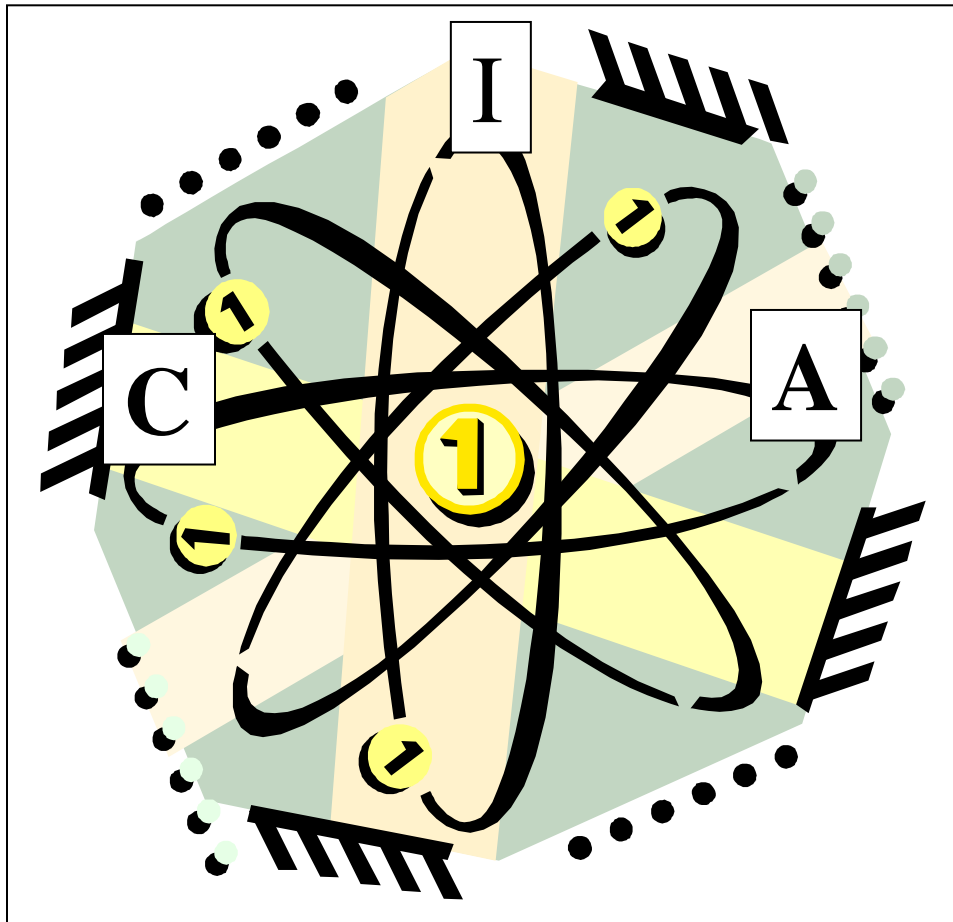


# Curriculum, Instruction, Assessment (CIA) Alignment

## Science, Grade 1 Unit 5: Seed and Plant Germination

### Task Analysis and Hands-on Investigations



**Ronald Blocker, Superintendent  
Orange County Public Schools  
Orlando, Florida  
2003-2004**



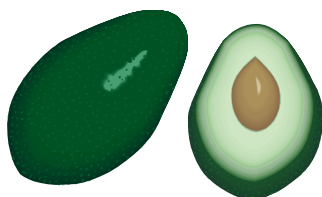
**Subject Area:** Science  
**Strand F:** Processes of Life \_\_\_\_\_  
**Grade:** 1 \_\_\_\_\_

**Benchmarks**

- SC.A.1.1.1: The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).
- SC.B.1.1.3: The student describes a model energy system (e.g., an aquarium or terrarium).
- SC.B.2.1.1: The student recognizes systems of matter and energy.
- SC.F.1.1.1: The student knows the basic needs of all living things.
- SC.F.1.1.3: The student describes how organisms change as they grow and mature.
- SC.F.1.1.5: The student compares and describes the structural characteristics of plants and animals.
- SC.G.1.1.2: The student knows that plants and animals are dependent upon each other for survival.
- SC.G.2.1.2: The student knows that the activities of humans affect plants and animals in many ways.

| <b>TASK ANALYSIS</b>              |                                                                                                                                                                                     |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>The student...</b>             |                                                                                                                                                                                     |
| <b>SEED AND PLANT GERMINATION</b> |                                                                                                                                                                                     |
| •                                 | observes and describes seeds.                                                                                                                                                       |
| •                                 | locates where seeds are found.                                                                                                                                                      |
| •                                 | 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. |
| •                                 | observes and analyzes each part of a plant (seeds, roots, stems, leaves, flowers and/or fruit) and correlates it to a specific function.                                            |
| •                                 | constructs and maintains a terrarium.                                                                                                                                               |
| •                                 | explains how plants are dependent on animals for seed dispersal.                                                                                                                    |

# SEEDS, SEEDS, SEEDS

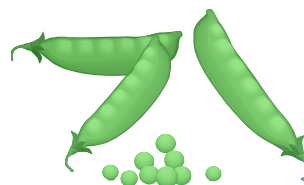


## **BENCHMARKS and TASKS**

**SC.A.1.1.1** The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

**SC.F.1.1.5** The student compares and describes the structural characteristics of plants and animals.

- The student observes and describes seeds.
- The student locates where seeds are found.



## **KEY QUESTION**

Where can seeds be found?

## **MATERIALS**

### **Teacher**

sharp knife

fruits and/or vegetables

chalkboard or chart paper

bar graph

*The Tiny Seed* by Eric Carle

*Pumpkin Pumpkin* by Jeanne Tiherington

*The Seed Song* by Judy Saksie

*Counting Seeds* (Benchmark Education Co.)

### **Per pair of students**

1 fresh fruit or vegetable

paper towel

paper plate

glue

### **Per student**

sheet of construction paper

markers or crayons

## **TEACHING TIPS**

1. Select fruits and vegetables that have different numbers of seeds, but do not select those with seeds too small or too numerous (e.g., peppers, cucumbers, cantaloupe) to be frustrating to examine and count.
2. Since fruits and vegetables are going to be used over a period of several days, store them in a refrigerator between activities.

## **DAY ONE**

### **ENGAGE**

1. Distribute one fruit or vegetable to each student or group. Allow students or groups to show the fruits/vegetables they have to the class. Encourage students to discuss how the fruits and vegetables are alike and how they are different.

2. Give students a piece of construction paper. Have them fold the paper into three sections. On the first section, students should draw and color a picture of the whole fruit or vegetable that was given to them or their group. The second and third sections will be completed later with a picture of the inside of the fruit or vegetable and the actual seeds.

| Whole | Cut in Half | Seed |
|-------|-------------|------|
|       | I think:    |      |
|       | I saw:      |      |

3. Store fruits and vegetables in the refrigerator until the next day.

**DAY TWO**  
**EXPLORE**

1. Give each student or group a paper plate containing the same fruit or vegetable the student or group observed the previous day.
2. Have students predict what might be inside the fruits or vegetables. In the second section of the record sheet in the “I think” box, students should draw what they think the inside of the fruit will look like. (If the students do not include seeds in their responses, allow them to discover the seeds for themselves through the exploration activities.)
3. The teacher should cut each fruit or vegetable in half. Students should then draw in the “I saw” box in the second section of the record sheet a picture of the fruit cut in half, showing where any seeds are located.
4. Next, ask students to remove and examine the seeds, noting the color, shape, size, and location of the seeds. Tell students to count the number of seeds as they remove them.
5. Students should each glue at least one of the seeds on the third section of the record sheet with their drawings of the whole and half fruit or vegetable.

**DAY THREE**  
**EXPLAIN**

1. On the board or on chart paper, label a bar graph with the names of the fruits/vegetables the different groups explored. Ask the students to complete the graph by marking the number of seeds that were found in the fruit they observed on their copy of the graph. If any students have seedless fruits/vegetables, the bar for that fruit/vegetable will not be colored but will remain on the graph.
2. Using the graph and the drawings completed previously by the students, discuss their discoveries. Ask:  
*How many seeds were in the fruit/vegetable?*  
*Did all of the fruits and vegetables have seeds?*  
*What color were the seeds?*  
*Do all fruits and vegetables have the same number of seeds?*

*Which fruit/vegetable had the most seeds?*  
*Do all big fruits/vegetables have big seeds?*  
*Do all small fruits/vegetables have small seeds?*  
*Where in the fruit/vegetable did you find the seed?*  
*Do we ever eat the seeds of a fruit or vegetable?*  
*Can we eat all the seeds found in the fruits and vegetables?* (Students may observe that many seeds are edible, but others are not.)

### **EXTEND/APPLY**

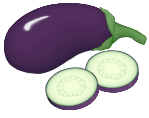
1. Since students' experiences with locating seeds have been limited to observing common fruits and vegetables, take the students outside and point out some other types of seeds - pine tree seeds (located in the cones), flower seeds, weed seeds, etc.
2. Incorporate the supplemental literature books for information and discussion.

### **EXTENSIONS**

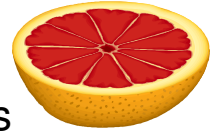
Encourage students to plant their seeds.

### **ASSESSMENT**

Have students write 2 or 3 true statements from the class bar graph comparing the seeds of the fruits and vegetables.



# Number of Seeds in Fruits and Vegetables



10

9

8

7

6

5

4

3

2

1

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|  |  |  |  |  |  |  |

pole bean

pea

green bean

pear

grapefruit

orange

apple

# SEED UNDERCOVER!



## BENCHMARKS and TASKS

**SC.A.1.1.1** The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

**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.1.1.2** The student knows that plants and animals are dependent upon each other for survival.

- The student observes and describes seeds.
- 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 maintains certain conditions in order for seeds to progress through the stages of growth (seed, seedling, mature plant) and analyzes how nature does the same.
- The student explains how plants are dependent on animals for seed dispersal.

## KEY QUESTION

What is the function of a seed?

## BACKGROUND INFORMATION

Seeds come in many different sizes, shapes, textures, and colors. Some are edible; some are not. Most plants produce a large number of seeds; this is because so few seeds survive. Some seeds just drop from the parent plant and take root, but they must compete for space and light. Animals and birds carry some seeds, others travel by the wind, and some seeds float. Some seeds are eaten by animals and then deposited in the ground as part of the animals' waste.

Germination is the process in which a plant begins to sprout or grow. In order to germinate, seeds must absorb water until they swell and burst their seed coat. All seeds have the same parts: a **seed coat** for protection, an **embryo** (the baby plant), and **cotyledon** (stores food that feeds the embryo until it is a seedling and can make its own food). The purpose of a seed is to develop into a new plant.

## MATERIALS

### Teacher

*The Tiny Seed* by Eric Carle

### Per student

science/plant journal  
magnifier

### Per group

lima beans or pinto beans  
1 paper towel  
2 clear plastic cups  
water

## TEACHING TIPS

1. Do not soak the beans overnight. Students will do this.
2. Save the beans from Day One to use on Day Two.

## ENGAGE

1. Ask:  
*What is a seed?*  
*Why do you think we have seeds in fruits and vegetables?*
2. Read and discuss *The Tiny Seed* by Eric Carle.

## EXPLORE

1. Tell students to observe a bean with their hand lens. Trace it in their science/plant journal.
2. Have each group place enough lima beans or pinto beans to fill two clear plastic cups. (The same kind of beans in both cups.)
3. Have students fill to the rim, ONE of the cups of beans with water. The other cup stays dry.
4. Have students predict what will happen to the beans in both cups. Record their predictions.
5. The students should observe changes over a two-hour period. Every half hour the students record their findings in their journal. After an hour, add just enough water to the watered beans so the water fills the cup. (If you have the students time this activity and read the clock, you will be supporting a mathematics benchmark.)

## EXPLAIN

Discuss the following questions every half hour and have students record in their journals:

*How did the seeds change when water was added?*

*Did both cups show a change? If not, which cup of seeds did not change?*

*Describe what changes you observed.*

*Be sure to include size, color, and hardness.*

*Did our predictions match our results?*

## EXPLORE

1. Ask students to carefully peel off the outer skin or seed coat of a soaked bean and then split the bean in half lengthwise. After opening the bean, students should use a magnifier to identify the parts of the seed: seed coat, embryo, and cotyledon (see **Background Information**). (Students probably will not use these terms, so accept their responses, and then provide the appropriate terms for the parts they've identified.) Do not expect first graders to memorize the terms.
2. Draw a seed on the board, labeling each part. Have students do the same in their science journals.
3. Discuss the function of the seed coat, the embryo, and cotyledon.

## EXPLAIN

1. Have students describe their observations after using the magnifier to examine their seed.
2. Explain to the students that **a seed has only one purpose – to become a new plant**. Ask students to think about how a seed gets to a certain place so it can become a new plant.  
Ask:  
*What is the main purpose of a seed?*

*What are the parts of a seed?*

*What is the function of each part of the seed?*

*How do seeds get from one place to another so they can become new plants? (See*

**Background Information.**)

**EXTEND/APPLY**

1. Share the following poem with the students:

THE SEED

The seed didn't like the dark and wet all around.  
So he burst his shell and traveled up above the ground.  
by Deirdre Englehart

2. Plant some of the seeds that were soaked and plant some seeds that were not soaked. Label the containers. Place in a well-lit area and provide water as needed. Observe the containers to see which seeds will sprout first.
3. Burdocks are plants with round burrs that stick to clothing or get tangled in animal fur. They also stick to each other. One man found burdocks to be so fascinating that he began experimenting with a man-made version. Have students try to predict what he invented, based on his study of burdocks. (He invented Velcro!)

# ADOPT – A - SEED

## BENCHMARKS AND TASKS

**SC.A.1.1.1** The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

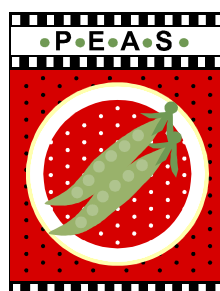
**SC.B.2.1.1** The student recognizes systems of matter and energy.

**SC.F.1.1.1** The student knows the basic needs of all living things.

**SC.F.1.1.3** The student describes how organisms change as they grow and mature.

**SC.F.1.1.5** The student compares and describes the structural characteristics of plants and animals.

- The student observes and describes seeds.
- The student maintains certain conditions in order for seeds to progress through stages of growth (seed, seedling, mature plant) and analyzes how nature does the same.



## KEY QUESTION

How do plants grow?

## BACKGROUND INFORMATION

Nearly all trees, shrubs, and vegetables started as seeds. A seed is actually a container or case, which contains plant life. Seeds have three main parts in common: the seed coat, a tough outer covering; the embryo, a “baby” plant inside the seed; and the cotyledon, the food supply surrounding the embryo. The food supply is the seed’s only source of nourishment as it pushes up through the soil and begins to grow into a young plant. Plants need light for growth, but seeds do not. Seeds are planted underground where it is dark, and they use their own stored energy for growth.

When a plant is just beginning to peek out from the seed, it is said to be sprouting. Once a seed begins to sprout, it needs the right amount of water and a suitable temperature. Water causes the seed to expand. Germination is the process through which the embryo inside the seed begins to grow. As a seed germinates, it develops roots that grow downward, a stem that pushes up to the light, and leaves.

## MATERIALS

### Teacher

packets of seeds (vegetables, flowers, herbs)

bag of assorted seeds

chart paper

Related literature:

*The Tiny Seed* by Eric Carle

*The Garden in the City* by Gerda Muller

*Growing a Plant* (Benchmark Education Co.)

*The Garden from Frog and Toad Together*

### Per Student

1 milk carton

soil

magnifier

clear tape

student science journals

centimeter ruler

crayons

plastic or styrofoam shallow tray

1 piece of drawing paper

## **TEACHING TIPS**

1. This learning event requires patience and persistence. Note those students experiencing particular success or difficulty in these tasks.
2. Clean milk cartons and poke three holes in the bottom of each using a pencil prior to beginning this activity.

## **ENGAGE**

1. Pass assorted seeds around the room to each table.
2. Ask:  
*Do you think that these seeds are alive? Why or why not?*  
*How could we find out if they are alive?*  
*If they are alive, or could be, what do you think would make them start to grow?*
3. As a class, brainstorm a list of the things students think seeds need to sprout. List these on a class chart.

## **EXPLORE**

### **Preparing the plants:**

1. Place assorted packets of seeds at each table.
2. Explain to students that they will be “adopting” seeds from one of the packets. Ask students to pick one packet of seeds.
3. On a chart, record each student’s selection.
4. Give each student a magnifier, a tray, crayons, and a piece of drawing paper.
5. On the drawing paper, have each student write his/her name; the name of the seed found on the seed packet; create a drawing of the seed from observing it; and a drawing of the plant on the front of the seed packet, which the seed will become.
6. Each student will take a prepared, clean milk carton; fill it 2/3 full of soil; place three holes in the soil with a pencil (about 1” deep); and plant three seeds in the soil.
7. Students will label their seed container with their name and the name of the plant. On one side they will tape the seed packet to the carton.
8. Read to the class either *The Tiny Seed* by Eric Carle or excerpts from *The Garden In the City* by Gerda Muller.
9. Ask:  
*What things do seeds need in order to grow?*  
*How can we provide for our seeds?*  
*Do you think seeds need to be moist or dry in order to sprout?*  
*What have you observed that makes you believe this?*

### **Plants Sprouting**

1. Allow students to place their seeds in a location they choose; water their plants as they feel necessary; and record all observations in student science journals.
2. Read the story called “The Garden” in *Frog and Toad Together*. After reading the story, discuss some of Toad’s ideas about how to “wake up” seeds.
3. Ask:  
*Do you think yelling might wake seeds up?*  
*How will we decide when seeds have sprouted?*  
*As seeds begin to sprout, record in student science journals how many days it took.*

## **Plants Growing**

1. Students will water plants daily and record all observations about the plants (shape, height, number of leaves, color) in their science journals.
2. Have students compare their observations with those of others. How do different plants appear similar and different?

## **EXPLAIN**

Through questioning and discussion, develop the concept of what plants need for growth.

*Did your seeds grow?*

*How did you take care of them?*

*Did you water them often? How often?*

*Did all of the seeds grow at the same rate?*

*Where did you place your seeds in the classroom? Why did you select that spot?*

*What can you tell us about growing plants?*

*Can you explain why you think some plants are taller than others?*

*Why are some plants not as green as others?*

*Why have some plants not grown very much?*

*Would you do anything differently if you were to adopt another seed?*

## **EXTEND/APPLY**

1. Take the class on a nature walk of the school grounds. Ask them to observe the conditions of various plants. Discuss some possible reasons why some plants are thriving and others are not.
2. Determine if the direction seeds are planted (vertically, horizontally, diagonally) affects the direction the stem of the sprouts will grow. Place seeds on a moist paper towel in a plastic zip lock bag with each seed placed in a different direction. Observe any differences.
3. Watch seedlings as their roots grow by placing them in a “pillow pack” garden. This consists of a gallon-size zip lock freezer bag filled  $\frac{3}{4}$  of the way with soil and zipped shut. Set the bag on its side and punch three or four holes on both sides of the bag. Plant seeds, or seedlings, in the holes of one side and place the other side in a large styrofoam meat tray in which you will add water. As the seed sprouts and becomes a seedling, the clear bag will provide the student with an inexpensive viewing site for the growing root system.
4. Read *Growing a Plant*.

## **EXTENSIONS**

1. Invite a person who works with plants to talk with your class (e.g., horticulturalist, nursery person, landscaper).
2. Do all plants grow from seeds? Are there other ways to grow plants? Read *The Plant Sitter* by Gene Zion and discuss. Create plant cuttings, grow bulbs, grow potatoes using the eyes of potatoes to support further learning.

## ASSESSMENT

Teacher assessment through observation should include the following criteria:

- Tasks have been completed by the student.
- Student journal entries should show growth and understanding.
- Student demonstrates understanding through successful completion of the activities and in class discussions.
- Data collection and organization of data was effective.
- Use of science tools enhanced their learning.
- Science safety rules were observed.

# SLURP!

## **BENCHMARKS and TASK**

**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.

- 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.

## **KEY QUESTION**

What is the main function of a plant stem?

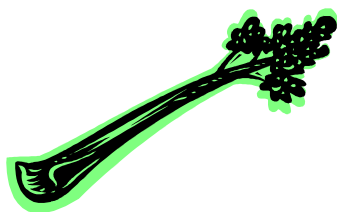
## **BACKGROUND INFORMATION**

The main function of a stem is to support the leaves and flowers of a plant and to connect them with the roots, which supply water, minerals, and nutrients. Plants absorb water through their roots in the soil. As water evaporates from the leaves, a vacuum is created that pulls the root water upward through the stem to the leaves. This principle is the same as sipping through a straw. (The narrowness of the tubes through which the water travels also contributes to this **capillary action**.)

## **MATERIALS**

### **Per pair of students**

fresh celery stalk with leaves  
clear cup of water  
red food coloring  
magnifier  
drawing paper  
plastic knife  
straws  
2 cups of drinking water (for students to sip with the straws)  
3 *Slurp!* worksheets



**Teacher**  
plant

## **TEACHING TIPS**

1. The celery experiment should be started in the morning and observed during the day.  
Keep it overnight.
2. Discuss the physical features of celery so students know what to draw.

## **ENGAGE**

1. Give each student a drink with a straw. Allow them to sip.  
Ask:  
*What happens to the water when you drink from a straw?*  
Tell students there is a plant part that acts much like a straw.
2. Show a plant to the class.  
Ask:  
*Which plant part do you think that might be? Why do you think so?*

Tell students they will do an experiment to help them decide.

### **EXPLORE**

1. Divide the class into pairs. Distribute materials to each pair.
2. Have groups fill a cup 2/3 full of water and add a few drops of red food coloring.
3. Show students how to use a plastic knife to cut off the bottom of a stalk of celery. (You may choose to do this ahead of time.)
4. Have the students examine the celery stalk including the bottom and discuss what it looks like.
5. Distribute and discuss the *Slurp!* record sheet #1. Allow time for students to draw what the celery stalk and the bottom of the celery look like now and to make predictions about what will happen to the celery stalk and record the predictions on the record sheet.
6. Have the students label the containers with their names and place the celery stalk in the cup. Set the cups out of the way, but in a location where they can be observed.
7. Students should observe the celery at given intervals during the day. Any movement of the color up the stem of the celery should be recorded by coloring the stalk of celery pictured on record sheet #2. (If feasible, record time to the nearest hour to support the math task analysis for first grade.)
8. When the observations are complete, have students cut off a small portion from the bottom of the stalk. Students can use a magnifier to see little dots of color. Have them draw a picture of the celery stalk and the cross-section of the celery stalk on the *Slurp!* record sheet #1.

### **EXPLAIN**

1. Bring the class together to discuss their observations.  
Ask:  
*What did you observe?*  
*What are the little dots of color on the bottom of the celery stalk?*  
(These are the tubes that carry the water through the plant.)
2. Cut the celery lengthwise and allow students to try to follow a tube up the stalk to a leaf. Cut leaves off of the stalk. After students have observed the leaves, ask:  
*Has the color reached the plant leaves?*  
*How did the water get pulled to the leaves?*  
*How could the water going up the stem help the plant?*
3. Ask students what other functions of the plant stems serve? (Stems support the leaves and flowers of the plant.)
4. Have students explain on the *SLURP!* record sheet #3 what happened to their celery after one day.

### **EXTEND/APPLY**

1. Take students on a stem walk. Look for a variety of plants.  
Ask:  
*Which part of the tree is the stem? (The trunk and the branches)*  
*Can you find the stem on a vine? Grass?*

2. Make a partial cut in a new celery stalk halfway up the stalk.  
Place the stalk in colored water.  
Leave overnight.  
Discuss their observations.

### **EXTENSIONS**

1. Leave a stalk of celery out of water overnight. Ask students to predict what will happen to the leaves and stem. Have them observe the celery the next morning. (It will be wilted.)  
Ask:  
*Do you think we can freshen the celery again? How?* (Add water and it will be fresh again.)
2. Provide students with pictures of foods. In small groups, have them decide which foods we eat that are obtained from stems or that are stems we eat. Examples include asparagus, potatoes, rhubarb, green onion, and sugar from stems of sugar cane. Potatoes are an example of an underground stem called a **tuber**.

### **ASSESSMENT**

Use the *SLURP!* record sheets to determine if students understand the purpose of stems. Students should include that the stem carries water and nutrients to the leaves.

Student Scientists \_\_\_\_\_

Record Sheet #1

# SLURP!

Draw a picture of your celery.

Draw a picture of the bottom of your celery.

Predict what will happen to the celery after it has been placed in the colored water.

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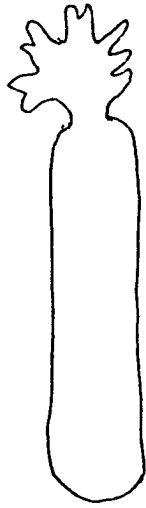
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Student Scientists \_\_\_\_\_

Record Sheet #2

# SLURP!



Time \_\_\_\_\_



Time \_\_\_\_\_



Time \_\_\_\_\_



Time \_\_\_\_\_

Student Scientists \_\_\_\_\_

Record Sheet #3

# SLURP!

Draw a picture of your celery stalk after one day.

Draw a picture of the bottom of your celery stalk after one day.

Explain what happened to your celery after one day in the colored water.

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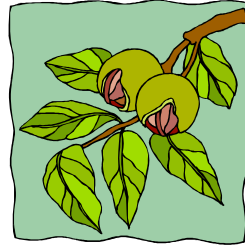
# LEAF ME ALONE

## BENCHMARKS and TASK

**SC.A.1.1.1** The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

**SC.F.1.1.5** The student compares and describes the structural characteristics of plants and animals.

- 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.



## KEY QUESTION

What is the function of leaves?

## BACKGROUND INFORMATION

Leaves come in many varieties. Some are large, small, slender, or wide. Leaves can be prickly, hairy, soft, or hard. Some leaves are smooth, toothed or lobed. Leaves can be classified as simple or compound. Most leaves have two parts, the blade and the petiole. The broad, flat part of a leaf is called the blade. The petiole is the stem-like part of the leaf that joins the blade to the stem. But all leaves change sunlight into energy through photosynthesis. The leaves are the primary food-making part of the plant. The leaves absorb carbon dioxide from the air and with water that comes through the roots of the plant, combines these elements and releases oxygen into the air. Oxygen is necessary for all living things.

Many leaves are edible such as lettuce, spinach, field greens, parsley, and cabbage.

## MATERIALS

### Teacher

variety of leaves

*Leaf Me Alone* poem written on chart paper

### Per student

*My Very Own Special Leaf* recording sheet

crayons

pencil

magnifier

paper clips

centimeter tape

## TEACHING TIPS

1. Photosynthesis is too difficult for first grade students to understand and will be explored in fifth grade. First grade students will observe a leaf, record their observations, and discuss the purpose of leaves.
2. If this activity cannot be completed in one day, keep the leaves from drying out by placing them in a solution of 1 part glycerin to 2 parts water. Layer the leaves in a shallow pan, cover with the solution, and soak for 24 hours. Remove the leaves from the solution and press them between newspapers for 3 days.
3. Include some leaves, such as spinach and lettuce that are edible in your display.

4. Write the *Leaf Me Alone* poem on chart paper or poster board for display.

### **ENGAGE**

1. Place a leaf in a bag and have students play *Twenty Questions* to determine what is in the bag.
2. If possible, take the students on a nature walk and have them pick up a leaf that will be their own. If not, display a variety of leaves and have each student choose one.
3. Allow students time to look at and discuss the leaves. Discuss differences they observe (e.g., color, size, shape).
4. Display and read poem, *Leaf Me Alone*. Discuss what the poem tells us about plants.
5. Ask:  
*What is the poem telling us is an important part of a plant?* (leaves)  
*What do leaves make for a plant?* (food)  
*What helps the leaf make food for the plant?* (the sun)  
*What travels to the tip of the leaf?* (water)

### **EXPLORE**

1. Have the students observe their leaf and draw it on the activity sheet.
2. Tell the students to look at their leaf through a magnifier and add details to their drawing.
3. Have the students measure the length of their leaf using paper clips, then measure in centimeters, and record their measurements on the activity sheet.
4. Tell the students to use their senses of smell and touch and record on the activity sheet.

### **EXPLAIN**

Have students share their observations and measurements.

Ask:

*Were all of the leaves the same color?*

*Does your leaf look the same on both sides? If not, how are they different?*

*What was the measurement of the shortest leaf?*

*What was the measurement of the longest leaf?*

*Can you find a leaf that is longer than yours?*

*Can you find a leaf that is shorter than yours?*

*Can you find a leaf that is the same length as yours?*

Discuss the functions of leaves. Tell the students that the leaves make food for the plant.

*What are the uses of leaves?* (e.g., beauty, mulch, animal habitat, eaten by insects, food)

*Name some leaves that we eat.*

### **EXTEND/APPLY**

1. Play *Show Me a Leaf*:  
Show Me a Leaf that has more than one blade.  
Show Me a Leaf that has spots on it.  
Show Me a Leaf that feels smooth, etc.
2. Create a Venn diagram with hula hoops or yarn: green, not green; scalloped edges, not scalloped edges, etc.
3. Make a leaf chain – My leaf is different from (or like) yours because...

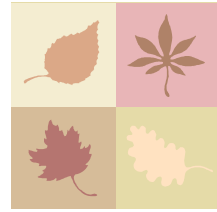
# LEAF ME ALONE

Please don't pull, cut or tear me,  
for a plant to live, I'm necessary.  
Whether I'm a bean, apple or pear,  
put me in the sun for proper care.  
In order to make food for a plant to grow,  
I spread my face for the sun to glow.  
My fine delicate veins do not rip,  
for the water must go to my very tip.  
If all these steps you do take,  
a healthy, beautiful plant I will make.

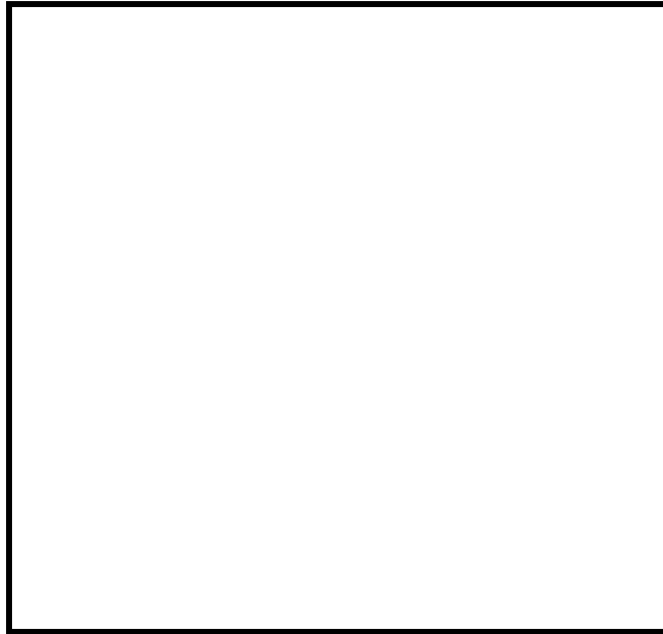
*by* **Dianne Billen**



## *My Very Own Special Leaf*



My leaf looks like this:



The color of my leaf is \_\_\_\_\_ .

My leaf is \_\_\_\_\_ paper clips long.

My leaf is \_\_\_\_\_ centimeters long.

My leaf smells like \_\_\_\_\_ .

My leaf feels like \_\_\_\_\_ .

I found my leaf \_\_\_\_\_ .

Leaves are for \_\_\_\_\_ .

\_\_\_\_\_ .

# PRETTY PETALS



## BENCHMARKS and TASK

**SC.A.1.1.1** The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

**SC.F.1.1.5** The student compares and describes the structural characteristics of plants and animals.

- 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.

## KEY QUESTION

How does a flower help a plant?

## BACKGROUND INFORMATION

The flower is the reproductive part of a plant. Most flowers have four main parts: the **sepals**, **stamen**, **petals**, and **pistil**. **All flowers have the same basic function – to produce seeds in order to preserve the species.** The colors, shapes, and scents of flowers all help the plant to reproduce itself.

Plants need pollen for fertilization so flowers can make more seeds. Bees, wasps, birds, water, man, and the wind carry the pollen from flower to flower. When an animal touches the pollen in a flower, it sticks to the animal. The next time the animal touches a flower, the pollen sticks to that flower. This is **pollination**.

## MATERIALS

### Teacher

chart paper or board space prepared for two  
class graphs  
*I Can Count the Petals of a Flower* by Wahl (NCTM)

### Per pair

flower  
newspaper

### Per student

crayons  
pencil  
drawing paper  
magnifier  
science journal

## TEACHING TIPS

1. Let your grocery store, flower shop, or plant nursery know ahead of time that you will need some old or discarded flowers on a specific day.
2. If possible, obtain a wide variety of flowers.

**ENGAGE**

Brainstorm with the students the names of flowers. Record on a Circle Map.

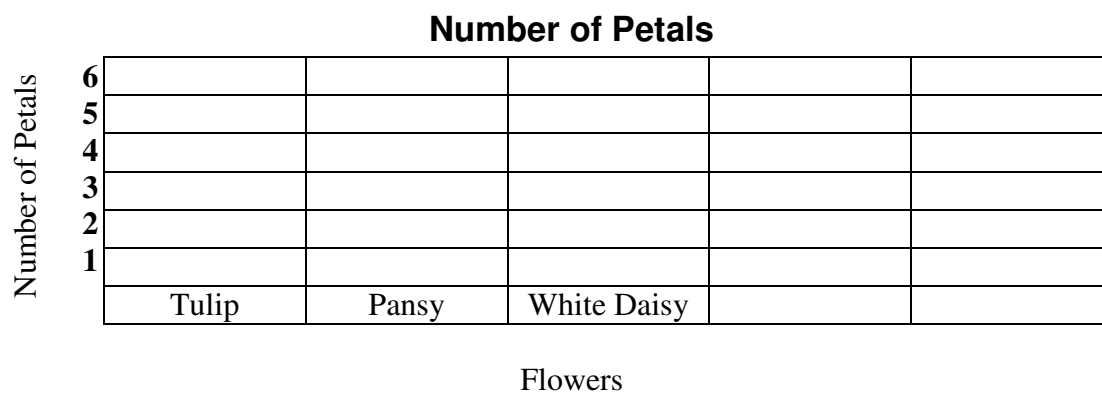
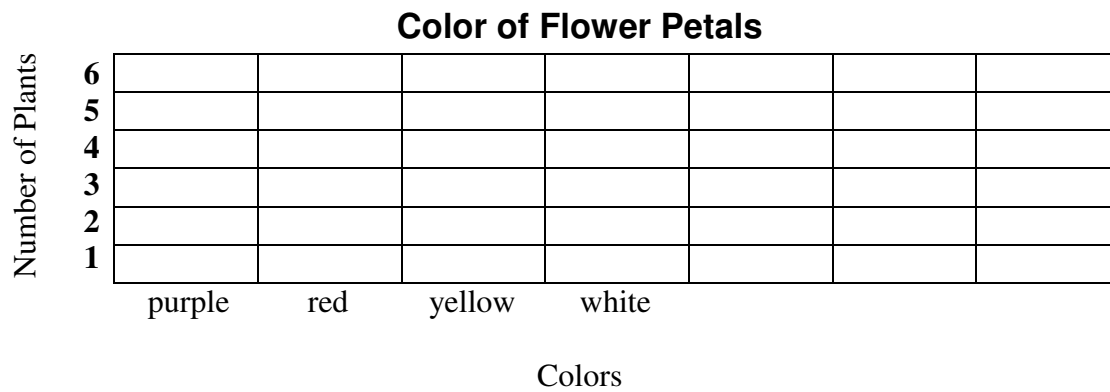
Ask:

*Why do you think plants have flowers?*

*How are new plants made?*

**EXPLORE**

1. Have students cover their work area with newspaper. Distribute flowers, magnifiers, drawing paper, and crayons.
2. Give students time to use magnifiers to closely examine the flowers. Encourage students to use their senses of smell, sight, and touch to make observations. Have students draw in their science journals a detailed sketch of the flower, showing the color, the number of petals, and any other distinguishing characteristics.
3. Collect the data and make two class graphs, showing the color of petals and number of petals.



**EXPLAIN**

1. Discuss student drawings and observations.

Ask:

*Are all of the flowers we observed the same color?*

*How many different colors did you discover?*

*How do you think bees and butterflies find flowers? List all responses.*

*Why do you think so many flowers are bright colors?*

*Do you think bright colors would make flowers more attractive to bees and butterflies? Why?*

*How many petals did your flower have?*

*Was the number of petals an even or an odd number?*

*Did all of the flowers have the same number of petals?*

2. Discuss pollination (refer to background information).

Ask:

*Did your flower have a scent (smell)? If so, what part of the flower had the scent?*

*Would a pleasant scent attract insects or keep them away?*

*How would an unpleasant odor protect a flower from insects?*

3. Read and discuss *I Can Count the Petals of a Flower*.

### **EXTEND/APPLY**

1. Take students to the playground or field and have them sit quietly. Ask them to observe their surroundings. Tell them to look for insects and observe their behavior.

Ask and discuss:

*Do the insects seem be attracted to certain flowers or plants more than others?*

*Do you notice some plants that do not seem to attract any insects?*

2. Bring in a small pot of marigolds. Marigolds have an unpleasant scent. This offensive odor may be beneficial to the marigold.

Ask and discuss how people may use marigolds to help other plants in their gardens. (Many people plant marigolds to repel harmful insects from nearby plants.)

### **EXTENSIONS**

As a demonstration, dissect one flower and display the four main parts (sepals, stamen, petals, and pistil). (Tulips, gladioli and lilies are easy to dissect.)

### **ASSESSMENT**

Teacher observation and completion of student journal entries.

# ROOT FOR THE PLANTS

## **BENCHMARKS and TASKS**

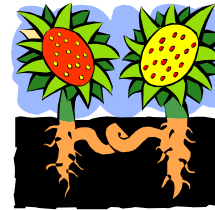
**SC.B.1.1.3** The student describes a model energy system (e.g., an aquarium or terrarium).

**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

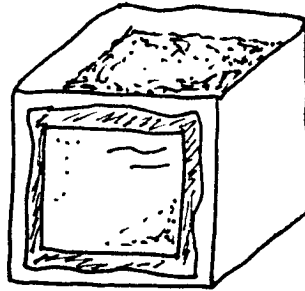
piece of pre-cut acetate (transparency film)

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.
- Students should plant seeds about 1 cm from the plastic window, and the box should be covered with plastic wrap to slow down evaporation.
  - 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**

- Read and discuss *Tops and Bottoms*.
- 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
- Ask the students to plan a special lunch consisting only of plant parts.
- 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.