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# **Small Engine Technology**

## General Assessment Information

### Blueprint Contents

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**Test Type:** The Small Engine Technology industry-based credential is included in NOCTI's Job Ready assessment battery. Job Ready assessments measure technical skills at the occupational level and include items which gauge factual and theoretical knowledge. Job Ready assessments typically offer both a written and performance component and can be used at the secondary and post-secondary levels. Job Ready assessments can be delivered in an online or paper/pencil format.

**Revision Team:** The assessment content is based on input from secondary, post-secondary, and business/industry representatives from the states of Michigan, New York, Pennsylvania, Texas.



47.0606- Small Engine Mechanics and Repair Technology/Technician



Career Cluster - Transportation, Distribution, and Logistics



49-3053.00- Outdoor Power Equipment and Other Small Engine Mechanics



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!

## Written Assessment

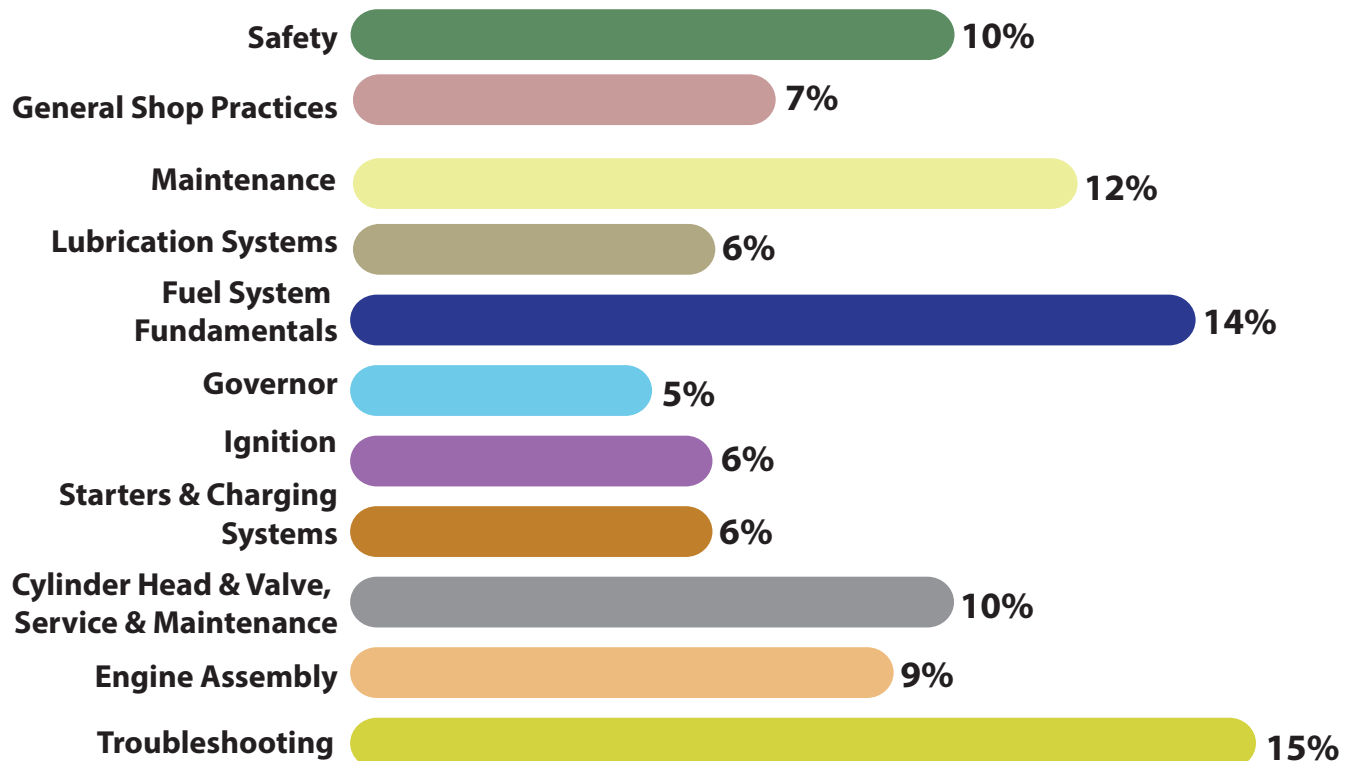
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 3 hours

**Number of Questions:** 186

**Number of Sessions:** This assessment may be administered in one, two, or three sessions.

### Areas Covered



## Specific Standards and Competencies Included 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 sales tax
- Demonstrate timekeeping and parts usage on worksheet and job ticket

### **Maintenance**

- Identify and perform 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

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## Specific Standards and Competencies (continued)

### Cylinder Head and Valve, Service and Maintenance

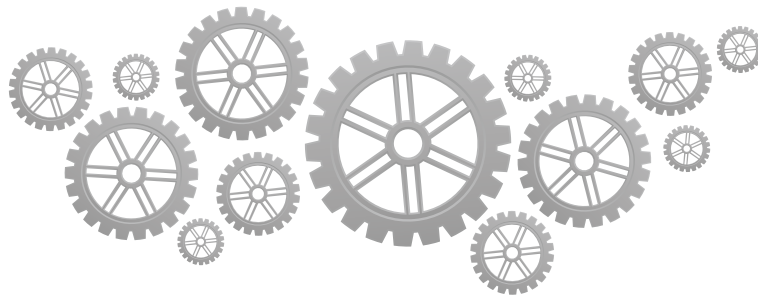
- Explain theory of compression
- Perform compression test and cylinder leak-down test
- Remove, inspect, reinstall, and adjust valves
- Inspect and measure valve guides and valve stems
- Remove, inspect, and reinstall cylinder head to manufacturer's specifications

### 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

### 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



## Sample Questions

**A fuse protects the circuit from damage due to**

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

**A technician should record the work performed on a work order**

- A. weekly
- B. per hour
- C. daily
- D. per job

**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. engine repairs

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Sample Questions (continued)

**What type of governor is activated by the air from a flywheel?**

- A. mechanical
- B. centrifugal
- C. pneumatic
- D. electrical

**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-starting
- C. back-firing
- D. overheating



## Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

**Administration Time:** 3 hours and 10 minutes

**Number of Jobs:** 7

### Areas Covered:

#### 12% Start and Adjust Engine

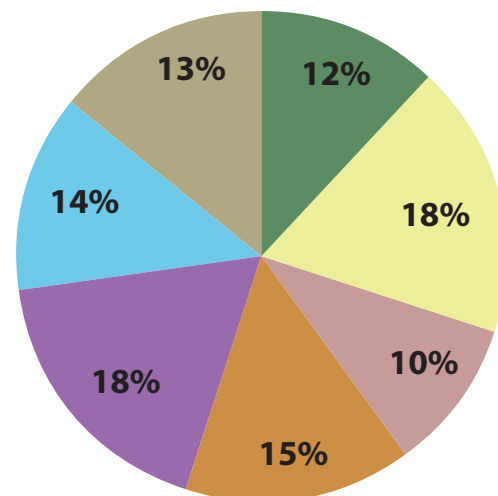
Participant will locate loose engine parts, determine proper oil and fuel level, and then start the engine. After starting, participant will check, adjust, and record the idle and high speed rpms.

#### 18% Ignition Service

Participant will test the engine ignition system, disassemble the ignition system, inspect, and clean engine components, locate, indicate condition of flywheel key, 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.



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### Areas Covered (continued)

#### **15% Valve Service**

Participant will measure and record intake 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.

#### **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.