



VIRGINIA  
FFA ASSOCIATION



# Small Engines Troubleshooting Event

## State Fair of Virginia

### Purpose:

This event provides FFA members an opportunity to demonstrate their knowledge of small engines by completing a written test and to display their practical skills by troubleshooting an engine malfunction.

### Procedures:

1. The state event is held during the State Fair of Virginia.
2. One participant from each area competes in the state event.
3. The event consists of two parts. Part I is a written test, and Part II is a practical test.

### Part I: Written Test

1. The written test contains:
  - a. 20 true-false and/or multiple-choice questions
  - b. One measurement
  - c. Five tool identifications
  - d. One part for which to determine the replacement part number.
2. The time limit is 40 minutes.
3. The test has a maximum of 100 points.

### Part II: Practical Test

1. The practical test involves having the participant troubleshoot an engine to determine specific malfunctions and to adjust the engine so that it operates properly.
2. The maximum time limit is two hours. A shorter time limit may be set if appropriate. If unplanned malfunction occurs, time required to correct the malfunction is deducted from the participant's total time.
3. If possible, all engines are of the same make and model and have the same malfunctions.
4. Participants bring their own safety glasses, tools, and repair manuals.
5. Oil, fuel, rags, fire extinguishers and parts containers are provided.
6. No work is to be done outside the designated troubleshooting area.
7. If a mechanical failure over which no one has any control should occur, it is considered an act of nature, and participants are expected to accept this without claim or recourse.
8. Adjustments must be within tolerances specified in repair manuals.
9. Participants should consult with the event manager when in doubt.
10. Participants are not penalized for requesting parts if they can justify their requests to the events manager.
11. Participants may be disqualified for any of the following reasons:
  - a. Failure to follow rules and regulations of the event or the judges' instructions
  - b. Conduct on the part of an instructor or participant unbecoming a gentleman or lady or inappropriate spirit of the event and of the school is represented.
  - c. Smoking in the event area.
  - d. Conversing with anyone other than the judges and the event manager.
  - e. Employing an unapproved practice (such as using starter fluid).

**2023 Date:** 9/22

### State Fair Address:

Meadow Event Park  
13111 Dawn Blvd  
Doswell, Virginia 23047  
Caroline County

### Contest Registration and Tickets for the Fair:

Participants must have a \$6 Student Competition Ticket to enter the Fairgrounds unless they are already at the Fair for another competition. Agricultural Education instructors are responsible for ordering tickets:

<https://www.vaffa.org/state-fair-of-virginia>

### Event Location:

Best of Show Tent

### Times:

**Contestant Meeting:** 10:00 AM  
**Contest Begins:** 10:15 AM  
**Awards:** Following the Event

### Entry Deadline:

September 15

### Contest Superintendents:

Andy Seibel  
Jeff Wilt  
Stuart Byrd

### Questions? Contact Us!

Virginia FFA Association  
115 Hutcheson Hall  
Blacksburg, Virginia 24061  
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alisonks@vt.edu  
540-231-3823

12. The event manager is allowed to request a participant's aid and to use participant's tools to determine if malfunctions have been corrected.

13. The point-addition system is used to score the event. The participant with the lowest total score is the winner. Each participant is scored on safety throughout the event. Each participant receives a Malfunction Check-off Sheet to complete as he or she corrects a malfunction. This sheet is also used for scoring. (The Malfunction Check-off Sheet and the Small Engines Troubleshooting Event Score Sheet follow this section).

14. Participants must notify the event manager when they have completed the event. At that point, no further adjustments to the engines are allowed.

15. Only members of the event committee and participants are allowed in the immediate troubleshooting area. Spectators are allowed to observe from a distance but may not converse with participants.

16. The event manager and judges' rule on any condition not covered herein. Their decision is final.

*Notes:*

### **Judging/Scoring Criteria:**

Written Exam (50 points per team member) - 100 points

Diagnosis (10 points per malfunction) - 100 points

Repair (50 points per correction) - 100 points

10 point deduction for safety infractions

### **Awards**

#### **Cash Awards:**

1st Place - \$50

2nd Place - \$35

3rd Place - \$20

4th Place - \$10

5th Place - \$5

Ribbons will be awarded 1st-5th place

#### **State Fair Scholarship Program:**

Scholarship funds will be divided equally between the participating students representing the winning teams. Please see the State Fair website, [www.statefairva.org](http://www.statefairva.org) for more information regarding the scholarship program.

1st Place - \$600

2nd Place - \$400

3rd Place - \$300

4th Place - \$200

#### **Event Sponsor:**

11047 Ledbetter Road, Ashland, VA 23005

#### **Supplementary Materials:**

Malfunction Check-off Sheet

Score Sheet

Event Tool List



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# Small Engines Troubleshooting

## MALFUNCTION CHECK-OFF SHEET

Participant's Name \_\_\_\_\_

School \_\_\_\_\_

Engine Model \_\_\_\_\_

Engine Type \_\_\_\_\_

<b>GOOD NEEDS WORK</b>			<b>DESCRIBE WORK DONE</b>
<b>1. Ignition System</b>			
a. Spark Plug			
b. Breaker points			
c. Condenser			
d. Armature air gap			
e. Ignition wires			
f. Other			
<b>2. Fuel System</b>			
a. Air Cleaner			
b. Carburetor			
c. Fuel			
d. Idle adjustment			
e. Main Load adjustment			
f. Choke			
g. Stop Switch			
h. Governor			
i. Other			
<b>3. Cranking System</b>			
a. Compression			
b. Tappet clearance			
c. Rings			
d. Timing			
e. Gaskets			
f. Other			
<b>4. Lubrication</b>			
a. Oil Level			
b. Drain plug			
c. Breather			
d. Other			

**NOTE: Notify event manager when you have completed the event**

# Small Engines Troubleshooting

## SCORE SHEET

Participant \_\_\_\_\_ School \_\_\_\_\_

Engine Model Number \_\_\_\_\_ Engine Type \_\_\_\_\_

	SCORING AREA	POINTS
1.	Failure to start engine (+200 points)	
2.	Failure to correct present defects (_____ defects not corrected X 50 points)	
3.	Number of parts requested but not needed: _____ X 20	
4.	Carburetor idle mixture improperly adjusted (+20 points) (Engine must have a distinct high and low end idle)	
5.	Number of minutes or major fractions thereof (over 30 seconds) of troubleshooting: _____ Minutes X 2 points	
6.	Safety violations (ex. Goggles, carelessness): _____ safety violations X 20 points	
7.	Improper use and care of tools: _____ incidents X 20 points	
8.	Failure to reassemble the engine to factory/original condition + 100	
9.	Written Examination: _____ wrong X 5 points	
10.	Parts and Tool ID: _____ wrong X 10 points	
11.	Measurement: +5 points if incorrect	
12.	Part Lookup: +20 points if incorrect	
	<b>TOTAL POINTS</b>	

# Small Engines Troubleshooting

## SCORE SHEET

### Measurement, Identification, Part Number

Participant \_\_\_\_\_

School \_\_\_\_\_

#### MEASUREMENTS

1. \_\_\_\_\_

#### PARTS AND OIL ID

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

#### DETERMINING PART NUMBER

1. \_\_\_\_\_

# Small Engines Event Tool List

Adapter—"to 3/8"  
Adjustable wrench  
Allen or hex wrench (SAE & metric)  
Ball peen hammer  
Box-end wrench  
Brass hammer  
Breaker bar\*  
Center punch  
Clutch type screwdriver  
Cold chisel  
Combination wrench  
Compression tester or gauge  
Crankshaft holder wrench  
Cylinder gauge  
Cylinder hone  
Cylinder ridge remover  
Deep socket or deep well socket\*#  
diagonal cutters  
Diagonal cutting pliers or  
Dial caliper  
Die  
Die stock  
Drift punch  
Extension\*  
Feeler gauge (SAE & metric)  
Flat file  
Flywheel holder  
Flywheel knocker  
Flywheel puller  
Gear or wheel puller  
Groove joint or channel lock pliers  
Half-round file  
Ignition or spark tester  
Impact socket\*  
Lever wrench pliers or vise grip  
pliers Metric socket

Micrometer  
Needle nose or long nose pliers  
Nut driver \*  
Offset screwdriver  
Open-end wrench  
Phillips screwdriver  
Pin punch or prick punch  
Piston groove cleaner  
Piston ring expander  
Plastic hammer  
Ratchet or ratchet handle\*  
Ratchet starter remover  
Ring compressor or piston ring  
compressor Round file  
Rubber mallet  
Screw extractor  
Sliding "T" handle  
Slip-joint or combination pliers  
Snap ring pliers  
Spark plug gauge and adjusting tool  
Spark plug socket  
Speed handle\*  
Standard or regular socket\*#  
Standard screwdriver  
Starter clutch wrench  
Tap  
Tap wrench  
Telescoping gauge  
Torque wrench\* (in lbs.)  
Torx screwdriver  
Valve grinder (hand)  
Valve lapper (hand)  
Valve refacer  
Valve spring compressor  
Vernier caliper  
Vibration tachometer

\* size drive—3/8

# point