

Plant Parts - Stems

Lesson Description

In this lesson, students explore what a stem does for a plant. They watch an experiment to see how water is transported up a stem. They dissect a stem and carefully observe the inside. The lesson includes optional activities for tasting stem vegetables and/or finding stem vegetables growing in the garden.

- Time required: 60 minutes
- Location of lesson: Classroom or garden

Learning Objectives

- Describe the function of a plant's stem.
- Understand how a stem transports water.
- Learn how to make observations and conduct experiments.

Attitude and Behavior Goals

- Like the taste of stem vegetables (optional tasting activity).
- Eat a wide variety of vegetables.

Materials and Preparation

- 2 Mason jars with water
- Red and blue dye or food coloring
- White Gerber daisies (2) OR celery sticks (2)
- 2 additional Mason jars with daisies or celery soaked in colored water
 - Do the daisy or celery experiment at least 24 hours before the class and bring the jars with the colored daisy or celery to class
- Tape (if using a daisy rather than celery)
- Pencil (if using a daisy rather than celery)
- Asparagus spears soaked in blue dye; 1 for each pair of students
 - Soak the asparagus spears in blue dye for 24 hours prior to class
- Rulers; 1 for each pair of students
- Magnifying glasses; 1 for each pair of students
- Plastic knives; 1 for each pair of students
- Paper towels or plates
- Crayons
- Stem vegetables for tasting (optional activity) – e.g. celery, broccoli stems, asparagus, cauliflower stems, rhubarb, leeks

-  **Stem Experiments**
- Water to drink during the Class Warm-up – water dispenser in the classroom and 1 cup or a water bottle for each student
 - *If you do not plan on doing the Stem Tasting activity, prepare vegetable snack of the week – 1 for each student

Class Warm-up: Champion Cheer (5 minutes)

- Give each student a cup of water or ensure that they have a filled water bottle in front of them.
- Lead the students in enthusiastically reciting the  **Champion Cheer**.
- At the end of the cheer, drink water together (*If you do not plan on doing the Stem Tasting activity, eat the veggie snack and have students complete their  **Taste Test Observations**).

Review of Last Lesson (2-3 minutes)

- Review the evaluation questions from last week’s lesson. Evaluation questions from all lessons are listed at the end of the workbook .

Class Discussion: Plant Parts (5 minutes)

Let’s think more about plant parts today. Raise your hand if you remember the 6 parts of a plant. What are the 6 different parts of a plant? (Answer: roots, stem, leaves, flower, fruit, seeds)

Each plant part has an important job. What does each plant part do?

(Answers:

- The **roots** support the plant and take in water and food for the plant.
- The **stem** supports the leaves and transports water and food.
- The **leaves** catch the sunlight to make food for the plant.
- The **flower** produces the fruit and helps make seeds.
- The **fruit** protects the seed and helps with spreading seeds around.
- The **seed** produces a new plant.)

Today we will focus on the stem. Tell me again – what does the stem do? (Answer: supports the leaves and transports water and food)

Stems help water and food get from the bottom part of the plant up to the top. We will do 2 experiments today to see how this works.

Activities (35 minutes)

-  **Daisy or Celery Experiment (15 minutes)**
 1. Refer students to the  **Stem Experiments** pages in their workbooks.

2. *Today we are going to be plant scientists. What is a plant scientist called? (Answer: botanist) As botanists, we are going to learn how water moves through the stem of a plant.*
3. Show the 2 jars of water. Add at least 10 drops of blue dye to one jar and at least 10 drops of red dye to the other jar.
4. *Next I am going to put the daisy [or celery] into the colored water. What do you think will happen? Write down your prediction, or hypothesis, after question # 1 in your workbook.*
5. If using a daisy, trim the stem so that it is a few inches longer than the height of the jar. The daisy should sit about 3-4 inches above the rim of the jar. Carefully cut the lower few inches of the stem in half, so that it can be split. One half will go in the blue dye and one half in the red dye. There should be 2-3 inches left intact below the flower. Be careful not to break the stem. Stabilize the upper part of the stem by taping it to a pencil, so the flower doesn't fall over. Place the jars in a sunny part of the classroom.
 - a. If using celery, cut the celery stick in half and put one half in each jar. Place the jars in a sunny part of the classroom. The celery will turn color much faster than the daisy.
6. Show the students the daisy [or celery] that you prepared the day before so they can see what will happen after a day.
 - a. *What happened to the stems?*
 - b. *Were your predictions, or hypotheses, correct?*
 - c. *How did the colored water go up the stem?*

-  **Asparagus Dissection (20 minutes)**

1. *Now we are going to continue being botanists and we are going to cut open, or dissect, a stem vegetable. Who has ever eaten asparagus? Asparagus is a stem vegetable. We are going to dissect asparagus to see what the stem looks like inside.*
2. Divide the students into pairs. Give each pair 1 asparagus spear that has been soaking in blue dye for 24 hours. Also give each pair a ruler, magnifying glass and a paper towel or plate (so their desks do not become blue).
3. Refer students to the  **Stem Experiments** pages in their workbooks.
4. *Carefully examine the outside of your asparagus. After # 2 in your workbook, draw what the outside of your asparagus looks like. Be as detailed as possible. Model this for the students by sketching your own picture on the board.*
5. *What are the triangle-shaped pieces on the outside of the stem? (Answer: the leaves)*
6. *What is at the top of the stem? (Answer: a leaf and flower buds)*
7. *Now we are going to cut the asparagus open and examine the inside. What do you think we will find inside?*

8. First model the dissection for the students. Sketch the asparagus on the board and show 2 dotted lines to indicate where you will cut. The 1st line represents a horizontal cut that creates a small log out of the bottom inch of the stem. The 2nd line represents a vertical cut that goes up the length of the stem. You will end up with 3 asparagus pieces. Model these cuts and show closely you would like them to observe the inside of their asparagus. Tell the students out loud all the things that you see.
9. Pass out a plastic knife to each group. Review safety rules:
 - a. *Hold the point away from yourself and others.*
 - b. *Only make cuts when using a stable surface.*
 - c. *Keep your fingers away from the area that you are cutting.*
 - d. *Make a steady cut straight down and not at a slant or toward you.*
 - e. *Set the knife aside in a safe place once you are done making your cut.*
10. *One of you will make the horizontal cut across and the other will make the vertical cut up and down. Make your cuts now.*
11. *Observe the inside very closely. Write down as many details as you can in # 3 in your workbook.*
12. *What parts of the stem are dyed blue?*
13. *What pattern did the horizontal cut reveal?*
14. *What pattern did the vertical cut reveal?*
15. *How far up do the lines go?*
16. *What does the stem you cut vertically look like when you view it from the bottom?*
17. *What happened while the asparagus was sitting in the blue water?*
18. *Now draw a picture of the inside of the asparagus in # 4 in your workbook.*
19. *Finally, use the ruler to measure each vertical piece of the stem. In your workbook write down the length in centimeters and in inches.*

Optional Activities (20 minutes)

- **Stem Tasting (10 minutes)**

1. Distribute stem vegetables to students for tasting. Examples of stem vegetables are: celery, broccoli stems, asparagus, cauliflower stems, rhubarb, or leeks.

- **Stems in the Garden (10 minutes)**

1. Go to the garden and observe different stem vegetables growing. Have a volunteer pick a vegetable stem from the garden if it is ready. Show students how the vegetable was growing in the ground. Point out the stem on the vegetable.

Evaluation Questions (5 minutes)

1. *What are the 6 parts of a plant?* (Answers: roots, stems, leaves, flowers, fruit, seeds)
2. *What is the purpose of the stem?* (Answer: supports the leaves and transports water and food)
3. *How does water move up a stem? Think of the experiments today – does the water go up tiny paths in the stem, or does it go up one big path?* (Answer: lots of tiny paths)
4. *What types of plants are stem vegetables?* (Answer: celery, broccoli stems, asparagus, cauliflower stems, rhubarb, leeks)
5. *How much water should you drink every day?* (Answer: at least 6 cups of water a day)
6. *How many fruits and vegetables should you eat every day?* (Answer: at least 5 fruits and vegetables a day)
7. *Does gardening connect you to your culture and help you learn new words in your language?* (Answer: yes)

Preparation for Future Lessons – Reminder for the Instructor

- Review the materials and preparation needed for the next lesson.
- Remember that an Elder guest instructor is needed for these Fall lessons: Lesson 2 (Exploring Plant Parts), Lesson 4 (Traveling Seeds), Lesson 6 (Winterizing the Garden) and Lesson 10 (Companion Planting and Traditional Cooking).

Notes
