Plant and Soil Science 1

Exam Information

Exam number
140

Items
56

Points
61

Prerequisites
None

Recommended course length
One Year

National Career Cluster
Agriculture, Food & Natural resources

Performance standards
Included (Optional)

Certificate available
Yes

Description

The Plant and Soil Science 1 industry certification exam assesses knowledge and skills in a wide range of scientific principles, such as genetics, disease, pests, and management practices. Learners demonstrate their understanding of scientific processes including observation, measurement, hypothesizing, data gathering, interpretation, analysis, and application.

Exam Blueprint

Standard	Percentage of exam
1. Leadership Development	3%
2. Work-Based Learning	2%
3. History, Importance, Scope of Plant Science	18%
4. Soil Science Concepts	23%
5. Plant Anatomy and Physiological Concepts	48%
6. Principles of Horticulture	7%

Standard 1

Students will participate in personal and leadership development activities through the FFA.

Objective 1 Student will use communication skills to effectively communicate with others.

1. Understand when it is appropriate to listen and to speak.
2. Understand and follow verbal and written instructions for classroom and laboratory activities.
3. Will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Objective 2 Student will effectively use teamwork to respectfully work with others.

1. Identify and understand different roles in working with a team.
2. Lead a group discussion or serve in a leadership capacity.

Objective 3 Student will use critical thinking and problem-solving skills.

1. Analyze the cause of the problem.
2. Develop a solution to address the problem.
3. Implement the plan.
4. Evaluate the effectiveness of the plan.

Objective 4 Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

1. Set and meet goals on attendance and punctuality.
2. Prioritize, plan, and manage work to complete assignments and projects on time.

Objective 5 Students will be accountable for results.

1. Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
2. Use reflection to describe what was learned, what went well, what could have been improved, and what are the implications to the learning process.
3. Track and communicate progress toward completion of assignments and projects.

Objective 6 Be familiar with the legal requirements and expectations of the course.

1. Be familiar with the course disclosure statement and all requirements for successful completion of the course.
2. Demonstrate workplace ethics, e.g., fair, honest, disciplined.

Standard 1 Performance Evaluation included below (Optional)

Standard 2

Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.

Objective 1 Student will demonstrate employability skills.

1. Use a career search network to find career choices.
2. Identify the appropriate CTE pathways for selected career choices.
3. Prepare for entry into the workforce by completing one of the following: a list of required skills needed for a career choice, a resume including a list of demonstrated skills, a cover letter or letter of application, a job application, or participate in an actual or simulated job interview.

Objective 2 Student will participate in a work-based learning experience outside the classroom.

1. Students will plan and implement a Supervised Agricultural Experience Program:
2. Foundational SAE: Career exploration and planning, employability skills for college and career readiness, personal financial management and planning, workplace safety, and agricultural literacy.
3. Immersion SAE: Ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.

Objective 3 Student will develop a job portfolio specific to their selected SAE/WBL experience.

1. Student will keep a personal record/journal/log of their SAE/WBL experience; including pictures, financial records or log of their hours, skills learned, goals, reflection, etc.

Standard 2 Performance Evaluation included below (Optional)

Standard 3

Students will explain the history, importance, and scope of plant science.

Objective 1 Discuss the history of agriculture.

1. Explain how the science of agriculture helped develop civilization, including agronomic, horticultural, and forestry plants.
2. Identify the major innovators and milestones in the advancement of agriculture.

Objective 2 Discuss the importance of plant science.

1. Identify the various roles of plants in everyday life.
2. Identify agriculturally important plants and explain their uses.
3. Identify and describe the major areas of plant science.

Standard 3 Performance Evaluation included below (Optional)

Standard 4

Students will explain soil science concepts.

Objective 1 Explain the meaning and importance of soil.

1. Explain the importance of soil as a life-supporting layer.
2. Describe the agricultural and nonagricultural uses of soil.

Objective 2 Describe the basic physical, biological, and chemical properties of soil and soilless media.

1. Explain soil components.
2. Describe the physical characteristics of soil and soilless media.
3. Describe the biological activity within soil and soilless media.
4. Describe the chemical properties of soil and soilless media.
5. Explain the characteristics of water movement in soil and soilless media

Objective 3 Explain soil fertility.

1. Describe the meaning and importance of soil fertility.
2. Explain the role of organic matter, soil depth, surface slope, soil organisms, and nutrient balance in soil productivity.
3. Describe the nitrogen cycle as it relates to soil fertility.

Standard 4 Performance Evaluation included below (Optional)

Standard 5

Students will describe plant anatomy and physiology concepts.

Objective 1 Explain plant classification.

1. Explain systems used to classify plants.
2. Compare and contrast the hierarchical classification of agricultural plants.
3. Classify plants according to life cycles, plant use, and status as monocotyledons or dicotyledons.

Objective 2 Explain the structures of plant cells and important cell processes.

1. Describe the structures of a typical plant cell and their functions.
2. Compare and contrast mitosis and meiosis.
3. Describe the structures of a seed, the types of seeds, and the function of seeds.
4. Describe the components of a root, the types of roots, and the functions of roots.
5. Describe the structures of a stem, the types of stems, and the functions of stems.
6. Describe the structures of a leaf, the types of leaves, and the functions of leaves.
7. Describe the major parts of a flower, their functions, and the types of flowers and flower forms.
8. Describe the structures of fruit, the types of fruit, and the purpose of fruit.

Objective 3 Determine the influence of environmental factors on plant growth.

1. Describe the functions of water in plant growth and the plant's response to a shortage or excess of water.
2. Explain the qualities of light that affect plant growth, including color, intensity, and duration.
3. Describe the effects of temperature on plant growth.
4. Describe the effect of diseases and insects on plant growth.

Objective 4 Explain plant physiology concepts and energy conversion in plants.

1. Explain the basic process, requirements for and by-products of photosynthesis.
2. Explain the basic process, requirements for and by-products of the carbon cycle.
3. Explain the basic process, requirements for and by-products of cellular respiration.

Objective 5 Explain plant reproduction.

1. Compare and contrast sexual and asexual reproduction.
2. Explain pollination, cross-pollination, and self-pollination of flowering plants.
3. Describe the process of seed germination.
4. Explain the conditions required for seed germination.
5. Explain the importance of seed viability and vigor.
6. Describe optimal conditions for asexual propagation.
7. Describe grafting techniques.

Objective 6 Explain the management of plant growth and development.

1. Describe the role of the apical meristem in plant growth.
2. Identify plant hormones/growth regulators and explain their functions.
3. Explain plant tropisms.

Standard 5 Performance Evaluation included below (Optional)

Standard 6

Students will explain principles of horticulture.

Objective 1 Explain plant management for food production.

1. Plan a vegetable/herb garden.
2. Choose one or more of the following food production methods
3. Describe the important techniques in producing tree fruits and small fruits.
4. Describe the elements of edible landscaping and limited space food production including rooftop, container, and raised-bed gardening.
5. Explain the techniques involved in producing small grain and oil crops.
6. Discuss the importance of hay and forage production to the overall food system.

Objective 2 Explain plant management for ornamental horticulture production.

1. Choose one or more of the following food production methods
2. Describe lawn establishment and care.
3. Plan and prepare a flower garden.
4. Develop a home landscape plan.
5. Describe the important techniques of landscape maintenance.
6. Describe the elements of growing plants indoors.
7. Describe methods of pruning.
8. Describe the efficient use of water in plant production.

Plant and Soil Science 1

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of 8 or higher on the rating scale. Students may be encouraged to repeat the objectives until they average 8 or higher.

Student's Name: _____

Class: _____

Performance standards rating scale

0	Limited skills	2	→	4	Moderate skills	6	→	8	High skills	10

Standard 1 – Leadership Development Score:

- Students will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Standard 2 – Work-Based Learning Score:

- Identify four personal values and explain how these values affect behavior and choices.
- Research a Human Services career that includes educational requirements, skill development, and income potential.
- Will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Standard 4 – Soil Science Score:

- Analyze soil fertility
- Classify soil texture

Standard 5 – Plant Structure and Function Score:

- Demonstrate methods of plant reproduction.
- Demonstrate control methods for plant growth and development.
- Identify Plant parts.

Standard 6 – Principles of Horticulture Score:

- Develop a plan for the planting, optimum growth for production, harvesting, and storage of a common crop.

Performance standard average score:

Evaluator Name: _____

Evaluator Title: _____

Evaluator Signature: _____

Date: _____