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# Heavy Equipment

## General Assessment Information

### Blueprint Contents

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**Test Type:** The Heavy Equipment assessment is included in NOCTI's Teacher assessment battery. Teacher assessments measure an individual's technical knowledge and skills in a proctored proficiency examination format. These assessments are used in a large number of states as part of the teacher licensing and/or certification process, assessing competency in all aspects of a particular industry. NOCTI Teacher tests typically offer both a written and performance component that must be administered at a NOCTI-approved Area Test Center. Teacher assessments can be delivered in an online or paper/pencil format.

**Revision Team:** The assessment content is based on input from subject matter experts representing the state of Pennsylvania.



49.0202- Construction/Heavy  
Equipment/Earthmoving  
Equipment Operation



Career Cluster 2-  
Architecture and Construction



47-2073.00- Operating Engineers  
and Other Construction  
Equipment Operators

## Written Assessment

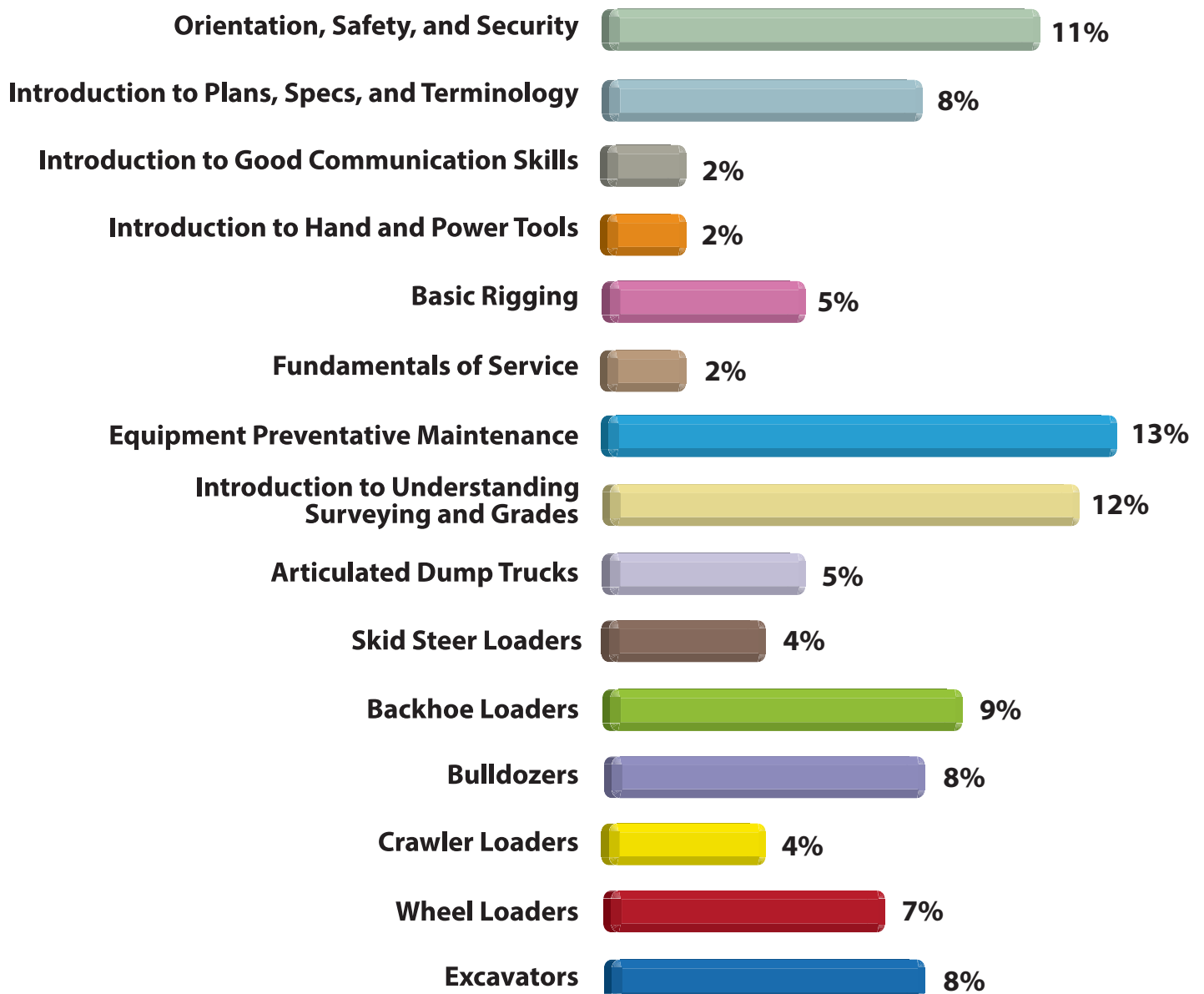
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 3 hours

**Number of Questions:** 232

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

### Areas Covered



## Specific Standards and Competencies Included in this Assessment

### **Orientation, Safety, and Security**

- Explain the appropriate safety dress code for a construction worker on the job site
- Explain the role safety plays in the construction crafts and describe job-site safety
- Explain the appropriate safety precautions around common job-site hazards
- Explain importance of HAZ COM requirement and MSDS
- Describe fire prevention and fire-fighting techniques
- Describe what OSHA is and what part it plays in job-site safety
- Practice safe equipment transportation on public roads and job sites
- Practice job-site safety, prevention of slip and fall and pinch-point accidents and electrocutions
- Identify the main risk and safety factors involved in trenching
- Identify blind spots on and around heavy equipment and importance to the highway inspector
- Define why it is important for all equipment to be secured after working hours

### **Introduction to Plans, Specs, and Terminology**

- Describe what specifications are
- Describe what a right-of-way is
- Match terms associated with soil to the correct definitions
- Select from a list types of compacting equipment
- Name the basic soil stabilization methods
- Define terms associated with basic earth moving operations
- Layout an earthmoving operation given the basic information and general requirements
- Describe various methods for keeping construction sites well drained
- Describe erosion and sedimentation control measures

### **Introduction to Good Communication Skills**

- Demonstrate how to properly fill out a job application
- Describe how to conduct yourself during a job interview
- Demonstrate how to research information for potential career
- Develop a 5-year plan for potential career and or education advancement

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## Specific Standards and Competencies (continued)

### Introduction to Hand and Power Tools

- Describe the basic procedures for taking care of these tools
- Recognize and identify some of the commonly used power tools in the construction trade

### Basic Rigging

- Identify and describe the use of slings and common rigging hardware
- Describe the basic hitch configurations and their proper connections
- Describe the basic load-handling safety practices
- Demonstrate proper use of American National Standards Institute (ANSI) hand signals
- Describe basic safety precautions taken into consideration while operating a fork lift

### Fundamentals of Service

- Demonstrate how to research technical information in service, parts and operation manuals
- Describe the operation of a handheld grease gun

### Equipment Preventative Maintenance

- Recite the preventive maintenance responsibilities of the operator
- Specify the basic equipment subsystems
- Identify sources of engine oil contamination
- List safety tips when working on a cooling system
- Properly jump-start vehicles equipped with either 12-volt or 12- to 24-volt electrical systems
- Explain the basic principles of hydraulics
- Explain hazards associated with hydraulic systems
- List safety tips when working on or around tires and rims

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## Specific Standards and Competencies (continued)

### **Introduction to Understanding Surveying and Grades**

- Identify equipment used by the operator to check stakes and grades
- State the meaning of slope ratio
- Calculate cuts and fills using an engineer's rule and hand level
- Define terms associated with plan reading, grade setting, and drainage

### **Articulated Dump Trucks**

- List all safety devices used on the articulating dump
- Explain warning controls and their functions
- Identify risks and safety factors involved in transporting and dumping articulating dump load
- Demonstrate the proper pre-start and post-start check of an articulating dump
- Identify the basic components of an articulating dump
- Demonstrate positioning the truck for a safe dumping condition

### **Skid Steer Loaders**

- List all safety devices used on the skid steer loader
- Demonstrate removing and installing the bucket and/or attachment
- Excavate material to build a stockpile of material
- Demonstrate load and carry operations
- Demonstrate bank loading
- Demonstrate proper loading techniques

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## Specific Standards and Competencies (continued)

### Backhoe Loaders

- State safety rules for operating a backhoe loader
- Identify basic components of a backhoe loader
- List the attachment used on backhoe loaders
- Demonstrate removing and installing backhoe bucket
- Excavate a trench with a level bottom
- Demonstrate loading techniques with the backhoe bucket
- Excavate material with loader bucket to build a pile
- Demonstrate load and carry operations
- Change bucket teeth
- Backfill a trench with the loader and/or backhoe buckets
- Demonstrate machine repositioning techniques while using the backhoe

### Bulldozers

- State safety rules for operating a bulldozer
- Identify basic components of a bulldozer
- Check and adjust track tension
- Demonstrate forming a stockpile
- Demonstrate cut and carry dozing
- Demonstrate cutting a road into a side hill
- Demonstrate moving stockpile from point "A" to point "B"
- Demonstrate spreading material into 6-inch layers
- Demonstrate slot dozing

### Crawler Loaders

- Identify basic components of a crawler loader
- Change bucket teeth
- Check and adjust track tension
- Demonstrate loading from a stockpile into a dump truck
- Excavate a cellar to specifications
- Demonstrate cutting a road into a side hill
- Demonstrate spreading material in 6-inch lifts or layers

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## Specific Standards and Competencies (continued)

### Wheel Loaders

- State safety rules for operating a wheel loader
- Describe the accessories used on wheel loaders
- Perform preventative maintenance according to manufacturer's recommendations
- Demonstrate moving and parking the machine safely
- Demonstrate bank loading into dump truck
- Demonstrate loading from a stockpile into a dump truck
- Demonstrate forming a stockpile
- Demonstrate load and carry operations
- Demonstrate spreading material in 6-inch layer

### Excavators

- State safety rules for operating an excavator
- Identify the basic components of an excavator
- Perform preventive maintenance according to manufacturer's recommendations
- Demonstrate the proper pre-start and post-start check of an excavator
- Start the engine and demonstrate engine warm-up and shutdown procedures
- Demonstrate removing, installing, and adjusting bucket
- Check and adjust track tension
- Demonstrate moving concrete barriers and structures
- Demonstrate placing objects in specified areas with a excavator bucket within specified time limit
- Demonstrate loading a dump truck
- Demonstrate excavating a trench 10 feet deep, 50 feet long according to OSHA standards then backfilling
- Demonstrate a counter rotational turn while holding the upper structure in one position



## Sample Questions

**What is the minimum distance spoil can be placed from any trench wall?**

- A. 2 feet
- B. 3 feet
- C. 4 feet
- D. 5 feet

**Which tool is best suited for cutting pipe?**

- A. cut off saw
- B. chain saw
- C. reciprocating saw
- D. jig saw

**Relief valves protect the hydraulic system from**

- A. over-pressurizing
- B. over-speeding
- C. under-pressurizing
- D. under-speeding

**When dumping material on a pile, the loader should be raised**

- A. to full height
- B. to 3/4 height
- C. only as high as required
- D. to 7/8 height

**An excavator attachment that can be used for lifting logs is a**

- A. blade
- B. ripper
- C. grapple
- D. hammer

## 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

**Number of Jobs:** 6

### Areas Covered:

#### **22% Dig a Flat Bottom Trench Using a Backhoe**

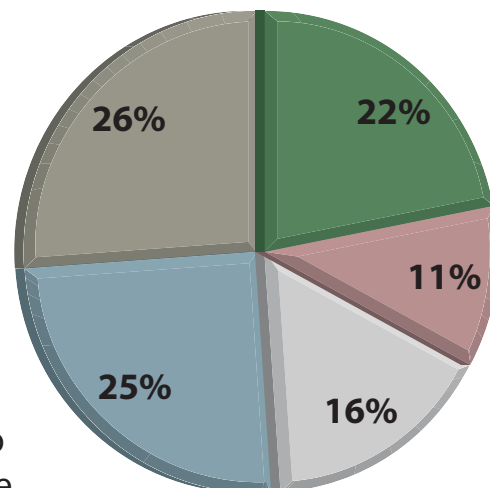
Inspect for proper personal protective equipment and work attire, perform pre-operational inspection, enter the machine, travel to work area, parking machine, set up machine for digging, digging process, reposition machine, transport back to staging area, overall appearance and accuracy.

#### **11% Perform a Pre-Operational Inspection on a Skid Steer Loader; Identify Lubrication Points and Lubricate a Grease Fitting**

Inspect for proper personal protective equipment and work attire, perform pre-operational inspection, identification of the problem, accurately point out 10 points of lubrication, grease fitting.

#### **16% Properly Set Up a Laser and Determine Elevations at 4 Grade Stakes Off of a Benchmark**

Inspect for proper personal protective equipment and work attire, set up laser and tripod, take reading at benchmark, establish height of instrument, obtain readings at stake locations, determine elevations of stake locations, correctly determine cut or fill requirements, correctly determine amount of cut or fill required, stored laser and tripod properly.



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### *Areas Covered (continued)*

**25% Back Fill Trench and Grade with a Dozer**

Inspect for proper personal protective equipment and work attire, perform pre-operational inspection, enter the machine, travel to work area, parking machine, inspect area, backfill the excavation process, grade area, transport back to staging area, park and shut down, backfill and grade quality.

**26% Load a Haul Unit with a Wheel or Crawler Loader**

Inspect for proper personal protective equipment and work attire, perform pre-operational inspection, enter the machine, travel to work area, parking machine, inspect loading area for hazards and terrain conditions, obtain a bucket of material, travel from pile to loading area, spot haul unit, load haul unit, release haul unit, maintain loading area, transport back to staging area, park and shut down.

## Sample Job

### Back Fill Trench and Grade with a Dozer

**Maximum Time:** 25 minutes

**Participant Activity:** The participant will perform a pre-operation inspection of the equipment and area. Backfill and grade an excavation designated by the evaluator.

