

# What Is a Stem For?

## BROWARD COUNTY ELEMENTARY SCIENCE BENCHMARK PLAN

### Grade 1—Quarter 2

#### Activity 17

##### SC.F.1.1.4

*The student understands that structures of living things are adapted to their function in specific environments.*

##### SC.F.1.1.5

*The student compares and describes the structural characteristics of plants and animals.*

##### SC.H.1.1.1

*The student knows that in order to learn, it is important to observe the same things often and compare them.*

##### SC.H.1.1.5

*The student uses the senses, tools, and instruments to obtain information from his or her surroundings.*

## ACTIVITY ASSESSMENT OPPORTUNITIES

The following suggestions are intended to help you identify major concepts covered in the activity that may need extra reinforcement. The goal is to provide opportunities to assess student progress without creating the need for a separate, formal assessment session (or activity) for each of the 40 hands-on activities at this grade level.

1. Ask, *If you found a plant with wilted leaves, what are some things you might do to help the plant live?* (Students may suggest watering the plant. Be sure students mention the role the plant's stem plays in getting water up to the leaves.)
2. Use the Activity Sheet(s) to assess student understanding of the major concepts in the activity.

In addition to the above assessment suggestions, the questions in bold and tasks that students perform throughout the activity provide opportunities to identify areas that may require additional review before proceeding further with the activity.



# What Is a Stem For?

## OBJECTIVES

Students examine plant stems and discuss their function. Then they set up an experiment to determine whether or not water travels up plant stems.

### The students

- ▶ guess what jobs stems do for plants
- ▶ observe that colored water travels up plant stems
- ▶ conclude that plant stems carry water up to the leaves of the plant

## SCHEDULE

About 20 minutes for set-up, followed by 20 minutes for observation later in the day

## MATERIALS



### For each student

- 1 Activity Sheet 17
- 1 crayon, red\*
- 1 pencil\*
- 1 pair safety goggles\*

### For each team of four

- 1 carnation, white, long-stemmed\*
- 1 celery stalk, with leaves\*
- 1 jar, clear plastic
- 2 magnifiers

### For the class

- 1 chart, Plant Parts
- 1 btl food coloring, red
- 1 knife, sharp\*
- water, tap\*

\*provided by the teacher

## PREPARATION

- 1 Obtain a bunch of celery, preferably one with a full set of leaves, and use a sharp knife to cut one stalk of celery for each team of four. Also obtain one long-stemmed white carnation for each team, and trim the stem so fresh tissue is exposed. Fill a jar three-quarters full of tap water for each team. Stand a celery stalk and a carnation in each jar until time for the activity. (It is important that the stems not dry out. If they do, the experiment will not work.)
- 2 Make a copy of Activity Sheet 17 for each student.
- 3 Post the Plant Parts chart where all students can see it.
- 4 Each student will need a pencil and a red crayon. Each team will need two magnifiers and a jar of water with a celery stalk and a carnation.

**Safety Note:** Check for any student allergies to plants or pollen before having students handle plants or plant parts.

## BACKGROUND INFORMATION

Somehow, the stem of a plant does not seem as glamorous as its roots, leaves, or flowers, but it performs the absolutely essential function of transporting food and water to all parts of the plant.

Without a stem, the entire plant would have to lie in direct contact with the soil in order to get the water and minerals it needs.

Fortunately, a stem is able to carry water and minerals upward through tiny passageways and supply them to even the uppermost parts of a plant. Similarly, the roots could not live

and grow if the stem did not carry down to them a supply of food produced by the leaves.

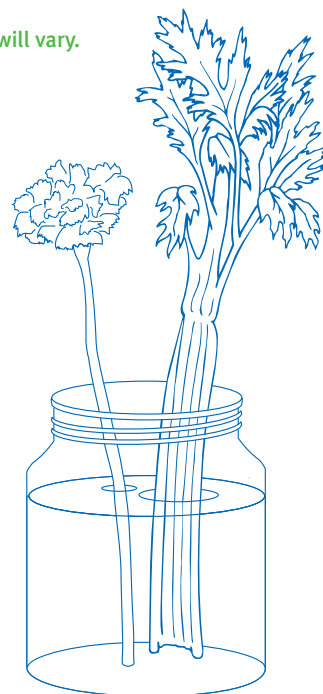
A stem also performs the function of holding the leaves up and out into the light so they can gather sunlight and make enough food for the plant's survival. Each plant branches and holds its leaves in its own distinctive arrangement.

In this activity, students see the water-transporting function of stems at work as they observe that colored water rises into the stems of plants.

#### ▼ Activity Sheet 17

### What Is a Stem For?

Answers will vary.



## Guiding the Activity

- 1 Refer students to the Plant Parts chart and point out the stems.

Ask, **What do you think a stem does for a plant?**

Have students help you make a list on the board of the possible “jobs” (functions) of a stem. If students do not suggest that a stem carries water up to the leaves, ask, **What happens when you water a wilted plant?**

Ask, **How do you think water gets to the leaves of the plant?**

- 2 Tell students that they will perform an experiment to demonstrate one of the functions of plant stems.

### Additional Information

*You may want to point out the stems of plants in the classroom as well.*

*Accept all answers and discuss them.*

*Students will have probably noticed that wilted plant leaves recover and are no longer wilted and the stem is no longer bent over after the plant receives water.*

*Students may guess that water moves up the stem to the leaves.*

## Guiding the Activity

Show students one of the jars of water with a celery stalk and carnation in it. Describe how you prepared the celery stalk. Point out to students that both the celery and the carnation have stems and (possibly) leaves.

Add 10–15 drops of red food coloring to the water in the jar and stir it gently. The water should turn deep red.

Ask, **What do you think will happen to these stems if we leave them in the colored water overnight?**

If some students predict that the stems will absorb the color, ask, **How far up the stems do you think the color will go?**

**3** Give each student a copy of **Activity Sheet 17**, a red crayon, and a pencil. Distribute a jar of water with a celery stalk and carnation to each team of four (see Figure 17-1).

Take the bottle of red food coloring from team to team, adding 10–15 drops to each jar.

Tell students to use their red crayons to color the water in the jar on the activity sheet. Also tell them to use the pencil to mark the pictures of the stems to show how far up the stems they think the red will go.

## Additional Information

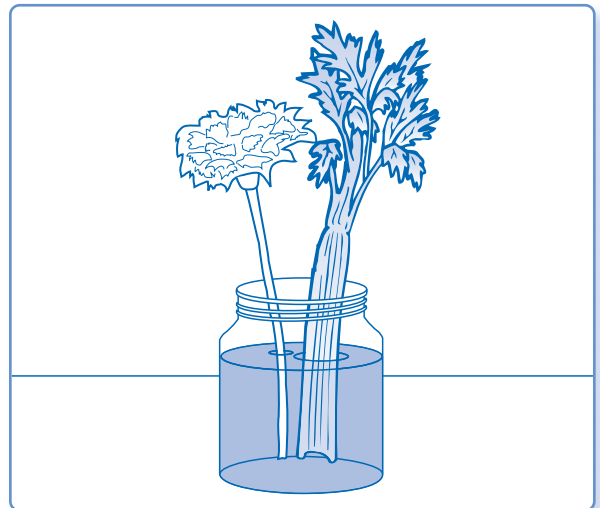
*If it has been more than 4 or 5 hours since you first cut the celery stalks and obtained the carnations, it is a good idea to make a fresh, clean cut with a sharp knife at the base of the stems before adding the food coloring to the water. Make sure the color of the water is deep red, not just pink; add more food coloring if necessary.*

*List students' ideas on the board.*

*Many students are likely to say that only the parts of the stems that are underwater will turn color.*

**Safety Note:** Tell students to be careful not to knock the jars over.

*Have them gently stir the water to spread the color evenly. The water should be a deep red. Add more food coloring if necessary.*



▲ Figure 17-1. Setting up the stem experiment.

## Guiding the Activity

## Additional Information

4 Place the jars with the plant stems in a place in the classroom where they will not be disturbed for a few hours. Collect students' activity sheets. Return the bottle of red food coloring to the kit. Leave the jars as long as possible to get the most noticeable results.

*Leave the jars as long as possible to get the most noticeable results.*

5 Return students' copies of **Activity Sheet 17** and give each student a red crayon. Distribute two magnifiers and a jar with stems in colored water to each team of four.

Allow students time to examine the celery stalk and carnation flower in their jars (see Figure 17-2).



▲ *Figure 17-2. Examining plant stems that have been in colored water.*

Tell students to use their red crayons to add color to the picture on the activity sheet to show how much the red color has been absorbed by the veins of the celery stalk.

*It is likely that the red has traveled all the way to the tips of the celery leaves and to the carnation flower. If results are not obvious, let the jars stand overnight, and have students make observations the next morning.*

6 When all students have examined the stems and colored the picture, ask, **What happened in your experiment?**

To conclude, ask, **What job does a stem perform for a plant? How can you tell?**

Tell students that the main jobs of the stem are to carry water to the leaves and to hold the leaves up and out into the light.

*The red coloring traveled up the stems higher than the water level in the jar.*

*The stem carries water up the plant. Since the red coloring moved up both plants, it shows that a stem carries water up into a plant.*

## REINFORCEMENT

Have students draw a tree with a trunk, branches, and leaves. Tell them to color with a blue crayon the path the water takes from the ground to the top leaves of the tree.

## SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

## CLEANUP

Empty, rinse, and air-dry the jars and return them to the kit along with the magnifiers. Leave the Plant Parts chart posted. Discard or compost the celery stalks and carnations.

## Connections

### Science Challenge

You may want to reinforce the idea that roots, as well as stems, carry water up the plant. Use the following activity to demonstrate this to students: Use a large carrot with some of its stem still attached, or preferably a whole carrot with its entire stem and leaves. Make sure students understand that the part we call the carrot is the root of the carrot plant. Mix red food coloring and water in equal amounts. Cut off about 1 cm (0.4 in.) from the bottom of the carrot and discard the small piece. Put the carrot cut side down in the colored water. After an hour or two, remove the carrot and rinse it off. Cut several thin slices from the bottom of the carrot and pass them around so students can examine them. They will see that the center of the carrot (the xylem) is stained red. Explain that this stained area is the part of the carrot that carries water up to the stem. (The phloem, the light-orange ring surrounding the xylem, carries nutrients upward and glucose downward.) Put the carrot back in the colored water and leave it overnight. The next day, cut the carrot in half lengthwise. Ask students to look at the stained part again and see if they can trace it up through the root and into the stem.

### Science Extension

► Point out to students that tree trunks are stems—very tall and wide stems, to be sure, but still stems. Provide short lengths of cross-cut logs so students can see what the inside of a tree trunk looks like. You may want to explain that the wider, lighter rings show how much the tree grew during the spring and summer. The narrower, darker rings show the tree's growth during the fall, when growth slows down. Also explain that they can tell how old a tree was when it was cut down by counting the dark rings—one for each year of the tree's age. Help them do this with the logs.

► Based on their observations in this activity, some students may develop the misconception that the changing colors of leaves in autumn is the result of colored materials in the soil being carried by water up the trees' trunks to their leaves. Explain that the red, orange, and yellow leaf colors they see in the fall are always in the leaves. In the spring and summer, when the leaves are making food for the plant, their green color is so strong that it hides the other colors. When the leaves start to die in the fall, the green color fades away and you can see the other colors.