

# Plant and Soil Science I

EXAM INFORMATION	DESCRIPTION														
<p><b>Exam Number</b> 140</p> <p><b>Items</b> 63</p> <p><b>Points</b> 66</p> <p><b>Prerequisites</b> NONE</p> <p><b>Recommended Course Length</b> ONE YEAR</p> <p><b>National Career Cluster</b> AGRICULTURE, FOOD &amp; NATURAL RESOURCES</p> <p><b>Performance Standards</b> INCLUDED (OPTIONAL)</p> <p><b>Certificate Available</b> YES</p>	<p>Students will demonstrate knowledge and skills in a wide range of scientific principles, such as genetics, disease, pests, and management practices. The scientific processes of observation, measurement, hypothesizing, data gathering, interpretation, analysis, and application are stressed.</p> <p><b>EXAM BLUEPRINT</b></p> <table border="1"> <thead> <tr> <th>STANDARD</th> <th>PERCENTAGE OF EXAM</th> </tr> </thead> <tbody> <tr> <td>1. Student Organizations in Agricultural Education</td> <td>6%</td> </tr> <tr> <td>2. Agricultural Experience in Agricultural Education</td> <td>5%</td> </tr> <tr> <td>3. History, Importance, Scope of Plant Science</td> <td>29%</td> </tr> <tr> <td>4. Soil Science Concepts</td> <td>27%</td> </tr> <tr> <td>5. Plant Anatomy and Physiology Concepts</td> <td>31%</td> </tr> <tr> <td>6. Principles of Horticulture</td> <td>2%</td> </tr> </tbody> </table>	STANDARD	PERCENTAGE OF EXAM	1. Student Organizations in Agricultural Education	6%	2. Agricultural Experience in Agricultural Education	5%	3. History, Importance, Scope of Plant Science	29%	4. Soil Science Concepts	27%	5. Plant Anatomy and Physiology Concepts	31%	6. Principles of Horticulture	2%
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## STANDARD 1

*Students will develop personal, leadership, and career skills through students organization participation*

**Objective 1** Assess the role of student organization participation in developing personal and leadership skills.

1. Identify important personal skills and the strategies used in developing the skills.
2. Identify important leadership skills and the role of student organization participation in developing the skills

**Objective 2** Assess the role of student organization participation in developing career skills.

1. List and describe proficiency awards appropriate for horticulture
2. List and describe career development events appropriate for horticulture.
3. Relate the importance of supervised agricultural experience to student organization achievement.
4. Utilize student organization and supervised agricultural experience participation to gain advanced degrees of student organization membership.

Standard 1 Performance Evaluation included below (Optional)

## STANDARD 2

*Students will explain the maintenance and expansion of supervised agricultural experience programs*

**Objective 1** Maintain and use agricultural experience records

1. Explain how agricultural experience records are maintained from year to year.
2. Explain how to summarize and analyze agricultural experience records.

**Objective 2** Devise long-range plans for expanding agricultural experience programs.

1. Evaluate the overall quality of a current agricultural experience and determine how to make it more productive or profitable.
2. Explain factors that should be considered in expanding an agricultural experience program.
3. Explain how placement agricultural experience and ownership agricultural experience programs may be expanded.

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.
- Objective 3** Identify career opportunities in plant science.
1. Identify and describe the major areas of plant science.
  2. Identify career opportunities in plant science and determine the education and training they entail.

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 the nonagricultural uses of soil.
- Objective 2** Describe 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.

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.
- Objective 3** Describe the anatomical features of a plant and their functions.
1. Describe the structures of a seed, the types of seeds, and the function of seeds.
  2. Describe the components of a root, the types of roots, and the functions of roots.
  3. Describe the structures of a stem, the types of stems, and the functions of stems.
  4. Describe the structures of a leaf, the types of leaves, and the functions of leaves.
  5. Describe the major parts of a flower, their functions, and the types of flowers and flower forms.
  6. Describe the structures of fruit, the types of fruit, and the purpose of fruit.
- Objective 4** Determine the influence of environmental factors on plant growth.
1. Describe the functions of water in plant growth.
  2. Explain plant responses to a shortage or excess of water.
  3. Describe efficient use of water in plant production.
  4. Explain the qualities of light that affect plant growth, including color, intensity, and duration.
  5. Explain plant responses to light.
  6. Describe the effects of temperature on plant growth.
  7. Describe plant responses to temperature extremes.
  8. Describe the effect of diseases and insects on plant growth.
- Objective 5** Explain plant physiology concepts and energy conversion in plants.

1. Explain the basic process of photosynthesis and its importance to life on Earth.
2. Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.
3. Explain cellular respiration and its importance to plant life.
4. Explain factors that affect cellular respiration and identify the products and byproducts of cellular respiration.

**Objective 6** Explain plant reproduction.

1. Compare and contrast sexual and asexual reproduction.
2. Explain pollination, cross-pollination, and self-pollination of flowering plants.
3. Diagram the process of plant fertilization.
4. Describe the process of seed germination.
5. Explain the conditions required for seed germination.
6. Explain the importance of seed viability and vigor.
7. Describe optimal conditions for asexual propagation.
8. Demonstrate techniques used to propagate plants by cuttings, division, separation, and layering.
9. Describe grafting techniques.

**Objective 7** Explain the management of plant growth and development.

1. Describe the role of the apical meristem in plant growth.
2. Identify plant hormones and explain their functions.
3. Explain plant tropisms.
4. Differentiate between synthetic growth regulators and plant hormones.
5. Describe the benefits of using plant growth regulators.

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 and prepare a vegetable/herb garden.
2. Describe the important techniques in producing tree fruits and small fruits.
3. Describe the elements of edible landscaping and limited space food production, including roof top, container, and raised-bed gardening.
4. Explain the techniques involved in producing small grain and oil crops.

5. Discuss the importance of hay and forage production to the overall food system.

**Objective 2** Explain plant management for ornamental horticulture production.

1. Describe lawn establishment and care.
2. Plan and prepare a flower garden.
3. Develop a home landscape plan.
4. Describe the important techniques of landscape maintenance.
5. Describe the elements of growing plants indoors.

Standard 6 Performance Evaluation included below (Optional)

## Plant and Soil Science I

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



#### STANDARD 1 – Student Organizations in Agricultural Education **Score:**

- Students will attend a student organization meeting
- Recite and explain a student organization creed

#### STANDARD 2 – Agricultural Experience in Agricultural Education **Score:**

- Students will use the approved record book to record financial transactions and activities on an agricultural experience
- Prepare and plan for a long-term agricultural experience

#### STANDARD 3 – Plant Science **Score:**

- Identify agricultural interests and/or career goals in the plant science are

#### STANDARD 4 – Soil Science **Score:**

- Analyze soil fertility
- Classify soil texture

#### STANDARD 5 – Plant Structure and Function **Score:**

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

#### STANDARD 6 – Principles of Horticulture **Score:**

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

**PERFORMANCE STANDARD AVERAGE SCORE:**

Evaluator Name: \_\_\_\_\_

Evaluator Title: \_\_\_\_\_

Evaluator Signature: \_\_\_\_\_

Date: \_\_\_\_\_