

# Plant Needs

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<b>Strand</b>	Life Processes
<b>Topic</b>	Investigating the needs of plants
<b>Primary SOL</b>	1.4 The student will investigate and understand that plants have basic life needs and functional parts and can be classified according to certain characteristics. Key concepts include a) plants need nutrients, air, water, light, and a place to grow.
<b>Related SOL</b>	1.6 The student will investigate and understand the basic relationships between the sun and Earth. Key concepts include a) the sun is the source of energy and light that warms the land, air, and water.  1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which b) observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy; f) inferences are made and conclusions are drawn about familiar objects and events; h) predictions are made based on patterns of observations; i) observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; j) simple investigations and experiments are conducted to answer questions.

## Background Information

All plants have the basic life needs of nutrients, air, water, light, and a place to grow.

## Materials

- Fast germinating bean seeds (e.g., black-eyed peas) – enough for each student to have four
- Zip-top plastic sandwich bags – one per student
- Potting soil
- Spray bottle filled with water
- Bulletin board or large window sill
- Student science journals or plant-observations chart
- Plant Needs Review Cards (attached)
- Scissors
- Glue
- Three small plastic drink cups per student
- Plant Growth handout (attached)

## Vocabulary

*air, life cycle, light, nutrient, seed, water, a “place” for a plant to grow*

## **Student/Teacher Actions (what students and teachers should be doing to facilitate learning)**

This experiment, which will take several weeks to complete, shows bean plants from the process of germination to maturity. It also shows how important each of the plants' needs (nutrients, air, water, light, and a place to grow) are to the survival of the plants. The day before starting the experiment, soak the beans in water overnight to assist the germination process.

### *Introduction*

1. Build interest in studying plants by showing pictures or a slideshow of various types of plants. (Note: Student comments as pictures are shown.)
2. Have students gather at the group reading area.
3. Choose a book about plants to read aloud in order to review SOL K.7 and build background knowledge for the experiment. Students may also enjoy acting out the parts of the plants in the story.
4. Tell students that they will be doing an activity to learn more about the things plants need to grow. The experiment will answer the question: "Can we discover what plants need to live by growing bean plants?"

### *Procedure, Part 1*

1. Explain that beans are really bean plant seeds, which are filled with everything a bean plant needs to begin life. Give each student a zip-top plastic sandwich bag containing 1/2 cup of potting soil. Explain that the soil contains many of the *nutrients* (food) the plant needs to grow. Plants absorb their nutrients through the soil through their roots. They also use sunlight, in a process called photosynthesis to create energy for them to use. (First-grade students are not expected to know any details about photosynthesis.)
2. Encourage students to use the word *soil* rather than *dirt*. Also, explain that the bag of soil is the *place* the plant needs to grow.
3. Give each student four beans that have been soaked in water. Have them place the four beans in the soil in the front of the bag, separate from each other. Remind students that each seed needs space to grow.
4. Ask students what else plants need to grow besides a place and nutrients. They should know the correct answers (water, air, and light), but if not, review SOL K.7b, which states that "plants need nutrients, water, air, light, and a place to grow to survive." Ask what should be added to each bag next. (*water*) Add to each bag two sprays of water from the spray bottle. (Note: There will be no need to add additional water as condensation inside the sealed bags will supply the beans with sufficient moisture.)
5. Guide students to seal their bags carefully without disturbing their beans and making sure there is ample *air* above the soil in each bag when it is sealed. Place the bags where students can observe them frequently and where they will receive plenty of *light*, e.g., on a window ledge or on a bulletin board. The bulletin board may also display picture references to each plant need.
6. Beans generally sprout within a few days and grow rapidly, given the above growing conditions. Have students observe their plants daily to monitor changes. Have them record changes, such as length of plant growth, in their science journals or on a small chart.

7. Distribute copies of the attached Plant Needs Review Cards, scissors, and glue. Direct students to cut out the cards and paste them in their science journals to use for review of plant needs and to assist them with assessment questions and prompts.

#### *Procedure, Part 2*

1. When the stems and leaves are tall enough to bend over in the bags, remove three hardy plants (the ones that have the most leaves, strongest stems, and good root systems) from a bag or bags to continue the plant needs experiment. (Note: Leave the remaining bags in place to demonstrate plant demise due to lack of air. You may also want to put some pin holes in several of the bags to demonstrate how supplying air to the plants will prolong their lives.)
2. Fill each of the three plastic cups 3/4-full with potting soil. Make a hole in the center of the soil deep enough to place a sprouted seed inside. Carefully remove one plant at a time and place it in one of the holes. Push the soil around the stem to secure the plant. Water lightly.
3. Label the three plants 1, 2, and 3 and the student's name. Put plant 1 near a sunny window, and water it every three days. Put plant 2 near a window, but do not water it again. Put plant 3 in a dark closet or cupboard or under a large cardboard box, and water it every three days.
4. Distribute copies of the attached Plant Growth handout. Have students predict what will happen to each plant, and write their predictions on the handout. Have students draw and write observations at the end of the first week and at the end of the second week.
5. At the end of the second week after students have finished drawing and writing their observations, have them compare plants 1, 2, and 3, as well as the plants still in the bags. Prompt a class discussion with the following questions:
  - Which plant grew best? (Plant 1) Why? (Has all the things it needs to grow)
  - Why didn't plant 2 grow well? (Lack of water)
  - Why didn't plant 3 grow well? (Lack of light)
  - Why didn't the plants that were left in the bags grow well? (Lack of air)

#### **Assessment**

- **Questions**
  - How did growing bean plants help us really see exactly what plants need to live?
  - What can you learn about all living things from this experiment?
- **Journal/Writing Prompts**
  - Pretend you are a bean plant. Use the picture cards to help tell a rebus story of your life as a plant. Make sure to include all the things you need to live a healthy life.
  - Use the pictures you drew of plants 1, 2, and 3 on your handout to explain why plants need nutrients, air, water, light, and a place to grow.
- **Other**
  - Perform this experiment with other types of seeds for students to see whether the same results occur.
  - Have students observe plants on the school grounds. If an outdoor classroom is available, have students note which plants look unhealthy, compare them to the healthy looking plants, and then brainstorm reasons the unhealthy ones look this way.

Ask them to suggest what basic need(s) the unhealthy plants may not be getting enough of to be healthy.

- If a digital microscope is available, have students observe the inside of a bean seed for Part 1. Also, have them compare the sprouted plants in each pot for Part 2.

### **Extensions and Connections (for all students)**

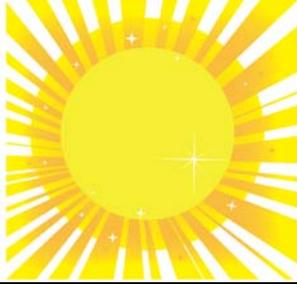
- If space is available at school, create a class garden for growing plants. Alternatively, a small garden can be made in a wagon that is pulled outside with the class as they go to recess or engage in other outdoor activities. A container plant in a public area of the school might be adopted by the class for care and observation. Students can be challenged to determine its needs and provide them.
- Invite a master gardener or nursery worker to come to a class and demonstrate taking care of plants. For example, transplanting a struggling pot-bound plant into a larger pot and observing the plant as it begins to flourish is a good demonstration of plants needing a place to grow.
- Take students on a field trip to an area nursery or farm to bring the outside plant world to life for students.
- Have students use plant materials (e.g., dried flowers, pressed leaves, twigs, bendable branches) to create works of art such as collages and sculptures. Also, have students take photos of flowers and leaves with a digital camera to print and mount for an art exhibition. You may wish to use an art teacher as a reference for such plant-based activities.

### **Strategies for Differentiation**

- Have students work in small groups to keep track of the plant growth.
- Have students use a visual display, such as a spreadsheet, to chart the growth of the plants.
- Use an Internet video that can be viewed multiple times to show the parts and growth of a plant.
- Have students work together to create a model of a plant from actual plant parts they collect around the school and/or at home.
- Create plant-needs vocabulary cards with pictures.

## Plant Needs Review Cards

Cut out the cards on the solid lines. Fold them on the dotted lines. Use them to review plant needs.

<h1>Nutrients</h1>	
<h1>Air</h1>	
<h1>Water</h1>	
<h1>Light</h1>	
<h1>A Place to Grow</h1>	

# Plant Growth



Name: \_\_\_\_\_ Date: \_\_\_\_\_

Draw and tell what happens to each plant during the experiment.

**Plant 1**  
Sunny window  
Water every 3 days

**Plant 2**  
Sunny window  
No water

**Plant 3**  
In a dark closet  
Water every 3 days



**Plant 1**



**Plant 2**



**Plant 3**

I predict plant 1 will \_\_\_\_\_  
\_\_\_\_\_  
During the first week, plant 1 \_\_\_\_\_  
\_\_\_\_\_  
During the second week, plant 1 \_\_\_\_\_  
\_\_\_\_\_

I predict plant 2 will \_\_\_\_\_  
\_\_\_\_\_  
During the first week, plant 2 \_\_\_\_\_  
\_\_\_\_\_  
During the second week, plant 2 \_\_\_\_\_  
\_\_\_\_\_

I predict plant 3 will \_\_\_\_\_  
\_\_\_\_\_  
During the first week, plant 3 \_\_\_\_\_  
\_\_\_\_\_  
During the second week, plant 3 \_\_\_\_\_  
\_\_\_\_\_