Lesson Plans for Module 22307-14

FINISHING AND GRADING

Module One (22307-14) provides training on common types of equipment and instruments used for finish grading, materials and methods used to stabilize soils and control soil erosion, and finishing and grading methods used for various applications.

Objectives

Learning Objective 1
• Describe the types of equipment used for finish grading.
  – Identify equipment used in finish grading.
  – Describe how laser instruments are used in finish grading.
  – Describe how a Global Positioning System (GPS) and a robotic total station are used in finish grading.

Learning Objective 2
• Explain methods used to stabilize soils and control soil erosion.
  – Identify soil stabilizers and binders.
  – Describe methods used in the application of soil binders.
  – Describe methods used to control soil erosion.

Learning Objective 3
• Describe finish grading methods.
  – Describe the use of grading specifications.
  – Explain how finish grade is established for slopes.
  – Explain how the finish subgrade and base are established.
  – Describe grading methods used for ditches and trenches.
  – Describe grading methods used on parking lots, sidewalks, and curbs.

Performance Task

Performance Task 1 (Learning Objective 3)
• Establish a finish grade after a rough grade has been performed, according to instructions.

Teaching Time: 25 hours
(Ten 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites
Core Curriculum; Heavy Equipment Operations Level One; Heavy Equipment Operations Level Two.

Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.
**Safety Considerations**
This module requires that trainees work with and in the vicinity of grading equipment and, possibly, other types of heavy equipment commonly found on construction sites. Safe working habits in the vicinity of heavy equipment must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE and follow all safe heavy equipment operating procedures. Any deficiencies must be corrected to ensure future trainee safety as they begin working with other heavy equipment later in their training and career. All practice sessions and performance tasks must be completed under your direct supervision.

**Classroom Equipment and Materials**
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- **Heavy Equipment Operations Level Three PowerPoint® Presentation Slides**
- DVD player or a computer with a DVD drive
- Computer with Internet access
- A set of site specifications for a construction project that includes grading specifications such as slope information and the locations of ditches
- An operator’s manual for the grading equipment in use

**Equipment and Materials for Laboratories and Performance Testing**
- Standard eye protection
- Work gloves
- Proper footwear as designated by the instructor or training facility provider
- Hearing protection as designated by the instructor or training facility provider
- Hard hats
- A functional motor grader or, if no grader is available, a functional dozer
- A suitable facility at which to operate the grading equipment and practice basic maneuvers
- A suitable area on which to perform finish grading operations
- A method of two-way communications with hands-free characteristics
- Examples of laser equipment, including carpenter’s level, handheld distance meter, laser transmitter and laser receiver that can be used for determining grade
- Three containers of soil
- Three containers of soil binders, one each of cement, lime, and calcium chloride
- A piece of geotextile material approximately 2 feet by 2 feet in size
- A container of soil dissolved in water for pouring through textile
- An empty container to collect water
- Some examples of grade stakes that are commonly used for finish grading

**Additional Resources**
This module presents thorough resources for task training. The following resource material is suggested for further study.

The Occupational Safety and Health Administration (OSHA) publishes safety requirements for rollers/compactors and related equipment in **OSHA 29 CFR Standard 1926**, found at [www.osha.gov](http://www.osha.gov).

There are a number of online resources available for trainees who would like more information on finishing and grading and other heavy equipment operations. A search for additional information may be assigned as homework to interested trainees.

An effective way for trainees to see grading equipment in action is to shoot your own video at a job site where they are being used. You can use this video to point out correct and incorrect methods of operation. This video can also be used to test the trainees on their knowledge of correct and incorrect operation.

Instructors should view all videos identified in the lesson plan before using them, to ensure their suitability. The videos will provide teachable moments in both proper and improper operation. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper techniques.
The Lesson Plan for this module is divided into ten 2.5-hour sessions. This time includes 10 minutes for administrative tasks, and a 10-minute break per session.

Due to the often-limited access to heavy equipment, it is suggested that the text of this module be presented in its entirety in the classroom environment before demonstrations and hands-on practice begins. Once the text has been presented, the practical instruction, demonstrations, and trainee practice using a functional grader or dozer can be done continuously without interruption. As a result, Sessions One through Six are designed exclusively for the classroom environment, while Sessions Seven through Nine include demonstrations, practice, and the execution of performance tasks.

**SESSION ONE**

Session One begins with coverage of common types of grading equipment used for finish grading. The manner in which motor graders, dozers, scrapers, and telescoping excavators perform finish grading is examined.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get trainees engaged and give them an idea of what they will learn in this module.
3. Identify and discuss how motor graders, dozers, scrapers, and telescoping excavators are used in finish grading work.

**SESSION TWO**

Session Two focuses on laser-based instruments that are used for automatic grade control. The various components of a laser-based system are identified and described, and the function of the system is examined.

1. Show the Session Two PowerPoint® presentation.
2. Identify and describe the major components of a laser-based grade control system.
3. Discuss how a laser-based grade control system is used for finish grading.

**SESSION THREE**

Session Three covers how a Global Positioning System (GPS) is used in some grade control systems. Another type of grade control system called a robotic total station is also examined.

1. Show the Session Three PowerPoint® presentation.
2. Discuss how a GPS-based grade control system works and explain how it is used for finish grading.
3. Discuss how a robotic total station works and explain how it is used for finish grading.

**SESSION FOUR**

Session Four covers different types of soil stabilizers and binders that are often used during finish grading. Methods used for applying the stabilizers and binders and for controlling soil erosion are also discussed.

1. Show the Session Four PowerPoint® presentation.
2. Identify and discuss materials commonly used as soil stabilizers and binders.
3. Discuss methods used for applying soil binders.
4. Discuss methods used for controlling soil erosion.
**Session Outline for 22307-14**

**FINISHING AND GRADING**

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**Session Five**

Session Five focuses on finish grading methods. It examines how grading specifications are used for various finish grading jobs, describes how a finish grade is established for slopes, and discusses how a finish subgrade and base are established.

1. Show the Session Five PowerPoint® presentation.
2. Discuss how grading specifications are used.
3. Explain how a finish grade is established for slopes.
4. Discuss how to establish a finish subgrade and base.

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**Session Six**

Session Five focuses on grading methods used for ditches, trenches, parking lots, sidewalks, and curbs.

1. Show the Session Five PowerPoint® presentation.
2. Discuss grading methods used for ditches and trenches.
3. Discuss grading methods used for parking lots, sidewalks, and curbs.

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**Session Seven Through Nine**

Sessions Seven through Nine are set aside for lab work needed to satisfy the module performance task. The labs involve establishing a finish grade after a rough grade has been performed, according to instructions. You can allocate lab time for these activities based on class size and available facilities and equipment.

1. Have the trainees establish a finish grade after a rough grade has been performed, according to instructions.

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**Session Ten**

Session Ten is a review and testing session. Have trainees complete the Module Review Questions. (Alternatively, these may be assigned as homework at the end of Session Nine.) Answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed by the end of this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
## Materials Checklist for *Finishing and Grading*, 22307-14

### Equipment and Materials

<table>
<thead>
<tr>
<th>Personal protective equipment:</th>
<th>A functional motor grader or, if no grader is available, a functional dozer</th>
<th>A method of two-way communications with hands-free characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard eye protection</td>
<td>A suitable facility at which to operate the grading equipment and practice basic maneuvers</td>
<td>A piece of geotextile material approximately 2 feet by 2 feet in size</td>
</tr>
<tr>
<td>Work gloves</td>
<td>A suitable area on which to perform finish grading operations</td>
<td>An empty container to collect water</td>
</tr>
<tr>
<td>Proper footwear as designated by the instructor or training facility provider</td>
<td>Examples of laser equipment, including carpenter’s level, handheld distance meter, laser transmitter and laser received that can be used for determining grade</td>
<td>A container of soil dissolved in water for pouring through textile</td>
</tr>
<tr>
<td>Hearing protection as designated by the instructor or training facility provider</td>
<td>Some examples of grade stakes that are commonly used for finish grading</td>
<td>Three containers of soil binders, one each of cement, lime, and calcium chloride</td>
</tr>
<tr>
<td>Hard hats</td>
<td></td>
<td>Three containers of soil</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Markers/chalk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pencils and paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Heavy Equipment Operations Level Three PowerPoint® Presentation Slides</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVD player or a computer with a DVD drive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer with Internet access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An operator’s manual for the grading equipment in use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A set of site specifications for a construction project that includes grading specifications such as slope information and the locations of ditches</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 22203-14

COMPACTATION EQUIPMENT

Module Two (22203-14) provides training on common types of compaction equipment; the primary instruments, controls, and attachments of a roller; safety guidelines associated with compaction equipment; and prestart inspections, preventive maintenance, and proper operating procedures. Factors involved in work activities associated with a roller are also presented.

### Objectives

**Learning Objective 1**
- Identify and describe types of compaction equipment.
  - Describe a pneumatic tire compactor.
  - Describe a steel-wheel compactor.
  - Describe a vibratory compactor.
  - Describe a sheepsfoot compactor.

**Learning Objective 2**
- Identify and describe the components, controls, and attachments on a typical compactor.
  - Describe the features of the operator’s cab.
  - Describe the instruments and indicators.
  - Describe control systems.
  - Identify common compactor attachments.

**Learning Objective 3**
- Describe safety guidelines and basic preventive maintenance requirements associated with compaction equipment.
  - Identify specific roller/compactor safety rules.
  - Identify tire safety rules.
  - Describe daily inspection and maintenance procedures.
  - Identify maintenance procedures involved in servicing a compactor.

**Learning Objective 4**
- Describe basic procedures for operating a compactor.
  - Identify steps for starting up and shutting down a compactor.
  - Identify steps for performing basic maneuvers with a compactor.

**Learning Objective 5**
- Describe factors involved in work activities associated with a compactor.
  - Identify factors involved in compaction equipment selection.
  - Identify factors involved in the method of compaction used.
  - Identify tests used to check compaction quality.
  - Describe the process of leveling and compacting soil.
  - Describe the process for backfilling.
  - Describe the processes used in compacting cement and asphalt.

### Performance Tasks

**Performance Task 1** (Learning Objective 3)
- Complete a proper prestart inspection and preventive maintenance of a compactor.

**Performance Task 2** (Learning Objective 4)
- Perform proper startup, warm-up, and shut-down procedures.

**Performance Task 3** (Learning Objectives 4 and 5)
- Execute basic maneuvers with compaction equipment, including forward/backward movement and turning.

### Teaching Time: 25 hours
(Ten 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

### Prerequisites
Core Curriculum; Heavy Equipment Operations Level One; Heavy Equipment Operations Level Two.
Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.

Safety Considerations
This module requires that trainees work with and in the vicinity of compaction equipment and other types of heavy equipment commonly found on construction sites. Safe working habits in the vicinity of heavy equipment must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE and follow all safe heavy equipment operating procedures. Any deficiencies must be corrected to ensure future trainee safety as they begin working with other heavy equipment later in their training and career. All practice sessions and performance tasks must be completed under your direct supervision.

Classroom Equipment and Materials
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- Heavy Equipment Operations Level Three PowerPoint® Presentation Slides
- DVD player or a computer with a DVD drive
- Computer with Internet access
- Photographs or, preferably, toy models of the four basic types of soil compactors
- Copies of the operator’s manual and the service record for the roller being used later for laboratory sessions
- An operator’s manual for the roller in use

Equipment and Materials for Laboratories and Performance Testing
- Standard eye protection
- Work gloves
- Proper footwear as designated by the instructor or training facility provider
- Hearing protection as designated by the instructor or training facility provider
- Hard hats
- A functional roller
- A suitable facility at which to operate the roller and practice basic maneuvers
- A suitable area on which to perform roller operations
- A method of two-way communications with hands-free characteristics
- A bag of soil that can be used to demonstrate wet, optimum, and dry moisture content
- The following fluids and materials for the roller in use:
  - Fuel
  - Engine oil
  - Transmission fluid
  - Hydraulic fluid
  - Water
  - Lubricating grease and grease guns
- Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of a roller
- Rags
Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study.

The Occupational Safety and Health Administration (OSHA) publishes safety requirements for rollers/compactors and related equipment in *OSHA 29 CFR Standard 1926*, found at [www.osha.gov](http://www.osha.gov).

There are a number of online resources available for trainees who would like more information on compaction equipment and other heavy equipment. A search for additional information may be assigned as homework to interested trainees.

An effective way for trainees to see compaction equipment in action is to shoot your own video at a job site where they are being used. You can use this video to point out correct and incorrect methods of operation. This video can also be used to test the trainees on their knowledge of correct and incorrect operation. For compaction equipment, this video could include:

- Prestart walk-around inspection
- Startup and shutdown process
- Various tasks in progress

Instructors should view all videos identified in the lesson plan before using them, to ensure their suitability. The videos will provide teachable moments in both proper and improper operation. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper techniques.

Instructors should also consider taking still pictures of controls and instrumentation inside a cab and adding them to the PowerPoint® presentation. Images from the specific roller the trainees will operate are especially helpful. The use of such images for a review of the controls and instrumentation is recommended as an exercise in a number of lesson plan sessions.
Session Outline for 22203-14

COMPACTION EQUIPMENT

The Lesson Plan for this module is divided into ten 2.5-hour sessions. This time includes 10 minutes for administrative tasks, and a 10-minute break per session.

Due to the often-limited access to heavy equipment, it is suggested that the text of this module be presented in its entirety in the classroom environment before demonstrations and hands-on practice begins. Once the text has been presented, the practical instruction, demonstrations, and trainee practice using functional compaction equipment can be done continuously without interruption. As a result, Sessions One through Five are designed exclusively for the classroom environment, while Sessions Six through Nine include demonstrations, practice, and the execution of performance tasks.

**SESSION ONE**

Session One begins with an introduction to some of the fundamentals of soil compaction. It continues with coverage of common types of compaction equipment.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get trainees engaged and give them an idea of what they will learn in this module.
3. Describe how compaction is an engineered process of increasing soil density.
4. Identify the four basic types of rollers that are used for soil compaction.
5. Discuss the operation and use of a pneumatic roller, a steel-wheel roller, a vibratory compactor, a sheepsfoot roller, and a dropping-weight compactor.

**SESSION TWO**

Session Two focuses on the components, controls, and attachments on a typical roller. It covers the primary features of a roller’s operator’s cab, as well as the common operating controls, instrumentation, and attachments.

1. Show the Session Two PowerPoint® presentation.
2. Identify the major components of a typical roller.
3. Discuss the layout and features of the operator’s cab.
4. Describe the instruments, displays, and indicators found in the cab.
5. Discuss the controls that are used for basic roller operation, vehicle movement, and attachments.
6. Explain how water spray units, dozer blades, and scarifiers are used as roller attachments.

**SESSION THREE**

Session Three covers safety guidelines and basic preventive maintenance requirements associated with compaction equipment.

1. Show the Session Three PowerPoint® presentation.
2. Discuss the importance of safe equipment operation.
3. Identify and discuss general safety rules that apply to preparation, avoiding dangerous behavior, and using common sense and advance planning.
4. Discuss specific safety rules that apply to roller/compactor operation.
5. Discuss tire safety rules that apply to rubber-tire rollers.
6. Discuss items that should be checked during a daily inspection.
7. Discuss maintenance procedures involved in servicing a roller.
**SESSION FOUR**

Session Four covers the steps used for starting up and shutting down a roller and explains how to perform basic maneuvers with a roller.

1. Show the Session Four PowerPoint® presentation.
2. Identify and discuss the steps involved in starting up and shutting down a roller.
3. Discuss how to move forward, move backward, and turn a roller.
4. Identify and discuss the steps involved in transporting a roller.

**SESSION FIVE**

Session Five focuses on how to select the proper equipment and compaction method; use tests to check compaction quality; level and compact soil; backfill; and compact cement and asphalt.

1. Show the Session Five PowerPoint® presentation.
2. Discuss how to select the proper compaction equipment and method for a job.
3. Explain how a sand cone test or nuclear testing can be used to check compaction quality.
4. Discuss the processes used for leveling and compacting soil, backfilling, compacting cement, and compacting asphalt.

**SESSIONS SIX THROUGH NINE**

Sessions Six through Nine are set aside for lab work needed to satisfy the module performance tasks. The labs include inspecting and performing routine service on a roller; starting up, warming up, and shutting down the roller; and performing basic operations with a roller. You can allocate lab time for these activities based on class size and available facilities and equipment.

1. Have the trainees complete a proper prestart inspection and maintenance of a roller.
2. Have the trainees perform proper startup, warm-up, and shutdown procedures.
3. Have the trainees carry out basic operations with a roller.
4. Have the trainees compact an area approximately 20 feet (6.10 meters) long and 10 feet (3.05 meters) wide.

**SESSION TEN**

Session Ten is a review and testing session. Have trainees complete the Module Review Questions. (Alternatively, these may be assigned as homework at the end of Session Nine.) Answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed by the end of this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
Materials Checklist for *Compaction Equipment, 22203-14*

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>The following fluids and materials for the roller in use:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal protective equipment:</strong></td>
<td></td>
</tr>
<tr>
<td>Standard eye protection</td>
<td>A functional roller</td>
</tr>
<tr>
<td>Work gloves</td>
<td>A suitable area on which to perform roller operations</td>
</tr>
<tr>
<td>Proper footwear as designated by the instructor or training facility provider</td>
<td>A suitable facility at which to operate the roller and practice basic maneuvers</td>
</tr>
<tr>
<td>Hearing protection as designated by the instructor or training facility provider</td>
<td>A bag of soil that can be used to demonstrate wet, optimum, and dry moisture content</td>
</tr>
<tr>
<td>Hard hats</td>
<td>Rags</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of a roller</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td></td>
</tr>
<tr>
<td>Pencils and paper</td>
<td></td>
</tr>
<tr>
<td><em>Heavy Equipment Operations Level Three PowerPoint® Presentation Slides</em></td>
<td></td>
</tr>
<tr>
<td>DVD player or a computer with a DVD drive</td>
<td></td>
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<tr>
<td>Computer with Internet access</td>
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</tr>
<tr>
<td>Photographs or, preferably, toy models of the four basic types of rollers</td>
<td></td>
</tr>
<tr>
<td>Copies of the operator's manual and the service record for the roller being used later for laboratory sessions</td>
<td></td>
</tr>
<tr>
<td>An operator's manual for the roller in use</td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 22303-14

BACKHOES

Module Three (22303-14) identifies and describes the common uses, types, components, instruments, controls, and attachments of backhoes. Safety guidelines, prestart inspection procedures, and preventive maintenance requirements are presented. Basic startup and operation are described, and common work activities associated with backhoes are covered.

Objectives

Learning Objective 1
• Identify and describe common uses and types of backhoes.
  – Describe common uses of a backhoe.
  – Identify types and configurations of backhoes.

Learning Objective 2
• Identify and describe the components, controls, and attachments on a typical backhoe.
  – Describe the major parts of a backhoe.
  – Describe the instruments and controls.
  – Describe the backhoe controls.
  – Describe common backhoe attachments.

Learning Objective 3
• Identify and describe safety, inspection, and service guidelines associated with a backhoe.
  – Describe rules pertaining to safety.
  – Describe daily inspection checks.
  – Describe the servicing requirements for a backhoe.

Learning Objective 4
• Describe basic operating procedures for a backhoe.
  – Identify factors for effective backhoe operation.
  – Identify steps for preparing to work with a backhoe.
  – Identify steps for performing basic maneuvers with a backhoe.

Learning Objective 5
• Identify and describe common work activities for a backhoe.
  – Describe loading from a stockpile with a backhoe.
  – Describe trenching and loading with a backhoe.
  – Describe demolition using the hydraulic breaker.
  – Describe setting pipe using a backhoe.
  – Describe excavating footings and foundations with a backhoe.
  – Describe working with a backhoe in confined or unstable areas.
  – Describe basic procedures for roading and transporting a backhoe.

Performance Tasks

Performance Task 1 (Learning Objective 3)
• Demonstrate a proper prestart inspection of a backhoe.

Performance Task 2 (Learning Objective 4)
• Perform a proper startup, warm-up, and shut-down of a backhoe.

Performance Task 3 (Learning Objective 4)
• Perform basic backhoe maneuvers, including forward movement, moving in reverse, turning, and operating the front loader bucket.

Performance Task 4 (Learning Objective 4)
• Perform the operation of setting up a backhoe, using stabilizers, and digging with the bucket.

Performance Task 5 (Learning Objectives 4 and 5)
• Perform an excavation of a trench 20 to 40 feet (6 to 12 meters) long with spoil piles at least 2 feet (0.6 meters) from the edge.

Teaching Time: 30 hours
(Twelve 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites
Core Curriculum; Heavy Equipment Operations Level One; Heavy Equipment Operations Level Two.
Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.

Safety Considerations
This module requires that trainees work with and in the vicinity of backhoes and other types of heavy equipment commonly found on construction sites. Safe working habits in the vicinity of heavy equipment must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE and follow all safe heavy equipment operating procedures. Any deficiencies must be corrected to ensure future trainee safety as they begin working with other heavy equipment later in their training and career. All practice sessions and performance tasks must be completed under your direct supervision.

Classroom Equipment and Materials
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Heavy Equipment Operations Level Three PowerPoint® Presentation Slides
DVD player
Computer
A toy model of a typical backhoe/loader that has movable parts
An operator’s manual for a backhoe that includes a daily inspection check sheet and a routine maintenance schedule
An operator’s manual for the backhoe in use

Equipment and Materials for Laboratories and Performance Testing
Standard eye protection
Work gloves
Proper footwear as designated by the instructor or training facility provider
Hearing protection as designated by the instructor or training facility provider
Hard hats
A large (preferably transparent) container in which soil can be placed
Enough soil to partially fill the container
A small shovel or gardening tool that would enable a trench to be cut into the soil
A functional backhoe
A suitable facility at which to operate the backhoe and practice basic work activities

A suitable area on which to perform backhoe operations
A method of two-way communications with hands-free characteristics
The following fluids and materials for the backhoe in use:
Fuel
Engine oil
Transmission fluid
Hydraulic fluid
Water
Lubricating grease and grease guns
Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of a backhoe
Rags

Additional Resources
This module presents thorough resources for task training. There are a number of online resources, including video, available for trainees who would like more information on backhoes and their operation. A search for additional information may be assigned as homework to interested trainees.

Instructors should view any videos before using them to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the Internet, make personal videos, and take still pictures related to backhoes and heavy equipment operation and add them to the PowerPoint® presentations throughout the program.
Session Outline for 22303-14

**BACKHOES**

The Lesson Plan for this module is divided into twelve 2.5-hour sessions. This time includes 10 minutes for administrative tasks, and a 10-minute break per session.

Due to the often-limited access to heavy equipment, it is suggested that the text of this module be presented in its entirety in the classroom environment before demonstrations and hands-on practice begins. Once the text has been presented, the practical instruction, demonstrations, and trainee practice using a functional grader or dozer can be done continuously without interruption. As a result, Sessions One through Six are designed exclusively for the classroom environment, while Sessions Seven through Eleven include demonstrations, practice, and the execution of performance tasks.

**SESSION ONE**

Session One begins with a discussion of the common uses of backhoes. It continues with coverage of the various types and configurations of backhoes.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get trainees engaged and give them an idea of what they will learn in this module.
3. Discuss how backhoes are commonly used for digging and cleaning narrow ditches, excavating small areas, light duty hoisting, and loading trucks.
4. Discuss how a backhoe/loader that is mounted on a wheel-type tractor is the most common backhoe configuration in use today, and identify other less common configurations.

**SESSION TWO**

Session Two covers the major components of a backhoe, as well as various instruments and vehicle controls that are typically found in the operator’s cab of a backhoe.

1. Show the Session Two PowerPoint® presentation.
2. Identify and discuss the major parts that make up a typical backhoe/loader.
3. Talk about the layout of the instrument panels and controls in the cab of a backhoe.
4. Identify and discuss the major instruments and vehicle movement controls on the backhoe.

**SESSION THREE**

Session Three focuses on various configurations of backhoe controls and covers common backhoe attachments.

1. Show the Session Three PowerPoint® presentation.
2. Identify and discuss basic backhoe control functions.
3. Discuss two-lever and four-lever backhoe controls.
4. Discuss joystick backhoe controls.
5. Identify and discuss common attachments that are used on a backhoe.

**SESSION FOUR**

Session Four covers safety guidelines and inspection and maintenance procedures for a backhoe. Coverage includes safety guidelines for operators, co-workers, the public, and the equipment. In addition, specific procedures and locations involved in prestart inspections and preventive maintenance requirements are discussed.

1. Show the Session Four PowerPoint® presentation.
2. Discuss guidelines that apply to operator safety, the safety of co-workers and the public, and the safety of the equipment.
3. Identify and discuss items that must be inspected prior to the startup of a backhoe.
4. Talk about the fluids that must be checked and topped off prior to startup.
5. Discuss preventive maintenance requirements for a backhoe.
Session Outline for 22303-14

**BACKHOES**

**SESSION FIVE**

Session Five covers basic preparations for operating a backhoe, and it explains how to start up, warm up, and shut down a backhoe. It also covers how to perform basic maneuvers and operations with a backhoe.

1. Show the Session Five PowerPoint® presentation.
2. Discuss general ways to improve the efficiency of backhoe operation.
3. Discuss steps that should be followed during the startup, warm-up, and shutdown of a backhoe.
4. Discuss how to position, set up, and perform basic operations with a backhoe.

**SESSION SIX**

Session Six covers some common work activities that are often performed with backhoes.

1. Show the Session Six PowerPoint® presentation.
2. Discuss how to load material from a stockpile with a backhoe.
3. Discuss steps for trenching and loading with a backhoe.
4. Discuss how to perform demolition using a hydraulic breaker attachment on a backhoe.
5. Discuss how to use a backhoe for setting pipe.
6. Explain how to excavate footings and foundations with a backhoe.
7. Discuss how to operate a backhoe in confined and unstable areas.
8. Explain how to prepare a backhoe for roading and transporting.

**SESSIONS SEVEN THROUGH ELEVEN**

Sessions Seven through Eleven are set aside for lab work needed to satisfy module performance tasks. The labs include performing a prestart inspection and routine maintenance on a backhoe; starting up, warming up, and shutting down a backhoe; performing basic maneuvers with a backhoe; and excavating an area to given specifications using a backhoe. You can allocate lab time for these activities based on class size and available facilities.

1. Have the trainees demonstrate a proper prestart inspection of a backhoe.
2. Have the trainees perform a proper startup, warm-up, and shutdown of a backhoe.
3. Have the trainees perform basic backhoe maneuvers, including forward movement, turning, moving in reverse, and operating the front loader bucket.
4. Have the trainees perform the operation of setting up a backhoe, using stabilizers, and digging with the bucket.
5. Have the trainees perform an excavation of a trench 20 to 40 feet (6 to 12 meters) long with spoil piles at least 2 feet (0.6 meters) from the edge.

**SESSION TWELVE**

Session Twelve is a review and testing session. Have trainees complete the Module Review Questions. Alternatively, these may be assigned as homework at the end of Session Eleven. Go over the Module Review Questions in class prior to the exam and answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed during this session as well.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
### Materials Checklist for Backhoes, 22303-14

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Personal protective equipment:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A functional backhoe</td>
</tr>
<tr>
<td></td>
<td>The following fluids and mate-</td>
</tr>
<tr>
<td></td>
<td>rials for the backhoe in use:</td>
</tr>
<tr>
<td><strong>Standard eye protection</strong></td>
<td>A suitable facility at which to operate the backhoe and practice basic work activities</td>
</tr>
<tr>
<td><strong>Work gloves</strong></td>
<td>A suitable area on which to perform backhoe operations</td>
</tr>
<tr>
<td><strong>Proper footwear as designated by the instructor or training facility provider</strong></td>
<td>A large (preferably transparent) container in which soil can be placed.</td>
</tr>
<tr>
<td><strong>Hearing protection as designated by the instructor or training facility provider</strong></td>
<td>Enough soil to partially fill the container.</td>
</tr>
<tr>
<td><strong>Hard hats</strong></td>
<td>A small shovel or gardening tool that would enable a trench to be cut into the soil</td>
</tr>
<tr>
<td><strong>Whiteboard/chalkboard</strong></td>
<td>A method of two-way communications with hands-free characteristics</td>
</tr>
<tr>
<td></td>
<td>Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of a backhoe</td>
</tr>
<tr>
<td></td>
<td>Lubricating grease and grease guns</td>
</tr>
<tr>
<td></td>
<td>Rags</td>
</tr>
<tr>
<td><strong>Pencils and paper</strong></td>
<td>DVD player</td>
</tr>
<tr>
<td><strong>Heavy Equipment Operations Level Three PowerPoint® Presentation Slides</strong></td>
<td>Computer</td>
</tr>
<tr>
<td><strong>DVD player</strong></td>
<td>A toy model of a typical backhoe/loader that has movable parts</td>
</tr>
<tr>
<td><strong>Computer</strong></td>
<td>An operator’s manual for a backhoe that includes a daily inspection check sheet and a routine maintenance schedule</td>
</tr>
<tr>
<td><strong>A toy model of a typical backhoe/loader that has movable parts</strong></td>
<td>An operator’s manual for the backhoe in use</td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 22310-14

OFF-ROAD DUMP TRUCKS

Module Four (22310-14) identifies and describes the common types, uses, and components of off-road dump trucks. Safety guidelines, prestart inspection procedures, and preventive maintenance requirements are presented. Basic startup, driving maneuvers, loading, and dumping procedures for off-road dump trucks are covered.

Objectives

Learning Objective 1
• Identify and describe basic types, uses, and components of off-road dump trucks.
  – Identify and describe rigid dump trucks.
  – Identify and describe articulated dump trucks.
  – Identify and describe off-road truck instrumentation.
  – Identify and describe off-road truck control systems.

Learning Objective 2
• Identify and describe safety, inspection, and service guidelines associated with off-road dump trucks.
  – Describe guidelines associated with off-road truck safety.
  – Describe prestart inspection procedures.
  – Describe preventive maintenance requirements.

Learning Objective 3
• Describe basic startup and operating procedures for off-road dump trucks.
  – Describe startup, warm-up, and shutdown procedures.
  – Describe safe driving maneuvers and loading and dumping procedures.

Performance Tasks

Performance Task 1 (Learning Objective 2)
• Complete a proper prestart inspection and maintenance for an off-road dump truck.

Performance Task 2 (Learning Objective 3)
• Perform the proper startup, warm-up, and shutdown procedures.

Performance Task 3 (Learning Objective 3)
• Carry out basic operations with an off-road dump truck:
  – Properly position a truck for loading.
  – Safely drive the truck to a designated dumping site.
  – Dump the load in the designated spot.
  – Set the retarder system to reduce wear on the service brakes.

Teaching Time: 30 hours
(Twelve 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites

Core Curriculum; Heavy Equipment Operations Level One; Heavy Equipment Operations Level Two.

Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.
**Safety Considerations**
This module requires that trainees work with and in the vicinity of off-road dump trucks and other types of heavy equipment commonly found on construction sites. Safe working habits in the vicinity of heavy equipment must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE and follow all safe heavy equipment operating procedures. Any deficiencies must be corrected to ensure future trainee safety as they begin working with other heavy equipment later in their training and career. All practice sessions and performance tasks must be completed under your direct supervision.

### Classroom Equipment and Materials
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper

*Heavy Equipment Operations Level Three PowerPoint® Presentation Slides*
- DVD player
- Computer
- Toy models of a rigid-frame dump truck and an articulated frame dump truck
- An operator's manual for an off-road dump truck that includes a daily inspection check sheet and a routine maintenance schedule
- An operator's manual for the off-road dump truck in use

### Equipment and Materials for Laboratories and Performance Testing
- Standard eye protection
- Work gloves
- Proper footwear as designated by the instructor or training facility provider
- Hearing protection as designated by the instructor or training facility provider
- Hard hats
- A functional off-road dump truck
- A suitable facility at which to operate the off-road dump truck and practice basic maneuvers
- A suitable area on which to perform off-road dump truck operations
- A method of two-way communications with hands-free characteristics

- The following fluids and materials for the off-road dump truck in use:
  - Fuel
  - Engine oil
  - Transmission fluid
  - Hydraulic fluid
  - Water
  - Lubricating grease and grease guns
  - Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of an off-road dump truck
  - Rags

### Additional Resources
This module presents thorough resources for task training. There are a number of online resources, including video, available for trainees who would like more information on off-road dump trucks and their operation. A search for additional information may be assigned as homework to interested trainees.

Instructors should view any videos before using them to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the internet, make personal videos, and take still pictures related to off-road dump trucks and heavy equipment operation and add them to the PowerPoint® presentations throughout the program.
The Lesson Plan for this module is divided into twelve 2.5-hour sessions. This time includes 10 minutes for administrative tasks, and a 10-minute break per session.

Due to the often-limited access to heavy equipment, it is suggested that the text of this module be presented in its entirety in the classroom environment before demonstrations and hands-on practice begins. Once the text has been presented, the practical instruction, demonstrations, and trainee practice using a functional grader or dozer can be done continuously without interruption. As a result, Sessions One through Six are designed exclusively for the classroom environment, while Sessions Seven through Eleven include demonstrations, practice, and the execution of performance tasks.

**SESSION ONE**

Session One begins with an introduction to the basic types of off-road dump trucks. It continues with coverage of rigid-frame dump trucks, their uses, and their major components.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get trainees engaged and give them an idea of what they will learn in this module.
3. Identify and describe rigid-frame dump trucks.
4. Identify and describe common uses of rigid-frame dump trucks.
5. Identify and describe major parts of rigid-frame dump trucks.

**SESSION TWO**

Session Two covers articulated-frame dump trucks. It includes information about articulated-frame dump truck uses and major components.

1. Show the Session Two PowerPoint® presentation.
2. Identify and describe articulated-frame dump trucks.
3. Identify and describe common uses of articulated-frame dump trucks.
4. Identify and describe major parts of articulated-frame dump trucks.

**SESSION THREE**

Session Three deals with the instrumentation and control systems that are found on off-road dump trucks. Coverage includes gauges, indicators, and warning lights, along with control systems that monitor the engine, transmission, vehicle traction, braking, and hoist. Object detection systems and ground level control systems are also covered.

1. Show the Session Three PowerPoint® presentation.
2. Identify and describe off-road truck instrumentation.
3. Identify and describe off-road truck control systems.

**SESSION FOUR**

Session Four covers safety guidelines that apply to operators, co-workers and others, and the equipment, as well as information about prestart inspections and preventive maintenance requirements for off-road dump trucks.

1. Show the Session Four PowerPoint® presentation.
2. Discuss guidelines that apply to operator safety.
3. Discuss guidelines that apply to the safety of co-workers and the public.
4. Discuss guidelines that apply to equipment safety.
5. Discuss items that must be inspected prior to the startup of an off-road dump truck.
6. Identify and describe fluids that must be checked and topped off prior to startup.
7. Discuss preventive maintenance requirements for an off-road dump truck.
Session Outline for

OFF-ROAD DUMP TRUCKS

SESSION FIVE

Session Five covers basic startup, warm-up, and shutdown procedures that apply to off-road dump trucks.

1. Show the Session Five PowerPoint® presentation.
2. Discuss steps that should be followed during the startup of an off-road dump truck.
3. Discuss guidelines that apply to the proper warm-up of an off-road dump truck.
4. Discuss steps that should be followed during the shutdown of an off-road dump truck.

SESSION SIX

Session Six covers procedures involved in the basic maneuvering of an off-road dump truck, including driving forward, backing, climbing and descending hills, and taking curves. Additional coverage includes safe loading and dumping practices and handling emergency situations.

1. Show the Session Six PowerPoint® presentation.
2. Describe basic steps involved in driving forward in an off-road dump truck.
3. Describe basic steps involved in backing up in an off-road dump truck.
4. Describe basic steps involved in climbing and descending hills in an off-road dump truck.
5. Describe basic steps involved in taking curves in an off-road dump truck.
6. Describe safe loading practices that apply to off-road dump trucks.
7. Describe safe dumping practices that apply to off-road dump trucks.
8. Describe how to handle emergency situations in an off-road dump truck.

SESSIONS SEVEN THROUGH ELEVEN

Sessions Seven through Eleven are set aside for lab work needed to satisfy module performance tasks. The labs include performing a prestart inspection and routine maintenance on an off-road dump truck; starting up, warming up, and shutting down the truck; performing basic maneuvers with the truck; and safely positioning the truck for loading, safely driving the truck to a designated dumping site, and safely dumping the load in the designated spot. You can allocate lab time for these activities based on class size and available facilities.

1. Have the trainees perform a prestart inspection on an off-road dump truck.
2. Have the trainees perform routine preventive maintenance on an off-road dump truck.
3. Have the trainees perform a proper startup, warm-up, and shutdown on an off-road dump truck.
4. Have the trainees perform basic maneuvers with an off-road dump truck.
5. Have the trainees demonstrate how to safely position an off-road dump truck for loading, safely drive the truck to a designated dumping site, and safely dump the load in the designated spot.

SESSION TWELVE

Session Twelve is a review and testing session. Have trainees complete the Module Review Questions. Alternatively, these may be assigned as homework at the end of Session Eleven. Go over the Module Review Questions in class prior to the exam and answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed during this session as well.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
## Materials Checklist for *Off-Road Dump Trucks, 22310-14*

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<td>Standard eye protection</td>
<td>A suitable facility at which to operate the off-road dump truck and practice basic maneuvers</td>
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<td>Work gloves</td>
<td>A method of two-way communications with hands-free characteristics</td>
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<td>Proper footwear as designated by the instructor or training facility provider</td>
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<td>Hearing protection as designated by the instructor or training facility provider</td>
<td>Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of an off-road dump truck</td>
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<td>An operator’s manual for the off-road dump truck in use</td>
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</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 22302-14

Dozers

Module Five (22302-14) identifies and describes the common uses, types, and components of dozers. Safety guidelines, prestart inspection procedures, and preventive maintenance requirements are presented. Basic startup and operation are described, and common work activities associated with dozers are covered.

### Objectives

#### Learning Objective 1
- Identify and describe the uses and components of a dozer.
  - Identify and describe common uses and types of dozers.
  - Identify and describe major parts of a dozer.
  - Identify and describe dozer instrumentation.
  - Identify and describe dozer controls.
  - Identify and describe common dozer blades.
  - Identify and describe common dozer attachments.

#### Learning Objective 2
- Identify and describe safety, inspection, and service guidelines associated with a dozer.
  - Describe guidelines associated with dozer safety.
  - Describe prestart inspection procedures.
  - Describe preventive maintenance requirements.

#### Learning Objective 3
- Describe basic startup and operating procedures for a dozer.
  - Describe startup, warm-up, and shutdown procedures.
  - Describe basic maneuvers and operations.
  - Describe common work activities.

### Performance Tasks

#### Performance Task 1 (Learning Objective 2)
- Demonstrate a proper prestart inspection and preventive maintenance on a dozer.

#### Performance Task 2 (Learning Objective 3)
- Perform proper startup, warm-up, and shutdown procedures.

#### Performance Task 3 (Learning Objective 3)
- Perform basic maneuvers with a dozer, including moving forward, moving backward, turning with the blade up, and straight dozing.

#### Performance Task 4 (Learning Objectives 3 and 4)
- Demonstrate basic dozer operation by:
  - Creating a level pad that measures approximately 20 feet by 20 feet ±1/10 foot (6 meters by 6 meters ±3 centimeters).
  - Pushing a stockpile while maintaining proper windrows and berms.

### Teaching Time: 30 hours
(Twelve 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

### Prerequisites
Core Curriculum; Heavy Equipment Operations Level One; Heavy Equipment Operations Level Two.

### Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.
**Safety Considerations**

This module requires that trainees work with and in the vicinity of dozers and other types of heavy equipment commonly found on construction sites. Safe working habits in the vicinity of heavy equipment must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE and follow all safe heavy equipment operating procedures. Any deficiencies must be corrected to ensure future trainee safety as they begin working with other heavy equipment later in their training and career. All practice sessions and performance tasks must be completed under your direct supervision.

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**Classroom Equipment and Materials**

- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- *Heavy Equipment Operations Level Three* PowerPoint® Presentation Slides
- DVD player
- Computer
- Toy model of a dozer
- Operator’s manual that includes a daily inspection check sheet and a routine maintenance schedule
- An operator’s manual for the dozer in use

**Equipment and Materials for Laboratories and Performance Testing**

- Standard eye protection
- Work gloves
- Proper footwear as designated by the instructor or training facility provider
- Hearing protection as designated by the instructor or training facility provider
- Hard hats
- A functional dozer
- A suitable facility at which to operate the dozers and practice basic work activities
- A suitable area on which to perform dozer operations
- A method of two-way communications with hands-free characteristics

- The following fluids and materials for the dozer in use:
  - Fuel
  - Engine oil
  - Transmission fluid
  - Hydraulic fluid
  - Water
  - Lubricating grease and grease guns
  - Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of a dozer
  - Rags

**Additional Resources**

This module presents thorough resources for task training. There are a number of online resources, including video, available for trainees who would like more information on dozers and their operation. A search for additional information may be assigned as homework to interested trainees.

Instructors should view any videos before using them, to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the Internet, make personal videos, and take still pictures related to dozers and heavy equipment operation and add them to the PowerPoint® presentations throughout the program.
The Lesson Plan for this module is divided into twelve 2.5-hour sessions. This time includes 10 minutes for administrative tasks, and a 10-minute break per session.

Due to the often-limited access to heavy equipment, it is suggested that the text of this module be presented in its entirety in the classroom environment before demonstrations and hands-on practice begins. Once the text has been presented, the practical instruction, demonstrations, and trainee practice using a functional grader or dozer can be done continuously without interruption. As a result, Sessions One through Seven are designed exclusively for the classroom environment, while Sessions Eight through Eleven include demonstrations, practice, and the execution of performance tasks.

**Session One**

Session One begins with a discussion of the common uses of dozers. It continues with coverage of the various types and configurations of dozers, and ends with a discussion of the major parts of a dozer.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get trainees engaged and give them an idea of what they will learn in this module.
3. Identify and describe common uses of dozers.
4. Identify and describe common types and configurations of dozers.
5. Identify and describe major parts of dozer, including the operator’s cab, the tracks, and the blade.

**Session Three**

Session Three deals with the numerous blades and attachments that can be used on a dozer.

1. Show the Session Three PowerPoint® presentation.
2. Identify and describe common and special application blades that are used on dozers.
3. Identify and describe rippers, winches, and other attachments that are used on dozers.

**Session Four**

Session Four covers safety guidelines and inspection and maintenance procedures for a dozer. Coverage includes safety guidelines for operators, co-workers, the public, and the equipment. In addition, specific procedures and locations involved in prestart inspections and preventive maintenance requirements are discussed.

1. Show the Session Four PowerPoint® presentation.
2. Discuss guidelines that apply to operator safety, the safety of co-workers and the public, and the safety of the equipment.
3. Discuss items that must be inspected prior to the startup of a dozer.
4. Identify and describe fluids that must be checked and topped off prior to startup.
5. Discuss preventive maintenance requirements for a dozer.
**Session Outline for 22302-14**

**Dozers**

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**Session Five**

Session Five covers basic startup, warm-up, and shutdown procedures that apply to dozers.

1. Show the Session Five PowerPoint® presentation.
2. Discuss steps that should be followed during the startup of a dozer.
3. Discuss guidelines that apply to the proper warm-up of a dozer.
4. Discuss steps that should be followed during the shutdown of a dozer.

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**Session Six**

Session Six covers basic maneuvers and operations that apply to dozers, including dozer movement and blade operation.

1. Show the Session Six PowerPoint® presentation.
2. Describe basic steps involved in moving forward with a dozer.
3. Describe basic steps involved in moving backward with a dozer.
4. Describe basic steps involved in steering and turning a dozer.
5. Describe basic steps involved in operating the dozer blade.

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**Session Seven**

Session Seven covers various work activities that apply to dozers. Coverage includes common or typical work activities as well as less common activities.

1. Show the Session Seven PowerPoint® presentation.
2. Describe procedures for various work activities that apply to dozers.

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**Sessions Eight through Eleven**

Sessions Eight through Eleven are set aside for lab work needed to satisfy module performance tasks. The labs include performing a prestart inspection and routine maintenance on a dozer; starting up, warming up, and shutting down a dozer; performing basic maneuvers with a dozer; and excavating an area to given specifications using a dozer. You can allocate lab time for these activities based on class size and available facilities.

1. Have the trainees perform a prestart inspection of a dozer.
2. Have the trainees perform routine preventive maintenance on a dozer.
3. Have the trainees perform a proper startup, warm-up, and shutdown on a dozer.
4. Have the trainees perform basic maneuvers with a dozer, including moving forward, moving backward, turning with the blade up, and straight dozing.
5. Have the trainees demonstrate basic dozer operation by creating a level pad that measures approximately 20 feet by 20 feet ±1/10 foot (6 meters by 6 meters ±3 centimeters).
6. Have the trainees demonstrate basic dozer operation by pushing a stockpile while maintaining proper windrows and berms.

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**Session Twelve**

Session Twelve is a review and testing session. Have trainees complete the Module Review Questions. Alternatively, these may be assigned as homework at the end of Session Eleven. Go over the Module Review Questions in class prior to the exam and answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed during this session as well.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
### Equipment and Materials

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<th><strong>A functional dozer</strong></th>
<th><strong>The following fluids and materials for the dozer in use:</strong></th>
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<tr>
<td>Standard eye protection</td>
<td>A suitable facility at which to operate the dozers and practice basic work activities</td>
<td>Fuel</td>
</tr>
<tr>
<td>Work gloves</td>
<td>A suitable area on which to perform dozer operations</td>
<td>Engine oil</td>
</tr>
<tr>
<td>Proper footwear as designated by the instructor or training facility provider</td>
<td>Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of a dozer</td>
<td>Transmission fluid</td>
</tr>
<tr>
<td>Hearing protection as designated by the instructor or training facility provider</td>
<td>A method of two-way communications with hands-free characteristics</td>
<td>Water</td>
</tr>
<tr>
<td>Hard hats</td>
<td>Rags</td>
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<td>Pencils and paper</td>
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<td><em>Heavy Equipment Operations Level Three PowerPoint® Presentation Slides</em></td>
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<td>Computer</td>
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<tr>
<td>Toy model of a dozer</td>
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<tr>
<td>An operator’s manual for the dozer in use</td>
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<tr>
<td>Operator’s manual that includes a daily inspection check sheet and a routine maintenance schedule</td>
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</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module Six (22304-14) identifies and describes the common types, uses, and components of excavators. Safety guidelines, prestart inspection procedures, and preventive maintenance requirements are presented. Basic start-up and operation are described, and common work activities associated with excavators are covered.

Objectives

Learning Objective 1
- Identify and describe types, uses, and components of excavators.
  a. Identify and describe common types of excavators.
  b. Identify and describe common uses of excavators.
  c. Identify and describe major parts of excavators.
  d. Identify and describe excavator instrumentation and controls.
  e. Identify and describe common excavator buckets and attachments.

Learning Objective 2
- Identify and describe safety, inspection, and service guidelines associated with an excavator.
  a. Describe guidelines associated with excavator safety.
  b. Describe prestart inspection procedures.
  c. Describe preventive maintenance requirements.

Learning Objective 3
- Describe basic startup and operating procedures for a track-mounted hydraulic excavator.
  a. Describe startup, warm-up, and shutdown procedures.
  b. Describe basic maneuvers and operations.
  c. Describe common work activities.
  d. Describe activities involving special attachments.

Performance Tasks

Performance Task 1 (Learning Objective 2)
- Demonstrate a proper prestart inspection and maintenance on an excavator.

Performance Task 2 (Learning Objective 3)
- Perform proper startup, warm-up, and shutdown procedures.

Performance Task 3 (Learning Objective 3)
- Perform basic maneuvers with a hydraulic excavator, including moving forward, moving backward, making a pivot turn, and making a spot turn.

Performance Task 4 (Learning Objective 3)
- Demonstrate basic excavator operation by creating a 10 feet by 10 feet (3 meter by 3 meter) excavation at least 3 feet (1 meter) deep to grade.

Teaching Time: 35 hours
(Fourteen 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites
Core Curriculum; Heavy Equipment Operations Level One; Heavy Equipment Operations Level Two.

Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.
**Safety Considerations**

This module requires that trainees work with and in the vicinity of excavators and other types of heavy equipment commonly found on construction sites. Safe working habits in the vicinity of heavy equipment must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE and follow all safe heavy equipment operating procedures. Any deficiencies must be corrected to ensure future trainee safety as they begin working with other heavy equipment later in their training and career. All practice sessions and performance tasks must be completed under your direct supervision.

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**Classroom Equipment and Materials**

- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- Heavy Equipment Operations Level Three PowerPoint® Presentation Slides
- DVD player
- Computer
- An operator's manual for an excavator that includes a periodic maintenance schedule
- An operator's manual for the excavator in use

**Equipment and Materials for Laboratories and Performance Testing**

- Standard eye protection
- Work gloves
- Proper footwear as designated by the instructor or training facility provider
- Hearing protection as designated by the instructor or training facility provider
- Hard hats
- A functional track-mounted hydraulic excavator
- A suitable facility at which to drive the excavator and practice basic work activities
- A suitable area on which to perform excavator operations
- A method of two-way communications with hands-free characteristics
- The following fluids and materials for the excavator in use:
  - Fuel
  - Engine oil
  - Transmission fluid
  - Hydraulic fluid
  - Water
  - Lubricating grease and grease guns
- Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of an excavator
- Rags
- Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


There are a number of online resources, including video, available for trainees who would like more information on excavators and their operation. A search for additional information may be assigned as homework to interested trainees.

Instructors should view any videos before using them, to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the Internet, make personal videos, and take still pictures related to excavators and heavy equipment operation and add them to the PowerPoint® presentations throughout the program.
The Lesson Plan for this module is divided into fourteen 2.5-hour sessions. This time includes 10 minutes for administrative tasks, and a 10-minute break per session.

Due to the often-limited access to heavy equipment, it is suggested that the text of this module be presented in its entirety in the classroom environment before demonstrations and hands-on practice begins. Once the text has been presented, the practical instruction, demonstrations, and trainee practice using a functional grader or dozer can be done continuously without interruption. As a result, Sessions One through Nine are designed exclusively for the classroom environment, while Sessions Ten through Thirteen include demonstrations, practice, and the execution of performance tasks.

**SESSION ONE**

Session One begins with a discussion of the common types of excavators. It continues with coverage of the various uses of excavators.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get trainees engaged and give them an idea of what they will learn in this module.
3. Identify the two basic types of excavators, hydraulic excavators and telescoping-boom excavators, and discuss variations of each type.
4. Describe common excavator uses, including general excavation and trenching; ditch cutting, shaping, and cleaning; side sloping; finish grading; placing riprap; ripping pavement; lifting; demolition; and scrap handling.

**SESSION THREE**

Session Three describes the numerous buckets and attachments that can be used on an excavator.

1. Show the Session Three PowerPoint® presentation.
2. Describe various types of buckets that are commonly used on excavators.
3. Describe various types of attachments that are commonly used on excavators.

**SESSION FOUR**

Session Four covers safety guidelines that apply to excavators. Coverage of safety guidelines for operators, co-workers, the public, and the equipment is provided. Additional coverage related to working around overhead power lines and underground utilities is provided.

1. Show the Session Four PowerPoint® presentation.
2. Discuss guidelines that apply to operator safety.
3. Discuss guidelines that apply to the safety of co-workers and the public.
4. Discuss guidelines that apply to the safety of the equipment.
5. Discuss guidelines that apply to working around overhead power lines and underground utilities.
### Session Five

Session Five deals with inspection and maintenance procedures for an excavator. Specific procedures and locations involved in prestart inspections are covered in detail. In addition, preventive maintenance requirements are discussed.

1. Show the Session Five PowerPoint® presentation.
2. Discuss items that must be inspected prior to the startup of an excavator.
3. Identify and describe fluids that must be checked and topped off prior to startup.
4. Discuss preventive maintenance requirements for an excavator.

### Session Six

Session Six covers basic startup, warm-up, and shutdown procedures that apply to hydraulic excavators.

1. Show the Session Six PowerPoint® presentation.
2. Discuss steps that should be followed during the startup of a hydraulic excavator.
3. Discuss guidelines that apply to the proper warm-up of a hydraulic excavator.
4. Discuss steps that should be followed during the shutdown of a hydraulic excavator.

### Session Seven

Session Seven covers basic operations that apply to hydraulic excavators, including excavator movement, boom and bucket movement, and operating on unstable ground.

1. Show the Session Seven PowerPoint® presentation.
2. Describe basic maneuvers and operations for a hydraulic excavator.

### Session Eight

Session Eight covers common work activities that apply to hydraulic excavators.

1. Show the Session Eight PowerPoint® presentation.
2. Describe steps involved in general excavation and loading with a hydraulic excavator.
3. Describe steps involved in excavating a foundation, loading trucks, and lifting objects with a hydraulic excavator.
4. Describe steps involved in trenching and laying pipe, placing bedding material, and setting pipe with a hydraulic excavator.
5. Describe steps involved with working in unstable soils with a hydraulic excavator.

### Session Nine

Session Nine focuses on special attachments and activities that apply to hydraulic excavators.

1. Show the Session Nine PowerPoint® presentation.
2. Describe steps involved in demolition work, blading, and digging with the shovel on a hydraulic excavator.
3. Describe steps involved in materials handling with a hydraulic excavator.
4. Describe steps involved in setting up and calibrating a laser guidance system, and with transporting a hydraulic excavator.
SESSIONS TEN THROUGH THIRTEEN

Sessions Ten through Thirteen are set aside for lab work needed to satisfy module performance tasks. The labs include performing a prestart inspection and routine maintenance on an excavator; starting up, warming up, and shutting down an excavator; performing basic maneuvers with an excavator; and excavating an area to given specifications using an excavator. You can allocate lab time for these activities based on class size and available facilities.

1. Have the trainees perform a prestart inspection of an excavator.
2. Have the trainees perform routine preventive maintenance on an excavator.
3. Have the trainees perform a proper startup, warm-up, and shutdown on a hydraulic excavator.
4. Have the trainees perform basic maneuvers with a hydraulic excavator, including moving forward, moving backward, making a pivot turn, and making a spot turn.
5. Have the trainees demonstrate basic excavator operation by creating a 10 feet by 10 feet (3 meter by 3 meter) excavation at least 3 feet (1 meter) deep to grade.

SESSION FOURTEEN

Session Fourteen is a review and testing session. Have trainees complete the Module Review Questions. Alternatively, these may be assigned as homework at the end of Session Thirteen. Go over the Module Review Questions in class prior to the exam and answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed during this session as well.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
## Equipment and Materials

<table>
<thead>
<tr>
<th>Personal protective equipment:</th>
<th>A functional track-mounted hydraulic excavator</th>
<th>The following fluids and materials for the excavator in use:</th>
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<tbody>
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<td>A suitable facility at which to drive the excavator and practice basic work activities</td>
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To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module Seven (22305-13) identifies and describes the common uses and types of motor graders. Safety guidelines, prestart inspection procedures, and preventive maintenance requirements are presented. Basic startup and operation are described, and common work activities associated with motor graders are covered.

**Objectives**

**Learning Objective 1**
- Identify and describe uses and components of a motor grader.
  - Identify and describe common uses and types of motor graders.
  - Identify and describe major parts of a motor grader.
  - Identify and describe motor grader instrumentation.
  - Identify and describe motor grader controls.
  - Identify and describe common motor grader attachments.

**Learning Objective 2**
- Identify and describe safety, inspection, and service guidelines associated with a motor grader.
  - Describe guidelines associated with motor grader safety.
  - Describe prestart inspection procedures.
  - Describe preventive maintenance requirements.

**Learning Objective 3**
- Describe basic startup and operating procedures for a motor grader.
  - Describe startup, warm-up, and shutdown procedures.
  - Describe basic maneuvers and operations.
  - Describe common work activities.

**Performance Tasks**

**Performance Task 1** (Learning Objective 2)
- Demonstrate a proper prestart inspection and maintenance on a motor grader.

**Performance Task 2** (Learning Objective 3)
- Perform proper startup, warm-up, and shutdown procedures.

**Performance Task 3** (Learning Objective 3)
- Perform basic maneuvers on a motor grader, including moving forward, moving backward, and turning.

**Performance Task 4** (Learning Objective 3)
- Demonstrate basic motor grader operation by:
  - Grading a rough grade by following grade stakes placed along a 300-foot (91-meter) section that is at least double the width of the machine.
  - Demonstrating rotation of the blade for high-bank grading.
  - Cutting a V-ditch with a 3-to-1 slope.

**Teaching Time: 40 hours**
(Sixteen 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

**Prerequisites**
*Core Curriculum; Heavy Equipment Operations Level One; Heavy Equipment Operations Level Two.*

**Before You Begin**
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from [www.nccerirc.com](http://www.nccerirc.com). The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.
Safety Considerations

This module requires that trainees work with and in the vicinity of motor graders and other types of heavy equipment commonly found on construction sites. Safe working habits in the vicinity of heavy equipment must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE and follow all safe heavy equipment operating procedures. Any deficiencies must be corrected to ensure future trainee safety as they begin working with other heavy equipment later in their training and career. All practice sessions and performance tasks must be completed under your direct supervision.

Classroom Equipment and Materials

- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- Heavy Equipment Operations Level Three PowerPoint® Presentation Slides
- DVD player
- Computer
- Toy grader with moveable blade
- Sand
- Container in which sand can be spread
- An operator’s manual for the motor grader in use

Equipment and Materials for Laboratories and Performance Testing

- Standard eye protection
- Work gloves
- Proper footwear as designated by the instructor or training facility provider
- Hearing protection as designated by the instructor or training facility provider
- Hard hats
- A functional motor grader
- A suitable facility at which to drive the motor grader and practice basic work activities
- A suitable area on which to perform motor grader operations
- A method of two-way communications with hands-free characteristics
- The following fluids and materials for the motor grader in use:
  - Fuel
  - Engine oil
  - Transmission fluid
  - Hydraulic fluid
  - Water
  - Lubricating grease and grease guns
  - Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of a motor grader
  - Rags

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


There are a number of online resources, including video, available for trainees who would like more information on motor graders and their operation. A search for additional information may be assigned as homework to interested trainees.

Instructors should view any videos before using them to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the Internet, make personal videos, and take still pictures related to motor graders and heavy equipment operation and add them to the PowerPoint® presentations throughout the program.
Session Outline for 22305-14

MOTOR GRADERS

The Lesson Plan for this module is divided into sixteen 2.5-hour sessions. This time includes 10 minutes for administrative tasks, and a 10-minute break per session.

Due to the often-limited access to heavy equipment, it is suggested that the text of this module be presented in its entirety in the classroom environment before demonstrations and hands-on practice begins. Once the text has been presented, the practical instruction, demonstrations, and trainee practice using a functional grader or dozer can be done continuously without interruption. As a result, Sessions One through Nine are designed exclusively for the classroom environment, while Sessions Ten through Fifteen include demonstrations, practice, and the execution of performance tasks.

**SESSION ONE**

Session One begins with a discussion of the various uses of motor graders. It continues with coverage of the common types of motor graders and how they differ in functionality and use.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get trainees engaged and give them an idea of what they will learn in this module.
3. Discuss motor grader uses, including rough grading, windrowing and mixing, spreading new material, finish grading, ditch cutting and cleaning, and snow plowing.
4. Describe common configurations of motor graders, including rigid-frame motor graders and articulated-frame motor graders.

**SESSION THREE**

Session Three covers the instrumentation and controls found in the operator’s cab of a motor grader. It includes information about gauges, sensors, and alert indicators as well as vehicle movement controls and blade controls.

1. Show the Session Three PowerPoint® presentation.
2. Describe the gauges and indicators on a motor grader.
3. Discuss the alert indicators on a motor grader.
4. Talk about different types of vehicle movement controls on a motor grader.
5. Discuss the blade controls on a motor grader.

**SESSION FOUR**

Session Four deals with special types of motor grader blades and common attachments. Information about automated guidance systems for motor graders is also included.

1. Show the Session Four PowerPoint® presentation.
2. Describe snow plow blades, serrated blades, and straight blades.
3. Describe scarifier and ripper attachments.
4. Discuss the use of laser leveling systems and Global Positioning Systems (GPS) with motor graders.
Session Five covers safety guidelines that apply to motor graders. Coverage of safety guidelines for operators, co-workers, the public, and the equipment is provided.

1. Show the Session Five PowerPoint® presentation.
2. Discuss guidelines that apply to operator safety.
3. Discuss guidelines that apply to the safety of co-workers and the public.
4. Discuss guidelines that apply to the safety of the equipment.

Session Six deals with inspection and maintenance procedures for a motor grader. Specific procedures and locations involved in prestart inspections are covered in detail. In addition, preventive maintenance requirements are discussed.

1. Show the Session Six PowerPoint® presentation.
2. Discuss items that must be inspected prior to the startup of a motor grader.
3. Identify and describe fluids that must be checked and topped off prior to startup.
4. Discuss preventive maintenance requirements for a motor grader.

Session Seven covers basic startup, warm-up, and shutdown procedures that apply to motor graders.

1. Show the Session Seven PowerPoint® presentation.
2. Discuss steps that should be followed during the startup of a motor grader.
3. Discuss guidelines that apply to the proper warm-up of a motor grader.
4. Discuss steps that should be followed during the shutdown of a motor grader.

Session Eight covers the basic maneuvering and operation of a motor grader. Basic requirements for effective operation are described, followed by guidelines on how to safely maneuver a motor grader and operate the blade. Information about the need for laser leveling system calibration is also covered.

1. Show the Session Eight PowerPoint® presentation.
2. Discuss basic steps for effective motor grader operation.
3. Describe how to use a motor grader’s controls to move forward, move backward, and steer and turn the grader.
4. Describe how to control and position a motor grader’s blade.
5. Discuss the need for laser leveling system calibration before a motor grader is used.

Session Nine covers common work activities that apply to motor graders.

1. Show the Session Nine PowerPoint® presentation.
2. Discuss steps involved in windrowing, spreading, and blending material with a motor grader.
3. Discuss steps involved in ditching, ripping, and scarifying material with a motor grader.
4. Discuss steps involved in various types of grading jobs.
5. Discuss steps involved in snow plowing and roading a motor grader.
Sessions Ten through Fifteen are set aside for lab work needed to satisfy the module performance tasks. The labs include performing a prestart inspection and routine maintenance on a motor grader; starting up, warming up, and shutting down a motor grader; performing basic motor grader maneuvers; performing rough grading procedures; demonstrating how to rotate the blade for different task positions and angles; and cutting a V-ditch. You can allocate lab time for these activities based on class size and available facilities. One approach might be to have some trainees performing prestart inspections while others are performing routine maintenance.

1. Have the trainees perform a proper prestart inspection of the motor grader.
2. Have the trainees perform routine preventive maintenance on the motor grader.
3. Have the trainees perform a proper startup, warm-up, and shutdown of the motor grader.
4. Have the trainees perform basic maneuvers on the motor grader, including moving forward, moving backward, and turning.
5. Have the trainees perform rough grading by following grade stakes placed along a 300-foot (91-meter) section that are at least double the width of the machine.
6. Have the trainees demonstrate how to rotate the blade for a minimum of three different task positions and angles and cut a V-ditch with a 3-to-1 slope.

Session Sixteen is a review and testing session. Have trainees complete the Module Review Questions. Alternatively, these may be assigned as homework at the end of Session Fifteen. Go over the Module Review Questions in class prior to the exam and answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed during this session as well.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
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To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.