

Plant Parts

During this lesson, students learn about external parts that all plants have, the purpose those parts serve within the plant and how that ties to the fruits and vegetables they eat.

Please be sure to read through the entire activity before you begin.

Objectives

Students will:

- Recognize that plants have different external parts that help them survive and grow.
- Observe that different plants have the same types of parts, even if they vary among plants.
- Identify the following plant parts for different types of plants: roots, stem, leaves and flowers.
- Observe that fruit forms from flowers.
- Discuss the relationship between the function and structure of each plant part.

Age Group

1st Grade

Time Frame

Warm Up—10 minutes

Part 1-4—1-2 hour

Wrap Up—20 minutes

Powerful Plants Seed Packs

1. Daucus (Red Cored Chantenay Carrot)
2. Ox Heart (Slicing Tomato)
3. Sun Flower (Mammoth Sunflower)
4. Rainbow Chard (Swiss Chard)
5. Butter Crunch (Bibb Lettuce)
6. Walt Ham (Waltham Broccoli)

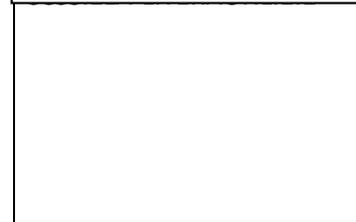
Standard Correlation

Next Generation Science Standards

<p>1-LS1-1.</p>	<p>Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.* [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]</p>	<p>LS1.A: Structure and Function All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)</p> <p>LS1.D: Information Processing Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)</p>
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Focus on Crosscutting Concepts

Structure and Function: The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)



Materials

Materials listed in order they are needed, but some materials from early parts of the activity are used again later.

Warm Up

- Whiteboard and markers
- Pictures/photos of common fruits and vegetables (optional)

Activity—Part 1

- Student science notebooks
- Pencils
- Colored pencils/markers/crayons
- Samples of 3 or more different types of flowering plants (including roots, stems, leaves and flowers)
- Plant Part Labels (attached, optional)

Activity—Part 2

- Flowering plant samples from Part 1
- Paper
- Clear tape

Activity—Part 3

- Access to computers or other devices with Internet connection
- Flower to fruit diagram
- Camera (optional)

Activity—Part 4

- Examples of real fruit (apple, banana, strawberry, etc.)

Wrap Up

- Plant Parts Bingo Cards (one per student)
- Markers/pencils or stickers
- Prizes (optional)

Background

This activity introduces students to the basic external parts of plants (roots, stems, leaves, flowers and fruit) so that they can gain an understanding of the biology behind these structures before relating structure and function in a biomimicry engineering design project as the correlated NGSS Performance Expectation dictates. To be able to complete the Performance Expectation, students need to understand what structures plants have and what they are used for. This activity addresses both those objectives.

At this level, plant structures will be limited to roots, stems, leaves, flowers and fruit. We will only differentiate types of roots based on observation—not necessarily address vocabulary (such as tap roots). The types of observations you will be able to make about these different plant parts will vary depending on which types of plants you have available. It is recommended that if you research the specific types of plants samples you have available to gain background knowledge about structures and function unique to those examples (for example, cactus needles).

Whenever possible, you are encouraged to tie in Powerful Plants examples grown in your school garden (and take students out to the garden to observe growing plants), or by growing examples indoors using

the provided materials. However, access to a garden is not necessary to complete this activity (but would enhance it).

In the Garden

This activity has excellent tie into the actual process of school gardening before, during and after. Depending on your situation and timing of your teaching of this topic you can tie in the school garden in several ways. Here are ideas:

- Use the time lapse videos from Part 3 to help students understand the process that seeds they are planting will go through. Also helps them to see how far along they are in the growing process at any given time and helps them anticipate what will come next.
- Use the garden to help students understand plant parts. They may have never observed that potatoes, beets or carrots have leaves above ground, or that squash, peas and beans have flowers, that when we eat lettuce and chard we are eating leaves and stems or that when we eat broccoli we are eating flowerets. Show them the garden at different phases so that they can see these plant parts as their food grows.
- Using the materials provided by Powerful Plants, grow Powerful Plants seeds in the classroom (transfer them to a school garden as they mature, if possible). Over the course of the growing season, continually observe the Powerful Plants and discuss which parts of the plants are visible as they grow (leaves, stem, flowers, fruit, etc). Emphasize which part of each plant is edible.

Using the Technology

The Powerful Plant seed packs provide a fun, interactive character and augmented reality video that tells students more about the plants. The plants for first grade have been carefully selected to accompany the activities. However, there is additional information provided through the seed pack videos. It is up to the teacher when in the process to tie in the seed packs.

Interactive audio/video questions pulled from the content of each character’s dialogue are part of the experience with each “talking” seed pack. This helps to ensure students are following along and paying attention. Audio feedback for correct/incorrect answers is given automatically as students answer the multiple choice and true/false questions. This helps ensure students are paying attention.

At this level, it is suggested that the students explore the seed packs on their own or in groups (using digital tablets pre-loaded with the Powerful Plants app).

Warm Up—Hungry for Plant Parts

- Gather students in a group
- Ask students to think about what they ate for their most recent meal (likely breakfast or lunch). Ask them if they ate any plants. Ask students to raise their hand and tell an example of a plant they ate recently. Students will likely list things like carrots, apples, corn, bananas, etc. Write their answers on the board and/or draw or show pictures or photos of the plants they list.
- Ask students if they ate any flowers today. Students will likely think this is funny and say no.
- Ask students if they ate any leaves today. Some students may know that foods like lettuce are leaves, others may think this is funny (imagining eating leaves from trees).

- Explain that we sometimes think of house plants, grass or trees in our yards when we use the word “plants” but much of the food we eat comes from plants.
- Explain to the students that in this activity we will first be observing plants and their parts, then comparing what those parts look like on different types of plants and finally thinking about the plant parts we eat.

Activity (Part 1)—Plant Parts

- Begin the lesson by asking students to draw a picture of a plant from memory in their science notebook. A quick observation walking round the room should give you a good idea about where your student’s understanding of plants lies. Most students will likely not include features such as roots in their drawing.
- Explain to students that now that they have drawn a plant from memory, they will now observe a real plant and sketch what they see. Tell them that this should be done on the next page, or separate column, in their science notebooks.
- Students should move into groups of 3-4 individuals, or, they can work independently if enough plant specimens are available (this will keep students from copying each other’s work).
- When students have finished their sketches, ask for volunteers who would like to share their drawings and explain what they observed. Allow 3-4 students to share.
- Ask students if they notice anything that is the same between the different groups’ plant drawings. Students may begin to notice that each plant has similar features—roots, stems, leaves, flowers. Walk around the room and show students the different plant examples—point out the roots, stems, leaves and flowers on the various samples.
- Provide students with the Plant Part Labels (optional). These can be cut apart ahead of time, or, if students are capable, can be done within their groups. Have students glue the labels into their science notebooks in the appropriate locations around their sketch. (This step could be skipped and labels could be written).

Activity (Part 2)—Plant Part Properties—Structure and Function

- Break each plant sample apart so that the roots, stems, leaves and flowers are all separated. Tape each plant’s roots, stem, leaves and flower to separate pieces of paper. Create four stations around the classroom. Place all the root samples at one station, all the stem samples at a second station, all the leaves at third station and all the flowers at a fourth station. Give the students time at each station to observe the different plant parts. They should look for similarities and differences between the different roots, stems, leaves and flowers (i.e. how are all the roots similar to one another? How are they different?). In this method, students will start to gather information about the general properties of each plant type. These can be recorded in the science notebook if students are capable.
- Lead a discussion in which first the structure and then the function of each plant part are discussed. Use the following chart as a discussion guide. Gently guide the discussion so that the underlined functions of each structure are discussed and clear to students.

Roots

S t r u c t u r e	What words might you use to describe roots?	<input type="checkbox"/> Flexible <input type="checkbox"/> Brown <input type="checkbox"/> Hard <input type="checkbox"/> Stringy <input type="checkbox"/> Long
	What things were the same about all the roots?	<input type="checkbox"/> Long <input type="checkbox"/> Stringy
	What things were different about some of the roots?	<input type="checkbox"/> Some longer than others <input type="checkbox"/> Some thicker than others
F u n c t i o n	What do you think the plant uses its roots for?	<input type="checkbox"/> Students may come to class with some background knowledge about what roots are and how the plant uses them. <input type="checkbox"/> Answers may include <u>soaking up water, soaking up nutrients, stability/anchoring</u>

Stems

S t r u c t u r e	What words might you use to describe stems?	<input type="checkbox"/> Straight <input type="checkbox"/> Strong <input type="checkbox"/> Green
	What things were the same about all the stems?	<input type="checkbox"/> Long <input type="checkbox"/> Straight <input type="checkbox"/> Had places where leaves come off them
	What things were different about some of the stems?	<input type="checkbox"/> Some stiffer than others <input type="checkbox"/> Some more flexible than others
F u n c t i o n	What do you think the plant uses its stem for?	<input type="checkbox"/> Answers may include <u>holding the plant up, growing tall</u>

Leaves

S t r u c t u r e	What words might you use to describe leaves?	<input type="checkbox"/> flat <input type="checkbox"/> round <input type="checkbox"/> pointy <input type="checkbox"/> bumpy <input type="checkbox"/> green
	What things were the same about all the leaves?	<input type="checkbox"/> Green <input type="checkbox"/> Flat <input type="checkbox"/> Veins
	What things were different about some of the leaves?	<input type="checkbox"/> Different shapes <input type="checkbox"/> Some have jagged (serrated) edges, some are smooth
F u n c t i o n	What do you think the plant uses its leaves for?	<input type="checkbox"/> Answers may include shade, rain protection <input type="checkbox"/> Be sure to discuss the idea that <u>leaves provide large surfaces for sunlight to shine on (so the plant can make food)</u>

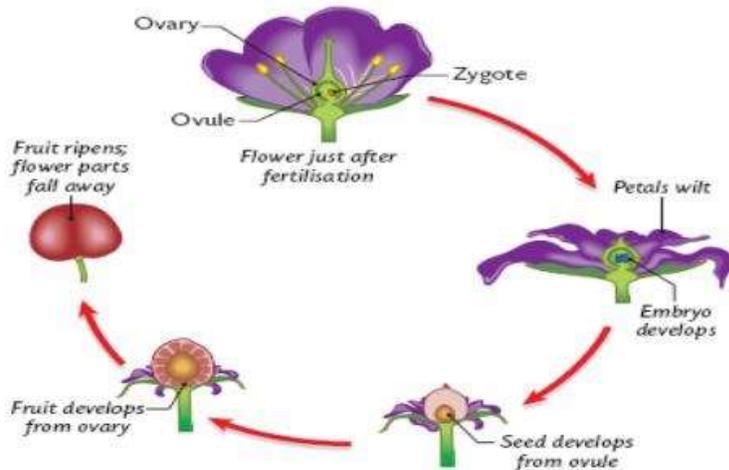
Flowers

S t r u c t u r e	What words might you use to describe flowers?	<input type="checkbox"/> Petals <input type="checkbox"/> Colorful <input type="checkbox"/> round
	What things were the same about all the flowers?	<input type="checkbox"/> Petals <input type="checkbox"/> Parts inside <input type="checkbox"/> Pollen
	What things were different about all the flowers?	<input type="checkbox"/> Colors <input type="checkbox"/> shape

F u n c t i o n	What do you think the plant uses its flowers for?	<ul style="list-style-type: none"> <input type="checkbox"/> Answers may include attracting bees, looking pretty, smelling good <input type="checkbox"/> Be sure to discuss the idea that <u>different flowers attract different pollinators which help the plant reproduce</u> <input type="checkbox"/> Also discuss the idea that in many cases, the fruit that we eat forms from the pollinated flower (see diagram and timelapse video links below)
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Activity--Part 3

After you have discussed the structure and function of roots, stems, leaves and flowers, explain to students that in many cases, the fruit that we eat forms from the pollinated flower. Share with students the diagram and timelapse videos below. Provide several samples of different types of fruit for students to observe prior to discussion.



http://leavingbio.net/The%20Structure%20and%20Functions%20of%20Flowers_files/image031.jpg

- Show these videos which show different types of fruit forming from flowers in time lapse:
 - Pear: <https://www.youtube.com/watch?v=4ttRgMj7PdQ>
 - Strawberry: <http://thekidshouldseethis.com/post/86335815207>

What is a Timelapse?

A timelapse is a video or series of photos that are show very quickly so that something that takes a long time and therefore is hard to see can be seen.

Create Your Own Timelapse

As an example to show students what a timelapse is, take a video of them working on a project in class at a normal speed, and then speed it up and show them. This can easily be done with a phone camera or a free app such as [Lapse It](#) or [Timelapse](#).