Elementary Science: Plant Parts & Plant Needs

A collection of hands-on lessons and activities for the elementary classroom that explore plant plants and needs.

Table of Contents

Apple Anatomy

Standards of Learning
Science: 5.1, 5.5

Objective
Students will:

- Create microscope slides and analyze them using a microscope. They will sketch their observations.

Materials

- very thin slices of apple and another fruit or vegetable
- water droppers
- microscope slides
- cover slips
- microscopes

Background Knowledge
There are numerous parts that can be found in a plant cell, which is what your students will be observing when looking through their microscope. The cell membrane forms a barrier between the inside of the apple and the outside. The cell membrane allows waste to exit the cell. The cell wall is used to provide structural support and control the amount of water entering the cell. The golgi body stores and distributes lipids and proteins into the cell. Lysosomes are the garbage disposal of the cell by cleaning up the cell and watching what comes in and out. Cytoplasm distributes oxygen and food to the cell and supports all of the parts inside the cell. The nucleolus is where ribosomes are made. The vacuole stores water, nutrients, and other substances that cannot be used right away. Ribosomes are protein builders for the cell. Chloroplasts are the food producers of the cell. They contain chlorophyll, the green substance used for photosynthesis. The nucleus regulates all cell activity and is made up of genetic information that controls cell growth. The nuclear envelope surrounds the nucleus and is similar to the cell membrane. The smooth endoplasmic reticulum packages protein for distribution in the cell and releases calcium for the cell. Mitochondria are used to provide the cell with energy by changing sugar into energy through respiration. Hopefully, these are the kinds of things your students will notice when observing their apple and fruit pieces.
Apples, like all living things are made up of cells. A high resolution microscope will allow students to observe the apple's cells. However, you may also do this lesson with a lower resolution microscope.

Procedure

1. Review with students the parts of a plant cell.
2. Pass out lab supplies to students.
3. Have them first place a small, thin slice of apple on their slide. Next, use the water dropper to place a drop of water on the slide. Then, place the cover slip on top.
4. Repeat the process to make their second slide using a different fruit or vegetable.
5. Students should place the first slide with the apple on it under the microscope. They should sketch and record their observations. Do the same for the second slide that has the other piece of fruit.
6. Ask students to brainstorm similarities and differences between the 2 slides. Record their answers on the board in a chart format.

Extension
Have students evaluate the truth of the statement, "An apple a day keeps the doctor away," by researching the nutritional value of apples.

Apple of My Eye

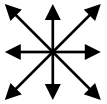
Standards of Learning
English: 2.1, 2.2, 2.9, 2.11, 2.12, 3.1, 3.6, 3.9
Science: 2.4, 3.8

Objective
The student will
- listen to and respond to a reading by recording facts about apples.

Materials
- Apples by Gail Gibbons
- 4, 1"x12," red strips of construction paper per student
- Hole punch
- school glue
- stapler
- Green pipe cleaners, 1 for each student

Background Information
The book, Apples, provides an excellent overview of apples, including history and science concepts. Students will learn about the life cycle of apples, their origin in the United States, as well as their uses.

Procedure
1. Read Apples to the class.
2. Ask students to brainstorm anything new that they learned from the book. Record their answers on the board.
3. Pass out 4 red strips of construction paper to each student.
4. On each strip they are to write a fact about apples, which they learned from the book.
5. Students then lay the strips on their desks (writing facing down), so that they form a star. See diagram to right.
6. Glue the strips together at the middle meeting point (you may also use a stapler).
7. Gather the ends to form an apple shape. Staple strips together at the top.
8. The student then punches two holes at the top and threads a green pipe cleaner through to form a stem and curling the ends to form a leaf.
9. Display around the room.



Extension
After making the apple, have students cut seeds out of brown construction paper. On each seed they should write a question about apples. Slide the seeds into the apple. Students get into pairs and trade apples. They shake their partner's apple and pull out a seed question. The student will then try to answer the question on the seed.

Bean Book

Standards of Learning
Science: 4.4

Objective
Students will:
- Create a model of seed structures

Materials
- Templates (attached)
- Staplers
- Scissors
- Soaked bean and corn seeds
- Hand lens
- toothpicks

Background Knowledge
Seeds have three basic structures – an outer seed coat, which protects the seed. The seed coat may be thick or thin. Inside, there is the embryo, which is the tiny plant and the cotyledon(s). The cotyledon(s) are the seed leaves, which contain the endosperm that holds the food. Plants with one cotyledon, such as corn, are called monocots; while plants with two cotyledons, such as beans, are called dicots.

The two types of seeds used in this lesson are each important crops to Virginia and each perennially rank in the top ten of the state's agricultural commodities.

Procedure
1. The day prior to the lesson, soak bean and corn seeds in water.
2. Pass out seeds and hand lens to students. Have them work in park to examine both of their seeds and draw their observations.
3. Instruct students to peel off the outer covering of both the bean and corn seeds. Have them examine the coverings of each seed and record the differences they find.
4. Using toothpicks, have the students split the bean seed into halves. Have them use a hand lens to examine each half and draw what they see.
5. Have students predict what they think they will find inside the corn kernel. Then have them split the corn kernel in half and examine each half. Draw their observations.
6. Instruct students to use toothpicks to scrape out the material inside the seed. Using their lens, have them examine and compare the insides of the two seeds.
7. Discuss the students' findings and correctly identify the structures that they saw and recorded. Explain the purpose behind the seed structures.
8. Tell students you will now be focusing on the structures within the bean seed. Pass out the patterns (attached) for the book.
9. Instruct students to cut out and assemble the book as shown in the picture below.
10. Next, have them label the pages in their book as well as write short descriptions.

Extension
Germinate a corn and a bean seed side-by-side so that students can witness the differences

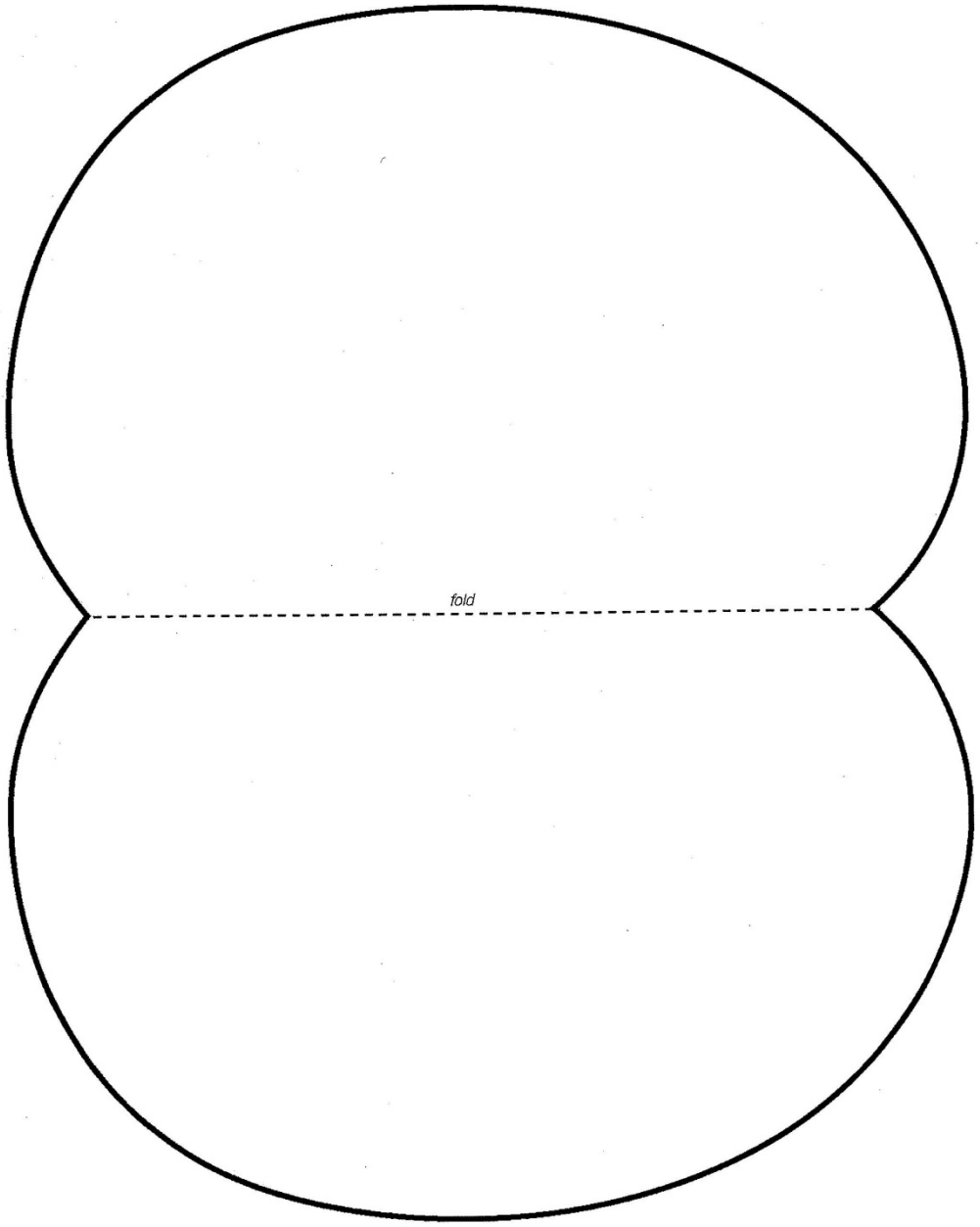
between the two. Wet two cotton balls and then place a bean seed on one and a corn seed on the other. Place both cotton balls inside the same clear plastic baggie. Hang in a warm spot and have students make daily observations.

References

Lesson adapted from Louisiana Agriculture in the Classroom

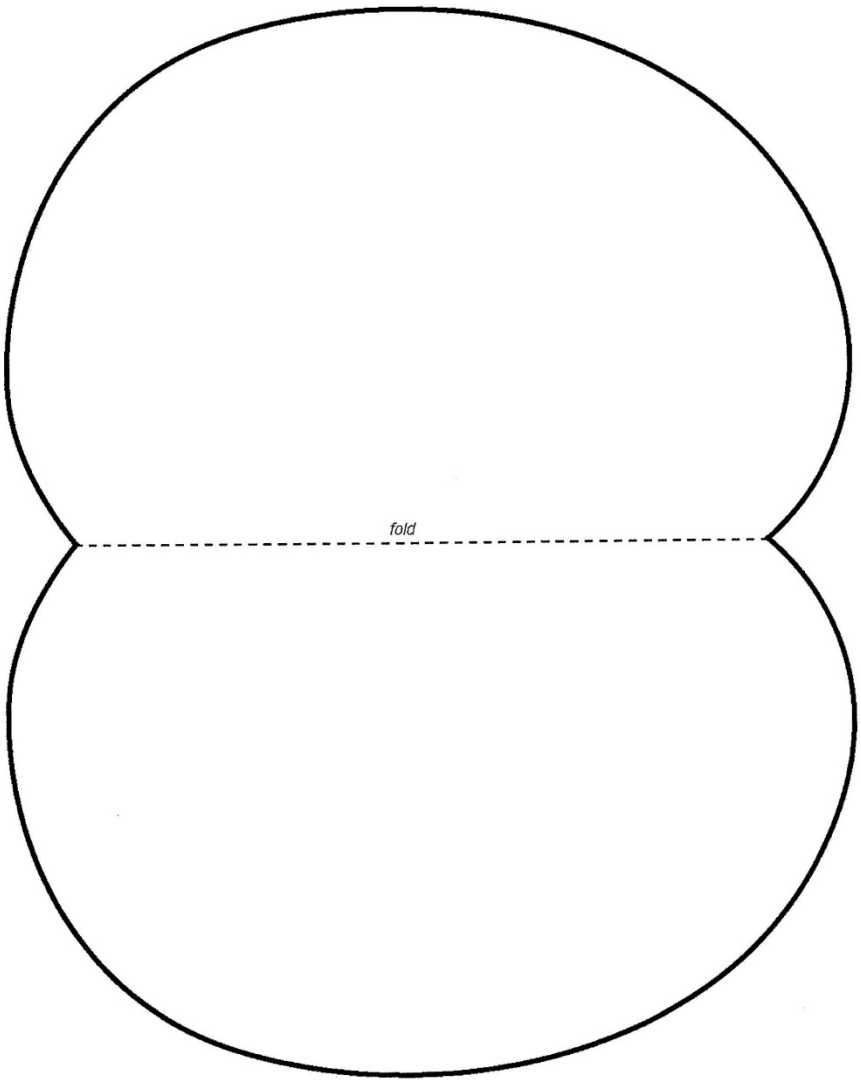
THE BEAN BOOK SEED COAT PATTERN

Copy onto brown construction paper. Each student gets one of these patterns.



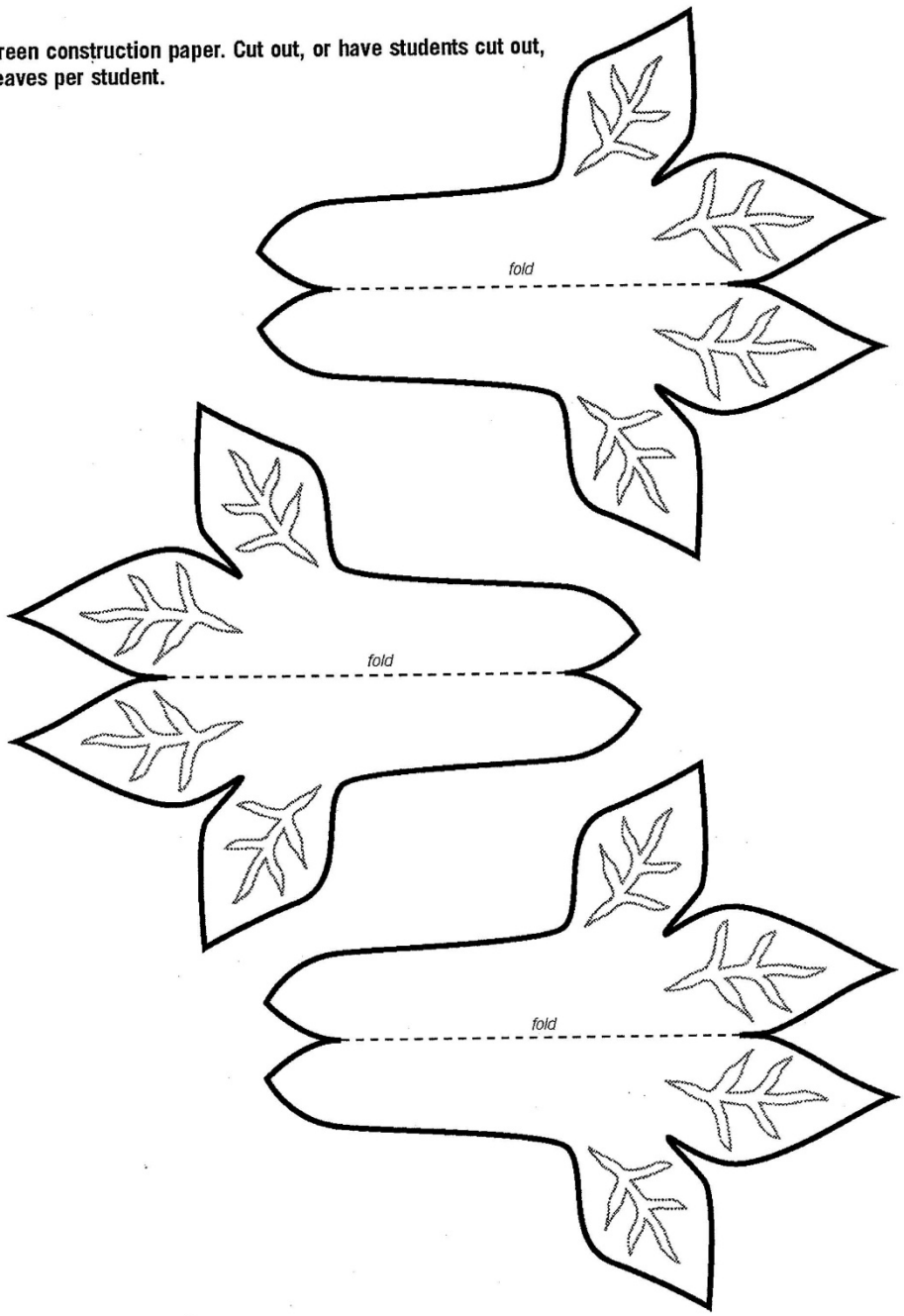
THE BEAN BOOK SEED LEAVES PATTERN

Copy onto white construction or index paper. Each student gets one of these patterns.



THE BEAN BOOK EMBRYO PATTERN

Copy onto green construction paper. Cut out, or have students cut out, one set of leaves per student.



Creative Veggies

Standards of Learning
Science K.1, K.7, K.9, 1.1, 1.4, 2.1, 2.4, 2.8, 3.8, 4.4
English K.1, K.2, 1.1, 1.2, 2.1, 2.2, 3.1
Health K.1, 1.2, 2.2, 3.1

Objective
Students will:
- Investigate and understand that plants have functional parts
- Listen and respond to a variety of books

Materials
- *Tops and Bottoms* by Janet Stevens
- Blank white paper (one sheet for each student)
- Vegetable templates (sheets provided)
- Construction paper
- Scissors
- Glue
- Markers/colored pencils

Background Knowledge
This lesson focuses on the plant parts and characteristics of vegetables. Specifically, students will learn that plants have edible and non-edible parts. The edible parts may be on the top, bottom, or in the middle, depending on the plant. Carrots, radishes, and beets are examples of vegetables with edible bottoms. Lettuce, broccoli, and celery are examples of vegetables with edible tops. Corn is an example of a vegetable with an edible middle. Through literature and art connections, students will be introduced to these topics.

Depending on your students' abilities, the set up for the vegetable person activity may vary. The following set up suggestions may be beneficial: use the templates to cut vegetables from construction paper for the students; make copies of the templates on colored paper for the students to use; allow the students to create their own vegetables from construction paper. Any of these variations will work for the activity.

Procedure
1. Ask the students which vegetables are their favorite.
2. Ask the students to name them and write them on the board.
3. Ask the students if they know which part of the plant they eat when eating these vegetables.
4. Tell the students that the part which can be eaten is called the edible part.
5. Read the book, *Tops and Bottoms,* aloud to the class.
6. While reading, ask the following questions in reference to the page(s) listed.
    - How are the crops planted? (Page 8)
      In rows
    - Who got the edible parts during the first harvest, Hare or Bear? (Pages 10-13)
      Hare
    - Which vegetables have edible bottoms? (Pages 10-13)
      Carrots, radishes, beets

- Who got the edible parts during the second harvest, Hare or Bear? (Pages 18-21)
  Hare
- Which vegetables have edible tops? (Pages 18-21)
  Lettuce, broccoli, celery
- Who got the edible parts during the third harvest, Hare or Bear? (Pages 26-29)
  Hare
- Which vegetable has edible middles? (Pages 26-29)
  Corn

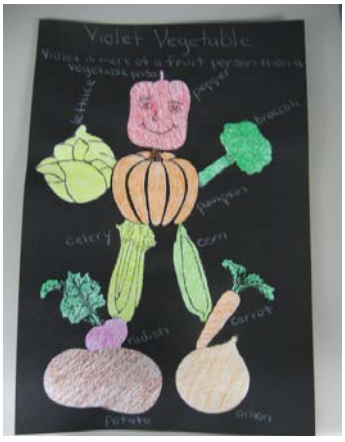
7. Tell the students that today they will be making their own vegetable people.
8. Hand out the materials necessary for making the vegetable people: glue, scissors, construction paper, and templates.
9. Ask the students to cut out their vegetables and glue them on their blank sheet of paper in the shape of a person.
   - Use the following guidelines:
     i. Create the "feet" from a root.
     ii. Create the "head" from an edible top.
10. After the vegetables are glued on, tell the students to draw in any parts they need, such as eyes, nose, mouth, etc.
11. After the person is completed, tell the students to label the vegetables they used on their paper.
12. Tell the students to name their vegetable person.
13. Finally, have students write a sentence about their vegetable person.
14. Ask some students to share their vegetable people.
15. While sharing, tell the students to include the vegetables they used and, if they know, to point out the edible parts.

Extension

- Ask students to choose a plant, find a picture of this plant, categorize it according to its characteristics (edible/non edible, flowering/non flowering, evergreen/deciduous), and present the information to the class.
- Copy a second set of vegetable templates and have students sort the cutouts by color, shape, size, and part eaten (Math 1.20).

References

Stevens, J. (1995). *Tops and Bottoms.* New York, NY: Scholastic Inc. ISBN: 0-590-97550-1



Garden Riddles

Standards of Learning
Science: 1.4, 4.4
Language Arts: 1.13, 2.12, 3.9, 4.7

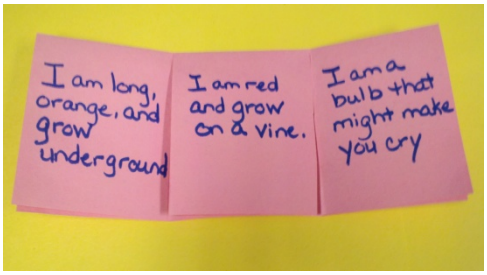
Objective
Students will:
- Describe various vegetables according to their unique characteristics

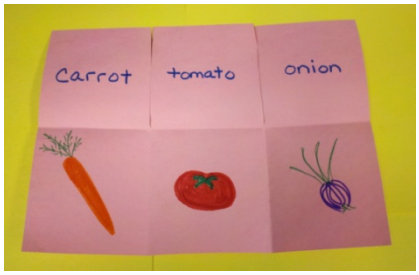
Materials
- Rectangular construction paper
- Scissors
- Markers/crayons
- Optional: What's in the Garden? by Marianne Berkes

Background Knowledge
Plants can be classified in a variety of ways, such as by the edible plant part or by whether it grows above or below ground. Many different vegetables are grown in Virginia; the top crops include tomatoes, potatoes, sweet potatoes, snap beans, corn, cabbage, and cucumbers. In particular, you will find many vegetable farms in the Coastal Plains region of the state, which includes the Eastern Shore.

Procedure
1. This lesson pairs especially well with the book What's in the Garden? by Marianne Berkes as the book is told using a series of clues about different fruits and vegetables. You may choose to begin the lesson by reading this book and discussing the characteristics of the plants mentioned.
2. Give each student a piece of construction paper. Fold in half vertically (hotdog style).
3. With the fold seam on top, pull the left and right side over to make thirds.
4. Open and place vertically, you will see 6 squares. Cut along the horizontal lines until you reach the vertical line (center fold).
5. Fold back in half along the center fold to create three flaps.
6. On the outside of the flaps, have students create three clues for three different vegetables – one vegetable and clue per flap.
7. Underneath each flap have them draw a picture and write the name of the answer.
8. Students can trade with each other and have them try to figure out each other's clues.

Extension
Cut the clue and picture segments apart and then sort on the board. You can sort by plant part, color, or tops and bottoms.





The Grocery Game

Standards of Learning
Science K.7, K.9, 1.4, 2.4, 2.8, 3.8, 4.4

Objective
Students will:

- Sort food products by the parts of a plant
- Investigate plant parts
- Identify plants as a useful resource

Materials

- Food labels mounted onto cardstock and laminated

Background Knowledge
There are parts of vegetables and fruits that we eat but we do not eat the same part of every vegetable. We can eat the roots, stems, leaves, and seeds of different types of vegetables. For example, when we eat a carrot we are eating the root. When we eat celery we are eating the stem. Eating peas or wheat means we are eating the seeds. Lettuce is the leaf part of the plant that we eat. Therefore, this is why we eat the top, bottom, or middle of different types of vegetables. We do not normally eat the flower part of a plant, and we normally eat the fruit part of the fruits that we eat. Your students can point out the parts of plants but they can also classify vegetables by the parts that we eat. This activity provides an opportunity to analyze the plant parts we eat, and offers a gateway to a discussion about healthy food choices.

This lesson gives an opportunity for your students to learn about healthy food choice and how they can use the food pyramid to make healthy food choices. By putting your students into groups and giving out stacks of food labels you are creating a family who has bought their groceries for the week. They can sort their food by looking at the main ingredient on each label and sorting them by the plant parts that we eat. Then they can look to the food pyramid to find out what part of the pyramid their plants parts come from. Once they have decided what food group each food goes in they can create a bar graph that shows how much of each food group they have eaten. They can decide if they are a healthy family or not and what they need more of to be healthy. This activity brings about great discussion amongst your students and strengthens their team building skills.

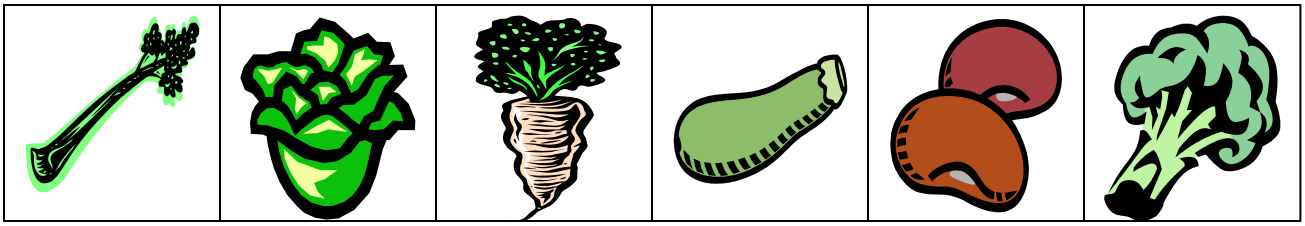
Procedure

1. Review the parts of a plant and their functions.
   - Roots – absorb water and nutrients; anchor the plant in the soil; store food
   - Stems – transport water and nutrients to the plant and provide support
   - Leaves – make food for the plant through photosynthesis; store food
   - Flowers – attract pollinators to the plant
   - Fruits – hold and protect the seeds
   - Seeds – germinate and grow a new plant
2. Give each student a food label.
3. Students should read the ingredients on the label and identify the main plant ingredient. ***The main ingredient is usually the first ingredient listed on the label, so instruct students to find the first plant or plant by-product listed in the ingredients.*

4. Have students share the main plant ingredient in their food product and tell what part of the plant the ingredient comes from.

Extension

- Have students keep track of all of the plant parts they eat throughout a given week and create a bar, line, or pictograph showing the results.
- Have students bring in their favorite fruit or vegetable and sort according to plant parts.
- Schedule a field trip to visit the produce section of a local supermarket. Identify the parts of a plant that various produce comes from.



celery (stem)	lettuce (leaf)	carrot (root)	squash (fruit)	bean / seed (seed)	broccoli (flower)

Let There Be Light

Standards of Learning
Science 4.4
English 4.7

Objective
Students will:

- Understand the basic life process of photosynthesis (chlorophyll, sunlight, water, carbon dioxide, oxygen, and soil nutrients)

Materials

- What Plants and I Need to Grow worksheet (handout provided)

Background Knowledge
This lesson allows students to play an active role in understanding what a plant needs to grow and a review of the process of photosynthesis. Photosynthesis is the process by which green plants covert carbon dioxide, water, and certain nutrients to carbohydrates in the presence of sunlight. The process of photosynthesis releases oxygen into the air. Green plants contain chlorophyll, which captures the energy in sunlight to drive the photosynthesis process. Photosynthesis is important because it allows green plants to release oxygen, which humans and other animals need to survive. Plants need sunlight, water, soil (nutrients/minerals), carbon dioxide, and oxygen to grow.

Procedure

1. Review the process of photosynthesis with students by asking the following review questions:
   - What is photosynthesis?
   - What is chlorophyll?
   - Why is the process of photosynthesis important?
2. Choose one student to represent a green plant. Other students will be added to the "plant's" environment throughout the activity in order to show the relationship between the multiple resources necessary for a plant to grow.
3. Tell this student ("plant") to crouch on the floor, while the rest of the class chants, "chlorophyll", in an effort to jump start the process of photosynthesis and making the plant grow.
4. Tell the "plant" to try to grow by standing up.
5. As the student starts to stand, place your hand on his/her head and say, "You can't grow yet plant."
6. Ask the class what else this "plant" will need to grow besides chlorophyll.
7. Choose a student to represent sunlight.
8. Tell this student to walk, with arms raised above his/her head in a circle to represent the sun, around the "plant" and say, "shine, shine, shine".
9. Tell the class that the plant now has chlorophyll and sunlight and ask them what else it needs to grow.
10. Choose a student to represent water.
11. Ask this student to walk around the "plant", holding his/her hands over the "plant's" head and wiggling his/her fingers while saying "sprinkle, sprinkle, sprinkle".

12. Tell the students that the plant now has chlorophyll, sunlight, and water and ask them what else it needs to grow.
13. Choose a student to represent soil.
14. Ask this student to pretend to shovel soil onto the “plant” while saying “soil, soil, soil”.
15. Tell the class that the plant now has chlorophyll, sunlight, water, and nutrients from the soil and ask them what else it needs to grow.
16. Choose three students to represent carbon dioxide. One student is the carbon atom and the two other students are the two oxygen atoms.
17. Ask these students to link arms and walk around the “plant” saying “CO2, CO2, CO2”.
18. Tell the students that the plant now has chlorophyll, sunlight, water, soil nutrients, and CO2, but it still can’t grow.
19. Choose two students to represent the oxygen molecule.
20. Ask these students to link arms and walk around the “plant” saying “I’m free, I’m free!”
21. Ask the class why the oxygen is saying this.
22. Remind them that plants give off oxygen during photosynthesis.
23. Ask the students if the “plant” can now grow and allow the plant to stand up to full height.
24. Ask the volunteers to return to their seats.
25. Hand out the What Plants and I Need to Grow sheet to each student and complete it as a class.

Extension

Ask students to design a poster on the importance of protecting the environment, particularly green plants, and the ways they can help.

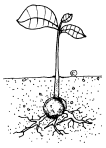
Have students use the What Plants and I Need to Grow worksheet as a pre-writing activity prior to writing a paragraph on the topic.

Name: _____ **Date:** _____

What Plants and I Need to Grow

Instructions: Fill in the spaces with what plants need and what you need to grow.

Plants Need:



I Need:

What answers are the same for plants and you?

_____
_____
_____

What resources do you need that plants give you?

_____
_____
_____

Plant Parts Foldable

Standards of Learning
Science: 1.4, 4.4

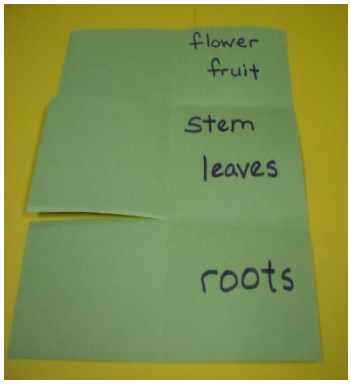
Objective
Students will:
- Label the parts of a plant

Materials
- Rectangular construction paper
- Scissors
- Markers/crayons

Background Knowledge
Plants can be classified in a variety of ways, such as by the edible plant part or by whether it grows above or below ground. Many different vegetables are grown in Virginia; the top crops include tomatoes, potatoes, sweet potatoes, snap beans, corn, cabbage, and cucumbers. In particular, you will find many vegetable farms in the Coastal Plains region of the state, which includes the Eastern Shore.

There are parts of vegetables and fruits that we eat but we do not eat the same part of every vegetable. We can eat the roots, stems, leaves, and seeds of different types of vegetables. For example, when we eat a carrot we are eating the root. When we eat celery we are eating the stem. Eating peas or wheat means we are eating the seeds. Lettuce is the leaf part of the plant that we eat.

Procedure
1. Give each student a piece of construction paper. Fold in half vertically (hotdog style).
2. With the fold seam on top, pull the left and right side over to make thirds.
3. Open and place vertically, you will see 6 squares. Cut along the horizontal lines until you reach the vertical line (center fold).
4. Fold back in half along the center fold to create three flaps.
5. Place it on the desk vertically. Choose a plant to draw, and draw on the flaps, making sure that the bottom flap contains the roots, the middle contains the stem or vine, and the top contains the flower or fruit.
6. On the inside of the flaps, write the correct plant part.



Plant Parts We Eat

Standards of Learning
Science K.1, K.7, 1.1, 1.4, 2.1, 2.8, 3.1, 4.1, 4.4
Language Arts 1.2, 2.2, 2.3, 3.1, 4.1, 5.1

Objective
Students will:
- Identify the parts of a plant
- Sort plants by the part we eat

Materials
- *Tops and Bottoms* by Janet Stevens
- Fresh or artificial vegetables (list at end of lesson plan)
- 8 ½ X 11 signs (TOPS, BOTTOMS, MIDDLES)
- 8 ½ X 11 signs (ROOT, STEM, LEAF, FLOWER, FRUIT, SEED)

Background Knowledge
There are parts of vegetables and fruits that we eat but we do not eat the same part of every vegetable. We can eat the roots, stems, leaves, and seeds of different types of vegetables. For example, when we eat a carrot we are eating the root. When we eat celery we are eating the stem. Eating peas or wheat means we are eating the seeds. Lettuce is the leaf part of the plant that we eat. Therefore, this is why we eat the top, bottom, or middle of different types of vegetables. We do not normally eat the flower part of a plant, and we normally eat the fruit part of the fruits that we eat. Your students can point out the parts of plants but they can also classify vegetables by the parts that we eat. This activity provides an excellent opportunity for students to have a concrete experience with identifying vegetable parts. Consider creating a *Tops and Bottoms* themed unit using a box to decorate and store the book, sample artificial vegetables, and even a toy bear and bunny.

This activity also points out the importance of sharing and caring amongst your students. They can learn to work together on certain situations and look out for each other when someone needs help.

Review plant part definitions with students.
- Roots – usually the underground part of a plant that absorbs water and nutrients and can also store food; means of anchorage and support for plants
- Stems – the main trunk of a plant that supports and carries water and nutrients to the rest of the plant
- Leaves – the outgrowth from the stems whose main function is to produce food for the plant through photosynthesis
- Flowers – the parts of the plant that hold the reproductive organs
- Fruits – the fleshy part of the plant that holds the seeds
- Seeds - the fertilized ripened ovule of a flowering plant containing an embryo and capable normally of germination to produce a new plant

Review edible plant parts with students, show fresh, artificial or illustrations.
- Roots – carrot, radish, beet, turnip, parsnip, sweet potato
- Stems – celery, asparagus, potato (fleshy underground stem called a tuber), rhubarb, cinnamon

- Leaves – lettuce, cabbage, spinach, onion (bulb), garlic (bulb), parsley, dill, rosemary, thyme, sage, collards, brussel sprouts
- Fruit – tomato, cucumber, squash, apple, peppers, eggplant, pears, avocado, peach, green beans
- Flowers – broccoli, cauliflower, artichoke, capers
- Seeds – corn, peas, peanuts, black-eyed peas, kidney beans, pinto beans, black beans

Procedure

1. Read or review the book *Tops and Bottoms* by Janet Stevens.
2. Have students categorize vegetables that were in the story into groups (TOPS, BOTTOMS, MIDDLES).
3. Introduce other vegetables (not in the story) and sort them into the three groups.
4. Review the six basic parts of a plant and their functions.
    - Roots – absorb water and nutrients; anchor the plant in the soil; store food
    - Stems – transport water and nutrients to the plant and provide support
    - Leaves – make food for the plant through photosynthesis; store food
    - Flowers – attract pollinators to the plant
    - Fruits – holds and protects the seeds
    - Seeds – germinate and grow a new plant
5. Group the same vegetables used in steps 2 & 3 into the six basic plant parts.

Suggested Vegetables

- Roots – carrot, turnip, radish, beet, sweet potato, parsnip
- Stems – Irish potato, asparagus, celery
- Leaves – lettuce, cabbage, spinach, collards, onion, scallions, garlic
- Flowers – cauliflower, broccoli, artichoke
- Fruits – tomato, cucumber, squash, pepper, beans in a pod
- Seeds – corn, peanuts, peas (shelled), beans (shelled), oats, wheat, rice, barley, rye

Extension

- Have students keep a chart of the foods they eat for each meal for one week. Identify foods that had plants in them and categorize according to the six basic plant parts.
- Have a vegetable tasting exercise. Provide a variety of fresh vegetables cut into bite-size pieces for the students to taste. Taste them plain and then with a vegetable dip.
- Have a salad party. Include all parts of the plant in individual serving bowls. Try to include at least two from each category. Label each bowl with the name of the vegetable and the plant part (example: carrot – root, lettuce – leaf). Encourage students to choose at least one vegetable from each category for their salad. Provide students with a variety of dressings and toppings.

Sunflower Sampler

Standards of Learning
Science K.1, K.7, 1.1, 1.4, 2.8, 4.1, 4.4

Objective
Students will:
- Illustrate the parts of a plant and describe the functions

Materials
- Paper plates
- Markers/crayons
- Scissors
- Glue
- Ruler
- Green and brown construction paper
- Sunflower seeds

Background Knowledge
Introduce your students to sunflowers by discussing the large variety of sunflowers available. Share pictures of several types. Discuss how easily sunflowers spread in a short period of time to take over an entire field. Turn the discussion to the parts of the plant (roots, stem, leaves, flower, seeds) and talk about the various parts of the flower (stamen, pistil, sepal, ovary, ovule, seed). Lead the class in a discussion of the function of each plant part.

Procedure
1. Provide each child with a paper plate and instruct them to draw a sunflower.
2. Give each child 10-15 seeds to glue to the center of the sunflower.
3. Have students cut a strip one inch wide of green construction paper to use as a stem. Attach stem to back of paper plate.
4. Next have students cut out leaves from green construction paper and attach to stem. Reinforce the purpose and function of leaves in photosynthesis.
5. Finally instruct the class to cut a square of brown construction paper and form roots. Attach to the bottom of the stem.
6. As an evaluation of the project have students label the parts of the sunflower plant.

Extension
Create a bulletin board with all the sunflowers created by the class. Emphasize the variety of colors, sizes, and heights of the flowers.

What other plants can be used to illustrate the plant parts with these materials? (watermelon, other types of flowers, tomatoes)

Super Seeds

Standards of Learning
Science: K.1, K.7, K.9, 1.1, 1.3, 1.4, 2.1, 2.3, 2.8, 3.1, 3.3, 3.8, 4.1, 4.4, LS.1, LS.4

Objective
The students will:
- generate a hypothesis and record observations.
- identify moisture and warmth as conditions necessary for a seed to germinate.

Materials
- small, clear plastic cup
- 5 tablespoons of plaster of Paris
- 2 or more tablespoons of water
- plastic spoon for mixing
- dropper
- soybean seeds

Background Knowledge
Seeds require moisture and warmth to germinate. In this case the seed absorbs moisture from the plaster mixture. As the seed absorbs water it increases in size and applies pressure to the surrounding plaster. This force, combined with the strength of the germinating sprout, causes the plaster to crack and allows the shoot to grow up through the plaster. This strength and ability to grow in adverse conditions allows plants to survive in a wide range of environments. You may also notice that when water is mixed with plaster the cup becomes warm. A chemical reaction which gives off heat like this is known as an *exothermic* reaction.

Procedure
1. Ask students to list the conditions necessary for a seed to germinate (moisture, warmth).
2. Place plaster of Paris in a plastic cup.
3. Add water and mix. Continue to add drops of water until the mixture has the consistency of a very thick milkshake.
4. Have students make observations of what happens when water is added to the plaster.
5. Push 3 soybeans into the plaster until they are covered, then smooth the surface of the plaster.
6. Have students create a hypothesis of what they think will happen to the soybeans.
7. The next day, add a tablespoon of water to the cup and continue to make observations.
8. Make regular observations. What happens? Why?
9. Revisit the students' hypotheses, where they supported or rejected? Why?

Extension
Conduct an experiment testing different variables. Examples:
- different seeds
- different amounts of plaster of Paris
- different amounts of water
- grow the seeds in different temperatures

References
Lesson adapted from Louisiana Ag in the Classroom.

Tops and Bottoms

Standards of Learning
Science: K.7, K.9, 1.4, 2.4, 2.8, 3.8, 4.4

Objective
Students will:
- Sort plants by the part we eat

Materials
- *Tops and Bottoms* by Janet Stevens
- 2 paper plates per student
- Hole punch
- Brads
- Scissors
- Crayons/markers

Background Knowledge
There are parts of vegetables and fruits that we eat but we do not eat the same part of every vegetable. We can eat the roots, stems, leaves, and seeds of different types of vegetables. For example, when we eat a carrot we are eating the root. When we eat celery we are eating the stem. Eating peas or wheat means we are eating the seeds. Lettuce is the leaf part of the plant that we eat. Therefore, this is why we eat the top, bottom, or middle of different types of vegetables.

Review edible plant parts with students, show fresh, artificial or illustrations.
- Roots – carrot, radish, beet, turnip, parsnip, sweet potato
- Stems – celery, asparagus, potato (fleshy underground stem called a tuber), rhubarb, cinnamon
- Leaves – lettuce, cabbage, spinach, onion (bulb), garlic (bulb), parsley, dill, rosemary, thyme, sage, collards, brussel sprouts
- Fruit – tomato, cucumber, squash, apple, peppers, eggplant, pears, avocado, peach, green beans
- Flowers – broccoli, cauliflower, artichoke, capers
- Seeds – corn, peas, peanuts, black-eyed peas, kidney beans, pinto beans, black beans

Procedure
1. Read the book *Tops and Bottoms* by Janet Stevens. Sort the vegetables mentioned in the book into 2 columns – tops and bottoms.
2. Give each student a paper plate. Have them fold it in half and open. Then draw a line along the crease. On the top half of the plate have them draw pictures of the plants that we eat the tops of. On the bottom half of the plate have them draw pictures of the plants that we eat the bottoms of.
3. Fold the second paper plate in half as well. Label the top half “Tops” and the bottom half “Bottoms.” Cut along the crease.
4. Attach to the first plate using brads.
5. Now have students take turns rotating the top or bottom piece of the plate to reveal the corresponding vegetables below.


Tops
Bottoms


Tops
Bottoms