code Change #2:</p>	<p>Section VI Tools – pages 4-5 Language cleanup for clarity; Remove tools no longer applicable (Cold Chisel, Drift Punch & Torx screwdriver); Add tooling (Gasket scraper, Rubber mat, T-15 and T-30 3/8" drive Torx sockets)</p>
<p>Proposed CATA Code Change #3:</p>	<p>Appendix I Identification Lists – pages 6-7 Language clean up – Tools used for the identification portion of the contest are to be those commonly used in small gas engine repair. Some examples are listed in the table below. In regards to the engine parts, list the items shown serve only as a point of reference for study. Similar items from other brands and models of engines may be used. However, the name shown from the list will not be altered. The most modern tools and engine parts available should be used at all times. However, engine parts 25 years old or older will not be used.</p> <p>Tool List – Add Torx Socket Engine Parts – Add Briggs 60000 series engines</p>
<p>Proposed CATA Code Change #4:</p>	<p>Appendix II Troubleshooting General Info – page 8 Minor language change – Standard Questions and Example Responses</p>
<p>Proposed CATA Code Change #5:</p>	<p>Appendix III Troubleshooting Score Sheet – pages 9-10</p> <ol style="list-style-type: none"> 1. Clarify Pre Start checks “a” through “e” can be done in any order 2. Clarify Diagnostic Method Criteria is scored 30, 15 or 0 points. 3. Procedurals – Modify language to match System changes. 4. System Scoring – Clarify scoring is 10, 5 or 0 points based on the need to go into a system and how the Team performed 5. RPM Adjustments – Modify to reflect actual contest practice of not adjusting engines.

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<p>Proposed CATA Code Change #6:</p>	<p>Appendix IV Work Order – page 11</p> <ol style="list-style-type: none"> 1. Add a Labor Hours component and instructions for Teams to list Work Performed descriptions & hours required using the Flat Rate Labor Repair Chart. 2. Clarify Parts Total & Tax calculated from actual Parts Ordered; Raise labor rate to \$75.00 per hour; Clarify the points available for Tax & Totals are based on a math check only. 3. Legibility – Clarify points awarded are either 2 or 0 if any portion is not legible. <p>Flat Rate Labor Chart – (page 12) The items listed align with common bugs used for the Troubleshooting portion of the contest. When available, Briggs standard times were used, otherwise times representative of what it should take are listed.</p>
<p>Proposed CATA Code Change #7:</p>	<p>Appendix V Score Sheet Judging Criteria – pages 13-14</p> <p>III Pre Start Checks – Add clarification about what repairs could be made during Custom Complaint Verification – Acceptable repairs may include: Starter Rope repair; Adding of engine oil, Repair of the kill switch; Clean out of contaminated fuel; Fuel Leak repair</p> <p>V. Procedurals – Language Clarification – Examples of a situation that would require a procedural include, but not limited to: misadjusted valves, magneto on backwards, improper magneto gap, carburetor spacer on backwards (NOTE: Protrusion must be installed toward the carburetor with a gasket on both sides), governor linkage on backwards installed incorrectly, not scraping old head gasket material before installing a new head gasket, not replacing all required gaskets for the repair.</p> <p>VI. Fuel System, Ignition System, Compression System – Modify language to align with 4 scoring options:</p> <ol style="list-style-type: none"> A. Repairs needed, done & explained correctly = 10 points B. Repairs needed, done correctly but not explained = 5 points C. Repairs not needed but done & explained correctly = 5 points D. Repairs not needed & nothing done = 10 points E. Improper/Incomplete repairs done or the Judge stops the Team to avoid damage = 0 points <p>VIII. Work Order Documentation – Add section to clarify how the Work Order should be scored in the Work Performed, Parts, Tax & Totals areas.</p>

SMALL ENGINES

Revised ~~6/2015~~ 5/30/2018

Purpose and Standards

The purpose of the contest is to stimulate an appreciation for small engine repair and serve as one method of training Future Farmers in the skills and safety practices needed in diagnosing engine malfunctions. Schools will be required to bring a prescribed list of tools. There will be a critique following the contest.

Foundation Standards: Mathematics Algebra 10 and Geometry 11, Listening and Speaking 1.8, 2.3, Technology 4.1, 4.2, 4.6, Problem Solving and Critical Thinking 5.1, 5.2, 5.3, Health and Safety 6.2, 6.4, 6.5, Ethics and Legal Responsibilities 8.3, Leadership and Teamwork 9.1, 9.2, 9.3.

Ag Mechanics Pathway Standards: Safety B 1.0, Engines and Machinery B 10.0, B11.0.

Contestants

The contest team will be made up of three members. Each member will compete in the Theory and Identification areas. The top ten teams based on the combined scores of Theory and Identification areas will compete in the Problem Solving, Technical Skills, and Troubleshooting. The top five individuals, if they are not part of one of the top ten teams, will compete in the Problem Solving and Technical Skills area as well.

Classes

Class	Individual Points	Team Points
Identification	50	150
Theory Test	50	150
Problem Solving	50	150
Technical Skills	50	150
Troubleshooting		200
Total	200	800

Tiebreaker

1. Individual and team ties will be broken by individual's/team's scores on problem solving.
2. If a tie persists it will be broken by score on technical skills test.
3. If a tie persists it will be broken by score on theory test.
4. If a tie persists it will be broken by score on identification test.
5. If a tie persists it will be broken by the flip of a coin.

*In the Qualifying rounds of Theory and Identification, ties will be broken by individual/team scores on theory. If a tie persists, follow ~~3 and~~ 4 then 5 above.

Ties in the individual sub-contests will be broken by the highest individual overall score. Team sub-contests will be broken by the highest overall team score.

Sub-contest Awards

Sub-contest ribbons will be awarded to the top five individuals and teams in Theory, Identification, and Problem Solving and to the top five teams in Troubleshooting.

Requirements of the Host Institution

The sponsoring institution will indicate the parts catalog and price guide format and the engine model number that will be used in the troubleshooting portion of the contest in the registration materials sent to the competing school. A list of troubleshooting engine specifications, for the judges will also be provided.

Rules

The contest is made up of the following areas:

- I. **IDENTIFICATION:** (Time: 40 minutes) (50 points)
 - A. Identification of engine parts and tools
 1. A key with the parts identified will be available at the end of the contest. All names used shall be those used by the manufacturer's engine or parts manual (16 horsepower or less) ... See Appendix I list.
- II. **THEORY:** (Time: 40 minutes) (50 points - Maximum of 50 questions)
 - A. A written test on Basic Engine Theory including the following areas:

1. Carburetion	6. Lubrication
2. Compression	7. Maintenance
3. Cooling systems	8. Safety
4. Fuels	9. Starters
5. Ignition	10. Troubleshooting
 - B. Questions may be submitted by each school planning to compete at State Finals in the Small Engines Contest. They are to include the textbook page number, question and correct answer. They must be submitted by December 1 of each year to the Chairman at the school hosting the State Finals Contest.
 - C. Test questions will be derived from the following Reference Materials:
 1. Briggs Stratton Repair Manual – Single Cylinder 'L' Head and OHV (Intek)
 2. FOS (Compact Engine by John Deere)
 3. Small Gas Engines by Alfred C. Roth
 4. Small Engines by Bruce Radcliff (American Technical Publications)
 - D. The questions on this test will be theoretical in nature and will not include any references to exact engine specifications that should be looked up in the engine technical manual.
 - E. A copy of that year's written test will be provided to coaches as a hard copy or electronically.
- III. **PROBLEM SOLVING:** (Time: 40 minutes) (50 points)
 - A. Problem solving shall be made up of stations with 'hands-on' skills. A minimum of ten stations are required.
 - B. Each station will be equipped with the following:
 1. The specific components needed for the exercise.
 2. All tools needed to perform the task at the station.
 3. All technical manual pages and reference sheets needed that explain the procedure.
 4. A list of all specifications needed to complete the exercise.
 - C. Examples of Problem Solving questions are:
 1. On what model engine are you working?
 2. To order a new head gasket for this model engine what is the part number?
 3. What is the valve clearance specification for this model engine?
 4. What high altitude jet would you use in this carburetor?

- IV. **TECHNICAL SKILLS:** (Time: 40 minutes) (50 points)
- A. Technical Skills shall be made up of stations with “hands-on” skills. A minimum of ten stations are required.
 - B. Each station will be equipped with the following:
 - 1. The specific components needed for the exercise.
 - 2. All tools needed to perform the task at the station.
 - 3. All technical manual pages and reference sheets needed that explain the procedure.
 - 4. A list of all specifications needed to complete the exercise.
 - C. Examples of “hands-on” exercises for Technical Skills are:
 - 1. Using a micrometer.
 - 2. Using a hole gauge and micrometer--measure valve guides, connecting rod journals, piston pin journals.
 - 3. Using a telescoping gauge and micrometer--measure cylinder bore.
 - 4. Using a dial indicator--measure crankshaft endplay.
 - 5. Using a feeler gauge--measure valve tappet clearance, point gap, armature air gap.
 - 6. Using a vibra tach--measure engine r.p.m.
 - 7. Using plug gauges as available from Briggs and Stratton--measure bearings, valve guides, breaker point plunger guides for "go no go" situations.
 - 8. Using a leak down tester to test engine compression.
 - 9. From displays of tools select those items needed for: pulling and installing valve seats; pulling and installing valve guides, etc.
 - 10. From displays of engine components: identify correctly assembled connecting rods and caps, ignition system, etc.
 - 11. Use of a billing statement and the calculations involved for parts and labor.
 - 12. Use of a digital multimeter.
- V. **TROUBLESHOOTING THE SMALL ENGINE** (200 points possible awarded to the team and no individual points to be awarded).
- A. A \$15.00 fee per team will be charged for maintenance and repair of engines used at the State Finals Contest each year. This fee will be given to the host providing the engines for the troubleshooting portion of the contest.
 - B. Other than the use of a leak down tester, all tools will be hand powered. All small engines will be of same type starters, carburetors, and ignition systems. Teams are allowed two (2) minutes for tool set up prior to starting troubleshooting. Troubleshooting score sheets will be returned with team results as soon as possible. Each troubleshooting judge should critique each team upon completion of the troubleshooting phase of the contest. Team members may not possess any engine parts except those that might be provided by contest sponsor. Written material will be limited to the appropriate Repair Manual and a list of common specifications for the engine being used in the contest. No score sheets, etc. will be allowed.
 - C. Time: 60 minutes maximum. Engines will run ~~properly~~ for one minute.
 - 1. Time will be stopped for any repairs required that are not a part of the engine scenario and/or bugs introduced into engines.
 - 2. If time is stopped, Teams will only be able to correct the issue outside the contest's intended scope.
 - 3. Upon completion of these repairs the Time will resume.

Text additions are formatted with blue underline and deletions are ~~red-strikethrough~~.

- D. Common adjustments and repairs will need to be solved by the team in the contest. The team will work together on trouble shooting. Example:
1. Spark plug out of adjustment
 2. Governor linkage incorrect
 3. Carburetor out of adjustment
 4. Loss of compression
 5. Loose parts
 6. Obstructions
 7. Improper assembly
 8. Missing parts
 9. Worn or damaged parts
 10. Ignition system inoperable.
- E. The contestants will be judged on the following items:
1. Safety
 2. Proper use of tools
 3. Neatness of work
 4. Starting procedures
 5. Pre-start checks and diagnostics
 6. Troubleshooting and diagnostic methods
 7. Completion of work order (Note: Appendix IV)
- F. If a team's troubleshooting judge deems the procedures and actions damaging to the engine and its components, the judge will have the team stop with appropriate points deducted on the Small Engines Troubleshooting Score Sheet.
- VI. **TOOLS** – Each team's toolbox should include tools commonly used in the repair and maintenance of small gas engines.
1. #2 Philips and Standard screwdrivers at least 8" in length
 2. Socket, Shallow 6 point– 1/2" drive – 15/16"
 3. Flex handle – 1/2" drive
 4. Nut drivers – 1/4", 5/16", 3/8" and 7/16"
 5. Sockets, Shallow 6 point– 3/8" drive 1/4" to 1/2"
 6. Extensions s – 3/8" drive – 3" and 6"
 7. Ratchet – 3/8" drive
 8. Nut drivers – 7mm to 10mm
 9. Sockets, Shallow 6 point– 3/8" drive – 7mm to 10mm
 10. Allen wrench socket set – 3/8" drive – standard and metric
 11. Appropriate Repair Manual
 12. Ball Peen Hammer
 13. Calculator
 - ~~14. Cold Chisel~~
 15. Container to drain fuel and/or oil into
 - ~~16. Drift Punch~~
 17. ~~End~~ Combination wrenches: 3/8" to 5/8"
 18. ~~End~~ Combination wrenches: 8mm to 10mm
 19. Engine anchoring device
 20. Flash light
 21. Flat feeler gauge set
 22. Torque wrenches – Foot-lb and Inch-lb.
 23. Gasket scraper
 24. Governor adjustment tang benders
 25. Ignition Spark Tester

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26. Leak down tester and air tank
27. Lighter
28. Long nose pliers
29. Pencil
30. Rubber Mat – 12" x 12" to run engine on
31. Safety Glasses (1 pair per member)
32. Short 1/2 " drive extension
33. Pliers Slip joint
34. Soft faced mallet or dead blow hammer
35. Spark Plug Gapping tool
36. Sockets, Spark Plug– 5/8", 3/4" and 13/16"
37. Starter rope threading tool
38. Storage containers used to put engine hardware into as it is removed
39. Strap wrench – Used to hold flywheel when torqueing
40. Tachometer – Digital or mechanical
41. ~~Torx Screwdrivers, T-15, T-20, T-30~~
42. Sockets, Torx – 3/8" drive – T-15, T-20 and T-30

APPENDIX I**IDENTIFICATION LIST**

Tools used for the identification portion of the contest are to be those commonly used in small gas engine repair. Some examples are listed in the table below. In regards to the engine parts, list the items shown serve only as a point of reference for study. Similar items from other brands ~~and models~~ of engines may be used. ~~However, the name shown from the list will not be altered. The most modern tools and engine parts available should be used at all times. However, engine parts 25 years old or older will not be used.~~

TOOLS

Adjustable open end wrench	Ratchet handle
Allen wrench	Regular or slotted screwdriver
Ball peen hammer	Ring compressor
Battery pliers	Screw pitch gauge
Box end wrench	Six point socket
Center punch	Socket adapter
Cold chisel	Socket extension
Combination end wrench	Soft face hammer
Combination slip joint pliers	Spark plug gauge
Deep socket	Spark plug socket
Diagonal pliers	Spark tester
Drift punch	Speed handle
Flat feeler gauge	Strap wrench
Flex handle	Tachometer
Fuel clamp pliers	Torque wrench
Lever jawed wrench	Torx screwdriver
Long nose pliers	<u>Torx socket</u>
Nut driver	Universal joint
Offset screwdriver	Valve spring compressor
Open end wrench	Volt ohm milliamp (VOM) meter
Phillips screwdriver	Water pump pliers
Pin punch	

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SPECIAL TOOLS

Briggs & Stratton Service Tools Catalog

ENGINE PARTS

~~The engine parts will be selected from these series: 90000, 120000, 110000, 260000.~~

The engine parts will be selected from the following: Briggs & Stratton Series 60000 to 260000

Example:

Briggs & Stratton Illustrated Parts Lists specified below:

MODEL NUMBER	TYPE NUMBER
91200 TO 91299	0017
124700 TO 124799	0101
110400 TO 110499	N/A
261700 TO 267199	0020

APPENDIX II**Troubleshooting – General Information**

Each team of three contestants will be given a maximum of one hour to diagnose and repair an engine, and complete a standardized work order (see example – Appendix III). The judge will act as the customer and the team will act as the service technicians. Through a series of standard questions, asked by the team members, they will diagnose and repair the engine based on the responses received from the judge (see example below). Upon starting the engine, the team will then be required to complete a work order including costs for parts, labor, and sales tax. Each judge will be provided with the standard questions and answers to the questions.

EXAMPLE**Standard Questions and Example Responses**

Question: What is wrong with the engine?

Response: The (equipment type) will not run.

Question: How did the engine act when the problem occurred?

Response: It ran fine the last time I used it, but when I went to use it again, it would not start.

Question: Did you do anything to the engine prior to bringing it in?

Response: I removed the carburetor and looked inside. I also removed the float bowl and didn't see anything wrong, so I put it back together.

Question: What would you like us to do to the engine?

Response: Repair the problem.

Question: When was this engine last serviced?

Response: I had it serviced last year after using it on a job site. It's been sitting in my garage for the last six months.

Appendix III -- Small Engines Troubleshooting Score Sheet

Team Name:		Judge's Name:		Possible	Earned
Points in these categories are variable					
Safety – Deduct 1 point for each infraction up to the maximum points in each line item.					
a. Wipes up oil and fuel spills as they occur				0 to 5	
b. Maintains safe work practices				0 to 5	
c. Each member wears safety glasses at all times				0 to 5	
Total				15	
Tools and Parts – Deduct 1 point for each infraction up to the maximum points in each line item.					
a. Uses proper tool for the job				5	
b. Drops tools and parts – (Proper grip, careful not to drop tools and parts, etc.)				5	
c. Parts and Hardware installed correctly (not within the 3 systems below)				5	
d. Uses proper torque specifications and patterns as needed: Flywheel Nut - Head - Carburetor - Armature - Muffler Rocker Arm Assembly - Main Jet - Spark Plug - Rocker Cover - Governor Lever (Deduct 1pt per item if torqued incorrectly.)				5	
Total				20	
Pre Start Checks (Points are all or nothing in this category. NOTE: Steps "a" through "e" can be done in any order)					
a. Check for proper oil level				5	
b. Check Gasoline Quality and Level				5	
c. Starter Operational				5	
d. Air cleaner serviced or replaced				5	
e. Stop Switch Operational				5	
f. Customer Complaint Verified (Tried to start the engine to verify the complaint prior to making repairs. No Points will be deducted for necessary repairs made to verify the complaint or prevent engine damage. No diagnostic repairs).				5	
Total				30	
Diagnostic Method Criteria (Points awarded in this category must be 30, 15 or 0)					
An organized Diagnostic Method is used to isolate the engine problem and prior to a system disassembly. Team must explain their diagnostic method to the judge and the result of their testing to receive points. Method used and correct diagnosis = 30pts. Method used but incorrect diagnosis = 15pts. No diagnostic method used = 0pts.				See criteria	
Total				30	
Procedurals Scoring – 0 Points awarded for improper assembly or incomplete repairs in each area. No points will be given if a team fails to follow proper assembly of all components or if a judge must stop/correct a team for improper procedures that would result in engine damage. Points in the Fuel System, Ignition System and Compression areas will only be awarded if the team clearly explains to the judge why a procedure was performed. A team performing a task without explanation will not earn points.					
Fuel System (10pts) Required (circle one) Y N (Select only one Option "a" through "e")					
a. Repairs Needed, and Correct procedures used <u>and Rational explanation given</u> (5 10 pts) or				Score in correct box 0 or 5	
b. Repairs Not Needed, but Correct procedures used <u>and no or incorrect explanation given</u> (5 pts) or					
c. Repairs Not needed, but correct procedures used <u>and Rational explanation given</u> and no procedures used (no explanation necessary) (10 5 pts) or					
d. <u>Repairs not needed, no explanation needed (10 pts)</u> Team provides a clear explanation of what procedures were					
e. <u>Improper or incomplete repairs done and/or Judge stopped team to avoid damage</u> (0 pts)					
Total				10	
Ignition System (10pts) Required (circle one) Y N (Select only one Option "a" through "e")					
a. Repairs Needed, and Correct procedures used <u>and Rational explanation given</u> (5 10 pts) or				Score in correct box 0 or 5	
b. Repairs Not Needed, but Correct procedures used <u>and no or incorrect explanation given</u> (5 pts) or					
c. Repairs Not needed, but correct procedures used <u>and Rational explanation given</u> and no procedures used (no explanation necessary) (10 5 pts) or					
d. <u>Repairs not needed, no explanation needed (10 pts)</u> or Team provides a clear explanation of what procedures were					
e. <u>Improper or incomplete repairs done and/or Judge stopped team to avoid damage</u> (0 pts)					
Total				10	
Compression System (10pts) Required (circle one) Y N (Select only one Option "a" through "e")					
a. Repairs Needed, and Correct procedures used <u>and Rational explanation given</u> (5 10 pts) or				Score in correct box 0 or 5	
b. Repairs Not Needed, but Correct procedures used <u>and no or incorrect explanation given</u> (5 pts) or					
c. Repairs Not needed, but correct procedures used <u>and Rational explanation given</u> and no procedures used (no explanation necessary) (10 5 pts) or					
d. <u>Repairs not needed, no explanation needed (10 pts)</u> Team provides a clear explanation of what procedures were					
e. <u>Improper or incomplete repairs done and/or Judge stopped team to avoid damage</u> (0 pts)					

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		Total	10	
RPM Adjustments – Points are all or nothing in this category – Host will determine ALL RPM settings. All settings must be accurately measured and adjustment procedure is explained if needed.				
a. Non-governed Idle RPM Spec [(+/- 50 RPM)	- Team Reading: [Adj Explained: Y N N/A
a. Governed Idle RPM is correct [(+/- 50 RPM)	- Team Reading: [Adj Explained: Y N N/A
b. High Speed RPM is correct [(+/- 50 RPM)	- Team Reading: [Adj Explained: Y N N/A
c. Engine started and runs properly for 1 minute within the allotted time after setting <u>measuring & explaining the above engine RPM adjustments.</u>				
		Total	25	
Total points awarded for Troubleshooting			150	
Total points awarded for Work Order (Must be turned in to the judge within the one-hour time limit.)			50	
GRAND TOTAL			200	

California FFA Small Engines Work Order

(Must be turned in to the judge within the one-hour time limit.)

Team Name _____

Date Unit was Inspected _____

Engine Number _____

Date Unit was Completed _____

					Judges Use Only!		
Judge's Name		Engine Brand	Type of Equipment			Possible	Awarded
Model / Serial #		Type #	Code			10 pts	
Customer Comments: (5 questions at 2 pts ea.)							
1.					10 pts		
2.							
3.							
4.							
5.							
Work Performed: List each task performed on a separate line below and use the Flat Rate Labor Repair Chart description & hours provided to determine Labor Charge.							
<u>Labor Description</u>					<u>Labor Hours</u>	<u>Labor Charge</u>	
Labor Totals							
					10pts		
Part #	Description	Qty.	Unit Price	Total Price	10 pts		
Total Number of parts ordered divided by 10 equals points allowed. Subtotal, Tax and Total calculated from actual parts ordered.			Parts Total		8 pts	Math Check Only	
Parts Total & Tax calculated from actual Parts Ordered			Tax (8%)				
Labor Charge is \$55.00 \$75.00 per hour with one hour minimum for work performed.			Labor Total				
Totals 2 points each			Grand Total				
Legibility – 2 points or Zero (0) points – If any portion is not legible, no points will be awarded.					2 pts		
Judge's Signature: _____					Total Team Points Awarded	50 pts	

Flat Rate Labor Repair Chart

<u>Labor Rate is \$75.00 per hour</u>	<u>Bill Time</u>
<u>Repair/Adjustment Description</u>	<u>In hours</u>
<u>Pre-Check & Diagnostics – Does not include repairs</u>	<u>0.2</u>
<u>Fuel System Repairs/Adjustments</u>	
<u>Carburetor Rebuild / Reassemble *</u>	<u>0.4</u>
<u>Carburetor Replacement *</u>	<u>0.2</u>
<u>Carburetor Spacer Replacement *</u>	<u>0.2</u>
<u>Carburetor / Fuel Line Obstruction Removal</u>	<u>0.2</u>
<u>Main Jet Replacement *</u>	<u>0.2</u>
<u>Float Repair/Replacement *</u>	<u>0.3</u>
<u>Carburetor Gasket(s) Replacement Only</u>	<u>0.2</u>
<u>Other Fuel System repair not listed - (must provide summary repair description on work order)</u>	<u>0.3</u>
* = Time includes gasket replacement	
<u>Ignition System Repairs/Adjustments</u>	
<u>Armature Air Gap Adjustment</u>	<u>0.2</u>
<u>Armature Replacement</u>	<u>0.3</u>
<u>Flywheel Key Replacement</u>	<u>0.5</u>
<u>Kill Switch Repair/Replace</u>	<u>0.2</u>
<u>Spark Plug Replacement/Adjust Gap</u>	<u>0.1</u>
<u>Other Ignition System repair not listed - (must provide summary repair description on work order)</u>	<u>0.3</u>
<u>Compression System Repairs/Adjustments</u>	
<u>Valve(s) Replacement</u>	<u>0.7</u>
<u>Valve(s) Clearance Adjustment</u>	<u>0.3</u>
<u>Push Rod(s) Replacement</u>	<u>0.5</u>
<u>Cylinder Head Gasket Replacement</u>	<u>0.7</u>
<u>Cylinder Head Replacement / Reassembly</u>	<u>0.7</u>
<u>Other Compression System repair not listed - (must provide summary repair description on work order)</u>	<u>0.5</u>
<u>Service</u>	
<u>25 Hour - Clean Air Filter</u>	<u>0.1</u>
<u>50 Hour - Clean air filter, Change engine oil, check muffler and spark arrester</u>	<u>0.2</u>
<u>100 Hour / Annual - Replace air filter, Replace pre-cleaner, Replace spark plug, Replace fuel filter, Clean air cooling system, Valve Adjustment</u>	<u>0.5</u>
<u>Starter Repair/Adjustments</u>	
<u>Rewind Starter Assemble Repair</u>	<u>0.3</u>
<u>Rewind Starter Replacement</u>	<u>0.2</u>
<u>Governor Repair/Adjustments</u>	
<u>Static Adjustment</u>	<u>0.2</u>
<u>Linkage Repair/Replacement</u>	<u>0.3</u>
<u>Exhaust System Repair</u>	
<u>Obstruction Removal</u>	<u>0.2</u>
<u>Engine Repair - Other</u>	
<u>Other necessary engine repairs not listed above - (must provide summary repair description on work order)</u>	<u>0.2</u>

APPENDIX V**Score Sheet Judging Criteria****I. Safety**

- A. Wipes up oil and fuel spills as they occur – within 30 seconds of occurring is acceptable.
- B. Maintains safe work practices – this includes organized worktable, safe tool, and engine handling. Personal injury will incur maximum point deduction.
- C. Each member wears approved safety glasses at all times. – 1 pt deduction for each occurrence. If team member fails to have glasses on for more than 30 seconds, will incur maximum point deduction. No points will be deducted for removing safety glasses to read Technical Manuals or Illustrated Parts Lists.

II. Tools and Parts

- A. Uses proper tool for the job – examples of infractions include using the wrong size wrench/socket on a fastener, using a screwdriver to pry, or using a hex wrench in a torx fastener. Should not include: using a socket and extension as a nut driver, using common pliers to remove fuel lines, or using a screwdriver to loosen the oil fill cap.
- B. Drops tools and parts (proper grip, careful not to drop tools and parts, etc.) - examples of infractions for improper grip include not holding a torque wrench at the handle or balance point, touching the torque wrench on other than the handle while torquing, or using a closed fist grip while torquing the flywheel.
- C. Parts and hardware installed correctly (not within the three diagnostic areas) – examples of infractions include sheet metal components not fitted correctly, kill wire or spark plug wire routed incorrectly, or air filter cover incorrect.

III. Pre Start Checks

- A. Check for proper oil level – team checks that the oil level is within operating range.
- B. Check gasoline quality and level – team checks for sufficient fuel level and takes a fuel sample to check for contaminants.
- C. Starter operational – team checks for proper and safe starter operation. This includes checking starter rope for frays.
- D. Air cleaner serviced or replaced – team checks air filter for debris and replaces as needed.
- E. Stop switch operational – team tests the stop switch operation using an ignition tester as visual confirmation the stop switch is functioning.
 - i. All Pre Start Checks listed above must be done before the team attempts to start and verify customer's complaint to receive points for each area.
- F. Customer complaint verified – team tried to start the engine and duplicate the customer's complaint. The team must verify complaint prior to making repairs within the fuel, ignition, and compression systems. Points will not be deducted for necessary repairs made to verify the complaint or prevent engine damage. [Acceptable repairs may include: Starter Rope repair; Adding of engine oil, Repair of the kill switch; Clean out of contaminated fuel; Fuel Leak repair](#)

IV. Diagnostic Method Criteria

- A. The team should have a method of testing each of the three systems that directs them to the area with the problem. The team should have a logical explanation of how they came to their conclusion of what systems are malfunctioning. If a team disassembles the wrong system, points will be deducted from the Diagnostic Method Criteria portion of the score sheet only.

Text additions are formatted with blue underline and deletions are ~~red-strikethrough~~.

V. Procedurals

- A. Procedurals will not earn points ~~be given as a 5 point loss~~ within the Fuel, Ignition, and/or Compression Systems when a team fails to correctly assemble or adjust parts within that system. Examples of a situation that would require a procedural include, but not limited to: misadjusted valves, magneto on backwards, improper magneto gap, carburetor spacer on backwards (NOTE: Protrusion must be installed toward the carburetor with a gasket on both sides), governor linkage ~~on backwards~~ installed incorrectly, not scraping old ~~head~~ gasket material before installing a new ~~head~~ gasket, not replacing all required gaskets for the repair.

VI. Fuel System, Ignition System, Compression System

- A. Repairs needed, ~~and~~ correct procedures used and rational diagnostic explanation given – 10 points will be awarded if the team corrected the problem within the area with no procedurals and explained diagnostic rationale.
- B. Repairs ~~not~~ needed, ~~but~~ correct procedures used and no or incorrect explanation given – ~~10~~ 5 points will be awarded if the team ~~took apart and assembled a system~~ disassembles and assembles system components that was ~~not~~ necessary and did so with ~~no~~ correct procedurals but gave no diagnostic explanation. Points will be deducted from the Diagnostic Method portion of the score sheet if this occurs.
- C. Repairs not needed, but correct procedures used and rational diagnostic explanation given and no procedures used (no explanation necessary) – ~~10~~ 5 points will be awarded ~~automatically~~ if a system is not part of the problem but and the team ~~did not disassemble it~~ used and explained diagnostic rationale.
- D. ~~Team provides a clear explanation of what procedures were performed and why. If a team disassembles and assembles system components the team needs to explain what items were fixed and the procedures that were used.~~ Repairs not needed so no diagnostic explanation needed – 10 points will be awarded ~~automatically if a team does nothing with a system because it is not necessary~~ disassembles and assembles system components the team needs to explain what items were fixed and the procedures that were used.
- E. When improper or incomplete repairs are done and/or a Judge stops the team to avoid damage to the engine – 0 points will be awarded.

VII. RPM Adjustments

- A. Non-governed idle, governed idle and high-speed engine RPM will be ~~adjusted and~~ measured using a tachometer. The judge will verify the team's measurement is correct and within ~~adjustment plus or minus 50 RPM from the determined desired settings. If necessary, the team will properly explain how each of the governor adjustments would be made according to factory procedures to bring the engine into specification.~~ Zero (0) points will be awarded if the team fails to ~~follow~~ accurately measure and /or describe approved speed adjustment procedures or fails to identify the engine is out of specification range for each speed adjustment area.

VIII. Work Order Documentation

The Flat Rate Labor Charge Chart is based on Briggs allowed times where available and designed to bring industry time management practices to the CDE.

- A. Teams will use the standard repair descriptions and times when documenting the repair on the Work Order.
- B. Teams will need to clearly define when "Other" work is performed that is not listed in the Flat Rate Labor Charge Chart.
- C. Judges will score the Labor and Parts charges on the Work Order portion of the contest as if they were the actual customer. Specifically, Teams should not be docked points if they perform additional work and/or replace parts that make sense and are properly explained as part of the scenario but not listed on the answer key.
- D. The Parts Total, Tax, Labor Total and Grand Total score is a math check only based on the Team's actual work performed & parts replaced.