

Greenhouse Management

Exam Information	Description
Exam number 132 Items 45 National Career Cluster Agriculture, Food & Natural Resources Certification available Yes	The Greenhouse Management industry certification exam assesses learners' knowledge related to the greenhouse industry. The exam covers greenhouse operations and management as primary units of study. Learners demonstrate their understanding of how to produce commercial plant species in a controlled environment and manage both commercial and experimental greenhouse operations.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Leadership Development	7%
2. Work-Based Learning (SAE)	4%
3. Greenhouse Crop Production Techniques	76%
4. Greenhouse Business Concepts	13%

*Includes performance skill evaluation

Standard 1 - Leadership Development

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

Objective 1 Candidate 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, impromptu speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Objective 2 Candidate 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 Candidate 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 Candidate 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 Candidate 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 (SAE)

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

Objective 1 Candidate will demonstrate employability skills.

1. Use a career search network to find career choices.
2. Identify 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 participating in an actual or simulated job interview.

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

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

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

1. Candidate 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 - Greenhouse Crop Production Techniques

Candidates will demonstrate greenhouse crop production techniques.

Objective 1 Describe greenhouse structures.

1. Differentiate greenhouse designs.

2. Review considerations for greenhouse frameworks.
3. Identify and describe greenhouse glazing materials.
4. Describe the functions of the headhouse.
5. Describe greenhouse bench options.
6. Identify and operate supplemental lighting systems.

Objective 2 Explain greenhouse climate control.

1. Describe methods of heating greenhouse structures.
2. Contrast major greenhouse cooling and ventilation systems.
3. Discuss how energy curtains and shade cloth are used to maintain greenhouse temperatures.
4. Analyze greenhouse climate controls.

Objective 3 Describe automated greenhouse systems.

1. Assess automated planting systems.
2. Identify automated systems for moving plants in the greenhouse.
3. Compare automated watering systems.

Objective 4 Examine the components and properties of growing media.

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.

Objective 5 Investigate chemical characteristics of growing media.

1. Demonstrate proper techniques for sampling growing media.
2. Test and interpret the pH level of various growing media.

Objective 6 Supply nutrients to greenhouse crops.

1. Explain plant nutrition.
2. Describe pH and how it is modified.
3. Describe the components of a fertilizer.
4. Explain the methods of applying fertilizers to horticulture crops.

Objective 7 Explain the effects of light, temperature, air, and water on plant growth.

1. Examine the effect of light on greenhouse crops.
2. Describe the influence of temperature on greenhouse crops.
3. Explain how watering practices influence greenhouse crop production.
4. Explain the effect of oxygen and carbon dioxide on photosynthesis and plant growth.

Objective 8 Identify and explain the functions of plant growth regulators.

1. Compare the functions of plant hormones.
2. Examine commercial uses for plant growth regulators.

Objective 9 Propagate floriculture and greenhouse crops.

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. Demonstrate techniques for sowing seed.
8. Describe optimal conditions for asexual propagation.
9. Demonstrate techniques used to propagate plants by cuttings, division, separation, and layering.
10. Transplant greenhouse plant materials.
11. Compare and contrast annual, biennial, and perennial plants.
12. Compare and contrast plants that are either monocots or dicots

Objective 10 Grow greenhouse crops.

1. Plan a growing schedule to maximize the production of the greenhouse facility.
2. Explain the importance of proper spacing of greenhouse crops and recommended spacing practices.
3. Select the appropriate container and medium for a greenhouse crop.
4. Explain the purposes for pinching greenhouse crops and the techniques used.
5. Describe disbudding procedures.
6. Demonstrate proper watering techniques.
7. Demonstrate production of potted flowering crops.
8. Demonstrate production of bulb crops.
9. Demonstrate production of bedding plants.
10. Demonstrate production of foliage plants.

Objective 11 Discuss pest management techniques.

1. Identify categories of pests (e.g., weeds, insects, fungi, etc.).
2. Explain best management practices while maintaining environmental integrity.
3. Discuss alternative pest control techniques.
4. Demonstrate safe practices in selecting, applying, storing, and disposing of chemicals.
5. Explain integrated pest management (IPM).

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

Standard 4 - Greenhouse Business Concepts

Candidates will explain greenhouse business concepts

Objective 1 Price greenhouse crops.

1. Calculate the costs for greenhouse crops.
2. Assess typical pricing strategies.
3. Calculate mark-up.

Objective 2 Prepare greenhouse crops for sale

1. Clean plants and containers.
2. Decorate plants and containers.
3. Attach price tags and care instructions.

Objective 3 Explain the basics of marketing in the greenhouse industry.

1. Display greenhouse crops for sale.
2. Recognize ways of maintaining and increasing the effectiveness of horticultural business displays.
3. Recognize how advertising is used.
4. Complete sales tickets.
5. Use proper telephone techniques.
6. Describe effective packaging and delivery.

Objective 4 Describe greenhouse business management.

1. Differentiate the types of greenhouse businesses.
2. Recognize costs related to production.
3. Analyze the importance of marketing, promotion, and sales.

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

Performance Skills Evaluation

Exam name: Greenhouse Management

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

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

Pass:

Standard 2 – Work-Based Learning (SAE)

- Candidate 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 – *Standard name*

- Propagate plants using both seed and cuttings.
- Perform typical plant maintenance including, transplanting, watering, pinching, and disbudding.
- Develop a growing schedule to maximize the production of a greenhouse facility.
- Candidate will prepare greenhouse plants for sale.

Pass:

Standard 4 – *Standard name*

- Candidate will calculate the cost of greenhouse crops.
- Candidate will calculate mark-up.
- Candidate will prepare greenhouse crops for sale.

Pass:

Evaluator Name:

Date:
