



Entry Level Assessment Blueprint

Small Engine Technology



Test Code: 4178 / Version: 01

Specific Competencies and Skills Tested in this Assessment:

Safety

- Identify and test equipment safety devices
- Demonstrate proper techniques for using hand tools (e.g., torque wrenches)
- Demonstrate proper techniques for operating power tools and machinery
- Demonstrate proper handling, containment, and cleanup of hazardous materials (e.g., SDS)
- Demonstrate proper usage of personal protective equipment (PPE)
- Demonstrate safe operation of small engines and equipment

General Shop Practices

- Locate parts and equipment information using printed and electronic media
- Write a parts and labor invoice
- Calculate materials mark-up, labor time, and state tax
- Demonstrate timekeeping and parts usage on worksheet and job ticket

Maintenance

- Identify and conduct manufacturer's recommended service procedures
- Inspect, test, and adjust safety-stop devices
- Inspect and service intake and exhaust systems
- Identify, inspect, and service PTO and drive train (e.g., belts, blades, spindles)
- Identify, inspect, and service cooling system components (e.g., air and liquid cooled)
- Adjust levers and controls



Lubrication Systems

- Inspect and service engine lubrication system including breathers, filters, and strainers
- Identify types of lubricating mechanisms
- Identify proper types of oil and lubricants

Specific Competencies and Skills continued:

Fuel System Fundamentals

- Inspect fuel tank, lines, and filters
- Identify and service fuel delivery system components, including carburetor and fuel injection systems
- Adjust and service fuel system controls and linkages
- Explain fuel injection theory
- Explain carburetor theory
- Inspect and service air filtration system
- Disassemble, clean, inspect, and reassemble carburetor (e.g., float bowl)

Governor

- Identify governor parts, functions, and types
- Inspect, service, and adjust governor
- Identify governor-related problems

Ignition

- Explain ignition theory and coil output
- Identify, inspect, test, and adjust ignition components
- Disassemble, service, and reassemble ignition system and/or components

Starters and Charging Systems

- Identify, inspect, and test charging and starting systems
- Service and repair charging and starting systems
- Inspect and perform battery service

Cylinder Head and Valve, Service and Maintenance

- Explain theory of compression
- Perform compression test and cylinder leak-down test
- Remove, inspect, reinstall, and adjust valves
- Inspect and measure valve guides and valve stems
- Remove, inspect, and reinstall cylinder head to manufacturer's specifications

Engine Assembly

- Identify correct timing of crankshaft, camshaft, gears, and flywheel
- Identify, inspect, and measure crankshaft, camshaft, gears, and flywheel
- Identify, inspect, and measure piston, rings, and cylinder
- Identify, inspect, and measure bearing clearances and journal sizes of the crankshaft and connecting rod
- Identify proper usage of gaskets and sealants

Specific Competencies and Skills continued:

Troubleshooting

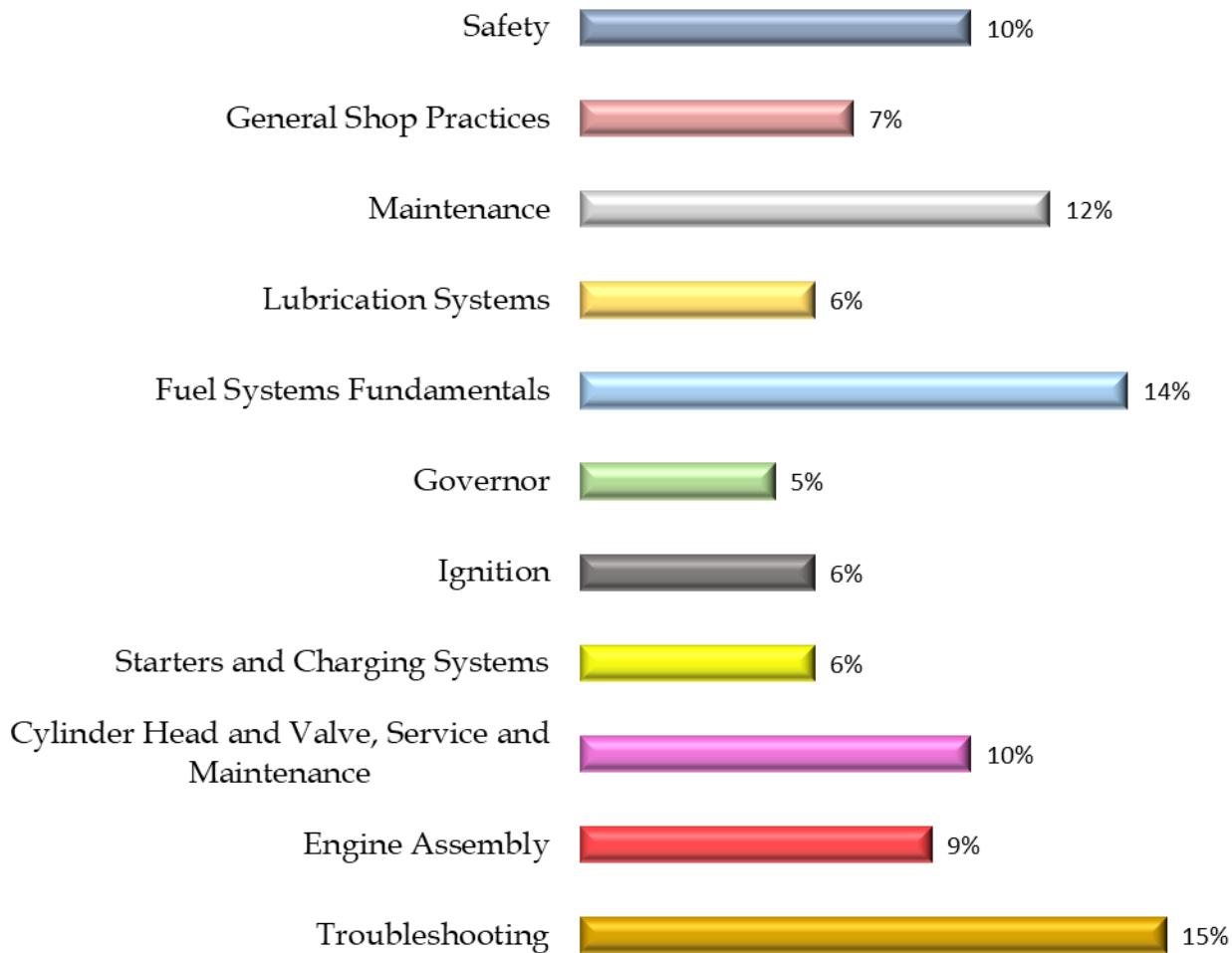
- Troubleshoot ignition system problems
- Troubleshoot starting and charging system problems
- Troubleshoot cooling system problems
- Troubleshoot fuel system problems
- Troubleshoot lubrication system problems
- Troubleshoot compression problems related to cylinder head and valves
- Troubleshoot low power and rough running conditions

Written Assessment:

Administration Time: 3 hours

Number of Questions: 186

Areas Covered:



Sample Questions:

A fuse protects the circuit from damage due to

- A. low amperage
- B. excessive voltage
- C. low voltage
- D. excessive amperage

The function of a breather is to vent the crankcase

- A. pressure
- B. elevation
- C. oil
- D. efficiency

The small engine owner's manual will provide information on

- A. torque spécifications
- B. firing order
- C. lubrication quantity
- D. engine repairs

The spark plug is part of the _____ system.

- A. fuel
- B. ignition
- C. charging
- D. lubrication

Excessive tappet clearance could be caused by

- A. unfiltered air
- B. cam lobe wear
- C. improper oil viscosity
- D. improper spring tension

A blocked fuel tank screen could cause a/an _____ condition.

- A. rich running
- B. no-starting
- C. back-firing
- D. overheating



Performance Assessment:

Administration Time: 3 hours and 10 minutes

Number of Jobs: 7

Areas Covered:

12%

Start and Adjust Engine

Participant will locate loose engine parts, determine proper oil and fuel level, and then start the engine. After starting, participant will check, adjust, and record the idle and high speed rpms.

18%

Ignition Service

Participant will test the engine ignition system, disassemble the ignition system, inspect and clean engine components, locate, indicate and record manufacturer specifications, reinstall ignition components, notify evaluator to check work, reassemble remaining parts, and recheck engine for spark.

10%

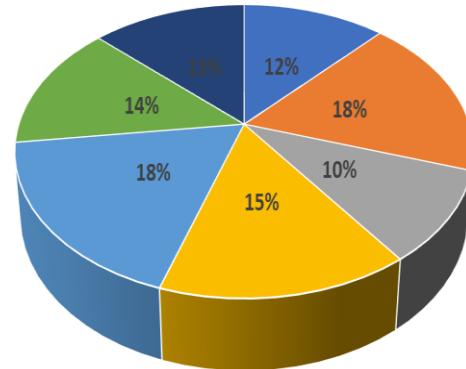
Mechanical and Electrical Measurement of Parts

Participant will locate the recommended specifications and record, measure the components listed, record measurements, and record findings. Next, the participant will use the multimeter to take and record electrical measurements for components, including continuity status for interlock switch and ignition switch, voltage of lawn mower battery, polarity of diode, and finally notify evaluator to check work.

15%

Valve Service

Participant will measure and record valve lash, remove and inspect cylinder head and gasket, remove valves, inspect seats, stems, faces, and guides, use manual to locate recommended specifications and record, measure and record findings, install valves, check and record intake valve lash, record cylinder head torque specifications, then install cylinder head and gasket, to specified torque.



Small Engine Technology (continued)

18%

Carburetor Service

Participant will disassemble and inspect a float-type carburetor, obtain the float setting and reassemble the carburetor to specifications. Participant will disassemble and inspect a diaphragm carburetor, check the operating condition of the parts, reassemble the carburetor to specification making sure to set the metering lever height.

14%

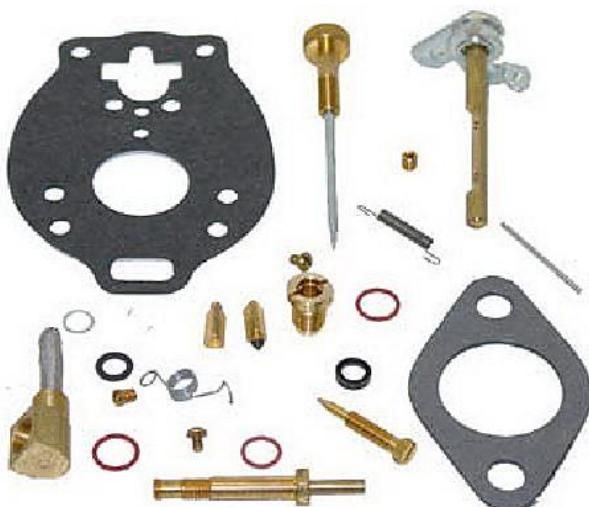
Invoicing Parts

Participant will look up cost of four engine parts, calculate the mark up price of each part, and complete an invoice that includes labor and sales tax.

13%

Manual Starter Service

Participant will disassemble a starter, inspect the parts, record findings then reassemble the starter replacing any defective parts, so the starter is fully functional.



Sample Job: Carburetor Service

Maximum Time: 45 minutes

Participant Activity: Participant will disassemble and inspect a float-type carburetor using appropriate hand tools, obtain the float setting and reassemble the carburetor to specifications. Participant will disassemble and inspect a diaphragm carburetor, check the operating condition of the parts, reassemble the carburetor to specification making sure to set the metering lever height.

