



National Craft Assessment and Certification Program  
S P E C I F I C A T I O N S

**HEAVY EQUIPMENT OPERATOR: LOADER**  
**AEN22LOADER02**

February 2018

**Focus Statement**

A loader operator masters all concepts and procedures involved in the operation of loaders. This includes basic daily preventive maintenance, safety checking, and control of the machine. He/she identifies attachments and uses the loader to perform the appropriate work-related tasks.

**Overview**

- Two-hour closed-book examination
- May use a basic function, non-printing calculator
- No extra papers, books, notes or study materials are allowed
- The minimum passing score is 75
- A corresponding hands-on Performance Verification is available

**NCCER Curriculum**

All NCCER knowledge assessments are referenced to NCCER's curriculum modules as listed on this specification sheet. You may order modules from Pearson (800.922.0579) or from NCCER's Online Catalog at [www.nccer.org](http://www.nccer.org).

**Assessment Development**

All questions are developed and approved by subject matter experts under the direction of NCCER.

**Credentials**

Upon successful completion of the knowledge assessment, NCCER will send applicable credentials to the assessment center.

**Score Report and Training Prescription**

Each candidate will have access to their assessment results including their overall score and recommended training.

**NCCER Registry**

Knowledge assessment results are recorded in NCCER's Registry and become a part of the portable record of an individual's NCCER credentials.

**Knowledge Assessment Contents:**

| Content Domain                                      | Number of Questions |
|---|---------------------|
| <b>Safety</b> (22102-12)                            | 7                   |
| <b>Basic Operations</b> (22104-12)                  | 10                  |
| <b>Grades and Site Work</b> (22106-12) (22210-13)   | 20                  |
| <b>Earth Moving and Soils</b> (22201-12) (22308-13) | 13                  |
| <b>Math</b> (22207-13)                              | 10                  |
| <b>Loader Operations</b> (22205-13)                 | 25                  |
| <b>Total Number of Questions</b>                    | <b>85</b>           |

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Learning Objectives related to Assessment:

| <b>Safety</b>               |  |
|-----------------------------|--|
| <b>Registry ID Number:</b>  | <b>Module Title and Objectives:</b>  |
| <b>22102-12</b>             | <b>Heavy Equipment Safety</b>  |
|                             | Explain the importance of safety when working with heavy equipment.  |
|                             | State the purposes of signs, tags, barricades, and lockout/tagout devices used on construction sites.  |
|                             | Describe the long- and short-term health effects, first-aid measures, handling and storage, and/or required personal protective equipment (PPE) for a chemical using a material data safety sheet (MSDS).  |
|                             | Identify safeguards used in a highway construction work zone.  |
|                             | State general guidelines for safe operation, maintenance, and transportation of heavy equipment.   |
|                             | Explain the dangers of working around an excavation area with heavy equipment.   |
| <b>Basic Operations</b>     |  |
| <b>Registry ID Number:</b>  | <b>Module Title and Objectives:</b>  |
| <b>22104-12</b>             | <b>Basic Operational Techniques</b>  |
|                             | Describe basic prestart activities for heavy equipment machinery.  |
|                             | Describe basic safety measures associated with operating heavy equipment.  |
|                             | Explain how to properly start, operate, and shut down the following types of heavy equipment: utility tractors, dozers, loaders, backhoes, excavators, compaction equipment, motor graders, scrapers, on-road dump trucks, off-road dump trucks, forklifts, skid steers, and trenchers.  |
| <b>Grades and Site Work</b> |  |
| <b>Registry ID Number:</b>  | <b>Module Title and Objectives:</b>  |
| <b>22106-12</b>             | <b>Grades</b>  |
|                             | Explain the terms used in grade work.  |
|                             | Identify types of stakes and explain markings on grade stakes and benchmark (BM) stakes.   |
|                             | Identify equipment used by the operator to check stakes.   |
|                             | Explain different types of slopes and slope ratio.   |
|                             | Check horizontal and vertical distance of cut and fill slope stakes.   |
|                             | Check finish subgrade on a cross slope.  |
| <b>22210-13</b>             | <b>Site Work</b>   |
|                             | Describe the safety practices associated with site grading work. <ul style="list-style-type: none"> <li>a. Explain the purpose of a site safety program.</li> <li>b. Describe why safety inspections and investigations are important.</li> <li>c. Explain how hazardous materials are controlled on a job site.</li> <li>d. Describe safety practices associated with trenching and excavations.</li> <li>e. Describe how to prepare heavy equipment for transporting.</li> </ul> |
|                             | Describe the methods used to control water on job sites. <ul style="list-style-type: none"> <li>a. Explain the importance of maintaining proper drainage on a job site.</li> <li>b. Describe the methods used to control groundwater and surface water.</li> </ul>   |

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|                               | <ul style="list-style-type: none"> <li>c. Describe the safety practices and construction methods used when working around bodies of water.</li> </ul>   |
|                               | <p>Explain how grades are established on a job site.</p> <ul style="list-style-type: none"> <li>a. Describe how to set grades from a benchmark.</li> <li>b. Describe how grades are set for highway construction.</li> <li>c. Describe how grades are set for building construction.</li> <li>d. Explain how grading operations are performed.</li> <li>e. Describe the use of stakeless and stringless grading systems.</li> </ul> |
| <b>Earth Moving and Soils</b> |   |
| <b>Registry ID Number:</b>    | <b>Module Title and Objectives:</b>   |
| <b>22201-12</b>               | <b>Introduction to Earthmoving</b>  |
|                               | Identify and explain earthmoving terms and methods.   |
|                               | Describe how to safely set up and coordinate earthmoving operations.  |
|                               | Identify and explain earthmoving operations.  |
|                               | Identify and explain soil stabilization methods.  |
|                               | Identify the best equipment for performing a given earthmoving operation.   |
|                               | List, in the correct order, the steps involved in an earthmoving operation.   |
| <b>22308-13</b>               | <b>Soils</b>  |
|                               | <p>Describe the different types and characteristics of soils.</p> <ul style="list-style-type: none"> <li>a. Identify the types of soils.</li> <li>b. Describe the properties of soils.</li> <li>c. Explain how soil density is determined.</li> <li>d. Explain how moisture affects soil.</li> </ul>  |
|                               | <p>Describe the factors that affect soil excavation.</p> <ul style="list-style-type: none"> <li>a. Explain what the swell factor is and how to calculate the swell factor of soils.</li> <li>b. Explain what the shrink factor is and how to calculate the shrink factor of soils.</li> <li>c. Describe how swell and shrink factors affect cycle times and equipment selection.</li> </ul>   |
|                               | <p>Describe working in various soil conditions.</p> <ul style="list-style-type: none"> <li>a. Describe the weight bearing and flotation properties of different soils.</li> <li>b. Explain how soil characteristics affect machine performance.</li> <li>c. Describe how soil conditions can affect trenching safety.</li> </ul>  |
| <b>Math</b>                   |   |
| <b>Registry ID Number:</b>    | <b>Module Title and Objectives:</b>   |
| <b>22207-13</b>               | <b>Excavation Math</b>  |
|                               | <p>Explain how to use formulas.</p> <ul style="list-style-type: none"> <li>a. Explain the sequence of operations in solving a problem using a formula.</li> <li>b. Explain how squares and square roots are derived.</li> <li>c. Define angles and identify the types of angles.</li> </ul>   |
|                               | <p>Explain how math is used to solve right triangle problems.</p> <ul style="list-style-type: none"> <li>a. Explain how to determine the length of a slope.</li> <li>b. Explain how a building is laid out using right triangle math.</li> </ul>  |
|                               | <p>Define area and explain why determining the area of a space is required.</p> <ul style="list-style-type: none"> <li>a. Determine the area of squares and rectangles.</li> <li>b. Determine the area of a triangle.</li> <li>c. Determine the area of a trapezoid.</li> <li>d. Determine the area of a circle.</li> </ul>   |
|                               | Define volume and explain the purpose of calculating volume.  |

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|                            | <ul style="list-style-type: none"> <li>a. Calculate the volume of a cube.</li> <li>b. Calculate the volume of a prism.</li> <li>c. Calculate the volume of a cylinder.</li> <li>d. Describe the estimating process used to determine the volume and weight of simple and complex excavations.</li> </ul>                             |
|                            | <b>Loader Operations</b>   |
| <b>Registry ID Number:</b> | <b>Module Title and Objectives:</b>  |
| <b>22205-13</b>            | <b>Loaders</b>   |
|                            | <ul style="list-style-type: none"> <li>Identify and describe common components of a loader.</li> <li>a. Identify and describe chassis components.</li> <li>b. Identify and describe loader controls.</li> <li>c. Identify and describe loader instrumentation.</li> <li>d. Identify and describe loader attachments.</li> </ul>      |
|                            | <ul style="list-style-type: none"> <li>Describe the prestart inspection and preventive maintenance requirements for a loader.</li> <li>a. Describe prestart inspection procedures.</li> <li>b. Describe preventive maintenance requirements.</li> </ul>  |
|                            | <ul style="list-style-type: none"> <li>Describe the startup and operating procedures for a loader.</li> <li>a. State loader-related safety guidelines.</li> <li>b. Describe startup, warm-up, and shutdown procedures.</li> <li>c. Describe basic maneuvers and operations.</li> <li>d. Describe related work activities.</li> </ul> |