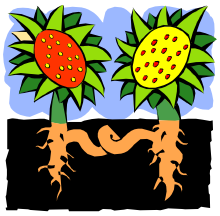
ROOT FOR THE PLANTS

BENCHMARKS and TASKS

SC.B.1.1.3 The student describes a model energy system (e.g., an aquarium or terrarium).
SC.F.1.1.1 The student knows the basic needs of all living things.
SC.F.1.1.5 The student compares and describes the structural characteristics of plants and animals.
SC.G.2.1.2 The student knows that the activities of humans affect plants and animals in many ways.

- The student maintains certain conditions (soil, water, light) in order for seeds to progress through the stages of growth (seed, seedling, mature plant) and analyzes how nature does the same.
- The student observes and analyzes each part of a plant (seeds, roots, stems, leaves, flowers and/or fruit) and correlates it to a specific function.
- The student constructs and maintains a terrarium.



KEY QUESTION

What is the function of a root?

BACKGROUND INFORMATION

Roots serve two main purposes: they anchor the plant to the ground and help to keep it upright, and they absorb and store raw materials, such as water, minerals, and nutrients. The tiny hairs growing on the root absorb water. (Do not share this information with students – they will draw conclusions about root function during this activity.)
The root is one of the first parts of a plant that starts to grow. No matter which way you plant a seed; it responds to gravity – it always manages to grow roots downward and the stem up towards the sun.

MATERIALS

Teacher

waterproof glue
scissors
Tops and Bottoms by Janet Stevens

Per student

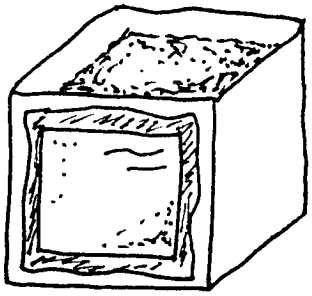
2-liter bottle
potting soil
pebbles
2 or 3 plants (weeds are fine)
clear plastic wrap
rubber band
science journal
magnifier
pencil

Per group

seeds (pea, bean, radish, mung)
weed or small potted plant
newspaper
milk carton root view box (see **Teaching Tips**)
potting soil
measuring tape
one piece of plastic wrap
dark cloth or paper
piece of pre-cut acetate (transparency film)
clipboard or stiff cardboard for writing outdoors

TEACHING TIPS

1. Well before doing this activity, tell students to bring in an empty, clean, 2-liter soda bottle.
2. Cut the top from the bottle about 3 or 4 inches from the top.
3. Prepare a milk carton root view box for each group:
   Cut the top from a half-gallon milk carton.
   Cut out a window area from one side, leaving about 2 cm of carton around the edges. Cut a piece of acetate (transparency film) to fit tightly into the window area. Use waterproof glue for a tight seal.
   Cut material (dark paper or cloth) to cover each viewing window. Velcro or tape material over window.



4. The top of the soil should be moistened as needed.
5. The roots will be easier to see if the view box is kept at a slant so the roots grow against the window.
6. The box should also be covered with a dark cloth or paper to simulate the darkness most roots require for growth.
7. Locate an area on the playground where students can pull weeds. If this is not possible, purchase a small potted plant and allow the class to work together.

ENGAGE

1. Take a walk and find some weeds on the playground. Have students observe and sketch the plant parts that are visible above the ground.
2. Next have them think about what the rest of the plant looks like underground. Allow time for students to sketch what they think the underground part of the plant looks like. Let students pull the weeds and take them back to the classroom.

EXPLORE Part 1

1. Have the students cover their work areas with newspaper. Let them soak the roots of their weeds in water, if necessary, to remove the soil. Have students observe and sketch the root system in their science journals. The students can use magnifiers to see the fine root hairs.
2. Ask the students to measure the length of the root and compare it to the length of the above ground part of the plant and record the information in their science journals.
3. Have students discuss their ideas about the function of a plant's root system.
4. Distribute the rest of the materials (milk carton, soil, seeds, plastic wrap) to each group. Have students dampen the potting soil, fill the view box almost to the top with potting

soil and water thoroughly.

5. Students should plant seeds about 1 cm from the plastic window, and the box should be covered with plastic wrap to slow down evaporation.
6. Have students observe the view box daily and make note of any changes in their science journal. Keep top of soil moistened as needed. Keep box at a slant for easy viewing and cover the box with a dark cloth or paper to simulate darkness. Remove the paper or cloth only during observations.

EXPLAIN

Ask the students to describe the changes they saw as they made observations through the window of the root view box.

Ask:

How could you tell that the seeds had started to grow?
Where was the first visible sign of growth?
Why do you think a plant needs roots?
What is the white fuzz that appeared on the roots? (root hairs)
What do you think the root hairs do for the plant? (They absorb moisture and nutrients. Explain that the water moves through the roots to the plant.)
How do you think the root helps the plant in addition to absorbing moisture and nutrients?
Which was the longer part of the weed – the root or the above – ground part of the plant?
Do all roots look alike?
What happens if you do not water the plant?
What happens if the plant does not get sunlight?

EXTEND/APPLY

1. Read and discuss *Tops and Bottoms*.
2. Ask students to think about some of the fruits and vegetables they normally eat. Discuss what part of the plant they are eating for each food they name. Some examples:
   leaves - lettuce, spinach
   stems - asparagus, potatoes
   fruits – apples, cucumbers
   seeds – peanuts, rice
   bulbs – onion
   roots – carrots, radishes, turnips, beets
3. Ask the students to plan a special lunch consisting only of plant parts.
4. Bring in various fruits and vegetables and classify them as a fruit or vegetable and what part of the plant is eaten (root, stem, leaf, bulb, seed, fruit).

EXPLORE Part 2

Have the students construct a terrarium using their 2-liter bottle. Demonstrate each instruction as they make it with you.

Put pebbles in the bottom of the bottle.
Add potting soil.
Carefully place your plants into small holes in the soil.
Cover the roots with soil and add water.
Place clear plastic wrap over the top and secure with a rubber band.

EXPLAIN

Ask:

What do our plants need to survive?
Where should we place our terrariums?
How will we know if our plants are thriving?
How will we be able to help our plants if they need it?

EXTEND/APPLY

Relate the terrariums to greenhouses. If possible, visit a nursery with greenhouses.

EXTENSIONS

Ask the students to keep a journal or a list at home of the parts of plants they eat during the week. After a week's time have the students bring their journal or list to school to share.

ASSESSMENT

Teacher observation and completion of student journal entries.
Proper care of the terrarium.