

Nursery Operation

Exam Information	Description
Exam number 134 Items 49 National Career Cluster Agriculture Certification available Yes	The Nursery Operation industry certification exam assesses learners' knowledge and skills in nursery operation practices. The exam evaluates their ability to select appropriate plant materials, design, install, and maintain interior and exterior plantings and hardscapes. Learners also demonstrate their skills in maintaining the facilities and equipment associated with the industry.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Leadership Development*	4%
2. Work-Based Learning*	4%
3. Nursery Components*	33%
4. Integrated Pest Management*	20%
5. Irrigation Systems*	29%
6. Nursery Business Concepts	10%

*Includes performance skill evaluation

Standard 1 - Leadership Development (4% of exam score)

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

Objective 1 Candidates 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 Candidates 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 Candidates 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 Candidates 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 Candidates 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.

Optional: Standard performance evaluations on the final page of this document

Standard 2 - Work-Based Learning (4%)

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

Objective 1 Candidates will demonstrate employability skills.

1. Use a career search network to find career choices.
2. Identify appropriate CTE Pathway for selected career choice.
3. Prepare for entry into the workforce by completing one of the following: 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 Candidates will participate in a work-based learning experience outside the classroom.

1. Candidates 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 Candidates will develop a job portfolio specific to their selected SAE/WBL experience.

1. Candidates 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.

Optional: Standard performance evaluations on the final page of this document

Standard 3 - Nursery Components (33%)

Candidates will demonstrate an understanding of nursery components.

Objective 1 Explain nursery practices.

1. Compare the different types of nurseries, i.e., wholesale, retail, etc.
2. Explain how a plant hardiness zone map and plant heat-zone map are used.
3. Describe the three types of packaging of nursery crops and contrast the advantages and disadvantages of each (e.g., ball and burlap, container, and bare root).
4. Explain how nursery stock is measured (e.g., trunk diameter, height, container size, etc.).
5. Determine factors for selecting a nursery site.

Objective 2 Identify and categorize nursery plants.

1. Explain systems used to classify plants.
2. Classify nursery plants according to the hierarchical classification system, life cycles, plant use, and status as monocotyledons or dicotyledons.

3. Identify flowering and shade trees.
4. Identify fruit and nut trees and shrubs.
5. Identify ornamental trees and shrubs.
6. Identify ornamental grasses, ground covers, and vines

Objective 3 Propagate nursery crops.

1. Compare and contrast sexual and asexual reproduction in nursery crops.
2. Diagram the process of plant pollination and fertilization of flowering plants.
3. Describe the process and conditions required for seed germination.
4. Demonstrate techniques for growing nursery crops from seed.
5. Describe optimal conditions for asexual propagation.
6. Demonstrate techniques used to propagate plants by grafting, cutting, division, separation, and layering.
7. Transplant nursery crops.

Objective 4 Describe proper tree and shrub maintenance practices and procedures.

1. Identify symptoms of water stress in trees and shrubs.
2. Explain recommended watering practices for trees and shrubs.
3. Identify symptoms of nutrient deficiency in trees and shrubs.
4. Explain guidelines for fertilizing trees and shrubs.
5. Describe how mulching and composting are used to retain moisture and supplement nutrients in nursery operations.
6. Identify tools used for pruning trees and shrubs.
7. Demonstrate various techniques for pruning trees and shrubs.
8. Describe the use of growth regulators in tree and shrub production.

Objective 5 Examine the physical and chemical properties of growing media in a nursery application.

1. Describe the components of growing media.
2. Describe the functions of growing media.
3. Determine desirable properties of growing media.
4. Evaluate the advantages and disadvantages of soilless media.
5. Demonstrate proper techniques for sampling growing media.
6. Test and determine pH level of various growing media.
7. Interpret pH test results of a growing medium sample.
8. Describe pH and how it is modified.

Optional: Standard performance evaluations on the final page of this document

Standard 4 - Landscape Plant Practice (20%)

Candidates will describe integrated pest management in a nursery operation.

Objective 1 Describe the principles of integrated pest management (IPM).

1. Explain IPM.
2. Identify benefits of IPM.
3. Describe pest control strategies associated with IPM.

Objective 2 Identify plant pests and diseases and their causes.

1. Identify types of plant pests and disorders.
2. Identify plant, insect, animal, and fungal pests.
3. Identify infectious and noninfectious plant diseases.

Objective 3 Explain procedures for the safe handling, use, and storage of pesticides.

1. Explain risks and benefits associated with the materials and methods used in plant pest management.
2. Interpret pesticide labels.
3. Explain procedures for mixing and storing pesticides.
4. Describe types of pesticide controls and formulations.
5. Explain the safety practices that should be followed when applying pesticides.
6. Describe the proper disposal of surplus pesticides and empty containers.
7. Evaluate environmental and consumer concerns regarding pest management strategies.

Optional: Standard performance evaluations on the final page of this document

Standard 5 - Irrigation Systems (29%)

Candidates will demonstrate an understanding of nursery equipment and irrigation systems.

Objective 1 Plan, install, and maintain a nursery irrigation system.

1. Determine plant needs for irrigation.
2. Calculate water flow in gallons per minute (GPM).
3. Identify and select components of irrigation systems, including pipes and joints.
4. Plan and illustrate a distribution system.
5. Calculate the cost of the parts, supplies, and labor for system installation.
6. Cut, fit, and install PVC/poly pipes and fittings.
7. Install valves and emitters.
8. Perform an irrigation system test.
9. Replace or repair irrigation system components.

Objective 2 Demonstrate the use of equipment and tools in nursery operations.

1. Identify common equipment and tools and their use in nursery operations.
2. Explain the meaning and importance of the operator's manual.
3. Identify the location and use of controls on equipment.
4. Follow safe practices in the use of nursery operation equipment.

Objective 3 Properly maintain equipment used in nursery operations.

1. Complete basic tire inspections and perform maintenance for safe tire performance.
2. Check the oil level and add oil if necessary.
3. Check the fuel level and add fuel if necessary.
4. Service the air cleaner.

Optional: Standard performance evaluations on the final page of this document

Standard 6 - Nursery Business Concepts (10%)

Candidates will explain nursery business concepts.

Objective 1 Prepare and price nursery plants for sale.

1. Assess typical markup and pricing strategies.
2. Attach price tags and care instructions.
3. Describe effective packaging and delivery.
4. Display nursery materials for sale.

Objective 2 Describe nursery business management.

1. Demonstrate customer relations skills.
2. Demonstrate the importance of effective inventory management.
3. Recognize costs related to nursery production.
4. Analyze the importance of marketing, promotion, and sales.
5. Describe career opportunities in the nursery industry.
6. Explain laws, codes, and regulations that affect the nursery industry.
7. Demonstrate the importance of safety for nursery operation employees.

Performance Skills Evaluation

Exam name: Nursery Operation

Candidate Name: _____

Performance assessments may be completed and evaluated any time before the certification is issued. The following performance skills can be used in connection with the associated standards and exam. The evaluator will function as the subject matter expert to determine if the candidate meets the skills requirements with a Yes/No for passing.

Standard 1 – Leadership Development Candidates 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.	Pass:
Standard 2 – Work-Based Learning Candidates 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.	Pass:
Standard 3 – Landscape Design Components - Identify by name flowering and shade trees. - Identify by name fruit and nut trees and shrubs. Identify by name ornamental trees and shrubs. - Identify by name ornamental grasses, ground covers, and vines.	
Standard 4 – Landscape Plant Practice Identify by name types of plant pests and disorders.	Pass:
Standard 5 – Irrigation Systems Plan, install, and maintain a nursery irrigation system.	Pass:

Evaluator Name: _____

Date: _____