

# Plant Structures Lab Stations

*Based on an activity from [www.plantingscience.org](http://www.plantingscience.org)*  
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## Focus on Inquiry

The student will make observations and inferences about the different structures and functions of plant physiology through a hands-on cycle of exploration.

## Lesson Content Overview




This lesson introduces students to a variety of different types of plants and plant structures. Students will work cooperatively in small groups to rotate through a series of varied stations that allow them to explore, identify, and label different parts of several different plants including the parts of a flower, stem and root structures, and vascular tissue.

<b>Duration</b> 60 minutes	<b>Setting</b> Classroom/Lab	<b>Grouping</b> 2-3 Students per group	<b>PTI Inquiry Subskills</b> 3.1, 3.3, 3.7, 4.2, 4.3, 5.2, 5.7, 5.8, 7.1
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Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
<i>Engage</i>	5 min	5.8	Projector/ video	2	Students will watch a video clip showing time lapse video of several different plants and plant functions. Students will discuss what they observed the plants doing.
<i>Explore</i>	60 min	3.1, 3.3, 3.7, 7.3	Dissecting microscope (if possible)	3	Students will work cooperatively in small groups to rotate through a series stations that allow them to explore, identify, and label different parts of several different plants.
<i>Explain</i>	10-15 min	4.2, 4.3, 5.8	None	3	Students will complete diagrams, observations, and analysis questions about the plants that they observe.
<i>Expand/Elaborate</i>	5-10 min	3.3, 5.2, 5.7, 7.1	None	2	Students will engage in a discussion about the similarities and differences that they observed in the plants and their structure and functions.
<i>Evaluate</i>	5-10 min	7.3	None	1	Students will complete a 5 question quiz that assesses their understanding of plants and the inquiry processes that they have been engaged in.

### Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

<h3>Next Generation Science Standards – Inquiry</h3> <p>NGSS Practice 2: Developing and Using Models                  NGSS Practice 3: Planning and Carrying Out Investigations                  NGSS Practice 4: Analyzing and Interpreting Data                  NGSS Practice 6: Constructing explanations                  NGSS Practice 8: Obtaining, Evaluating and Communicating Information</p>	
<h3>Next Generation Science Standards –Life Science</h3> <p><b>HS-LS1-2.:</b> Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <ul style="list-style-type: none"> <li>Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> </ul>	
<h3>Florida Science Standards – Nature of Science (Inquiry)</h3> <p><b>SC.912.N.3.5:</b> Describe the function of models in science, and identify the wide range of models used in</p>	

science.

**Florida Science Standards – Life Science**

**SC.912.L.14.7** Relate the structure of each of the major plant organs and tissues to physiological processes.



## Materials and Advance Preparation

### Materials List

Class set:

- Video Projector
- **Blackline Master #1-** Virtual Flower Dissection Lab
- **Blackline Master #2-** Flower Dissection Lab
- **Blackline Master #3-** Roots and Shoots Lab
- **Blackline Master #4-** Vascular Tissues Lab
- **Blackline Master #5-** Assessment

Student materials:

- **Blackline Master #1-** Virtual Flower Dissection Lab
- **Blackline Master #2-** Flower Dissection Lab
- **Blackline Master #3-** Roots and Shoots Lab
- **Blackline Master #4-** Vascular Tissues Lab
- **Blackline Master #5-** Assessment
- Virtual Lab Station; Chromebooks, laptops, iPads (some way to access the virtual lab)
- Flowers (preferably Hibiscus) 1 per lab group, tape, hand lens, forceps, probes.
- Roots and Shoots Lab Station: Samples of plants with fibrous roots (i.e. grass samples, tomato plants, most angiosperms); Samples of plants with taproots (i.e. carrot, beets, radish), forceps, hand lens
- Vascular Tissues Lab Station: Cross section of tree trunk; rulers, hand lens

### Blackline Masters

1. Blackline Master #1- Virtual Flower Dissection Lab
2. Blackline Master #2- Flower Dissection Lab
3. Blackline Master #3- Roots and Shoots Lab
4. Blackline Master #4- Vascular Tissues Lab
5. Blackline Master #5- Assessment

### Advance Preparation

1. Print lab station handouts.
2. Stations are set up with respective materials like flowers, plant root samples, cross section of tree stumps, forceps and hand lens.

## Lesson Information

### Learning Objectives

1. The student will be able to identify the major plant organs and tissues in angiosperms.
2. The student will be able to draw comparisons between the anatomy and physiology of plant structures to its function in angiosperms.

### Prior Knowledge Needed by the Students

- SC. 3. L. 14.1: Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction Students should have a basic understanding of the parts of a plant in regards to roots, stems, flowers, fruit, leaf/needle and petals.

- SC.4.L.16.1 Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination. Students should know the process of sexual reproduction in flowering plants including stamen, pistil, ovary, petals, sperm and egg.

### Background Information

Plants have anatomy and physiology that is unique to its type of growth and development. Flowering plants, called angiosperms, often have bright petals and sticky pollen in order to ensure germination by pollinators like bees and butterflies. In some angiosperms, the ovary will develop into a fleshy protective barrier called fruit in order to protect the seeds and can assist with seed dispersal as animals consume the fruit and release seeds in other parts of the environment. Reproduction in angiosperms relies heavily on male and female parts of the flower working collectively with pollinators or the natural environment to help with fertilization.

All plants have a vascular system that moves the necessary nutrients and water throughout the plant. While the vascular system may not look the same or have all of the same nomenclature in angiosperms, it serves the same purpose for the plant. If the vascular system is damaged, then the plant will likely die.

Plants grow from the roots. Roots can be fibrous in which the roots spread out in multiple directions or they can be tap roots in which a single root grows into the ground. The two root types have adaptations that assist the plant surviving in specific environments like being able to acquire water in arid climates or storage of large quantities of starch from photosynthesis.

### Lesson Procedure

#### Engage

1. Use the plant videos from 7activestudio for background information on plants:

[https://www.youtube.com/watch?v=oZyMVoOIYJY&list=PLyk75xrU6GCi270GszHopx7qay7e88\\_r2&index=14](https://www.youtube.com/watch?v=oZyMVoOIYJY&list=PLyk75xrU6GCi270GszHopx7qay7e88_r2&index=14)

2. Time lapse: <http://www.pbslearningmedia.org/resource/tdc02.sci.life.colt.plantsgrow/from-seed-to-flower/>

Guiding questions: What similarities do you see between the different types of plants as they grow? Compare and contrast the anatomy and physiology of various structures of angiosperms.

#### Explore

1. The four lab stations from the student hand out should be set up in advance (Virtual Flower Dissection Lab, Flower Dissection Lab, Roots and Shoots Lab, and Vascular Tissue Lab) with the materials listed:
  1. Virtual Flower Dissection Lab: A set of computers that will allow the lab group to access the virtual lab
  2. Flower Dissection Lab: Angiosperm samples (one for each group), hand lens, forceps, tape.
  3. Roots and Shoots Lab Station: Samples of plants with fibrous roots (i.e. grass samples, tomato plants, most angiosperms); Samples of plants with taproots (i.e. carrot, beets, radish), forceps, hand lens
  4. Vascular Tissues Lab Station: Cross section of tree trunk; rulers, hand lens
2. Students should spend approximately 15-20 minutes at each station in order to complete the handout.

#### Explain

1. Some questions you might ask students for each station include,
  1. Virtual Flower Dissection Lab:
    - How do pollinators assist with reproduction in angiosperms?
    - What role does meiosis play in the formation of seeds?
    - How does the angiosperm spread the seeds that form in the ovary?

2. Flower Dissection Lab:
  - How do pollinators assist with reproduction in angiosperms?
  - What role does meiosis play in the formation of seeds?
  - How does the angiosperm spread the seeds that form in the ovary?
3. Roots and Shoots Lab Station:
  - Palm trees typically have a tap root. Why is this type of adaption best in Florida?
  - Often times it is best to continue to trim the stem of fresh flowers in order for them to last longer. Why would this be beneficial to extending flower life?
  - What do you think is the most important part of the plant, leaves or roots?
4. Vascular Tissues Lab Station:
  - People often carve into the sides of trees. How could this be detrimental to the ability of the plant to get water?
  - The epidermis is the outer layer of skin in animals. How does this help you remember the purpose of dermal tissue?
  - Pith is typically located in the center of the plant as it stores nutrients and is part of transport within the plant. How is this adaptation help the plant beneficial to the plant?

**Expand**

1. Students can build a model of an angiosperm with appropriate labels for the anatomy and a brief description of function.
2. Students can grow plants with the different root systems. Students will record data on how growth is affected based on the root system in regards to time to germinate, length of roots and other qualitative observations.

**Evaluate****FORMAL EVALUATION**

- **Blackline Master #5**

**INFORMAL or OPTIONAL EVALUATIONS**

1. Notes
2. Discussion
3. Lab write-up

**WRAP UP.**

*Bring the lesson to a conclusion by holding a discussion comparing reproduction and growth tissues in an angiosperm.*

**Supplementary Resources****Teachers****Students****CITATION OF SOURCES****PHOTO/PICTURE CREDITS**

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Yes, I cited all materials and resources used in this lesson.

Lesson author signature

