

Horticulture

Study Guide

Assessments:

6205 Introduction to Horticulture

6201 Florist Assistant

6202 Nursery Technician

Aligned with the National
Agriculture, Food & Natural
Resource (AFNR) Cluster Content
Standards, Environmental Service
Systems (ESS), and Natural
Resource Systems (NRS)

Endorsed by the Oklahoma
Turfgrass Research Foundation,
Oklahoma Nursery & Landscape
Association, Oklahoma Greenhouse
Growers Association, and
Oklahoma State Florist Association

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Overview

This study guide is designed to help students prepare for the following Horticulture assessments: Introduction to Horticulture, Florist Assistant, and Nursery Technician. It not only includes information about the assessments, but also the skills standards upon which the assessments are based and test taking strategies. The assessments measure a student's ability to apply knowledge of the skills necessary for success in the horticulture industry.

Each of the four sections in this guide provides useful information for students preparing for the Horticulture assessments.

- CareerTech and Competency-Based Education: A Winning Combination
- Horticulture assessments
 - ▶ Assessment Information
 - ▶ Standards and Test Content
 - ▶ Sample Questions
 - ▶ Abbreviations, Symbols, and Acronyms
- Strategies for Test Taking Success
- Notes

This assessment's standards are aligned with those of Agriculture, Food and Natural Resources (AFNR). 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 these standards, go to: **www.ffa.org/thecouncil/Documents/finalafnrstandardsv324609withisbn_000.pdf**.

The Florist Assistant and Nursery Technician assessments are endorsed by the Oklahoma Turfgrass Research Foundation (OTRF), the Oklahoma Nursery & Landscape Association (ONLA), the Oklahoma Greenhouse Growers Association, and the Oklahoma State Florist Association (OSFA).

The OTRF helps the Oklahoma State University conduct turfgrass research and educates the members of OTRF in all turfgrass areas. The OTRF conducts a research and scholarship tournament to raise funds for research and scholarships. For more information about the OTRF, go to **<http://www.otrf.net/>**.

The ONLA offers education, networking, and resources to various businesses of the green industry. The ONLA also presents events and member benefits to fulfill business needs. More information about the ONLA can be found at **www.oknla.org/custom/index.php**.

The OSFA represents retail florists, designers, suppliers, and students in the floral industry. Also represented by membership are event planners, interior designers, greenhouses, and other floral-related fields. To learn more about the OSFA, visit **www.osfa.org/**.

Disclaimer

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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 work force.

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.

Certification 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, certification 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.

Certification assessments provide a means of evaluating the student's mastery of knowledge and skills. Coaching reports communicate 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.

Horticulture Assessment Information

What are the Horticulture assessments?

The Introduction to Horticulture, Florist Assistant, and Nursery Technician assessments are end-of-program assessments for students in Horticulture programs. The assessments provide an indication of student mastery of basic knowledge and concepts necessary for success in careers in this area.

How were the assessments developed?

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

The Introduction to Horticulture assessment is aligned with the Agriculture, Food & Natural Resource (AFNR) Cluster Content Standards.

The Florist Assistant and Nursery Technician assessments are endorsed by the Oklahoma Turfgrass Research Foundation (OTRF), Oklahoma Nursery & Landscape Association (ONLA), Oklahoma Greenhouse Growers Association, and Oklahoma State Florist Association (OSFA).

The committee assigned frequency and criticality ratings to each skill, which determines the significance of each task for test development:

Frequency: represents how often the task is performed on the job. Frequency rating scales vary for different occupations. The rating scale used in this publication is presented below:

1 = less than once a week 2 = at least once a week 3 = once or more a day

Criticality: denotes the level of consequence associated with performing a task incorrectly. The rating scale used in this publication is presented below:

1 = slight 2 = moderate 3 = extreme

What do the assessments cover?

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

Introduction to Horticulture (75 questions)

Life Knowledge and Cluster Skills	33%
Environmental Service Systems	4%
Natural Resource Systems	3%
Plant Systems	60%

Florist Assistant (55 questions)

Demonstrate Employability Skills	9%
Care for and Handle Flowers and Foliage	22%
Care for and Handle Flowering and Foliage Plants	16%
Design and Construct Floral Patterns	20%
Sell the Product	13%
Deliver Products	13%
Maintain Store	7%

Nursery Technician (55 questions)

Demonstrate Employability Skills	5%
Prepare Soil and Growing Media	4%
Propagate Horticultural Plants	7%
Grow Plants	7%
Control Disease, Weeds and Pests	7%
Irrigate Horticultural Crops	2%
Harvest Plants Duty	5%
Store, Ship, Take Inventory, and Maintain Merchandise	5%
Sell Horticultural Products	5%
Operate Equipment	4%
Maintain and Repair Equipment and Facilities	5%
Monitor and Operate Environmental Controls	2%
Plant Identification	4%

What are the benefits of using these assessments?

Students receive a 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 assessments be taken?

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

Are the assessments timed?

No. However, most students 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 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 **AA** 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. Students 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?

Students may retake the test unless their school or state testing policies prohibit retesting. Students who can retest must wait at least three days between test attempts.



Standards and Test Content Introduction to Horticulture

Live Knowledge and Cluster Skills (25 questions)

1. Use proper safety practices/personal protective equipment.
2. Research applicable regulatory and safety standards (e.g., MSDS, bioterrorism).
3. Handle chemicals and equipment in a safe and appropriate manner.
4. Identify standard tools, equipment, and safety procedures related to a specific task.
5. Set up/adjust tools and equipment related to complete a specific task.
6. Demonstrate appropriate operation, storage, and maintenance techniques for tools and equipment.
7. Use the appropriate procedures for the use and operation of specific tools and equipment.
8. Describe the conditions that cause the need for tool maintenance.

Environmental Service System (3 questions)

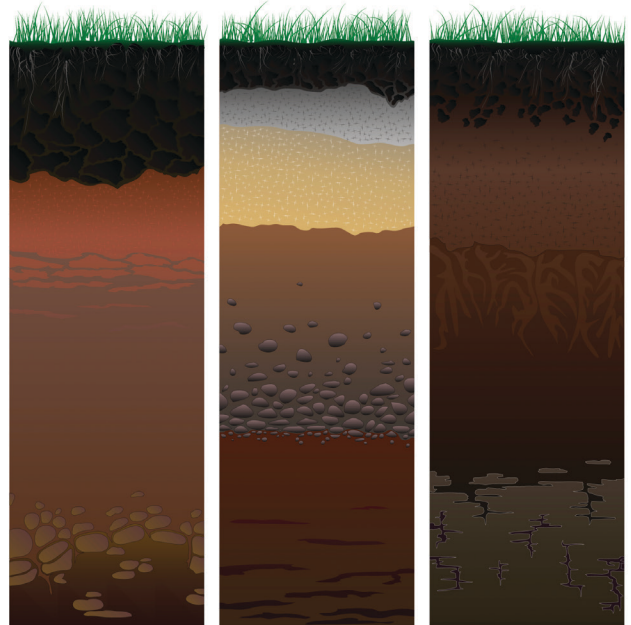
1. Explain the process of soil formation through weathering.
2. Explain how the physical qualities of the soil influence the infiltration and percolation of water.

Natural Resource Systems (2 questions)

1. Demonstrate techniques used to identify rock, mineral and soil types.
2. Identify rock, mineral and soil types.

Plant Systems (45 questions)

1. Explain systems used to classify plants.
2. Compare and contrast the hierarchical classification of agricultural plants.
3. Describe the morphological characteristics used to identify agricultural plants.
4. Identify agriculturally important plants by common names
5. Diagram a typical plant cell and identify plant cell organelles and their functions
6. Identify the components, the types and the functions of plant roots.
7. Identify the components and the functions of plant stems



8. Discuss leaf morphology and the functions of leaves
9. Explain how leaves capture light energy and allow for the exchange of gases.
10. Identify the components of a flower, the functions of a flower and the functions of flower components.
11. Explain the functions and components of seeds and fruit.
12. Explain the basic process of photosynthesis and its importance to life on Earth.
13. Explain cellular respiration and its importance to plant life.
14. Identify the five groups of naturally occurring plant hormones and synthetic plant growth regulators.
15. Identify the plant responses to plant growth regulators and different forms of tropism
16. Identify the major components of growing media and describe how growing media support plant growth.
17. Identify the categories of soil water
18. Discuss how soil drainage and water-holding capacity can be improved
19. Identify the essential nutrients for plant growth and development and their major functions
20. Describe nutrient deficiency symptoms and recognize environmental causes of nutrient deficiencies
21. Identify fertilizer sources of essential plant nutrients, explain fertilizer formulations, and describe different methods of fertilizer application.
22. Calculate the amount of fertilizer to be applied and calibrate equipment to apply the prescribed amount of fertilizer.
23. Explain pollination, cross-pollination and self-pollination of flowering plants.
24. Demonstrate sowing techniques and provide favorable conditions for seed germination
25. Handle seed to overcome seed dormancy mechanisms and to maintain seed viability and vigor
26. Describe optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation and layering.
27. Demonstrate proper procedures in budding or grafting selected materials.
28. Explain the importance of starting with pest-and disease-free propagation material.
29. Explain the reasons for preparing growing media before planting.
30. Demonstrate proper planting procedures and post-planting care.
31. Observe and record environmental conditions during the germination, growth and development of a crop.
32. Explain the reasons for controlling plant growth.
33. Demonstrate proper techniques to control and manage plant growth through mechanical, cultural or chemical means.
34. Identify types of plant pests and disorders.
35. Identify major local weeds, insect pests and infectious and noninfectious plant diseases.
36. Describe damage caused by plant pests and diseases.
37. Describe pest control strategies associated with integrated pest management.

38. Describe types of pesticide controls and formulations.
39. Explain risks and benefits associated with the materials and methods used in plant pest management.
40. Explain procedures for the safe handling, use and storage of pesticides.
41. Identify storage methods for plants and plant products.
42. Explain the proper conditions to maintain the quality of plants and plant products held in storage
43. Define design and identify design elements.
44. Explain design elements of line, form, texture and color and express the visual effect each has on the viewer.
45. Discuss the applications of art in agriculture/horticulture.



Standards and Test Content

Florist Assistant

Demonstrate Employability Skills (5 questions)

1. Maintain a courteous and responsive attitude toward all customers and co-workers **(3/3)**
2. Demonstrate professionalism (dress code, attendance, initiative, telephone etiquette, etc.) **(3/3)**
3. Compose written communication legibly using correct grammar, spelling, and format **(2/3)**
 - Career development documents
4. Interpret and follow written and oral directions **(3/3)**
5. Use basic keyboarding and computer skills **(3/3)**
6. Respond appropriately to compliments, complaints, conflicts, and criticism **(3/3)**
7. Apply customer relation skills **(3/3)**

Care For and Handle Cut Flowers and Foliage (12 questions)

1. Receive and unpack cut flowers and floral products without damaging **(2/3)**
2. Store flowers for maximum shelf life **(3/3)**
3. Utilize techniques to avoid problems of fresh cut flowers **(3/3)**
4. Cut flowers under warm water and place into appropriate storage solution in clean containers **(3/3)**
5. Place rehydrated flowers in refrigerator after reaching the preferred stage of maturity **(3/3)**
 - Hardening
6. Answer customer questions and outline care instructions **(2/3)**
7. Identify, spell, and pronounce correctly the common names for the most used cut flowers and greens **(3/3)**
 - Flowers
 - Anthurium
 - Carnation
 - Chrysanthemum
 - Daffodil
 - Gerbera
 - Gladiolus
 - Gypsophila
 - Stephanotis
 - Iris
 - Orchid
 - Orchid
 - Rose
 - Snapdragon
 - Stock
 - Tulip



- Cut Greens
 - Asparagus
 - Eucalyptus
 - Huckleberry
 - Leatherleaf
 - Podocarpus
 - Salal
 - Scotch Broom

Care for and Handle Cut Flowering Foliage Plants (9 questions)

1. Receive and unpack plants and merchandise without damaging **(2/3)**
2. Identify and report disease and insect damage -Names of common pests **(3/3)**
3. Select and prepare potted plants for sale **(2/2)**
4. Identify proper care requirements for flowering and foliage plants (water, light, shelf life, temperature, etc.) **(3/3)**
5. Answer customer questions regarding care **(2/3)**
6. Identify, spell, and pronounce types of plants **(3/3)**
 - Flowering bulb plants
 - Daffodil
 - Hyacinth
 - Lily
 - Tulip
 - Non-bulb cool season flowering plants
 - Calceolaria
 - Christmas Cactus
 - Cineraria
 - Cyclamen
 - Gloxinia
 - Poinsettia
 - Primula
 - Non-bulb cool season flowering plants
 - Aglaonema
 - Croton
 - Dieffenbachia
 - Dracaena
 - Fern
 - Ficus
 - Nephthytis
 - Spathiphyllum
 - Schefflera
 - Philodendron
 - Palm

Design and Construct Floral Patterns (11 questions)

1. Select components to create a pattern to complete an idea or theme **(2/2)**
2. Calculate an accurate cost and price of each product used in arrangements **(2/3)**
3. Perform assembly line techniques used during peak holidays and special occasions **(2/3)**
4. Design floral arrangements using symmetrical, asymmetrical, and round techniques **(3/3)**
 - Principles and elements of design
 - Forms and techniques
5. Make boutonnieres and corsages **(3/3)**
6. Make single flower arrangements in a bud vase **(3/3)**

7. Arrange multiple flowers (dozens and half dozens) in a vase **(3/3)**
8. Make funeral sprays and sympathy arrangements **(2/3)**
9. Understand basic mechanics of wiring and taping flowers **(3/3)**
 - Piercing
 - Straight-wire
 - Hairpin
 - Hook-wire
10. Understand and use different sizes and weights of ribbons **(3/3)**

Sell the Product (7 questions)

1. Complete orders and invoice forms and follow correct procedures for collecting payment **(2/3)**
2. Provide prompt service to customers and be attentive to their needs **(3/3)**
3. Be able to suggest appropriate products for different occasions and explain the price structure of those products **(3/3)**
4. Explain the price and payment to the customer **(3/3)**
5. Write and attach enclosure card **(3/3)**
6. Sell products and services on the telephone **(3/3)**
7. Use pricing procedure for wire orders **(2/3)**
8. Use directory for selling products for wire out **(3/3)**
9. Complete a floral wire service order **(2/3)**
10. Discuss quality and care of products with the customer **(3/3)**
11. Discuss techniques of good salesmanship **(3/3)**

Deliver Products (7 questions)

1. Use in-town delivery procedures and prepare related paperwork **(2/2)**
2. Use delivery aids **(3/3)**
3. Check product for overall quality before delivery **(3/3)**
4. Package orders for delivery **(3/3)**
5. Load delivery vehicle **(3/3)**
6. Deliver products on time **(3/3)**
7. Discuss how delivery procedures differ depending upon destination **(3/3)**
 - Hospitals
 - Funeral homes
 - Hotels
 - Parties
 - Event flowers

Maintain Store (4 questions)

1. Check received merchandise against invoice listing **(2/3)**
 - Cost of freight
 - Breakage
 - Boxing charges
2. Store received products and supplies and rotate as necessary **(2/3)**
3. Maintain current inventory of products **(2/3)**
4. Stock shelves, gondolas, and counter tops with merchandise **(2/3)**
5. Discuss displays **(2/2)**



Standards and Test Content Nursery Technician

Demonstrate Employability Skills (3 questions)

1. Read, maintain, and follow schedule (responsible, arrive on time) **(3/3)**
2. Dress appropriately **(2/2)**
3. Demonstrate an enthusiastic attitude **(1/1)**
4. Interpret and follow written and oral directions **(3/3)**
5. Use proper telephone skills **(2/2)**
6. Use customer service skills **(2/2)**
7. Determine daily assignments **(2/2)**
8. Train other employees **(1/1)**
9. Maintain a courteous and responsive attitude toward all customers and co-workers **(3/3)**



Prepare Soil and Growing Media (2 questions)

1. Pasteurize growing media **(3/3)**
2. Sterilize media with chemical soil sterilant **(3/3)**
 - Heat
 - Steam
 - Chemical
 - Biological
3. Mix growing media **(3/3)**
 - Media components
 - Breaking down a media recipe
4. Adjust pH of growing media **(2/2)**
 - Acidity
 - Alkalinity
 - Nutrient availability
 - Optimum level of pH in plants
5. Incorporate fertilizer into growing media **(3/3)**
 - Macronutrients (nitrogen, phosphorus, potassium)
 - Organic and inorganic
 - Soil testing
6. Store growing media **(2/2)**
 - Procedures to prevent contamination
 - Sanitation

Propagate Horticultural Plants (4 questions)

1. Sow, stratify, and scarify seeds **(3/2)**
2. Harden off seedlings **(3/2)**
3. Transplant seedlings **(3/2)**
4. Take cuttings **(3/3)**
5. Apply root hormones **(3/3)**
 - Dusting
 - Dipping
 - Spraying
6. Stick cuttings in medium **(2/1)**
 - Sand
 - Vermiculite
7. Harden off cuttings **(2/3)**
8. Propagate plants using air layering **(2/2)**
9. Propagate plants by division **(3/3)**
10. Operate mist system **(3/3)**
11. Label stock plants and cuttings **(3/3)**
12. Plant shrubs and trees **(3/3)**
 - Bare-root
 - Container
 - Burlap

Grow Plants (4 questions)

1. Transplant bare-root plants or liners **(3/2)**
2. Prune plants **(2/3)**
3. Pot plants **(3/3)**
4. Label plants **(3/3)**
5. Disbud plants **(2/2)**
6. Stake plants **(2/2)**
7. Pinch plants **(2/2)**
8. Fertilize plants **(2/2)**
9. Establish plant spacing **(3/3)**
 - Competition for light, water, nutrients, and spacing
 - Effects of insufficient spacing
10. Regulate plant photoperiod **(2/3)**
11. Apply growth regulator to crops **(2/2)**
12. Plant and force bulbs, corms, tubers, and tuberous roots **(2/2)**
 - Selection
 - Growing environments
13. Determine plant watering needs **(3/3)**

Control Disease, Weeds, and Pests (4 questions)

1. Demonstrate safe handling, storage, and application of pesticides **(3/3)**
2. Demonstrate first aid treatment for pesticides **(1/3)**
3. Clean spray equipment after use **(3/3)**
4. Read and interpret label **(3/3)**
5. Recognize and remove weeds from potted plants **(2/2)**
6. Remove weeds with power tools **(2/2)**
7. Control weeds around the premises **(2/2)**
8. Discuss greenhouse fumigation **(1/3)**
9. Treat bulbs or corms to control insects or diseases **(1/2)**
10. Scout for disease, insect problems, and unhealthy plants **(3/3)**
 - Insect and non-insect related damage
 - Removal of diseased or infested plants
 - Identify diseases found
11. Apply mulches **(2/2)**
 - Reasons for mulching
 - Varieties of mulches
12. Discuss Private Applicator's License **(2/2)**



Irrigate Horticultural Crops (1 question)

1. Irrigate field and container-grown plants **(3/3)**
 - Methods
 - Tools
2. Discuss irrigation systems **(2/2)**

Harvest Plants (3 questions)

1. Collect, label, clean, and store seeds **(1/1)**
2. Discuss ball trees and shrubs **(1/1)**
 - Manual vs. mechanical
3. Select and prepare plant materials for shipment **(3/2)**
4. Grade plant materials **(1/2)**
 - Recognize problems
 - Quality control and plant damage
5. Inventory plants **(3/3)**
 - Recordkeeping
 - Availability of product
6. Groom plants for sale **(3/3)**
 - Remove dead leaves
 - Pinching
 - Pruning
7. Load and move potted plants to parking area or house **(2/2)**

Store, Ship, Take Inventory, and Maintain Merchandise (3 questions)

1. Prepare beds for winter storage of plant materials **(2/2)**
 - Heeling in methods
 - Cold frames
 - Microfoam and mulching
 - Temperature control
 - Moisture regulation
2. Check received merchandise and plant materials against invoice listings **(3/3)**
 - Quality and numbers
 - Insects and disease
3. Keep current inventory of products **(3/3)**
4. Load delivery vehicle
 - Proper loading and handling techniques **(3/3)**
 - Wind protection
 - Sequence the drops
5. Deliver products to customer **(3/3)**
 - Being on time
 - Representing the company
 - Quality of service
 - Driving record

Sell Horticultural Products (3 questions)

1. Use good customer relations **(3/3)**
2. Interpret warranties and guarantees for customers **(3/3)**
 - Understand company policy
3. Build (counter and table-top) displays **(1/1)**
 - Facing shelves
4. Build exterior displays **(1/1)**
 - Basic marketing
5. Design and letter show cards **(1/1)**
6. Present sales information to customer **(3/3)**
7. Prepare sales invoice **(2/3)**
 - Write legibly
8. Deliver products to customer **(2/2)**
9. Price horticultural products **(1/1)**
 - Basic understanding of profit
 - Calculate standard markups, markdowns, and profit
10. Operate cash register **(3/3)**
 - Make change

Operate Equipment (2 questions)

1. Edge a sidewalk with edger (1/1)
2. Rake leaves with a blower (1/1)
3. Prepare soil with rotary tiller (1/1)
4. Mow grass with a mower (rotary or reel-type) (2/2)
5. Cut grass with string trimmer (2/2)
6. Compact a newly seeded or sodded lawn with roller (2/2)
7. Aerate sod (2/3)
8. Maintain equipment (2/3)
9. Clean and lubricate equipment (2/3)
 - Check oil, battery, radiator, air cleaner, tire pressure
10. Wear proper attire while operating equipment (3/3)
 - Safety guard

Maintain and Repair Equipment and Facilities (3 questions)

1. Store flammable materials (2/3)
2. Prepare equipment for winter storage (1/2)
 - Clean, repair, repaint
3. Construct temporary growing structures (2/2)
4. Sharpen hand tools and blades (2/2)
5. Perform preventative maintenance on equipment (2/3)
6. Perform minor engine tune-up (1/2)
7. Service engine, oil, and filters (1/1)
8. Clean work area (3/3)
9. Dispose of waste materials (1/3)
10. Clean and lubricate equipment (3/3)
11. Maintain pesticide application equipment (2/2)
 - Certification requirements
12. Discuss growing structure heating and cooling systems (3/3)
13. Order repair parts for equipment (1/1)
 - Locate model number and serial number
 - Identify parts for ordering



Monitor and Operate Environmental Controls (1 question)

1. Monitor automatic devices to control greenhouse temperature, humidity, and ventilation **(3/3)**
2. Install heating cables or mats **(1/3)**
3. Discuss shade and black cloth **(2/2)**

Plant Identification (22 questions)

1. Properly identify the following cut flowers and foliage: **(3/3)**
 - Alstroemeria
 - Baby's breath
 - Bird of Paradise
 - Carnation
 - Cattleya orchid
 - Chrysanthemum
 - Chrysanthemum, Pompon
 - Cymbidium
 - Daffodil
 - Delphinium
 - Eucalyptus
 - Fern, Flat
 - Fern, Leatherleaf or Baker's
 - Gardenia
 - Gerbera Daisy
 - Gladiola
 - Heather
 - Huckleberry
 - Iris
 - Lemon Leaf or Salal
 - Marguerite Daisy
 - Plumosa
 - Protea
 - Ranunculus
 - Rose, Hybrid Tea
 - Rose, Floribunda or Sweetheart
 - Rubrum Lily
 - Scotch Broom
 - Snapdragon
 - Statice, seafoam
 - Stephanotis
 - Tulip
2. Properly identify the following deciduous trees: **(3/3)**
 - Ash, Green
 - Birch, River
 - Crabapple, Flowering
 - Cypress, Bald
 - Dogwood, Flowering
 - Elm, Lacebark
 - Goldenrain Tree
 - Honeylocust, Thornless
 - Maple, Silver
 - Maple, Sugar
 - Oak, Pin
 - Oak, Water
 - Pear, Bradford
 - Pistache, Chinese
 - Purple-leaved Plum
 - Redbud, Eastern
 - Russian Olive
 - Sweetgum, American
 - Sycamore or American Plane Tree
 - Weeping willow
3. Properly identify the following deciduous shrubs: **(3/3)**
 - Althea, or Rose-of-Sharon
 - Barberry, Japanese
 - Crape Myrtle
 - "Crimson Pygmy" Barberry
 - Euonymus, Winged
 - Flowering Quince
 - Forsythia or Golden Bell
 - French Hybrid Lilac
 - Honeysuckle, Tatarian
 - Jasmine, Winter
 - Lilac, Persian
 - "Linwood Gold" Forsythia
 - Persian Lilac
 - Potentilla
 - Privet
 - Roses
 - Spirea, Anthony Waterer

4. Properly identify the following evergreens: **(3/3)**

- Arborvitae, Oriental
- Cedar, Atlas
- Cedar, Incense
- Creeping Juniper
- Juniper, Chinese
- Juniper, Rocky Mountain
- Pine, Austrian
- Pine, Mugo
- Pine, Scotch
- Pine, Ponderosa
- Pine, Slash
- Red Cedar, Eastern
- Spruce, Colorado Blue

5. Properly identify the following broad-leaved evergreen trees: **(3/3)**

- Holly, American
- Laurel, Cherry
- Magnolia, Southern
- Oak, Live

6. Properly identify the following garden annuals: **(3/3)**

- Ageratum
- Alyssum
- Amaranthus
- Balsam (Lady's Slipper)
- Begonia
- Bells of Ireland
- Browallia
- Calendula
- Calliopsis
- Capisium (Ornamental pepper)
- Carnation (annual)
- Castor Bean
- Celosia (Cockscomb)
- Centaurea (Cornflower)
- Chrysanthemum (annual)
- Cleome (Spiderflower)
- Coleus
- Cosmos
- Dianthus (annual pinks)
- Dusty Miller
- Gaillardia (annual)
- Geranium (seed)
- Gomphrena (Globe Amaranth)
- Helichrysum (Strawflower)
- Impatiens (Sultana)
- Lobelia
- Marigold
- Matricaria (Feverfew)
- Nasturtium
- Nicotiana (Flowering tobacco)
- Nierembergia (Cupflower)
- Pansy
- Periwinkle
- Petunia
- Phlox, Drummond (annual)
- Portulaca (Rose Moss)
- Rudbeckia (Coneflower)
- Salvia
- Scabiosa (Pincushion flower)
- Snapdragon
- Sweet peas
- Verbena
- Zinnia

7. Properly identify the following garden biennials: **(3/3)**

- Foxglove
- Hollyhock
- Lunaria (Money plant)
- Sweet William



8. Properly identify the following flowering perennials: **(3/3)**

- Alyssum (perennial)
- Asclepias (Butterfly flower)
- Candytuft Evergreen
- Canna
- Columbine
- Coreopsis
- Chrysanthemum
- Daylily
- Gaillardia
- Hibiscus (Rose Mallow)
- Hosta
- Iris, Bearded or German
- Liatris
- Lilly
- Peony
- Poppy
- Phlox (Summer)
- Phlox (Creeping)
- Pinks
- Red Hot Poker
- Rudbeckia
- Salvia (Farinacea) (Nemorosa)

9. Properly identify the following ground covers and vines: **(3/3)**

- Ajuga
- Andorra Juniper
- Bishop's Weed
- Boston Ivy
- Chinese Wisteria
- Euonymus Coloratus
- English Ivy
- Gray Santolina
- Gray Sedum
- Japanese Garden Juniper
- Liriope
- Monkey Grass –Liriope
- Mondo Grass –Ophiopogon
- Moneywort
- Pachysandra
- Potentilla
- Purple Leaf Winter Creeper Euonymous
- Santolina
- Sedum
- Variegated Liriope
- Vinca Major
- Vinca Minor

10. Properly identify the following bulbs: **(3/3)**

- Crocus
- Daffodils
- Hyacinth
- Jonquils
- Narcissus
- Tulips

11. Properly identify the following trees: **(3/3)**

- Amur Maple
- Bald Cypress
- Bradford Pear
- Chinese Pistache
- Crape Myrtle
- Flowering Crabapple
- Flowering Dogwood
- Fruitless Mulberry
- Green Ash
- Goldenrain Tree
- Japanese Maple
- Lacebark Elm
- Live Oak
- Newport Plum
- Redbud
- Red Maple
- Red Oak
- River Birch
- Russian Olive
- Southern Magnolia
- Sugar Maple
- Sweetgum
- Sycamore
- Water Oak
- Yaupon Holly

12. Properly identify the following broadleaved evergreen shrubs: **(3/3)**

- Azalea
- Burford Holly
- “Carissa” Holly
- Dwarf Chinese Holly
- Dwarf Yaupon Holly
- Dwarf nandina
- “Emerald Gaiety” Euonymous
- Fraser’s Photinia
- Glossy Abelia
- Gold Dust Aucuba
- “Gold Spot” Euonymous
- Green Euonymous
- Japanese Boxwood
- “Manhattan” Euonymous
- Nandina
- “Victory” Pyracantha

13. Properly identify the following conifers: **(3/3)**

- Austrian Pine
- Canaerti Juniper
- Colorado Blue Spruce
- Compact Andorra Juniper
- Dwarf Alberta Spruce
- Pyramidal Arborvitae
- Pfitzer Juniper
- Scotch Pine
- Slash Pine



Sample Questions

- _____ 1. What structure gives a cell its shape?
- a. chromosome
 - b. cytoplasm
 - c. membrane
 - d. nucleus
- _____ 2. Which root system has one major root that is larger than the rest?
- a. adventitious
 - b. fibrous
 - c. taproot
 - d. xylem
- _____ 3. A leaf arrangement that has three or more leaves radiating from a node is described as:
- a. bipinnate.
 - b. pinnate.
 - c. trifoliate
 - d. whorled
- _____ 4. The stem of a leaf is referred to as the:
- a. cuticle.
 - b. midrib.
 - c. petiole.
 - d. stoma.
- _____ 5. The fertilized egg of a new plant is referred to as the:
- a. embryo.
 - b. ovary.
 - c. spore.
 - d. seed.
- _____ 6. What is an example of inorganic matter?
- a. compost
 - b. pine bark
 - c. sphagnum moss
 - d. vermiculite

- _____ 7. Which type of pollination occurs when one flower is pollinated with another flower that has different characteristics?
- a. asexual
 - b. closed
 - c. cross
 - d. self
- _____ 8. What is the older growth of a woody plant called?
- a. hardwood
 - b. bark
 - c. semi-softwood
 - d. softwood
- _____ 9. What is the most common cause of plant death?
- a. improper humidity
 - b. improper watering
 - c. too little light
 - d. too much light
- _____ 10. What range of humidity is ideal for plants?
- a. 10-30%
 - b. 20-40%
 - c. 30-60%
 - d. 60-80%



Sample Questions — Key

1. What structure gives a cell its shape?

- a. chromosome **Incorrect**
- b. cytoplasm **Incorrect**
- c. membrane **Correct**
- d. nucleus **Incorrect**

2. Which root system has one major root that is larger than the rest?

- a. adventitious **Incorrect**
- b. fibrous **Incorrect**
- c. taproot **Correct**
- d. xylem **Incorrect**

3. A leaf arrangement that has three or more leaves radiating from a node is described as:

- a. bipinnate. **Incorrect**
- b. pinnate. **Incorrect**
- c. trifoliate **Incorrect**
- d. whorled **Correct**

4. The stem of a leaf is referred to as the:

- a. cuticle. **Incorrect**
- b. midrib. **Incorrect**
- c. petiole. **Correct**
- d. stoma. **Incorrect**

5. The fertilized egg of a new plant is referred to as the:

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- a. 10-30% **Incorrect**
- b. 20-40% **Incorrect**
- c. 30-60% **Correct**
- d. 60-80% **Incorrect**

Abbreviations, Symbols and Acronyms

The following is a list of abbreviations, symbols, and acronyms used in the Horticulture study guide and on the Introduction to Horticulture, Florist Assistant, and Nursery Technician assessments.

&	And
°	Degree
"	Inches
#	Number
%	Percent
AFNR	National Agriculture, Food & Natural Resource
ESS	Environmental Service Systems
F	Fahrenheit
Fe	Iron
GPS	Global Positioning System
IEP	Individualized Education Plan
lb	Pound
K	Potassium
MSDS	Material Safety Data Sheet
N	Nitrogen
N	Nitrogen
NRS	Natural Resource Systems
ONLA	Oklahoma Nursery & Landscape Association
OSFA	Oklahoma State Florist Association
OTRF	Oklahoma Turfgrass Research Foundation
P	Phosphorus
SBAE	School-based agricultural education
The Council	National Council for Agricultural Education

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.



