



## AGRICULTURE

**COURSE:** Exploring Agriculture Education

**UNIT 3:** Going Green in Horticulture and Plant Science

### INTRODUCTION

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**Annotation:**

This unit includes lessons on the four areas of the horticulture industry, and plant science, careers in horticulture, and plant nomenclature.

**Grade(s):**

X	6 <sup>th</sup>
	7 <sup>th</sup>
	8 <sup>th</sup>

**Time:**

Ten fifty minute class periods

**Author:**

Rhonda Stone

**Students with Disabilities:**

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided appropriately. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation. Many students (both with and without disabilities) who struggle with reading may benefit from the use of text reading software or other technological aids to provide access to printed materials. Many of these are available at little or no cost on the internet.

## FOCUS STANDARDS

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### GPS Focus Standards:

#### MSAGED6-5

**Express knowledge of the area of horticulture.**

- a) Define Horticulture.
- b) Compare / contrast the horticulture and agriculture industry.
- c) Identify the four areas of the horticulture industry: Floriculture, Olericulture, Nursery/Landscape, Pomology

### GPS Academic Standards:

#### M6D2

**Students will use experimental and simple theoretical probability and will understand the nature of sampling. They will also make predictions from investigations.**

#### M6M2

**Students will use appropriate units of measure for finding length, perimeter, area, and volume and will express each quantity using the appropriate unit.**

## UNDERSTANDING & GOALS

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### Enduring Understandings:

- Horticulture is an important part of agriculture. The four major areas of horticulture provide numerous career opportunities.

### Essential Questions:

- What is horticulture?
- What are some horticultural careers?
- How do plants grow?
- What do plants need to grow?
- What are the parts of the plant?
- What parts of the plant do we eat?
- How is math used for statistical analysis of plant diseases in nurseries?

### Knowledge from this Unit:

Students will be able to:

- Describe the scope of the horticulture industry.
- Identify the parts of the plant.
- Identify the edible parts of plants.
- Explain plant nutrition.
- Describe the process of photosynthesis.

## ASSESSMENTS

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### Assessment Method Type:

- Pre-test
- Objective assessment - multiple-choice, true- false, etc.
  - Quizzes/Tests
  - Unit test
- Group project
- Individual project
- Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
  - Self-check rubrics
  - Self-check during writing/planning process
  - Journal reflections on concepts, personal experiences and impact on one's life
  - Reflect on evaluations of work from teachers, business partners, and competition judges
  - Academic prompts
  - Practice quizzes/tests
- Subjective assessment/Informal observations
  - Essay tests
  - Observe students working with partners
  - Observe students role playing
- Peer-assessment
  - Peer editing and commentary of products/projects/presentations using rubrics
  - Peer editing and/or critiquing
- Dialogue and Discussion
  - Student/teacher conferences
  - Partner and small group discussions
  - Whole group discussions
  - Interaction with/feedback from community members/speakers and business partners
- Constructed Responses
  - Chart good reading/writing/listening/speaking habits
  - Application of skills to real-life situations/scenarios
- Post-test

## LESSON PLANS

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### • LESSON 1: TERMINOLOGY AND DEFINITIONS

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1. Identify the Standards. Standards should be posted in the classroom for each lesson.

#### **MSAGED6-5**

#### **Express knowledge of the area of horticulture.**

- a) Define Horticulture.
- b) Compare / contrast the horticulture and agriculture industry.
- c) Identify the four areas of the horticulture industry: Floriculture, Olericulture, Nursery/Landscape, Pomology

**M6D2**

**Students will use experimental and simple theoretical probability and will understand the nature of sampling. They will also make predictions from investigations.**

**M6M2**

**Students will use appropriate units of measure for finding length, perimeter, area, and volume and will express each quantity using the appropriate unit.**

2. Review Essential Questions. Post Essential Questions in the classroom.

- What is horticulture?
- How does horticulture differ from and compare to agriculture?
- What are some horticultural careers?
- How do plants grow?
- What do plants need to grow?
- What are the parts of the plant?
- What parts of the plant do we eat?
- How is math used for statistical analysis of plant diseases in nurseries?

3. Review the unit vocabulary.

Arborist	Germinate	Macronutrients	Pomology
Carbon Dioxide	Glucose	Micronutrients	Professor/Teacher
Embryo	Golf Course Manager	Nursery Employee	Roots
Extension Agent	Greenhouse Employee	Nursery/Landscape	Sample
Fertilization	Groundskeeper	Nutrients	Scientific Nomenclature
Fibrous	Horticultural Salesperson	Olericulture	Seed
Floriculture	Horticulture	Orchardist	Species
Florist	Interiorscaper	Ornamental Horticulture	Sprout
Flower	Landscape Designer	Oxygen	Stem
Fruit	Latin	Phloem	Taproot
Garden Center Employee	Leaves	Photosynthesis	Vegetative
Genus	Light Energy	Pollination	Xylem

4. Lead a discussion about the four areas of the horticulture industry.

- What is "horticulture?"
  - **Answer:** The culture of plants for food, comfort, and beautification purposes
- What does the term "horticulture" mean in Latin?
  - **Answer:** Garden culture
- What is "olericulture?"
  - **Answer:** The area of horticulture that involves the planting, harvesting, storing, processing and marketing of vegetable crops
- What are some examples of vegetable crops?
  - **Examples:** Sweet corn, tomatoes, lettuce
- What is "pomology?"
  - **Answer:** The area of horticulture that involves planting, harvesting, storing, processing and marketing of fruit and nut crops
- What are some examples of fruit and nut crops?
  - **Examples:** Peaches, strawberries, walnuts
- What two areas of horticulture make up ornamental horticulture?
  - **Answer:** Floriculture and nursery/landscape

- What is “floriculture?”
  - **Answer:** The area of horticulture associated with producing, transporting and using cut flowers, potted plants, and annual bedding plants
- What is “nursery/landscape horticulture?”
  - **Answer:** The production and use of plants to beautify the environment
- What is a nursery?
  - **Answer:** A place which specializes in growing and caring for plants, shrubs and ornamental trees that can later be transported to landscape areas
- What are some examples of landscape horticulture?
  - **Examples:** Designing landscapes, landscape maintenance

5. Have students complete the **Areas of Horticulture Quiz**.

- See attached supplementary files

## • **LESSON 2: COMPARE/CONTRAST HORTICULTURE AND AGRICULTURE**

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1. Review Essential Questions.

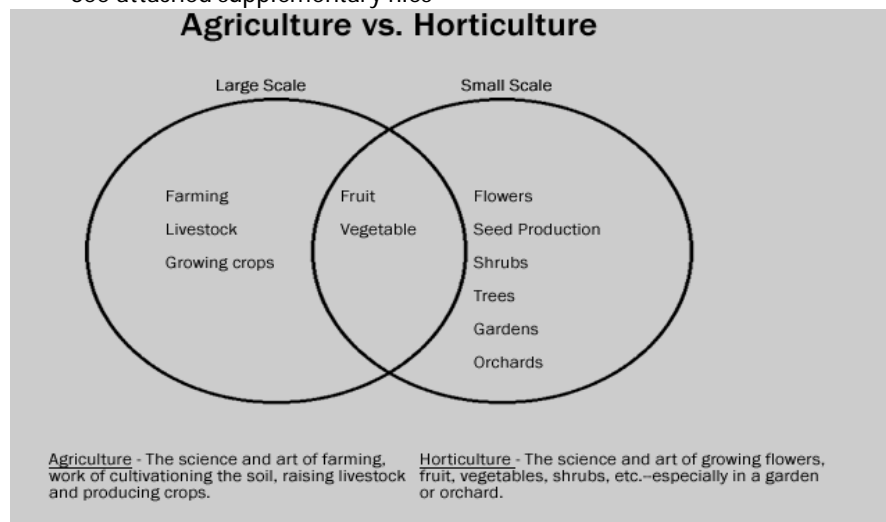
- How does horticulture differ from and compare to agriculture?

2. Lead a discussion about the two industries.

- Ask students, “What is the difference between agriculture and horticulture?”
  - **Answer:** Agriculture deals with raising livestock, cultivating the soil, and producing row crops, including some fruits and vegetables. Horticulture produces flowers, fruits, and vegetables, especially in garden or orchards.
- Is horticulture primarily large scale or small scale production?
  - **Answer:** Small scale
- Is agriculture primarily large scale or small scale production?
  - **Answer:** Large scale
- What kinds of things are produced in agriculture that are not produced in horticulture?
  - **Examples:** Cattle, wheat, cotton, pigs

3. Comparing/Contrasting Activity

- Have students complete the **Compare and Contrast Horticulture and Agriculture** worksheet.
  - See attached supplementary files



### • LESSON 3: CAREERS IN HORTICULTURE

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1. Review Essential Questions. Post Essential Questions in the classroom.
  - What are some careers in the horticulture industry?
2. I Want to Work in Horticulture!
  - Ask students, “Which of the unit vocabulary words are examples of horticulture careers?”
    - **Answer:** Landscape designer, nursery employee, florist, arborist, orchardist, golf course manager, horticultural salesperson, extension agent, groundskeeper, greenhouse employee, garden center employee, interiorscaper and professor/teacher
  - What do each of these different jobs do?
    - Have students complete the **Careers in Horticulture** handout to learn about each of the different careers.
      - See attached supplementary files
3. After students have completed the handout, lead a discussion about the careers.
  - Do you know anyone who works in horticulture?
  - Did any of these jobs interest you? Why or why not?
  - What are some places in the community that will hire you to work in horticulture?

### • LESSON 4: PLANT RESEARCH

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1. Review Essential Questions. Post Essential Questions in the classroom.
  - How are plants identified?
2. Plant Identification
  - Show the **Junior FFA Floriculture** PowerPoint presentation to the class.
    - See attached supplementary files
    - **Note:** There is a picture quiz on plant identification at the end of the PowerPoint.
  - Lead a discussion on plant identification during the PowerPoint.
    - Ask students to point out any plants that are grown at their house or are native to the area.
    - Ask students, “Which type of horticulture would this plant fall under?”
    - Instruct students to keep in mind a plant to do a research project on.
3. Plant Research Project
  - Have students choose one of the plants they saw in the PowerPoint to do a project on.
  - Using the **Flower Research Graphic Organizer**, students should research their plant and create a presentation about it for the class.
    - See attached supplementary files
  - Tell students their research presentations can include PowerPoints, posters, reports or any other creative method.

## • LESSON 5: PLANT NOMENCLATURE

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### 1. Review Essential Questions

- How do horticulturalists name plants?

### 2. Lead a discussion about nomenclature.

- Ask students, “What is nomenclature?”
- What is the difference between a genus and specie?
- If humans are called *Homo sapiens*, what part is the genus and which part is the specie?
- Why is Latin the chosen language for plant nomenclature?
- What types of things can Latin names tell us about a plant?
  - **Examples:** Color, country of origin, shape of petals and leaves
- Do we call plants by their Latin name or by a different name?

### 3. Have students complete **The Name Game** worksheet to practice using Latin nomenclature.

- See attached supplementary files

## • LESSON 6: PLANT ANATOMY

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### 1. Review Essential Questions. Post Essential Questions in the classroom.

- What are the parts of the plant?

### 2. Vegetative Plant Structures

- Review functions of each of the three vegetative structures with the class. Show pictures of the different structures to the class.
  - **Roots**
    - Roots are the portion of the plant that grow underground
    - **Functions:** Anchor the plant into the ground, absorb water, air, and nutrients from the soil
    - Types of Root Systems
      - **Taproot:** One major root is larger than the rest
        - **Example:** Carrots
      - **Fibrous:** Many very small roots that spread out into the soil
        - **Example:** Grass roots
  - **Stem**
    - **Function:** Support and transportation
    - **Xylem:** Tissue that carries water and nutrients from the roots to the leaves
    - **Phloem:** Tissue that carries nutrients from the leaves down to the roots, supplying non-nutrient producing organs and structures
  - **Leaves**
    - **Function:** Pull raw material from air, water, and soil and transform them into nutrients for the plant using photosynthesis
    - **Photosynthesis:** Process using energy from sunlight to convert water and carbon dioxide into carbohydrates and oxygen
      - Carbohydrates are stored and oxygen is released into the atmosphere

- Access [http://www.homeschoolhelperonline.com/worksheets/images/label\\_parts\\_plant.gif](http://www.homeschoolhelperonline.com/worksheets/images/label_parts_plant.gif) or <http://laika.ed.csuohio.edu/SUM00/ETE567/plants/plant.htm> to find worksheets for students to label parts of the plant.
    - Students can either label the parts on the worksheet, or draw and label a picture of the plant they researched in Lesson 4.
3. Reproductive Plant Structures
- Review functions of each of the reproductive structures with the class. Show pictures of the different structures during the review.
    - **Flowers**
      - **Function:** Pollinate, fertilize and reproduce
      - Flowers come in a variety of shapes and sizes
    - **Fruit**
      - The fruit is a mature plant ovary, or female reproductive structure
      - All flowering plants form some type of fruit during the reproduction process
        - **Examples:** Peaches, berries, pea pods, tomatoes, okra, and peppers
    - **Seed**
      - Seeds, each containing the embryo of a new plant, form inside the fruit
      - Under the right conditions, the seed will germinate
      - **Germination:** Beginning of the growth process, when the young plant sends its roots into the soil and its stem and leaves into the air
4. Plant Life Review Activities
- In order to review for the plants quiz, students can complete any of the following activities:
    - How Do Plants Grow Word Search
      - From <http://www.craftjr.com/plant-life/how-do-plants-grow-word-search/>
    - Plant Parts Worksheet
      - From <http://www.classroomjr.com/plant-life-for-kids/plant-parts-worksheet/>
    - Plant Life Worksheet
      - From <http://www.classroomjr.com/plant-life-for-kids/plant-life-worksheet/>
5. Have students complete the **Parts of a Plant Quiz**.
- See attached supplementary files
  - If students finish the quiz early, have them try their hand at raising a virtual plant using the interactive game from <http://www.sciencekids.co.nz/gamesactivities/plantsgrow.html>.

## • LESSON 7: PHOTOSYNTHESIS AND PLANT NUTRIENTS

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1. Review Essential Questions. Post Essential Questions in the classroom.
  - What nutrients do plants need to grow?
2. Photosynthesis Discussion
  - Ask students, “What is photosynthesis?”
  - Do we undergo photosynthesis? Why or why not?
  - Is photosynthesis good for the environment?
  - How does photosynthesis help a plant grow?
3. Have students complete the **Photosynthesis Worksheet**. Review the answers using the attached answer key after the class is finished.
  - See attached supplementary files

4. Photosynthesis Review Activities
  - Photosynthesis Components Worksheet
    - From <http://www.markofthepencil.com/pages/photosynthesis-worksheet.gif>
  - Photosynthesis Fun Animation game, Survive with Light Quiz, and Photosynthesis Worksheet
    - From <http://www.growingthenextgeneration.com/teachers-guide-games-explained.html>
  - Photosynthesis Interactive Game
    - From [http://earthguide.ucsd.edu/earthguide/diagrams/photosynthesis/photosynthesis\\_game.html](http://earthguide.ucsd.edu/earthguide/diagrams/photosynthesis/photosynthesis_game.html)
5. Lead a brief discussion about the nutrients plants need.
  - Which words on the unit vocabulary are examples of nutrients plants need?
  - What are the chemical symbols for these nutrients?
  - Do humans need these nutrients as well?
  - Give students the **Plant Nutrients Chart**. Have them go online and search for the symbols for each nutrient.
    - See attached supplementary files
6. Have students complete the **Plants Need Food Too** worksheet.
  - See attached supplementary files
  - **Note:** This activity can be used as an assessment.

## • LESSON 8: WHAT PART DO WE EAT?

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1. Review Essential Questions
  - What are the parts of the plant?
2. Lead a discussion about types of plants we eat.
  - Ask students, “What are the main parts of a plant?”
  - Which parts of the plants do we eat?
  - What are some examples of leaves we eat?
    - **Examples:** Spinach, lettuce
  - What are some examples of roots we eat?
    - Examples: Carrots, onions
  - What are some examples of fruits we eat?
    - Examples: Peaches, strawberries, tomatoes
3. Edible Plants Activities
  - Have students complete the **Plant Parts Chart** handout and match the type of food with the plant part it comes from.
    - See attached supplementary files
  - Let students do the **How Do Plants Grow Crossword** activity.
    - See attached supplementary files

## • LESSON 9: PARTS OF THE FLOWER

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1. Review Essential Questions. Post Essential Questions in the classroom.
  - What are the parts of the flower?
2. Discuss the parts of a flower.
  - **Stamen:** The Male Parts
    - **Anther:** Produces pollen, which is equivalent to sperm in animals
    - **Filament:** Holds up the anther to ensure insects brush past it
  - **Carpel:** The Female Parts
    - **Stigma:** Sticky female part of the flower that receives pollen
    - **Style:** Tube which takes the pollen from the stigma to the ovary
  - **Ovary:** Also in female, but not part of the carpel
    - Produces, protects and stores ovules that are ready for pollination
  - **Sepals:** Protect the bud/flower
  - **Petal:** Colored part of the flower used to attract insects
3. Practicing the Parts of a Flower
  - Have students label the **Flower Parts** worksheet.
    - See attached supplementary files
  - Give each student a **Flower Review Website** handout and instruct them to go to **<http://www.urbanext.uiuc.edu/gpe/case4/index.html>**.
    - See attached supplementary files
  - Have students complete the **Parts of the Flower Review Questions** and then review the answers.
    - See attached supplementary files

## • LESSON 10: SPROUTING SEEDS

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1. Review Essential Questions. Post Essential Questions in the classroom.
  - What are the requirements for seeds to sprout?
2. Lab Activity
  - Review the process of germination with students.
  - Using the instructions found on **<http://www.kidzone.ws/science/seeds.htm>** to let students sprout some seeds of their own and record the growth rates.

## • LESSON 11: INCORPORATING MATHEMATICS

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1. Review Essential Questions. Post Essential Questions in the classroom.
  - How is math used for statistical analysis of plant diseases in nurseries?
2. Review percentages with students by having them answer the following problems. (Some students may need calculators)
  - 25% of 300 **75**
  - 50% of 180 **90**
  - 30% of 150 **45**
  - 75% of 100 **75**

3. Have students complete the worksheet [Statistical Sampling of Plant Disease](#).
  - See attached supplementary files
4. Review the worksheet with the class.

### **Attachments for Learning Experiences:**

[Areas of Horticulture Quiz](#)

[Compare and Contrast Horticulture and Agriculture](#)

[Careers in Horticulture](#)

[Junior FFA Floriculture](#)

[Flower Research Graphic Organizer](#)

[The Name Game](#)

[Parts of a Plant Quiz](#)

[Photosynthesis Worksheet](#)

[Plant Nutrients Chart](#)

[Plants Need Food Too](#)

[Plant Parts Chart](#)

[How do Plants Grow-Crossword](#)

[Parts of the Flower Review Questions](#)

[Flower Review Website](#)

[Flower Parts](#)

[Statistical Sampling of Plant Disease](#)

### **Notes & Reflections:**



## **CULMINATING PERFORMANCE TASK**

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**Culminating Unit Performance Task Title:**

**Culminating Unit Performance Task Description/Directions/Differentiated Instruction:**

**Attachments for Culminating Performance Task:**



## **UNIT RESOURCES**

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**Web Resources:**

[http://www.homeschoolhelperonline.com/worksheets/images/label\\_parts\\_plant.gif](http://www.homeschoolhelperonline.com/worksheets/images/label_parts_plant.gif)

<http://laika.ed.csuohio.edu/SUM00/ETE567/plants/plant.htm>

<http://www.craftjr.com/plant-life/how-do-plants-grow-word-sea/>

<http://www.classroomjr.com/plant-life-for-kids/plant-parts-worksheet/>

<http://www.classroomjr.com/plant-life-for-kids/plant-life-worksheet/>

<http://www.sciencekids.co.nz/gamesactivities/plantsgrow.html>

<http://www.markofthepencil.com/pages/photosynthesis-worksheet.gif>

<http://www.growingthenextgeneration.com/teachers-guide-games-explained.html>

[http://earthguide.ucsd.edu/earthguide/diagrams/photosynthesis/photosynthesis\\_game.html](http://earthguide.ucsd.edu/earthguide/diagrams/photosynthesis/photosynthesis_game.html)

<http://www.urbanext.uiuc.edu/gpe/case4/index.html>

<http://www.kidzone.ws/science/seeds.htm>

**Attachment(s):**

**Materials & Equipment:**

**What 21st Century Technology was used in this unit:**

- Slide Show Software
- Interactive Whiteboard
- Student Response System
- Web Design Software
- Animation Software
- Email

- Graphing Software
- Calculator
- Desktop Publishing
- Blog
- Wiki
- Website

- Audio File(s)
- Graphic Organizer
- Image File(s)
- Video
- Electronic Game or Puzzle Maker