



## DEPARTMENT OF HUMAN RESOURCES

### **Study Guide** Heavy Equipment Operator Written Examination

- This booklet contains SAMPLE QUESTIONS ONLY. Studying this booklet will not necessarily improve your exam score.

JULY 2018

## **PURPOSE AND CONTENT OF THIS EXAM PREPARATION GUIDE**

This guide was developed to help you prepare to take the written exam for Heavy Equipment Operator. It contains general exam-taking advice and also provides specific information related to the exam content. This information includes the subject areas covered by the exam, the kinds of questions to expect, strategies for approaching the questions, and sample questions. Though this information cannot guarantee a higher exam score, it can give you direction for your exam preparation that will assist you in doing your best.

### **PREPARING TO TAKE THE EXAM**

#### **Before the Day of the Exam**

- Review this guide to get familiar with the content of the exam. Knowing about the topics and kinds of questions that will be in the exam will ensure that you will not be surprised by the content of the exam or the manner in which it is presented. This can improve your ability to demonstrate your job potential.
- Make sure that you know where the exam will be administered and all of the relevant details, such as where to park, where to report for the exam, and what identification is required.

#### **On the Day of the Exam**

- Make sure that you are well rested and have eaten. These things will help your concentration during the exam.
- Plan your day to allow plenty of time to get yourself prepared and get to the exam site. Allow enough time to cope with weather, traffic, parking, etc. Hurrying creates anxiety, so do not put yourself in the position of having to hurry.
- Listen carefully to all instructions from the exam administrator. Make sure that you understand the instructions and carry them out correctly. Ask questions at the proper time before the exam begins if you are unsure of any aspect of what you should do during the exam.

## GENERAL EXAM TAKING TIPS

- Use your time carefully. The time limit should provide you with more than enough time if you move through the exam steadily and do not spend too much time on any one question.
- Read the questions and answer choices carefully. Read all of the answer choices before you select an answer.
- If you come to a question that is especially difficult, skip that question and come back to it later if you have time.
- Answer every question. Scores are based on the number of correct answers. You will receive no credit if you leave an answer space blank. It is to your advantage to use your best judgment to make a choice among the answer choices provided.

## THE HEAVY EQUIPMENT OPERATOR WRITTEN EXAM

The written exam for Heavy Equipment Operator is based upon a job study that identified the most important knowledge, skills, and abilities required to perform the job successfully. These areas include:

- your knowledge of basic workplace safety practices.
- your ability to interpret street maps and directions.
- your knowledge of concepts related to the performance of outdoor maintenance activities.
- your knowledge of the operation and maintenance of heavy equipment.

All of the exam questions are presented in a multiple-choice format. Each question is identified by a question number that is followed by a question statement. After the question statement, there are between two and four answer choices. You should read all of the answer choices and then choose the best answer. **Each question has only one correct answer.**

## EXAM SECTION 1: BASIC SAFETY

This exam section contains eighteen (18) questions related to performing physical tasks and responding appropriately to safety concerns. An effective strategy for answering questions in this section is to create a picture in your mind of the situation described in each question and its response choices. This should help you to clarify what types of hazards might be associated with the situation and how they are affected by the different choices.

Examples of these types of questions are shown below. The sample questions are followed by brief explanations of the correct answers.

1. Which of the following is best for extinguishing a diesel or gasoline fuel fire?
  - A. Sand.
  - B. Water.
  - C. A foam fire extinguisher.
  - D. A soda acid fire extinguisher.

**Answer:** The correct answer to sample question #1 is response choice "C". A foam fire extinguisher is by far the best thing to use on a burning petroleum-based fire. Sand is more effectively used to suffocate fires fueled by burning metals, such as magnesium. Water is not recommended because a stream of water can cause a diesel or gasoline fire to spread. Both materials are lighter than water and will, therefore, float on top of water. A soda acid fire extinguisher is not recommended because its extinguishing agent is water which is propelled by carbon dioxide, created by a chemical reaction.

2. The safest way to remove a tick that is attached to your skin is to:
  - A. coat the tick with petroleum jelly.
  - B. burn the tick with the flame from a match.
  - C. scrape the tick off with a flat surface such as a credit card.
  - D. grasp the tick with tweezers as close to the skin as possible.

**Answer:** The correct answer to sample question #2 is response choice "D". A common hazard associated with working outdoors is insect bites and stings. Therefore, it is important to know how to properly treat bites or stings from different types of insects. A tick embeds its head under the skin and must be promptly and

carefully removed. The recommended technique is to use tweezers to pull the tick out. The other response choices pose the risk of additional injury by leaving the tick in place too long or breaking the head off under the skin. Methods for treating insect bites and stings are described in materials provided online by the Occupational Health and Safety Administration (OSHA) and the Centers for Disease Control (CDC).

3. Which of the following is the most important reason for a rule that requires the reporting of all accidents at work?
  - A. This is the best way to identify and document who was responsible.
  - B. This discourages workers from claiming that they were injured at work when it is not true.
  - C. This enables the City to report required accident statistics to state and federal safety organizations.
  - D. This ensures that the causes of accidents are identified so that they can be eliminated from the workplace.

**Answer:** The correct answer to sample question #3 is response choice "D". Making the workplace safer for employees is always the primary purpose of safety rules and policies. Assigning blame, discouraging dishonest employee behavior, or satisfying government reporting mandates do not directly contribute to protecting employees from accidents that could have been prevented.

## **EXAM SECTION 2: FOLLOWING STREET MAPS AND DIRECTIONS**

This exam section contains fifteen (15) questions that evaluate your understanding of basic directions such as north, south, east, and west, and how to best move from one destination to another. Some questions will provide written descriptions and ask you to make decisions based upon them. Other questions will involve looking at a map to determine how to arrive at a certain destination.

Here are some suggested strategies for approaching these types of questions:

- Double check your accuracy when instructed to make a left or right turn. How often have you heard someone say "your other left" or "your other right" when someone has made a mistake in this area? Although we all know our left from our right, it is fairly common to make a mistake when our minds are focused on other parts of the directions.

- When referring to a map or diagram, first make sure that you understand the orientation of the picture, such as which direction is north or what is considered the "top" of the picture. Make sure that you understand the starting direction (north, south, east, or west) and the direction of travel. Then create an image in your mind. It is much easier to avoid mistakes when you have a visual image.
- When you are asked to determine the best travel route, consider anything that might make travel more difficult or less direct, such as backtracking or making many stops or turns.

Examples of the types of questions in this exam section are shown below. The sample questions are followed by brief explanations of the correct answers.

4. If you were traveling south and made a right-hand turn, in which direction would you then be traveling?
- A. East.  
B. West.

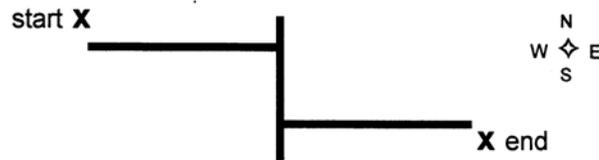
**Answer:** The correct answer to sample question #4 is response choice "B". To correctly answer the question, you must understand the relative positioning of north, south, east, and west. This positioning is best depicted by the classic "compass rose" shown below:



Based on this representation of the four directions, it can be seen that if you were traveling south and turned right (clockwise), you would then be traveling west, which is answer choice "B".

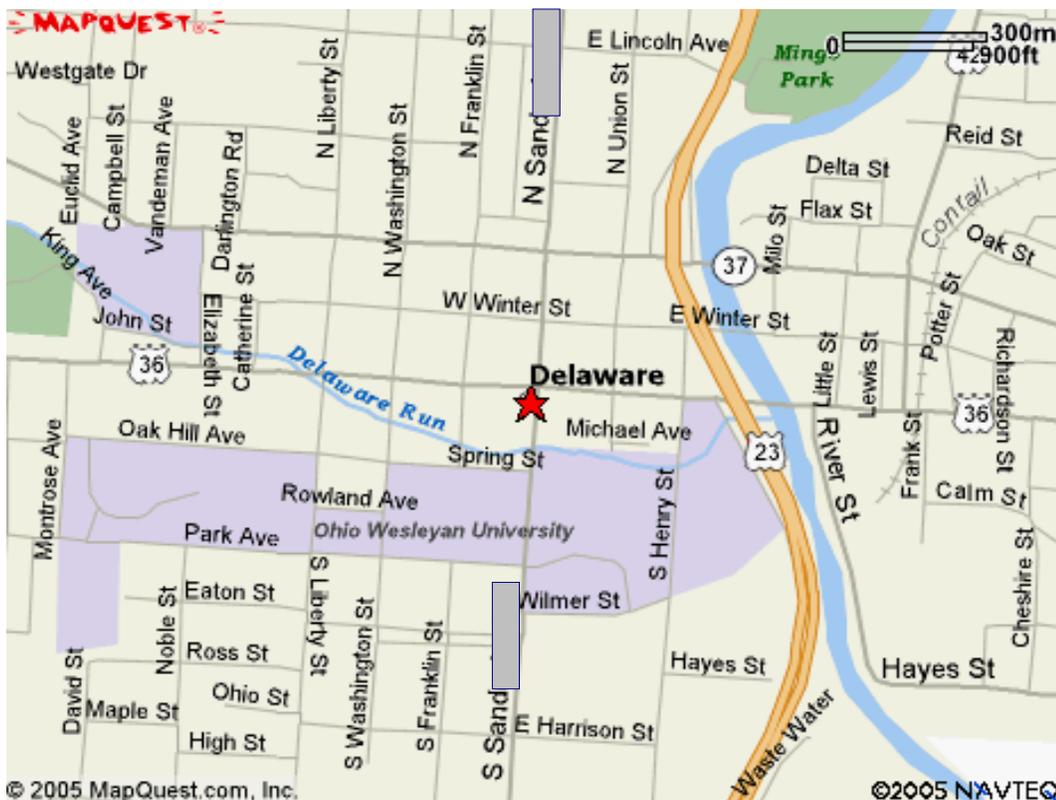
5. A man walks 5 blocks east. Then he turns to the right and walks 4 blocks. Then he turns to the left, walks 5 more blocks and is at his destination. In which direction is he now from his starting point?
- A. South.  
B. Northeast.  
C. Southeast.  
D. Southwest.

**Answer:** The correct answer to sample question #5 is response choice "C". To answer this question, it is helpful to create a mental picture of what is described. In this case, that image would look something like the diagram below.



After traveling east, a right turn results in the man walking in a southerly direction. When he turns left at the end of 4 blocks, he is again traveling east. When depicted in the image, it is clear that the man's destination is southeast of his starting point.

Use the map below to answer the question that follows.



6. You are on the corner of Lewis Street and E. Winter Street. Which of the following is the most direct route to the corner of Montrose Avenue and Park Avenue?
- A. West on Delaware and south on Montrose Ave.
  - B. West on E. Winter Street, south on Liberty Street, and west on Park Ave.
  - C. East on E. Winter Street, south on N. Washington Street, and west on Park Ave.
  - D. South on Lewis Street, west on Delaware, south on Liberty Street, and west on Park Ave.

**Answer:** The correct answer to sample question #6 is response choice "B". To answer this question, you should visually follow the route suggested by each response choice. You might even find that pointing in a tracing motion with your pencil will help you focus more clearly on the route. The route indicated by response choice "B" is the one that accurately follows the map with the fewest turns and least distance traveled, making choice "B" the correct answer to the question.

### **EXAM SECTION 3: OUTDOOR MAINTENANCE**

This exam section contains sixteen (16) questions that evaluate your knowledge of basic tools and their use as well as other concepts related to performance of outdoor maintenance tasks. The best strategy for approaching questions in this area is to read each question and all of the response choices. Then re-read the question to make sure that you understand precisely what is being asked. Now create a visual image of the situation presented and how each response choice affects it. You can then eliminate the least reasonable options and select the one best answer.

Other questions in this section ask about the content of a reading passage and they assess your skill in understanding, interpreting, and applying information provided in written form. A good strategy to use for these types of questions is to read through the entire passage, then read each question, and finally refer back to the passage as you select an answer choice. When reading each question, give careful consideration to the words used. For example, does the question ask you to identify what is most important, the largest, the newest, or the extreme of some other attribute? Does it ask for a reason, a result, or a cause?

Examples of the types of questions in this exam section are shown below. The sample questions are followed by brief explanations of the correct answers.

7. The maintenance of power tools includes keeping them clean, which is best achieved by:
- A. wiping them with a solvent-soaked cloth.
  - B. wiping them with a water-dampened cloth or sponge.
  - C. dipping them quickly into warm water and then wiping them thoroughly with a dry clean cloth.
  - D. spraying them with a solvent, waiting a few minutes, and then wiping them dry with a clean cloth.

**Answer:** The correct answer to sample question #7 is response choice "B", using a water-dampened cloth or sponge. The application of a solvent by either wiping or spraying it on would damage some tool surfaces. And because of their electric motors and wiring, power tools should never be immersed in water.

8. A section of the lawn in a park is to be fertilized. The area to be fertilized is a 200 feet wide and 900 feet long and a bag of fertilizer will cover 1,000 square yards. How many bags of fertilizer will it take to do this job?
- A. 20.
  - B. 60.
  - C. 120.
  - D. 180.

**Answer:** The correct answer to sample question #8 is response choice "A". The area is 180,000 square feet (200 feet x 900 feet = 180,000). Note that the coverage of a bag of fertilizer is reported in square yards. So the square feet to be covered can be converted to square yards by dividing by 9 (1 square yard = 9 square feet). That makes the area to be fertilized 20,000 square yards (180,000 square feet ) 9 = 20,000 square yards). Since one bag will cover 1,000 square yards, it will take 20 bags of fertilizer (20,000 ) 1,000 = 20).

Note that the coverage by a bag of fertilizer could have been converted to square feet to correspond to the 180,000 square foot lawn. This is done by multiplying 1,000 square yards by 9 (1 square yard = 9 square feet. That makes the coverage by one bag 9,000 square feet (1,000 x 9 = 9,000). Of course, the result is the same: 180,000 ) 9,000 = 20 bags of fertilizer.

**Use the following information to answer the question that follows.**

### **Manufacture and Composition of Cement**

Imperfect cement usually is the result of defective manufacture, not faulty composition. Even cement made from very finely ground materials will work well if it is thoroughly mixed and contains more than the usual quantity of lime. Cement with low levels of lime may be unsound due to haphazard manufacture.

9. According to the paragraph above, what is often the cause of poor quality cement?
- A. High lime content.
  - B. Faulty composition.
  - C. Flawed manufacture.
  - D. Very finely ground materials.

**Answer:** The correct answer to sample question #9 is response choice "C". The question asks about the cause of poor quality cement. While all of the response choices include some language contained in the reading passage, only choice "C" is the reason given for substandard cement. The first sentence of the paragraph states that "Imperfect cement usually is the result of defective manufacture, not faulty composition."

With these types of questions, it is important that you select your answer based solely on the information provided. These exam questions are designed to assess your ability to correctly interpret what is provided, not to assess your knowledge of the subject area addressed by the reading passage.

## **EXAM SECTION 4: HEAVY EQUIPMENT OPERATION AND MAINTENANCE**

This exam section contains sixteen (16) questions designed to assess your knowledge of the operation and maintenance of heavy equipment. Question content includes concepts related to appropriate equipment selection, operation, and techniques for achieving specific outcomes. Other questions ask about heavy equipment maintenance activities and some questions require basic computations related to equipment care and use.

Depending on your current knowledge and experience, an effective strategy for doing your best on this exam section would be to review some references on these topics prior to taking the exam. Then, when taking the exam, carefully read each question and make sure you know exactly what is being asked. With a clear

understanding of the question, you then should be better able to draw upon your knowledge of these topics and thoughtfully consider the response choices. For questions that require computations, remember that the most common mistakes include approaching the calculation incorrectly and making simple arithmetic errors. Therefore, a good strategy is to take time to be sure that you understand exactly what you are supposed to compute. Then consider whether your calculation plan correctly takes all information into account, carefully perform each step, and check your work. It is always important to check your work for a careless mistake. For example, be sure that you have put a decimal point in the correct place.

Examples of the types of questions in this exam section are shown below. The sample questions are followed by brief explanations of the correct answers.

10. The primary use that is made of a sheepfoot roller (or tamping roller) is to:
- A. compact soil.
  - B. grade slopes.
  - C. rip up pavement.
  - D. smooth new asphalt.

**Answer:** The correct answer to sample question #10 is response choice "A". These rollers are compacting machines that are usually used on new earthwork fills, including the laying of foundations and at road and dam construction sites. They would not be particularly effective for grading slopes, ripping up pavement, or producing a smooth asphalt surface.

11. The combustion quality of diesel fuel is measured and reported as:
- A. octane.
  - B. cetane.
  - C. detonation.
  - D. ash content.

**Answer:** The correct answer to sample question #11 is response choice "B". This question requires recognition of the term used to refer to the combustion speed of diesel fuel. Also referred to as CN, for cetane number, the cetane rating is the inverse of the octane rating for gasoline, since octane is a measure of the ignition stability of gasoline.

12. Which of the following is the best technique when using a backhoe to dig in hard ground?
- A. Use the cutting edge of the bucket like a large pickaxe to loosen the soil.
  - B. Position the bucket at a flatter than usual angle of entry and make long scraping passes.
  - C. Position the bucket so that the teeth make nearly vertical contact with the ground and make short "biting" passes.
  - D. Set up the equipment on a tilt so that one corner of the bucket penetrates first on each pass, concentrating the bucket's power.

**Answer:** The correct answer to sample question #12 is response choice "B". Decreasing the angle of bucket entry into the soil is the recommended approach. Use of a backhoe to pound the hard ground like a pickaxe or to make biting passes would be ineffective as well as potentially damaging to the equipment. At the very least, such "hammering" contact may cause premature wear to the backhoe pins and bushings. Of course, the operation of the backhoe on a tilt is unsafe.

13. The fuel tank of a piece of equipment has a capacity of 90 gallons. It will run for 12 hours on a full tank. If the fuel gauge shows that one-quarter of the tank has been consumed, how much longer can the equipment be operated before it runs out of fuel?
- A. 3.0 hours.
  - B. 5.0 hours.
  - C. 7.0 hours.
  - D. 9.0 hours.

**Answer:** The correct answer to sample question #13 is response choice "D". If one-quarter of the fuel capacity has been consumed, then three-quarters remain ( $1 - .25 = .75$ ) Therefore, three-quarters of a full tank's 12-hour work time remains, or  $12 \times .75 = 9.0$  hours.

### ADDITIONAL ASSISTANCE

If you feel that you would benefit from more practice, your local library or relevant Internet web sites should have reference materials that can be helpful. This is true for all of the subject areas covered by the Heavy Equipment Operator written exam.