SkillsUSA

Career Essentials: *Assessments*

# Career Essentials: Assessments

## Teacher Preparation Guide For Use with the Career Essentials: Assessments

*Discover, Develop and Validate Students' Knowledge and Skill*

***POWER EQUIPMENT TECHNOLOGY ASSESSMENT***

# Introduction to the Career Essentials: Assessments

The Career Essentials: Assessments can help both students and teachers discover students' occupational strengths. By implementing the Career Essentials: Assessments, students and teachers can collaboratively develop a life-long learning plan to validate and enhance students' skills and knowledge. Assessment data results are beneficial for students, teachers and administrators in validating student learning, and improving programs and their accountability.

This teacher preparation guide is a tool developed for instructors to help students capitalize on their unique strengths, which can improve individual student performance and provide a clear way forward for student success.

The Career Essentials: Assessments Teacher Preparation Guide provides an easy-to-follow road map to implement the Career Essentials: Assessments. The guide is not meant to be curriculum nor should it replace that which already exists. It provides specific information regarding the Career Essentials: Assessments so teachers can identify existing curriculum areas that may need additional emphasis.

The guide ultimately helps teachers provide students with learning opportunities. Its goal is for students to become comfortable and successful with the Career Essentials: Assessments.

Inside the guide, teachers will find:

- Major content areas of the assessment
- A blueprint of the assessment competency areas
- A checklist of the various competency areas within the assessment
- Access to a trade- or technical-specific online 10-question demo assessment
- Resources used for the assessment development
- Access to an employability skills based, online 10-question practice assessment to help students navigate the assessment system

**Table of Contents**

**What are Career Essentials: Assessments?**
Career Essentials: Assessments are online assessments that evaluate technical and employability skills and knowledge. They are the way ahead for the next generation of our American workforce, and they help candidates validate their technical skills and knowledge to potential employers. They also help local instructors demonstrate the value of their programs, while supporting local industries with a pool of potential employees that has been tested by a system they can trust.

Each assessment was developed by a panel of industry, high school and college/postsecondary subject matter experts (SMEs) using national technical standards. Career Essentials: Assessments were created by industry to ensure relevance to entry-level skills, meet Perkins IV accountability requirements and provide certificates to students who achieve industry-defined scores. They ensure your students are workforce ready.

Career Essentials: Assessments incorporate photographs, videos, animations and illustrations to ensure clarity for each technical question. Drag-and-drop and multiple-choice questions appeal to visual and kinesthetic learners and test content knowledge rather than test-taking abilities. Even simple multiple-choice questions are brought to life through pictures and animations.

Assessments are available in more than 40 trade, industrial and technical areas. A rigorous and educationally sound process captures critical competencies, standards and criteria as defined by industry.

Academic core and critical skill areas also exist in each assessment. State-level academic curriculum specialists identified connections to national academic standards.

Each one-hour assessment includes 50 questions. Under the supervision of a proctor, the integrity of each test is ensured by offering multiple unique versions of the assessment, which measure the same core and critical competencies. Even within the same version, questions and answers are displayed in varying orders to prevent test takers from copying others. The Career Essentials: Assessments are designed to be user-friendly and intuitive for students.

**For complete information regarding the Career Essentials: Assessments and to see all assessment areas, please visit the website at:**
***www.careeressentials.org/assessments .***

**Using the Career Essentials: Assessments**
Every classroom is unique. You can use the Career Essentials: Assessments in a way that best suits your program and students. The following directions are SkillsUSA's suggested and preferred method to implement the assessments so that your students gain the most from the results.

The most important step in the Career Essentials: Assessments process is to select the correct assessment for your students. You are key to the selection process. Without your involvement, the wrong assessment may be selected. Assessment titles do not provide enough information for proper selection. Review the various assessment categories that best correspond to your program.

Next, look at each of the assessment titles within the category and the corresponding blueprint. The blueprint will tell you which competencies and subjects are addressed in the assessment.

Cross-walk the various blueprints with your classroom curriculum. The assessment blueprint will show what's emphasized and how competencies are weighed. Please remember the Career Essentials: Assessments are based on national industry standards, so the assessment may not perfectly align with the existing curriculum. Content may need to be added or emphasized to better prepare students for the Career Essentials: Assessments.

Once you have selected the assessment that best fits your program, administer that Career Essentials: Assessments at the beginning of your students' final program year. This could be considered a pre-test.

Assessment results are available as soon as your student completes the assessment. The report provides you with a gap analysis to identify your students' learning needs according to each competency area within the assessment. Dynamic reports compare your students' performance to the current state and national averages. Reports also enable you to track a student's progress on an individual basis. The assessment pre-testing results provide you with a benchmark for your students and identify student learning gaps. This data may help you adjust your own curriculum and identify areas that may need more or less emphasis. The data can be shared with students so everyone can focus on learning areas that need improvement during the school year.

Then, at the end of the school year or program semester, administer your specific Career Essentials: Assessments a second time as a post-test.

Use post-test data to improve or adjust curriculum once again for your next program year. This way, curriculum adjustments are made using the student testing data rather than arbitrarily making adjustments.

This pre- and post-test process is a "win-win" situation for the teacher and especially the student! To ensure a quality process, SkillsUSA is ready to help at any time.

**Preparing Students for the Career Essentials: Assessments**

Provide each student with a copy of their trade- or technical-specific Career Essentials: Assessments Blueprint. Do this at the beginning of your course. Review and discuss the blueprint with your class, providing insight on the assessment weighting and what is emphasized.

Have students discuss how they can assist each other to prepare for the assessment.

Place the Career Essentials: Assessments Blueprint on the classroom wall. The blueprint will help students focus on the appropriate course content areas that align with the assessment. It will also help everyone to be aware of the program's goals and expectations.

**The Career Essentials: Assessments at a Glance**

- **Select the correct assessment title. *Do not* have someone select the assessment for you, as there may be several titles that may relate to your program**
- **Review the assessment blueprint that best aligns with your existing curriculum**
- **Identify gaps in your curriculum, and use additional resources to enhance or align the curriculum**
- **Share the assessment blueprint with the students so everyone is aware of the expectation**
- **Have your students take the assessment at the beginning of their final program year as a pre-test**
- **Use pre-test data to identify learning gaps or strengths of individual students or the class**
- **Remediate the students using the data analysis from pre-test to enhance, emphasize and adjust learning objectives**
- **Have your students take the assessment a second time (as a post-test) at the end of the program year to determine learning gains/gaps**
- **Use post-test data to improve or adjust curriculum for your next program year**

Administer the Career Essentials: Assessments as a pre-test to identify student gaps. If possible, pre-test your students at the beginning of their final program year to identify learning gaps both individually and as a class. The data will provide an excellent "road map" to prepare students to take the assessment again (post-test) at the end of the program. Using the data, tailor the instruction to better prepare your students.

Use the Career Essentials: Assessments competency areas checksheets included in this guide to encourage class discussion and help students identify strengths and weaknesses.

Use the pre-test data to ascertain problematic learning areas. Have students identify discussion topics based on the various competency areas and their pre-test data results. Exercises, demonstrations and even questions can be developed by the students using their textbooks or other resources listed in this guide.

Assign homework that aligns to the assessment blueprint. Focus on a competency area within the assessment. Using the checksheets in this guide, have students develop questions and potential answers using the resources identified when developing the assessment. Use the questions for class discussion or "quiz bowl" activities.

Have students take the Career Essentials: Assessments trade- or technical-specific online 10-question demo assessment. This could be a homework assignment or done in class 30 days prior to taking the assessment the second time (as a post-test). This not only will provide students with specific sample questions and potential answers, but it will also allow students to experience the online system again and become more familiar with the types of questions they may encounter when taking the actual assessment.

Following the demo assessment, discuss the experience students had. What question(s) did they not understand? Did they have difficulty navigating the online system? This experience will help students be more comfortable and confident when taking the final assessment.

Discuss as a class or individually with students which question(s) were difficult. Facilitate a discussion to glean more information regarding why certain answers were wrong. Offer techniques students can use to better determine correct answers.

**Workplace-Ready Skills**

Through the Career Essentials: Assessments, you have the option for your students take an Employability Assessment. This assessment tests a student's workplace-ready skills such as communication, teamwork, time management and more. It can be used for any student in any occupational area as a practice test or a separate assessment.

If you use the Employability Assessment as a practice test have students take it in class. Not only can the Employability Assessment help students become familiar with the navigational tools of the assessment system, but it can also measure and make your students aware of another important skill set. It may also help them become comfortable in the testing environment.

See the Career Essentials: Assessments website for more information: *www.careeressentials.org/assessments*

The Employability Assessment is *not* intended to familiarize students with the Power Equip-

**Please note: For all Career Essentials: Assessments to be valid, instructors cannot be present in the room where their students will be taking the test. A proctor is required. Proctors can be other instructors, a school administrator or school counselor.**

ment Technology assessment content.

**Assessment Competency Areas**
Career Essentials: Assessments Power Equipment Technology Assessment covers 13 major technical competency areas (unit areas). In the online assessment, these 13 competencies are tested with 50 interactive, multiple-choice items. Each competency area has a different number of items. The chart lists the major technical competency areas and the percentage of the assessment in each one.

**Technical Competency Areas for Power Equipment Technology**

| Competency | Percentage of Area Assessment |
|---|---|
| Test and repair ignition and charging systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke) | 18% |
| Test and repair fuel systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke except 2.4 solenoids) | 8% |
| Test and repair governor systems in a shop situation to manufacturer's specifications (primarily 4 stroke) | 2% |
| Inspect and adjust starter systems in a shop situation to manufacturer's specifications (both 2 and 4 cycle) | 1% |
| Inspect and service lubricating systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke) | 4% |
| Inspect and service valves in a shop situation to manufacturer's specifications (4 stroke only) | 6% |
| Inspect and service exhaust systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke) | 0.5% |
| Test and repair engine block components in a shop situation to manufacturer's specifications (both 2 and 4 stroke) | 12% |
| Demonstrate diagnostic and failure analysis in a shop situation to manufacturer's specifications | 9% |
| Demonstrate appropriate, commonly-accepted procedures in a shop situation | 9% |
| Demonstrate appropriate, commonly-accepted business operation skills in a shop situation | 0.5% |
| Inspect and service transmission/power train components in a shop situation to manufacturer's specifications | 0.5% |
| Show understanding of general competencies required for power equipment technology | 30% |

**Academic Core and Critical Skill Areas**
Academic core and critical skill areas also exist in each assessment. The SkillsUSA national technical committee identified that the following academic skills are embedded in the Power Equipment Technology training program and assessment:

**Math Skills**
- Use proportions and ratios to solve practical problems
- Use scientific notation
- Solve practical problems involving percents
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Make predictions using knowledge of prob-

ability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Find slope of a line

**Science Skills**
- Plan and conduct a scientific investigation
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Understand Law of Conservation of Matter and Energy
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

**Language Arts Skills**
- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

**Connections to National Standards**
State-level academic curriculum specialists identified the following connections to national academic standards.

**Math Standards**
- Numbers and operations
- Measurement
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. To view high school standards, visit: *www.nctm.org/standards/content.aspx?id=16909.*

**Science Standards**
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: *www2.mcrel.org/compendium/* .

**Language Arts Standards**
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: *www.readwritethink.org/standards/index.html*.

**Student Tools:**
**Access Directions for the Trade- or Technical-Specific Online 10-Item Demo Assessment**
Have your students copy and paste this link *www.careeressentials.org/assessments/demo-our-assessments/* into their browser. The sample programmatic questions will give you and your students an idea of the types of questions on the assessment and how the questions are generally written.

**Student Tools:**
**Test-Taking Reminders**
Encourage your students to have good study habits. Below are basic reminders to better prepare students for life-long learning and workplace success. You may want to have this discussion at the beginning of the year to encourage students to incorporate these strategies.
- Develop a regular study schedule
- Identify a specific location to study
- Always take notes while studying in class or on your own
- Take short breaks during your study session
- Perform “mini-testing” to make sure you understand and comprehend the program concepts
- Join small study groups to help focus on the program content
- If you need special assistance in testing, tell your teacher or counselor so they can make accommodations.

**Student Testing Tips**
The most important tip for your students is to be prepared mentally and physically for the testing session. Make sure to tell them to get plenty of rest and eat healthy. Suggest they wear comfortable and appropriate clothing to the testing session. If they are able to bring items

to the testing session, such as a non-programmable calculator, make sure they have the items ready the night before. Have students check our website at *www.careeressentials.org/wp-content/uploads/2017/07/Permitted-Testing-Tools-Aids.pdf* for permitted tools or job aids that can be used during testing. The more organized they are before the testing period, the more relaxed they will be during the actual testing session.

Encourage your students to be relaxed and positive. If they begin to panic during the testing, suggest they take some deep breaths to relax and think positive thoughts.

Do not rush through the questions. Instruct your students to read the question and potential answers thoroughly. Tell them to make sure they know exactly what the question is asking before answering. Let them know that if they are unsure, they can mark the question and return to it. Other questions may have clues to the correct answer.

Use process of elimination. If your students are not sure of the correct answer, tell them to study the potential answers and eliminate the ones that they know are not correct.

If all else fails, tell students to *guess*. After they have exhausted all options, tell them to take their best guess at the correct answer. If they have studied the content area, they may intuitively know the correct answer. The Career Essentials: Assessments system does not penalize students for guessing and they may guess correctly!

**Student Tools:**

**Power Equipment Technology Blueprint and Competency Area Knowledge Checksheets**

The next section provides the assessment blueprint and detailed topics within each competency area covered within the Power Equipment Technology assessment. Photocopy and share the following blueprints and checksheets with your students so they can better prepare for each of the competency areas within the Power Equipment Technology assessment.

**Summary and Quick Glance Testing Reminders**

The Career Essentials: Assessments process is designed for program and curriculum improvement. This is a continuous improvement process to better meet the educational needs of your students by strategically using data results.

Advanced planning and preparation is a key component in implementing this process. Below we have attempted to summarize the steps in the suggested Career Essentials: Assessments implementation pre- and post-test process.

- Identify the correct assessment for your program
- Share the selected assessment blueprint with your students, parents, advisory board members and others. Place the blueprint on the classroom wall
- Pre-test your students at the beginning of their final programmatic year
- Use the data results to identify "learning gaps"
- Share the pre-test data with the student(s)
- Tailor learning experiences to meet student needs and supplement current curriculum
- Develop homework assignments around the competency knowledge checksheets located in this guide
- Have students take the demo 10-question practice test 30 days prior to the post-test
- For students that need more time in the actual testing environment, use the Employability Assessment to review navigational tools and to make students more comfortable in the testing lab
- Finally, review the blueprint and knowledge checksheets in totality before taking the post-test to ensure students are aware of the expectation

Using the above steps, you and your students should see improvement in the post-test assessment score report and a percentage of knowledge gained.

SkillsUSA | Career Essentials: Assessments

# Power Equipment Technology Blueprint

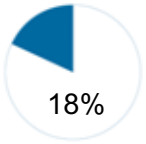
This Blueprint contains the subject matter content of this Career Essentials Assessment.

**Note**: To fully prepare for **Power Equipment Technology** SkillsUSA Championships contest, refer to the current year's SkillsUSA Championships Technical Standard, now included with your SkillsUSA Professional Membership. If you need help in accessing this benefit, contact the SkillsUSA Membership Office at 1-800-355-8422.

## Standards and Competencies

Competencies are weighted throughout the assessment. The percent shown is the weight of the competency. There are 50 questions per assessment.

**Test and repair ignition and charging systems in a shop situation to manufacturer's specifications. (both 2 and 4 stroke)**




- ∞ Describe/EXPLAIN components of an ignition system
- ∞ Properly disassemble ignition system
- ∞ Properly inspect and test ignition components
- ∞ Test performance of coil/ignition modules
- ∞ Repair and replace electronic ignition components
- ∞ Test and troubleshoot equipment-related switches and harnesses
- ∞ Test and troubleshoot stators, regulators and any related wiring harnesses

**Test and repair fuel systems in a shop situation to manufacturer's specifications. (both 2 and 4 stroke except 2.4…solenoids)**


- ∞ Explain components of a fuel system
- ∞ Inspect, service, repair, and adjust carburetors, gaseous fuel regulators, and mixers
- ∞ Inspect, clean and replace filters
- ∞ Inspect, service and repair fuel tanks, fuel pumps and solenoids
- ∞ Test equipment-related fuel tanks, lines and related systems

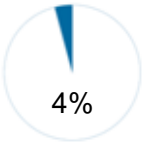
**Test and repair governor systems in a shop situation to manufacturer's specifications. (primarily 4 stroke)**


- ∞ Explain the primary types of governor systems
- ∞ Inspect, service, and reassemble governors
- ∞ Explain which governor system components cause engines to increase or decrease RPMs

**Inspect and adjust starter systems in a shop situation to manufacturer's specifications. (both 2 and 4 cycle)**


- ∞ Recognize components of a starter system
- ∞ Inspect, service, and adjust various starting systems
- ∞ Use provided wiring schematics to test and troubleshoot a starter system (primarily 4 stroke)
- ∞ Inspect and test cooling systems in a shop situation to manufacturer's specifications.

**Inspect and service lubricating systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke)**




- ∞ Explain the various styles and types of lubrication systems
- ∞ Check oil and/or fuel/oil mixture levels
- ∞ Use required tools to check oil pressurized systems
- ∞ Explain the purposes of various grades of oils
- ∞ Identify proper grade of oil in engines/equipment (need to differentiate Qs by 2 and 4 stroke)

**Inspect and service valves in a shop situation to manufacturer's specifications (4 stroke only)**


- ∞ Identify and the primary types and styles of valve train components used most commonly by manufacturers (IDENTIFY, DESCRIBE OR EXPLAIN?)
- ∞ Inspect and service valve train components
- ∞ Explain the importance of proper sealing of valve components

**Inspect and service exhaust systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke)**


- ∞ Identify the primary types of exhaust systems
- ∞ Explain how exhaust systems relate to the engine and or equipment
- ∞ Inspect and service exhaust components
- ∞ Demonstrate the procedures for testing for exhaust system compliance to EPA and/or other emission requirements/standards (edit and keep)

**Test and repair engine block components in a shop situation to manufacturer's specifications (Both 2 and 4 stroke)**


- ∞ Explain necessary service procedures needed for engine block components
- ∞ Identify needed repairs to given engine block components
- ∞ Complete service and repair procedures on engine block components. This could include disassembling the engine and inspecting and measuring crankshafts, connecting rod bearings, journals, cylinders, piston and rings. (Both 2 and 4 stroke)
- ∞ Complete repairs to correct torque of critical fasteners.
- ∞ Replace gaskets and/or seals

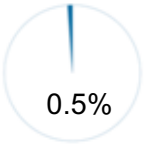
**Demonstrate diagnostic and failure analysis in a shop situation to manufacturer's specifications.**


- ∞ Demonstrate the proper use of specialized, diagnostic tools including: compression gauge, leak down testers, and voltmeters/multimeters
- ∞ Test crankcase vacuum (primarily 2 stroke)
- ∞ Test compression
- ∞ Analyze failed engine components to correctly determine the type of failure
- ∞ Determine best method to repair failed engine components

**Demonstrate appropriate, commonly-accepted procedures in a shop situation.**


- ∞ Demonstrate the proper techniques in the care and use of tools and equipment.
- ∞ Demonstrate ability to work accurately with precision instruments
- ∞ Use proper safety procedures
- ∞ Use service manuals and/or bulletins.
- ∞ Give a verbal response to a customer and/or customer-related problematic question
- ∞ Prep equipment for delivery in a given scenario

**Demonstrate appropriate, commonly-accepted business operation skills in a shop situation.**




- Look up correct part number by using paper, micro-fiche and/or electronic means
  - Prepare a shop repair ticket.
- Operate equipment within equipment manufacturer's guidelines

**Inspect and service transmission/powertrain components in a shop situation to manufacturer's specifications.**


- State the theory of transmission
- Disassemble power train components
- Assemble power train components
- Inspect, diagnose and correct a potential problem

**Show understanding of general competencies required for power equipment technology.**


- Show reading and comprehension of informational texts
- Describe basic 2 and 4 stroke theory
- Describe electrical theory
- Describe carburetion theory and other related fuel systems
- Read and follow schematics for electrical
- Communicate effectively to others in through oral and written communications
- Demonstrate basic computer skills.

## Additional Resources and Notes

Additional source material can be found on the manufacturers' Web sites, through the local central distributors, dealers or manufacturers within each state. Those manufacturers are:

- Briggs & Stratton Corp: www.briggsandstratton.com
- Kohler Engines: www.kohlerengines.com, www.kohlerplus.com
- Tecumseh Product: www.tecumsehproducts.com
- Shindiawa: www.shindiawa.com
- MTD: www.mtdproducts.com
- Simplicity: www.simplicity.com
- Miller Welders: www.millerwelds.com
- John Deere: www.johndeere.com

**Demonstrate professional development skills in a simulated customer-service or employment situation. Examples may include:**

- Job interview
- Customer service scenario
- Communications
- Decision making, problem solving and/or critical thinking

## Committee Identified Academic Skills

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the power equipment technology training program and assessment:

**Math Skills**

- Use proportions and ratios to solve practical problems
- Use scientific notation
- Solve practical problems involving percents
- Measure angles

- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Find slope of a line

**Science Skills**

- Plan and conduct a scientific investigation
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
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- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

**Language Arts Skills**

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

## Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

**Math Standards**

- Numbers and operations
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***Source:*** NCTM Principles and Standards for School Mathematics. To view high school standards, visit: http://www.nctm.org/standards/content.aspx?id=16909.

**Science Standards**

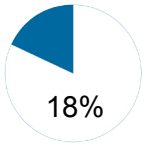
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

***Source:*** McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks/.

**Language Arts Standards**

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

***Source:*** IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.readwritethink.org/standards/index.html.



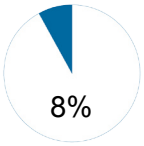

Review Dates:

## Competency Area 1: Test and repair ignition and charging systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke)

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Describe/EXPLAIN components of an ignition system? | ❒ | ❒ | ❒ |
| 2. Properly disassemble ignition system? | ❒ | ❒ | ❒ |
| 3. Properly inspect and test ignition components? | ❒ | ❒ | ❒ |
| 4. Test performance of coil/ignition modules? | ❒ | ❒ | ❒ |
| 5. Repair and replace electronic ignition components? | ❒ | ❒ | ❒ |
| 6. Test and troubleshoot equipment-related switches and harnesses? | ❒ | ❒ | ❒ |
| 7. Test and troubleshoot stators, regulators and any related wiring harnesses? | ❒ | ❒ | ❒ |

Areas I Need To Review:



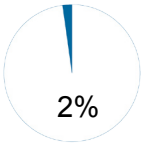

**Review Dates**

## Competency Area 2: Test and repair fuel systems in a shop situation to manufacturer's specifications. (both 2 and 4 stroke except 2.4…solenoids)

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Explain components of a fuel system? | ❒ | ❒ | ❒ |
| 2. Inspect, service, repair, and adjust carburetors, gaseous fuel regulators, and mixers? | ❒ | ❒ | ❒ |
| 3. Inspect, clean and replace filters? | ❒ | ❒ | ❒ |
| 4. Inspect, service and repair fuel tanks, fuel pumps and solenoids? | ❒ | ❒ | ❒ |
| 5. Test equipment-related fuel tanks, lines and related systems? | ❒ | ❒ | ❒ |

Areas I Need To Review:



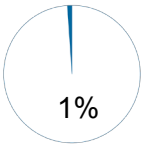

**Review Dates:**

## Competency Area 3: Test and repair governor systems in a shop situation to manufacturer's specifications. (primarily 4 stroke)

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Explain the primary types of governor systems? | ❒ | ❒ | ❒ |
| 2. Inspect, service, and reassemble governors? | ❒ | ❒ | ❒ |
| 3. Explain which governor system components cause engines to increase or decrease RPMs? | ❒ | ❒ | ❒ |

Areas I Need To Review:



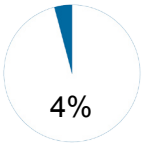

**Review Dates:**

## Competency Area 4: Inspect and adjust starter systems in a shop situation to manufacturer's specifications. (both 2 and 4 cycle)

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Recognize components of a starter system? | ❒ | ❒ | ❒ |
| 2. Inspect, service, and adjust various starting systems? | ❒ | ❒ | ❒ |
| 3. Use provided wiring schematics to test and troubleshoot a starter system? (primarily 4 stroke) | ❒ | ❒ | ❒ |
| 4. Inspect and test cooling systems in a shop situation to manufacturer's specifications? | ❒ | ❒ | ❒ |

Areas I Need To Review:



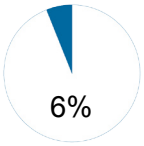

**Review Dates:**

## Competency Area 5: Inspect and service lubricating systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke)

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Explain the various styles and types of lubrication systems? | ❒ | ❒ | ❒ |
| 2. Check oil and/or fuel/oil mixture levels? | ❒ | ❒ | ❒ |
| 3. Use required tools to check oil pressurized systems? | ❒ | ❒ | ❒ |
| 4. Explain the purposes of various grades of oils? | ❒ | ❒ | ❒ |
| 5. Identify proper grade of oil in engines/equipment? (need to differentiate Qs by 2 and 4 stroke) | ❒ | ❒ | ❒ |

Areas I Need To Review:



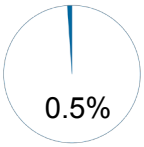

**Review Dates:**

## Competency Area 6: Inspect and service valves in a shop situation to manufacturer's specifications (4 stroke only)

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Identify the primary types and styles of valve train components used most commonly by manufacturers? (Identify, describe or explain) | ❒ | ❒ | ❒ |
| 2. Inspect and service valve train components? | ❒ | ❒ | ❒ |
| 3. Explain the importance of proper sealing of valve components? | ❒ | ❒ | ❒ |

Areas I Need To Review:



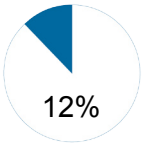

**Review Dates:**

## Competency Area 7: Inspect and service exhaust systems in a shop situation to manufacturer's specifications (both 2 and 4 stroke)

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Identify the primary types of exhaust systems? | ❒ | ❒ | ❒ |
| 2. Explain how exhaust systems relate to the engine and/or equipment? | ❒ | ❒ | ❒ |
| 3. Inspect and service exhaust components? | ❒ | ❒ | ❒ |
| 4. Demonstrate the procedures for testing for exhaust system compliance to EPA and/or other emission requirements/standards (edit and keep)? | ❒ | ❒ | ❒ |

Areas I Need To Review:




**Review Dates:**

## Competency Area 8: Test and repair engine block components in a shop situation to manufacturer's specifications (both 2 and 4 stroke)

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Explain necessary service procedures needed for engine block components? | ❒ | ❒ | ❒ |
| 2. Identify needed repairs to given engine block components? | ❒ | ❒ | ❒ |
| 3. Complete service and repair procedures on engine block components? This could include disassembling the engine and inspecting and measuring crankshafts, connecting rod bearings, journals, cylinders, piston and rings. (both 2 and 4 stroke) | ❒ | ❒ | ❒ |
| 4. Complete repairs to correct torque of critical fasteners? | ❒ | ❒ | ❒ |
| 5. Replace gaskets and/or seals? | ❒ | ❒ | ❒ |

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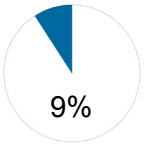


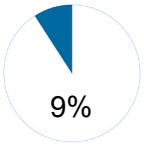

**Review Dates:**

## Competency Area 9: Demonstrate diagnostic and failure analysis in a shop situation to manufacturer's specifications

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Demonstrate the proper use of specialized, diagnostic tools including: compression gauge, leak down testers, and voltmeters/multimeters? | ❒ | ❒ | ❒ |
| 2. Test crankcase vacuum? (primarily 2 stroke) | ❒ | ❒ | ❒ |
| 3. Test compression? | ❒ | ❒ | ❒ |
| 4. Analyze failed engine components to correctly determine the type of failure? | ❒ | ❒ | ❒ |
| 5. Determine the best method to repair failed engine components? | ❒ | ❒ | ❒ |

Areas I Need To Review:



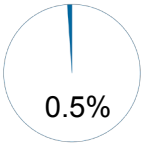

**Review Dates:**

## Competency Area 10: Demonstrate appropriate, commonly-accepted procedures in a shop situation

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Demonstrate the proper techniques in the care and use of tools and equipment? | ❒ | ❒ | ❒ |
| 2. Demonstrate ability to work accurately with precision instruments? | ❒ | ❒ | ❒ |
| 3. Use proper safety procedures? | ❒ | ❒ | ❒ |
| 4. Use service manuals and/or bulletins? | ❒ | ❒ | ❒ |
| 5. Give verbal response to a customer and/or customer-related problematic question? | ❒ | ❒ | ❒ |
| 6. Prep equipment for delivery in a given scenario? | ❒ | ❒ | ❒ |

Areas I Need To Review:




**Review Dates:**

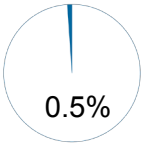
## Competency Area 11: Demonstrate appropriate, commonly-accepted business operation skills in a shop situation

### Knowledge Check

How well do you know how to:

| | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Look up correct part number by using paper, micro-fiche and/or electronic means? | ❒ | ❒ | ❒ |
| 2. Prepare a shop repair ticket? | ❒ | ❒ | ❒ |
| 3. Operate equipment within equipment manufacturer's guidelines? | ❒ | ❒ | ❒ |

Areas I Need To Review:



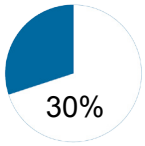

**Review Dates:**

## Competency Area 12: Inspect and service transmission/power train components in a shop situation to manufacturer's specifications

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. State the theory of transmission? | ❒ | ❒ | ❒ |
| 2. Disassemble power train components? | ❒ | ❒ | ❒ |
| 3. Assemble power train components? | ❒ | ❒ | ❒ |
| 4. Inspect, diagnose and correct a potential problem? | ❒ | ❒ | ❒ |

Areas I Need To Review:




**Review Dates:**

## Competency Area 13: Show understanding of general competencies required for power equipment technology

### Knowledge Check

| How well do you know how to: | Very Well | Somewhat Well | Not Well |
|---|---|---|---|
| 1. Show reading and comprehension of informational texts? | ❒ | ❒ | ❒ |
| 2. Describe basic 2 and 4 stroke theory? | ❒ | ❒ | ❒ |
| 3. Describe electrical theory? | ❒ | ❒ | ❒ |
| 4. Describe carburetion theory and other related fuel systems? | ❒ | ❒ | ❒ |
| 5. Read and follow schematics for electrical? | ❒ | ❒ | ❒ |
| 6. Communicate effectively to others through oral and written communications? | ❒ | ❒ | ❒ |
| 7. Demonstrate basic computer skills? | ❒ | ❒ | ❒ |

Areas I Need To Review:

# Helpful Tips and Reminders for Students

**Access Directions to the Trade- or Technical-Specific Online 10-question Demo Assessment**

Access the Web link *www.careeressentials.org/assessments/demo-our-assessments/* with your browser. The sample programmatic questions will help give you an idea of the types of questions on the assessment and how they are generally written.

**Test-Taking Reminders**

Implementing good study habits is essential for any test or class. Below are basic reminders to better prepare you for life-long learning and workplace success. Incorporate these strategies into your everyday habits.

- Develop a regular study schedule
- Identify a specific location to study
- Always take notes while studying in class or on your own
- Take short breaks during your study session
- Perform "mini-testing" to make sure you understand and comprehend the program concepts
- Join small study groups to help focus on the program content
- If you need special assistance in testing, tell your teacher or counselor so he or she can make accommodations

**Student Testing Tips**

The most important tip for you is to be prepared mentally and physically for the testing session. Make sure to get plenty of rest and eat healthy. Wear comfortable and appropriate clothing to the testing session. Find out if you can bring items to the testing session, such as a non-programmable calculator, and make sure you have the items ready the night before. Check the website at *www.careeressentials.org/wp-content/uploads/2017/07/Permitted-Testing-Tools-Aids.pdf* for permitted tools or job aids that can be used during testing. The more organized you are before the testing period, the more relaxed you will be during the actual testing session.

Be relaxed and positive. If you begin to panic during the testing, take some deep breaths to relax, and think positive thoughts.

Do not rush through the questions. Read the question and potential answers thoroughly. Make sure you know exactly what the question is asking before answering. If you are unsure, note the question and return to it. Other questions may have clues to the correct answer. Use process of elimination. If you are not sure of the correct answer, study the potential answers and eliminate the ones that you know are not correct.

If all else fails – *guess*. After you have exhausted all options, take your best guess at the correct answer. If you have studied the content area, you may intuitively know the correct answer. The Career Essentials: Assessments does not penalize you for guessing, and you may guess correctly!

# Sample Assessement Questions

**Sample Questions**

The following questions are examples of the types of questions you may see within the assessment test. The questions could be in the form of a video clip, drop and drag, sequential or a typical multiple choice.

1) Which of the following is TRUE concerning cylinder head bolts?

A. They always require torquing sequences for installation.
B. They are always the same length.
C. They will always have SAE NF threads.
D. They should always be installed using a sealer.

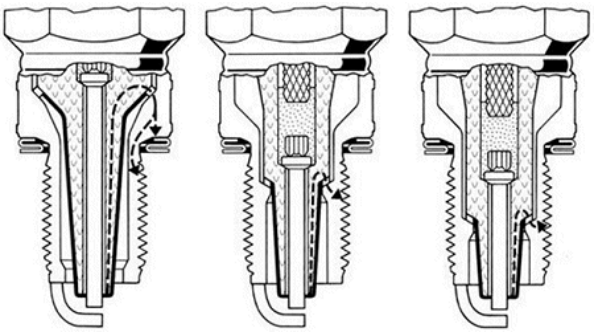
Answer: A

2) A multi-meter is connected directly to the positive and negative posts of the battery. This will most likely result in:

A. A burned-out meter.
B. Accurate readings.
C. An indication of the charge state of the battery.
D. The battery discharging.

Answer: A

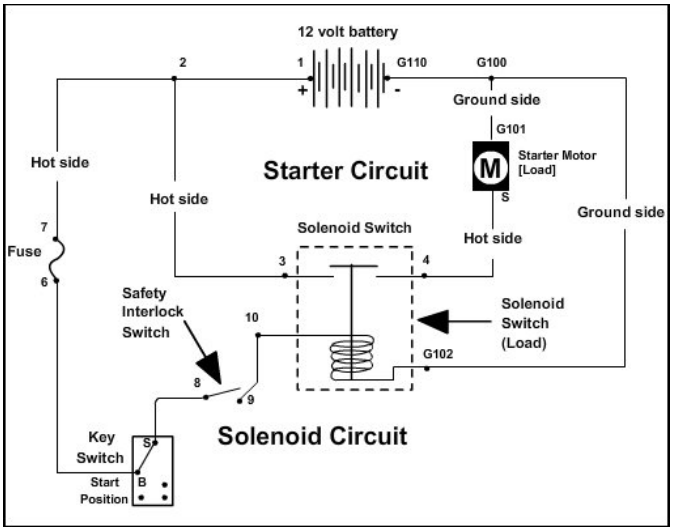
3) A spark plug's heat range refers to:



A. The spark plug's range of heat dissipation.
B. The speed that the temperature rises.
C. The temperature of the spark plug body.
D. The voltage required to fire the plug.

Answer: A

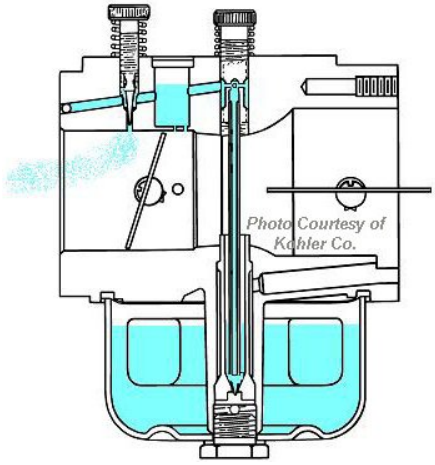
4) The current flows through the starter motor circuit through which of the following components?




A. Battery, solenoid and starter motor
B. Battery, fuse, key switch, solenoid and starter motor
C. Battery, safety interlock switch, fuse and starter motor
D. Battery, starter motor and power source

Answer: A

5) Fuel will flow from low speed discharge ports due to:




Choose one answer.

A. Low pressure at the throttle plate.
B. High fuel level in the float chamber.
C. High pressure in the intake tract as the piston descends.
D. Gravity flow from the fuel tank.

Answer: A

6) Piston ring end gap is the distance between the:


A. Ends of the ring when squarely positioned in the cylinder.
B. Compression ring and oil ring.
C. Ring and cylinder wall when installed in the cylinder.
D. Side of the ring and the piston ring groove

Answer: A

# Resources

**Additional Resources**
Below are resources that will be helpful in preparing for the Assessments which were created based on industry standards nationwide. Use the Career Essentials: Assessments Blueprint as a guideline for competencies tested. Use the resources below to find curriculum or additional study guides for industry standards.

**Power Equipment Technology Resources:**
www.careeressentials.org/assessments/assessment-resources/