

Introduction to Agricultural Power and Technology

Study Guide

Assessments:
6315 Introduction to Agricultural
Power and Technology

Aligned with the National
Agriculture, Food and
Natural Resources (AFNR)



Overview

This study guide is designed to help students prepare for the Introduction to Agricultural Power and Technology assessment. It not only includes information about the assessment, but also the skills standards upon which the assessment is based and test taking strategies.

Each of the four sections in this guide provides useful information for students preparing for the Introduction to Agricultural Power and Technology assessment.

- CareerTech and Competency-Based Education: A Winning Combination
- Introduction to Agricultural Power and Technology
 - ▶ Assessment Information
 - ▶ Standards and Test Content
 - ▶ Sample Questions
 - ▶ Abbreviations, Symbols and Acronyms
- Strategies for Test Taking Success
- Notes

The standards for these assessments are aligned with the Agriculture, Food and Natural Resources (AFNR) standards. The AFNR standards were developed by the National Council for Agricultural Education (The Council). The Council's vision is to be the premier leadership organization for shaping and strengthening school-based agricultural education (SBAE) at all levels in the United States. Its mission is to proactively identify current and emerging issues of national concern, provide innovative solutions in response to current and emerging issues, coordinate the efforts of appropriate entities in strengthening programs, and serve as a national advocate for school-based agricultural education.

For more information about the AFNR standards, go to <https://thecouncil.ffa.org/afnr/>

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CareerTech and Competency-Based Education: A Winning Combination

Competency-based education uses learning outcomes that emphasize both the application and creation of knowledge and the mastery of skills critical for success. In a competency-based education system, students advance upon mastery of competencies, which are measurable, transferable outcomes that empower students.

Career and technology education uses industry professionals and certification standards to identify the knowledge and skills needed to master an occupation. This input provides the foundation for development of curriculum, assessments and other instructional materials needed to prepare students for wealth-generating occupations and produce comprehensively trained, highly skilled employees demanded by the workforce.

Tools for Success

CareerTech education relies on three basic instructional components to deliver competency-based instruction: skills standards, curriculum materials, and competency assessments.

Skills standards provide the foundation for competency-based instruction and outline the knowledge and skills that must be mastered in order to perform related jobs within an industry. Skills standards are aligned with national skills standards and/or industry certification requirements; therefore, a student trained to the skills standards is equally employable in local, state and national job markets.

Curriculum materials and textbooks contain information and activities that teach students the knowledge and skills outlined in the skills standards. In addition to complementing classroom instruction, curriculum resources include supplemental activities that enhance learning by providing opportunities to apply knowledge and demonstrate skills.

Competency Assessments test the student over material outlined in the skills standards and taught using the curriculum materials and textbooks. When used with classroom performance evaluations, written competency assessments provide a means of measuring occupational readiness.

Each of these components satisfies a unique purpose in competency-based education and reinforces the knowledge and skills students need to gain employment and succeed on the job.

Measuring Success

Evaluation is an important component of competency-based education. Pre-training assessments measure the student's existing knowledge prior to receiving instruction and ensure the student's training builds upon this knowledge base. Formative assessments administered throughout the training process provide a means of continuously monitoring the student's progress towards mastery.

Written competency assessments provide a means of evaluating the student's mastery of knowledge and skills. Coaching reports communicate competency assessment scores to students and provide a breakdown of assessment results by standard area. The coaching report also shows how well the student has mastered skills needed to perform major job functions and identifies areas of job responsibility that may require additional instruction and/or training.

Introduction to Agricultural Power and Technology Assessment Information

What is the Introduction to Agricultural Power and Technology assessment?

The Introduction to Agricultural Power and Technology assessment is an end-of-program assessment for students in the Agricultural Power and Technology program. The assessment provides an indication of student mastery of basic knowledge and concepts necessary for success in this area.

How was the assessment developed?

The assessment was developed by the CareerTech Testing Center. Items were developed and reviewed by a committee of subject matter experts.

What does the assessment cover?

Specifically, the test includes multiple-choice test items over the following areas:

Introduction to Agricultural Power and Technology (75 questions)

Safety	13%
Tools	13%
Engines	7%
Electricity	11%
Construction and Fabrication	7%
Welding and Cutting	47%
Geospatial	2%

What are the benefits of using the assessment?

Students receive a competency certificate for each assessment that he/she passes. This certificate may be included in his/her portfolio and used to communicate the student's mastery of the subject matter to potential employers.

When should the assessment be taken?

The CareerTech Testing Center recommends that students take this assessment as soon as possible after receiving all standards-related instruction, rather than waiting until the end of the school year.

Is the assessment timed?


No. Although students may take as long as they need, most finish the assessment within one hour.

What resources can students use on these assessments?

Students are allowed to use calculators and scratch paper on CTTC competency assessments; however, these items must be provided by the testing proctor and returned to the proctor before the student's exam is submitted for scoring. Calculator apps on cell phones and other devices may not be used on these assessments.

What accommodations can be made for students with Individualized Education Plans (IEPs)?

Accommodations are allowed for students with an Individualized Education Plan. Examples of allowable accommodations include:

- **Extended time** — This assessment is not timed; therefore, students may take as much time as needed to finish. The assessment must be completed in one testing session.
- **Readers** — A reader may be used to read the assessment to a student who has been identified as needing this accommodation.
- **Enlarged text** — Students needing this accommodation can activate this feature by clicking the  icon in the upper right corner of the screen.

What can students expect on Test Day?

All CTTC assessments are web-based and delivered exclusively by a proctor in the school's assessment center. The proctor **cannot** be an instructor or anyone who was involved with the student during instruction.

Assessments are delivered in a question-by-question format. When a question is presented, the student can select a response or leave the question unanswered and advance to the next question. Student may also flag questions to revisit before the test is scored. All questions must be answered before the test can be submitted for scoring.

After the assessment is scored, the student will receive a score report that not only shows the student's score on the assessment, but also how the student performed in each standard area.

Can students retake the test?

- Remediation is recommended prior to retesting.
- If a participant fails on the first (1st) attempt to pass a CTTC test, a waiting period between the first (1st) and second (2nd) attempt is not required.
- After the second (2nd) attempt, the participant must wait **three (3) calendar days** before retaking the examination.
- A participant is **not allowed** more than three (3) test attempts.
- A student **may not** retake a test that he/she has already passed.

Standards and Test Content

Introduction to Agricultural Power and Technology

Duty A: Safety (10 questions)

CODE	TASK
A.01	Use proper safety practices/personal protective equipment.
A.02	Research applicable regulatory and safety standards (e.g., SDS, bioterrorism).
A.03	Handle chemicals and equipment in a safe and appropriate manner.

Duty B: Tools (10 questions)

CODE	TASK
B.01	Identify standard tools, equipment, and safety procedures related to a specific task.
B.02	Identify and demonstrate safe use and maintenance of measurement and layout tools.
B.03	Follow operating instructions related to specific tools and equipment needed to complete a task.
B.04	Use the appropriate procedures for the use and operation of specific tools and equipment.
B.05	Demonstrate safety precautions when using tools for a specific task around bystanders.
B.06	Describe the conditions that cause the need for tool maintenance.
B.07	Select, maintain and use hand and power tools in service, construction and fabrication.
B.08	Ensure the presence and function of safety systems and hardware on tools and equipment.

Duty C: Engines (5 questions)

CODE	TASK
C.01	Classify lubricants by source, sustainability and equipment compatibility.
C.02	Classify lubricants by SAE viscosity and API service classifications.
C.03	Identify and schedule power unit and equipment lubrication.
C.04	Service filtration systems and maintain fluid levels on power units and equipment.
C.05	Adjust equipment, including belts and drives, chains and sprockets, and maintain fluid conveyance components, such as hoses, lines and nozzles. <ul style="list-style-type: none">• hydraulic systems
C.06	Maintain the cleanliness and appearance of power units and equipment to assure functionality. <ul style="list-style-type: none">• small gas
C.07	Identify components and systems of internal combustion engines. <ul style="list-style-type: none">• 2-cycle/4-cycle• ethanol vs. natural diesel
C.08	Describe the operation on internal combustion engines by types of fuel used.

Duty D: Electricity (8 questions)

CODE	TASK
D.01	Apply the meaning and measurement of electricity, including amperage, voltage and wattage.
D.02	Identify the kinds and applications of electricity, including direct and alternating current.
D.03	Interpret electrical system symbols and diagrams.
D.04	Identify electricity measurements and make measurement calculations.
D.05	Distinguish electrical circuits and components of each.
D.06	Discuss various types and sources of electricity.
D.07	Use volt and amp meters and continuity testers to demonstrate electricity principles.
D.08	Recognize common electrical symbols.
D.09	Identify hazards and safety practices in planning, installing and using electricity.
D.10	Distinguish and select materials and tools used in electrical control circuit installation.

Duty E: Construction and Fabrication (5 questions)

CODE	TASK
E.01	Identify symbols and drawing techniques used to develop plans and sketches.
E.02	Prepare bills of materials to accompany plans and sketches.
E.03	Use scale measurement and dimension to develop plans and sketches.
E.04	Identify criteria in selecting materials in agricultural construction/fabrication.
E.05	Select types of materials, determine quantities and estimate their costs and other costs associated with a specified project plan.
E.06	Construct and/or repair with wood and metal.
E.07	Measure and calculate materials for concrete, brick, stone or masonry units in agricultural construction.
E.08	Construct and/or repair with concrete, brick, stone or masonry units. <ul style="list-style-type: none">• concrete basics• slope
E.09	Measure and calculate fencing materials.
E.10	Construct and/or repair fencing, including wood, static wire, electrical wire and other fencing materials.



Duty F: Welding and Cutting (35 questions)

CODE	TASK
F.01	Identify kinds and characteristics of metal materials.
F.02	Distinguish welding/cutting processes, positions, and materials preparation.
F.03	Identify power unit and equipment controls and instruments, along with their functions.
F.04	Perform start-up and shutdown procedures on power units and equipment as specified in technical manuals.
F.05	Perform pre-operation inspection according to manufacturers' specifications and/or prevailing industry standards.
F.06	Demonstrate safe practices and regulations in the operation of power units and equipment.

Duty G: Geospatial (2 questions)

CODE	TASK
G.01	Identify geospatial technologies, including global positioning, geographical information and remote sensing.
G.02	Explain and evaluate concepts and principles of geospatial technologies.
G.03	Explain site-specific agriculture as related to geospatial technologies.
G.04	Describe equipment and processes used in geospatial technologies. <ul style="list-style-type: none">• where used — overspraying, fence rows, etc.



Sample Questions

1. Which of the following characteristics indicates a good weld?
 - a. slight crown at the end of the weld
 - b. porosity with small cracks
 - c. internal concavity
 - d. varied bead ripples
2. A welder is experiencing insufficient penetration. Which of the following issues is likely the cause?
 - a. slight crown at the end of the weld
 - b. porosity with small cracks
 - c. internal concavity
 - d. varied bead ripples
3. Which type of weld fuses two metal faces at a 90° angle from each other and fills in the outside space at the triangular cross section where the metal pieces join?
 - a. surface
 - b. fillet
 - c. plug
 - d. slot
4. The location of first aid equipment is indicated by which federal safety color?
 - a. green
 - b. purple
 - c. yellow
 - d. red
5. How many feet of fencing is needed in an agriculture scale drawing that uses a scale of $\frac{1}{4}$ " equals 5' and is 10" long?
 - a. 100
 - b. 200
 - c. 300
 - d. 400
6. How many cubic yards of concrete are needed for a 20' x 30' pad that is 6" thick?
 - a. 9.37
 - b. 11.11
 - c. 13.45
 - d. 15.87

7. What type of switch is used to control a fan motor when the temperature reaches 80° inside a welding shop?
- a. thermostat
 - b. single pole
 - c. double pole
 - d. pressure
8. Which type of motion is used with fast-fill electrodes to make stringer beads in all positions and on all types of joints?
- a. triangular weave
 - b. circular
 - c. straight whipping
 - d. box weave
9. What element is metallic, in PAC electrodes, and used for cutting with air or oxygen?
- a. hafnium
 - b. polonium
 - c. thorium
 - d. tin
10. A luminous bridge formed in a gap between two electrodes is a/an:
- a. flux.
 - b. arc.
 - c. slag.
 - d. shield.



Sample Questions — Key

1. Which of the following characteristics indicates a good weld?

a. slight crown at the end of the weld	Correct
b. porosity with small cracks	Incorrect
c. internal concavity	Incorrect
d. varied bead ripples	Incorrect

2. A welder is experiencing insufficient penetration. Which of the following issues is likely the cause?

a. slight crown at the end of the weld	Correct
b. porosity with small cracks	Incorrect
c. internal concavity	Incorrect
d. varied bead ripples	Incorrect

3. Which type of weld fuses two metal faces at a 90° angle from each other and fills in the outside space at the triangular cross section where the metal pieces join?

a. surface	Incorrect
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c. plug	Incorrect
d. slot	Incorrect

4. The location of first aid equipment is indicated by which federal safety color?

a. green	Correct
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d. red	Incorrect

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7. What type of switch is used to control a fan motor when the temperature reaches 80° inside a welding shop?

- a. thermostat Correct
- b. single pole Incorrect
- c. double pole Incorrect
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8. Which type of motion is used with fast-fill electrodes to make stringer beads in all positions and on all types of joints?

- a. triangular weave Incorrect
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- c. straight whipping Correct
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9. What element is metallic, in PAC electrodes, and used for cutting with air or oxygen?

- a. hafnium Correct
- b. polonium Incorrect
- c. thorium Incorrect
- d. tin Incorrect

10. A luminous bridge formed in a gap between two electrodes is a/an:

- a. flux. Incorrect
- b. arc. Correct
- c. slag. Incorrect
- d. shield. Incorrect

Abbreviations, Symbols, and Acronyms

The following is a list of abbreviations, symbols, and acronyms used in the Introduction to Agricultural Power and Technology study guide and on the Introduction to Agricultural Power and Technology assessment.

°	Degree
“	Inches
‘	Feet
AC	Alternating Current
dB	Decibel
DCEP	Direct-Current Electrode Positive
DCRP	Direct-Current Reverse Polarity
DCSP	Direct-Current Straight Polarity
A	Amp/Amperes
V	Volt

Test Taking Strategies

This section of the study guide contains valuable information for testing success and provides a common-sense approach for preparing for and performing well on any test.

General Testing Advice

1. Get a good night's rest the night before the test – eight hours of sleep is recommended.
2. Avoid junk food and “eat right” several days before the test.
3. Do not drink a lot or eat a large meal prior to testing.
4. Be confident in your knowledge and skills!
5. Relax and try to ignore distractions during the test.
6. Focus on the task at hand — taking the test and doing your best!
7. Listen carefully to the instructions provided by the exam proctor. If the instructions are not clear, ask for clarification.

Testing Tips

1. Read the entire question before attempting to answer it.
2. Try to answer the question before reading the choices. Then, read the choices to determine if one matches, or is similar to your answer.
3. Do not change your answer unless you misread the question or are certain that your first answer is incorrect.
4. Answer questions you know first, so you can spend additional time on the more difficult questions.
5. Check to make sure you have answered every question before you submit the assessment for scoring — unanswered questions are marked incorrect.



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