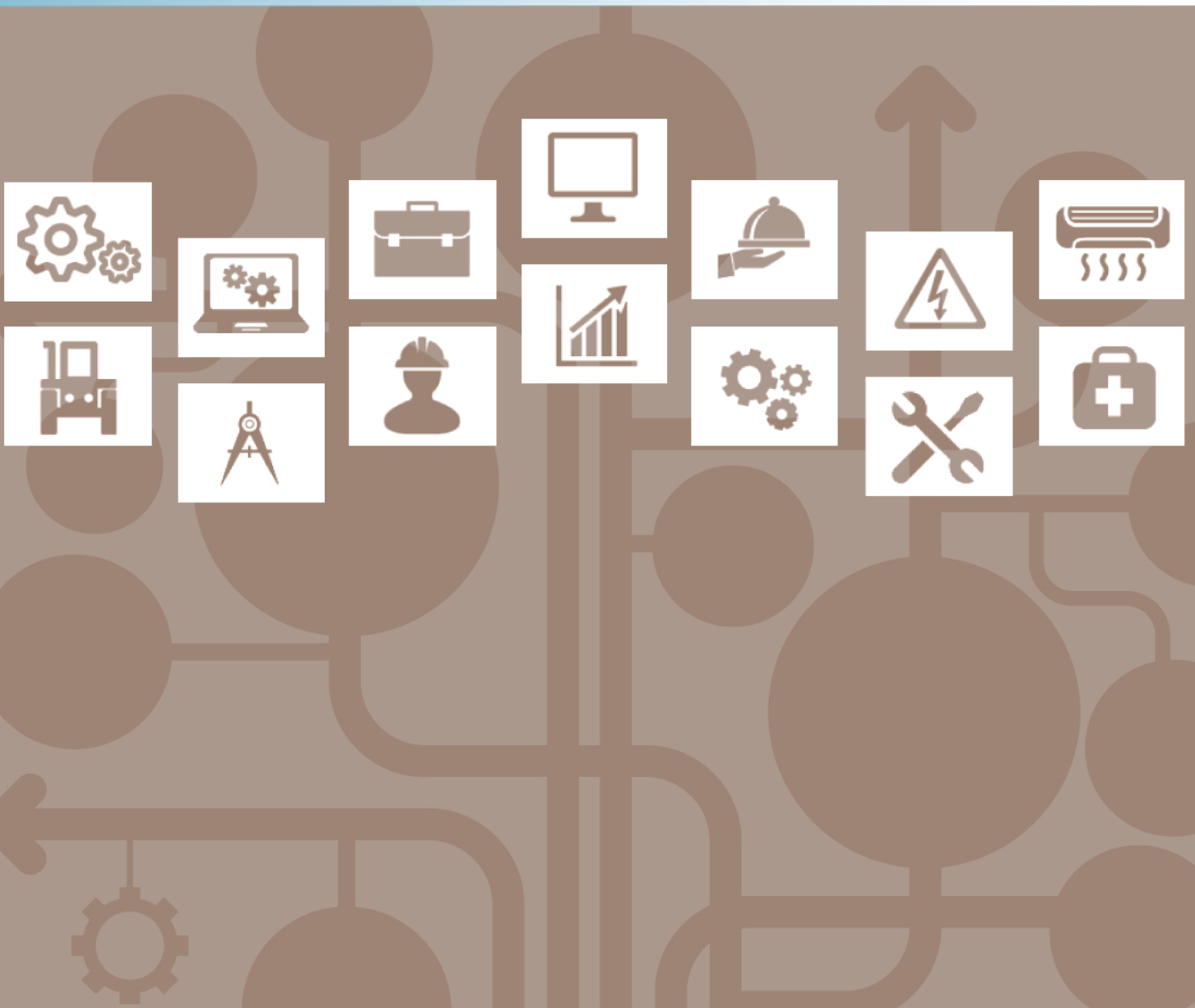




Small Engine Technology



Test Code: 4168 / Version: 01

Specific Competencies and Skills Tested in this Assessment:

Safety

- Identify and test equipment safety devices
- Demonstrate proper techniques for hand tools (e.g., screwdriver, torque wrenches)
- Demonstrate proper techniques for power tools and machinery
- Demonstrate proper handling, containment, and clean-up 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 and inspect PTO and drive train (e.g., belts, blades, pulleys, spindles)
- Inspect and service cooling system components (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 (diaphragm and float bowl)

Carburetor Fundamentals

- Inspect and service air intake system
- Identify parts and functions of carburetors
- Explain carburetor theory
- Disassemble, clean, inspect, and reassemble carburetor (diaphragm and 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

Specific Competencies and Skills continued:

Engine Assembly

- Identify correct timing of crankshaft, camshaft, balance shaft, gears, and flywheel
- Identify and inspect, crankshaft, camshaft, balance shaft, 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

Troubleshooting

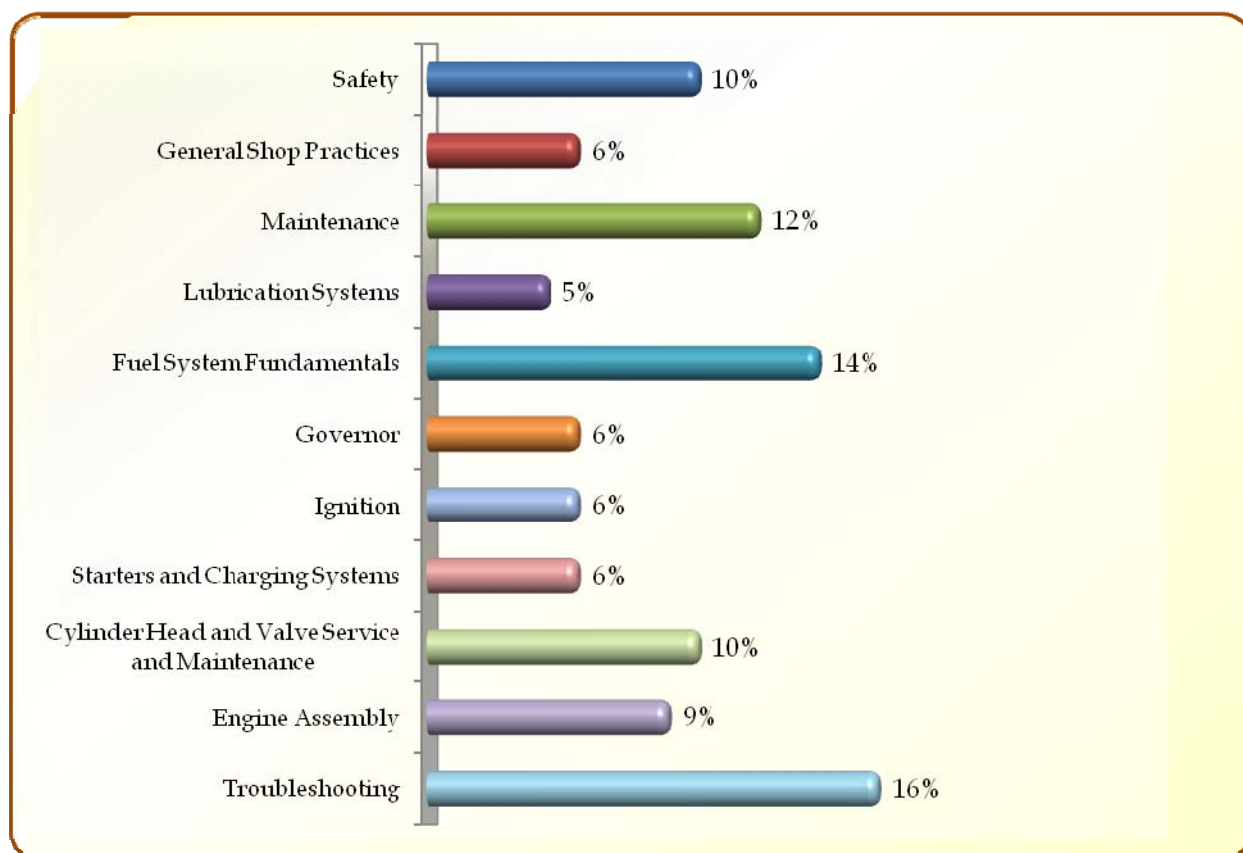
- Troubleshoot ignition system problems
- Troubleshoot starting and charging system problems
- Troubleshoot cooling system problems
- Troubleshoot fuel system problems
- Troubleshoot lubrication system problems
- Troubleshoot compression problems related to cylinder head and valves
- Troubleshoot low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

Written Assessment:

Administration Time: 3 hours

Number of Questions: 195

Areas Covered:



Sample Questions:

Carbon Monoxide is

- A. heavier than air and falls as it is warmed
- B. measured in percentage per thousand
- C. toxic and is produced by incomplete combustion
- D. odorous and tasty, which provides warning

If a throttle cable is rusted, loosen the cable by applying

- A. penetrating oil
- B. kerosene
- C. gasoline
- D. warm water

The function of a breather is to vent the crankcase

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

The EFI System refers to the

- A. Engine Fouling Intake
- B. Equal Flame Indicator
- C. Exhaust Flow Indicator
- D. Electronic Fuel Injection

The small engine owner's manual will provide information on

- A. torque specifications
- B. firing order
- C. lubrication quantity
- D. emergency operation

After installing a new governor spring, check the top engine speed with a

- A. dynameter
- B. tachometer
- C. flow meter
- D. rpm chart



Small Engine Technology (continued)

The spark plug is part of the _____ system

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

Voltage is defined as

- A. rate of flow
- B. electrical pressure
- C. resistance
- D. current flow

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.

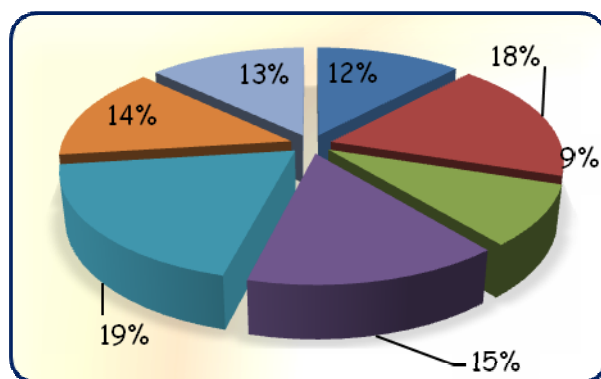
- A. rich running
- B. no-start
- C. back-firing
- D. overheating

Performance Assessment:

Administration Time: 3 hours and 5 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 carburetor idle and high speed rpms. Upon completion the engine will be returned to pretest conditions.

18%

Ignition Service

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

9%

Measure Parts

Participant will check and record ring end gap, crankpin journal diameter, cylinder bore, and ring side clearance.

15%

Valve Service

Participant will remove cylinder head, head gasket and valves. Participant will then measure and record the valve seat width, valve margin, and the intake and exhaust valve guide diameter. Participant will install the valves and adjust the valve clearances. Participant will install the cylinder head and head gasket recording the torque specifications to be used.

19%

Carburetor Service

Participant will disassemble and inspect a float type carburetor, obtain the float setting and reassemble the carburetor to specifications by installing any necessary new parts. 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 needle height.

14%

Invoicing Parts

Participant will look up cost of 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.



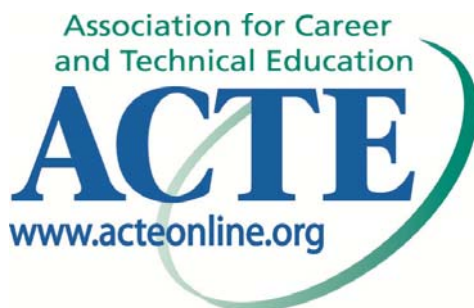
Sample Job: Invoicing Parts

Maximum Time: 20 minutes

Participant Activity: The participant will look up four engine parts that have been assigned and create an invoice based on these parts including labor and sales tax.



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in



career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!