

Celebrating Plant Parts

OVERVIEW

In this lesson, students continue their exploration of plants. They learn more about the structure and function of roots, stems, leaves, flowers, fruit, and seeds. This lesson may be challenging for some of your students. They will be asked to think about plants as botanists do. In the process, students may discover that the word “vegetable” is not a botanical term and what they thought was a vegetable is botanically a fruit. Challenge your students to think like botanists for part of this lesson. When they put on their chefs’ hats, they will be back in the world of “vegetables”! To celebrate what they have learned, the class will make a salad. We hope this lesson will deepen your students’ appreciation of the important role plants play in our lives and inspire students to consume more foods from plants. We encourage you to use the salad-making activity as an opportunity to reinforce the fact that we eat, and get energy from, all different parts of plants.

AIM

To further student understanding of plants and to enjoy eating a variety of plant parts.

SCIENTIFIC PROCESSES

observe, experiment, apply

OBJECTIVES

Students will be able to:

- identify the structure and function of plant parts;
 - identify edible plant parts;
 - describe food preparation procedures for safety, sanitation, and enjoyment;
 - appreciate the wide array of foods that we can get from plants.
-

MATERIALS

For the teacher:

- *Salad Grocery List* lesson resource
- *Kitchen Supplies and Equipment* lesson resource
- *Cooking Tips* lesson resource
- *Classroom Salad* recipe
- *Classroom Salad Dressing* recipe

For the class:

- (Optional) Hand towels

For each student:

- *Tomatoes: From Roots to Seeds* student reading
- *Roots* student reading
- *Stems* student reading
- *Leaves* student reading
- *Flowers* student reading
- *Fruit* student reading
- *Seeds* student reading
- *Plant Parts We Eat* activity sheet
- *Take-home Salad* recipe
- LiFE Logs

PROCEDURE

Before you begin:

- Make a copy of the *Tomatoes: From Roots to Seeds* reading for each student and read in literacy time before conducting this lesson.
- Make copies of the *Roots, Stems, Leaves, Flowers, Fruit* and *Seeds* readings for each student or for small groups of students. See procedure below.
- Make copies of the *Take-home Salad* recipe and *Plant Parts We Eat* activity sheet for each student.
- Review the *Salad Grocery List, Classroom Salad* recipe, and *Classroom Salad Dressing* recipe. Purchase the ingredients for the class salad and salad dressing.
- Copy the *Cooking Tips* lesson resource onto chart paper and post it in front of the class to review with students.
- Review the *Kitchen Supplies and Equipment* and *Cooking Tips* lesson resources and gather together any materials you may need for this project.
- Make an overhead transparency of the *Classroom Salad* recipe or make enough copies of it to distribute to student groups.
- Have students wash their hands just before you begin this lesson.
- If you have not already done so, post the Module Question and Unit 2 Question in front of the classroom.

MODULE QUESTION

How does nature provide us with food?

UNIT QUESTION

If there were no plants, would humans have food?



SEARCHING

1. Review Plant Parts

If you have not already read *Tomatoes: From Roots to Seeds*, read it as a class before going on with this lesson. Hold a brief discussion and invite students to discuss new information they learned about plants. Ask if they still have questions or have new questions about plant parts.

2. Review Module and Unit Questions

Remind the students of the Module Question and that the question for Unit 2 explores the connection between plants and the food humans eat. Tell students they will celebrate the diversity of plants in our diet by making and eating a salad.

3. Read Student Readings about Plant Parts

Have students work in 6 small groups. Assign each group one plant part to read about. Have students read about their plant part and study the drawing. After they have finished reading, give students several minutes to discuss what they have learned with their group members. Invite a volunteer from each group to present what the group learned about their plant part. You may wish to post this information on chart paper at the front of the room.

4. Look at Plant Drawings

Have students look at the drawings of the carrot, asparagus, lettuce, broccoli, tomato, and sunflower plants and read the information about each of these plant parts. Point out that all the plants have roots, stems, and leaves, but only some have flowers, fruits, and seeds. Explain that for each of these plants we typically eat only one part. For the carrots, tomato, and sunflower seeds we choose to eat the part of the plant where the most energy gets stored. *Why do we choose to eat different parts of different plants? How do you think people came to these decisions? Do you know of any plants where people typically eat the entire plant?* (Beets and turnips are two examples.)

5. Observe Salad Ingredients

Have students look at the carrots, celery, lettuce, broccoli, tomatoes, and sunflower seeds. Walk around the room with each ingredient so all can see. Point out that the recipe substitutes celery for asparagus. Explain to students that celery is not a stem, it is the **petiole** and joins the celery leaves to the stem. Have students compare the actual ingredients to the plant-part drawings. Invite them to share what they notice. *What do farmers do to take care of these plants? Does looking at these foods make it clear that each one is a different part of the plant?*



6. Establish Safe Cooking Practices

Review the *Cooking Tips* lesson resource and ask students to make additional suggestions.

7. Review the Recipe

Clarify what students will be doing with each salad ingredient (carrots: cutting the prepared carrot sticks into slices; celery: cutting the stalks into slices; lettuce: tearing the leaves into bite-sized pieces; tomatoes: cutting into bite-sized pieces; broccoli: cutting florets into bite-sized pieces). You may wish to demonstrate cutting and tearing techniques.

8. Prepare the Salad

If students have not already done so, have them wash their hands. Choose one of the following two methods for preparing the salad.

Method 1: Divide the class into 3–5 groups. Give each group some carrots, celery, lettuce, broccoli, and tomatoes to cut. This method gives all students an opportunity to prepare all the vegetables. It makes students feel more involved in the whole salad-making process. Essentially, each group makes its own salad.

Method 2: Divide the class into 5 groups. Give each group one vegetable to prepare. This method is easier to organize. With this method, be sure to give the lettuce group the largest bowl.

After you are certain students understand what they will be doing with the vegetables, pass out the plates and plastic knives.

As students are preparing the vegetables, make the dressing, using the *Classroom Salad Dressing* recipe. You can have the first group that finishes prepare the dressing or you can invite one student from each group to make the dressing in another part of the room.

9. Put Salad Together

Once all the vegetables are prepared, bring the whole class back together. If you are using Method 1, add some sunflower seeds to each group's salad and toss well. If you are using Method 2, mix the vegetables together in the large bowl, add sunflower seeds, and toss well. If students are tossing the salad, be sure they toss it gently.

10. Cleanup

During the cleanup make students aware that they are transforming the space where they prepared their salad into a place where they can relax and enjoy eating their salad. The cleanup can include: stacking up their cutting plates (you may want to save them to use as bedding in the compost bin in Lesson 10), washing all the plastic knives (save them for a future lesson), collecting all vegetable scraps (for the compost bin in Lesson 10), or disposing of scraps in the appropriate way for your school, wiping off all tables, picking up anything on the floor, and sweeping if necessary.

11. Eat and Enjoy!

Pass out clean plates and forks. Please make sure you have enough time for the students to relax and eat. Remember to eat with your students and encourage any other adults who are in the room to join you. While students are getting ready to eat, walk around and offer dressing for their salads. After everyone finishes eating, stack the plates, wash the forks, and rinse any leftover salad if you are saving it for compost.

12. LiFE Logs

Have students write a poem or short paragraph that describes something they enjoyed and learned while making and eating the salad today.

13. Assign Homework

For homework, students will fill in the table on the *Plant Parts We Eat* activity sheet. Explain to students that it may be easier to come up with some plant parts than others. Remind students that the purpose of this activity is to help them appreciate the wide variety of foods we eat that come from plants. Distribute the *Take-home Salad* recipe and encourage students to prepare this salad with their families.

Salad Grocery List

Now that students have learned about the structure and function of plant parts, it's time to celebrate! As a class, you will make a salad out of ingredients that demonstrate the diversity of plants and plant parts that we enjoy in our daily lives. Cooking and eating healthful food is an important part of the LiFE Program. This salad is one of several cooking and eating experiences in the LiFE modules.

This salad recipe includes carrots, celery, broccoli, lettuce, tomatoes, and sunflower seeds. Eating plants provides us with energy, minerals, vitamins, and other nutrients. Be sure to make copies of the take-home version of this recipe so students can share it with their families. Remind them that eating a wide variety of plants each day promotes health.

SHOPPING LIST

Salad Ingredients

- 1 head lettuce, romaine or other dark-green lettuce
- 1 bag mixed salad greens
- 7 carrots (6 for the salad and 1 for students to observe)
- 1 bunch celery
- 1 bunch of broccoli
- 1 pint cherry tomatoes, or 7 larger tomatoes
- 8 ounces ready-to-eat sunflower seeds

Salad Dressing Ingredients

- Olive oil
- Red vinegar
- Honey
- Dijon mustard
- 2 shallots
- 2 cloves garlic
- Salt and pepper

Kitchen Supplies and Equipment

You will need the following kitchen supplies and equipment to prepare the *Classroom Salad* recipe with your students.

SUPPLIES

For each student:

- 1 paper plate for chopping vegetables
- 1 paper plate to hold the serving of salad
- 1 plastic knife
- 1 plastic fork
- 1 napkin

Note: Use basic white paper plates, with no wax or dyes, if you want to save them to add to your compost box. Wash the plastic knives and forks and save to use again.

COOKING EQUIPMENT

For the teacher:

- 1 sharp knife for chopping
- 1 vegetable peeler
- 1 cutting board
- 1 spoon for serving salad dressing
- 2 large spoons to toss and serve salad
- 1 whisk

For the class:

- 1 bowl to mix salad dressing
- 1–2 large bowls to hold the salad
- 1 colander for rinsing vegetables

For each group of 4–6 students:

- Method 1: 5–6 small bowls to hold chopped vegetables
- Method 2: 1 medium bowl

Cooking Tips

Cooking with others is fun, especially if you follow these simple tips. They are not hard and will help you keep your cooking adventures safe, healthy, and enjoyable for everyone. *Bon appétit!*

Sanitation

1. Wash your hands before you begin cooking. After you have washed your hands, be sure you do not touch anything except the cooking materials. If you do, wash your hands again.
2. Try to keep food from falling on the floor. If food does fall on the floor, be sure to throw it away.
3. If you feel a cough or a sneeze coming, turn away from the food and cover your mouth. Be sure to wash your hands after coughing or sneezing.
4. Wash your hands again if you:
 - scratch your head
 - wipe your nose
 - touch the floor
 - touch anything that might make your hands dirty.

Safety

1. Be careful with all knives. Even plastic knives can hurt people.
2. Walk, do not run, jump, or skip in the classroom.
3. When you pass materials to others, do it with dignity and respect.

Making cooking enjoyable for all

1. Treat everyone with respect.
2. When it comes time to eat, if you don't like something, politely say, "No thank you." Please don't say it is "gross" or "nasty." Remember, you worked together as a class to prepare this food. Others want to enjoy it.
3. It's okay to talk quietly with your cooking partners. But when an adult calls for your attention, please stop talking and listen.
4. Be sure to compliment each other on a job well done.

Classroom Salad

Serves 25 small portions

INGREDIENTS

- 1 head dark-green lettuce, such as romaine
- 1 bag mixed salad greens
- 7 carrots
- 5 stalks of celery (from the bunch)
- 1 bunch of broccoli
- 1 pint cherry tomatoes or 7 larger tomatoes
- 8 ounces ready-to-eat sunflower seeds

Preparation before class

1. Wash the lettuce and the mixed salad greens.
2. Wash the carrots. Keep one carrot whole. If possible, buy a carrot with the top still on and save it for students to observe. Peel and cut the remaining six carrots into thin strips for students to chop.
3. Wash 5 stalks of celery. Keep the rest of the bunch whole for students to observe.
4. Wash and blanch the broccoli. To blanch, place the head of broccoli in boiling water for 1–2 minutes. Rinse and refrigerate immediately. While blanching is not essential, it will make the broccoli a bit softer. This will make it easier to cut with plastic knives. Students may also find it more palatable.
5. Wash the tomatoes. Pick out fruit with stems still attached for students to observe.
6. There is no preparation necessary for the hulled sunflower seeds. Try to bring in a few examples with the seeds still inside the gray “shell.”

DIRECTIONS

1. Use your hands to tear the lettuce into bite-sized pieces. Place the lettuce and mixed greens in the salad bowl.
2. With the plastic knife, cut the carrots, celery, broccoli, and tomatoes into bite-sized pieces and place in the salad bowl.
3. Sprinkle a small handful of sunflower seeds over the salad.
4. Gently toss the salad just until it looks mixed. Be careful not to overmix, which may damage the vegetables.
5. Prepare the *Classroom Salad Dressing* (see recipe on next page).
6. Serve salad on a plate. Add dressing. Sit, relax, eat, and enjoy.

Composting scraps: You may wish to save all vegetable scraps and leftover salad for the compost bin you will assemble in Lesson 10. Please rinse, in a colander, any salad that has dressing on it. These scraps can be saved in the refrigerator or freezer. You can also tear up the paper plates that were used for cutting and add them to the bedding in the compost bin. Do not use plates that have dressing on them in the compost bin. Refer to Lessons 9 and 10 for more information about composting.

Classroom Salad Dressing

Yields 2 cups

INGREDIENTS

2 shallots, minced

2 cloves garlic, minced

3/4 cup olive oil

3/4 cup red vinegar

4 tablespoons honey

3 tablespoons Dijon mustard

Salt and pepper

**(Optional) 2 sealed containers
or plastic bags**

DIRECTIONS

1. Mince the shallots. If you are not using the shallots right away, place them in a sealed container or plastic bag.
2. Mince the garlic. If you are not using the garlic right away, place it in a sealed container or plastic bag.
4. Place the olive oil, vinegar, honey, mustard, minced shallots, and garlic into a bowl. Whisk until thoroughly mixed.
5. Add salt and pepper to taste.



Name _____

Date _____

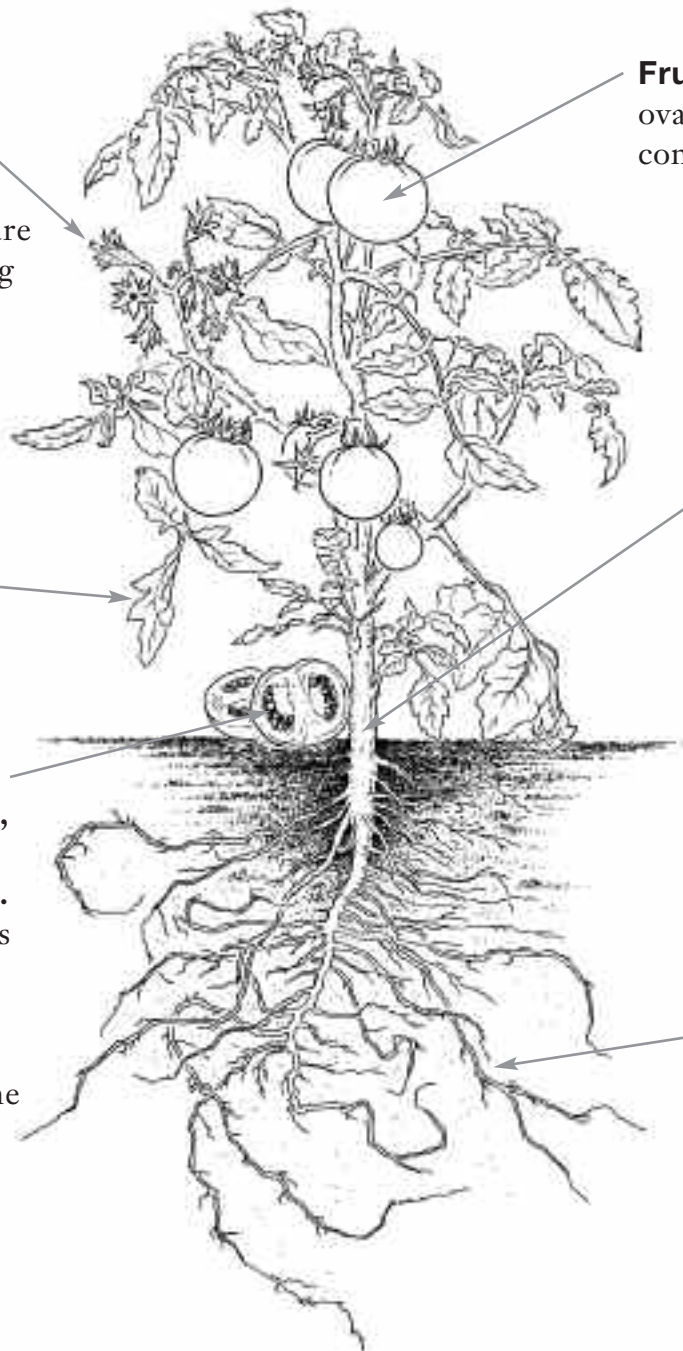
Tomatoes: From Roots to Seeds

When you make a salad, do you ever think about the plant parts that you are eating? Think about it. Lettuce is a leaf. A tomato is a fruit. Carrots are roots. This illustration shows the basic parts of a tomato plant and describes how they help the plant grow. Next time you are in the grocery store, see how many plant parts you can find.

Flowers are the way some plants reproduce. They are the seed-producing part of the plant.

Leaves produce food for the plant.

Seeds have three parts: the **embryo**, the **endosperm**, and the **seed coat**. The embryo grows into a new plant. The endosperm provides nutrients to the embryo. The seed coat protects the embryo.



Fruit is the ripened ovary of the plant and contains the seeds.

Stems transport materials, like water, minerals, and sugar, throughout the plant. They also support the leaves and other plant parts, like the flowers and fruit.

Roots take in water and minerals from the soil. Roots help hold the plant in place so strong winds don't blow it over.



Name

Date

Roots

Structure

There are two major types of root systems. Some plants, like grass, have a fibrous-root system. Fibrous roots form a mat-like structure and grow close to the surface of the soil. Other plants, like dandelions, have a taproot system. A taproot system has one main root that reaches deep into the ground. The taproot has a few short side branches.

Function

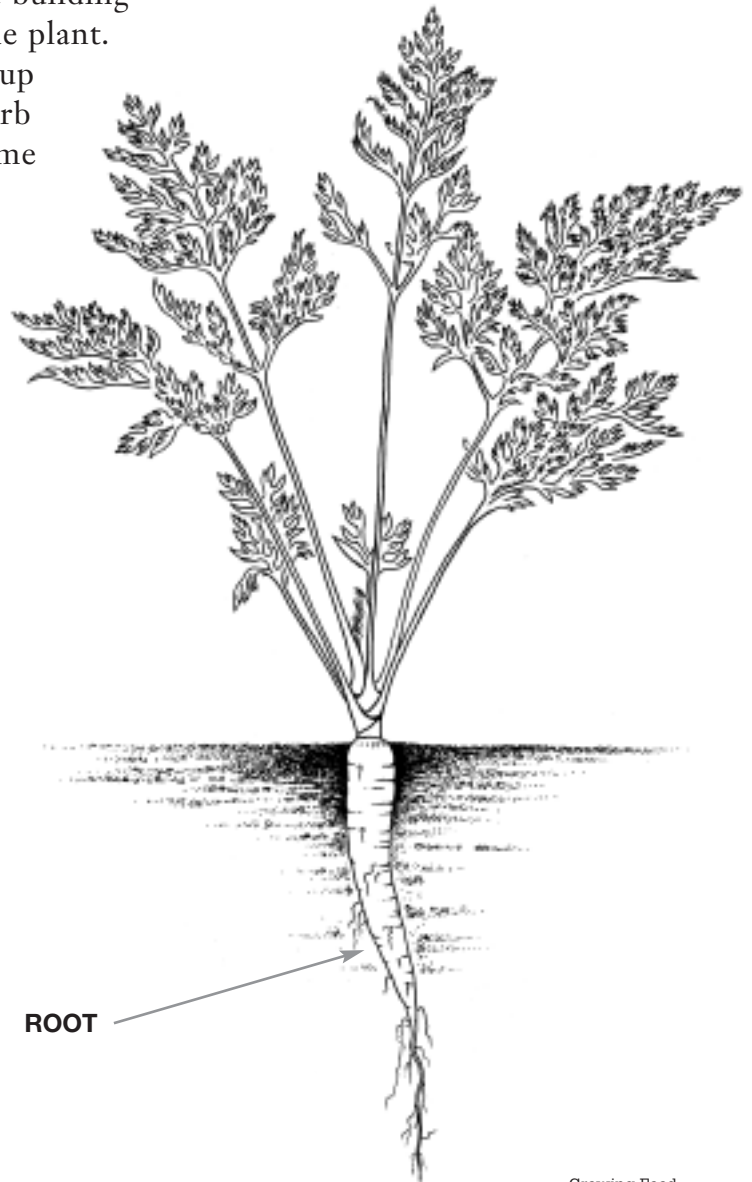
Roots have two functions for plants. 1. They anchor the plant in place. Think about the roots of a tree or the roots of a carrot plant. The roots of the ivy plant anchor the ivy to a vertical surface, like the side of a building or a wall. 2. They provide moisture to the plant. Roots that are deep in the ground bring up moisture found there. Surface roots absorb moisture that is closer to the surface. Some roots also store sugar and starches.

Edible Roots

Not all plant roots are edible. Some roots are poisonous. The roots of some vegetable crops are edible, like carrots, beets, and turnips. They are storage roots.

Examples of Edible Roots

- Beet
- Carrot**
- Cassava
- Horseradish
- Lotus root
- Parsnip
- Rutabaga
- Sweet potato
- Turnip



ROOT



Name _____

Date _____

Stems

Structure

Some stems grow above the ground, like the asparagus in this illustration. Others, like white potatoes, grow below the ground. Stems have structures that act like the veins that move blood in the human vascular system. These tube-like structures in the stem are called **phloem** and **xylem**. They are part of the plant's vascular system.

Function

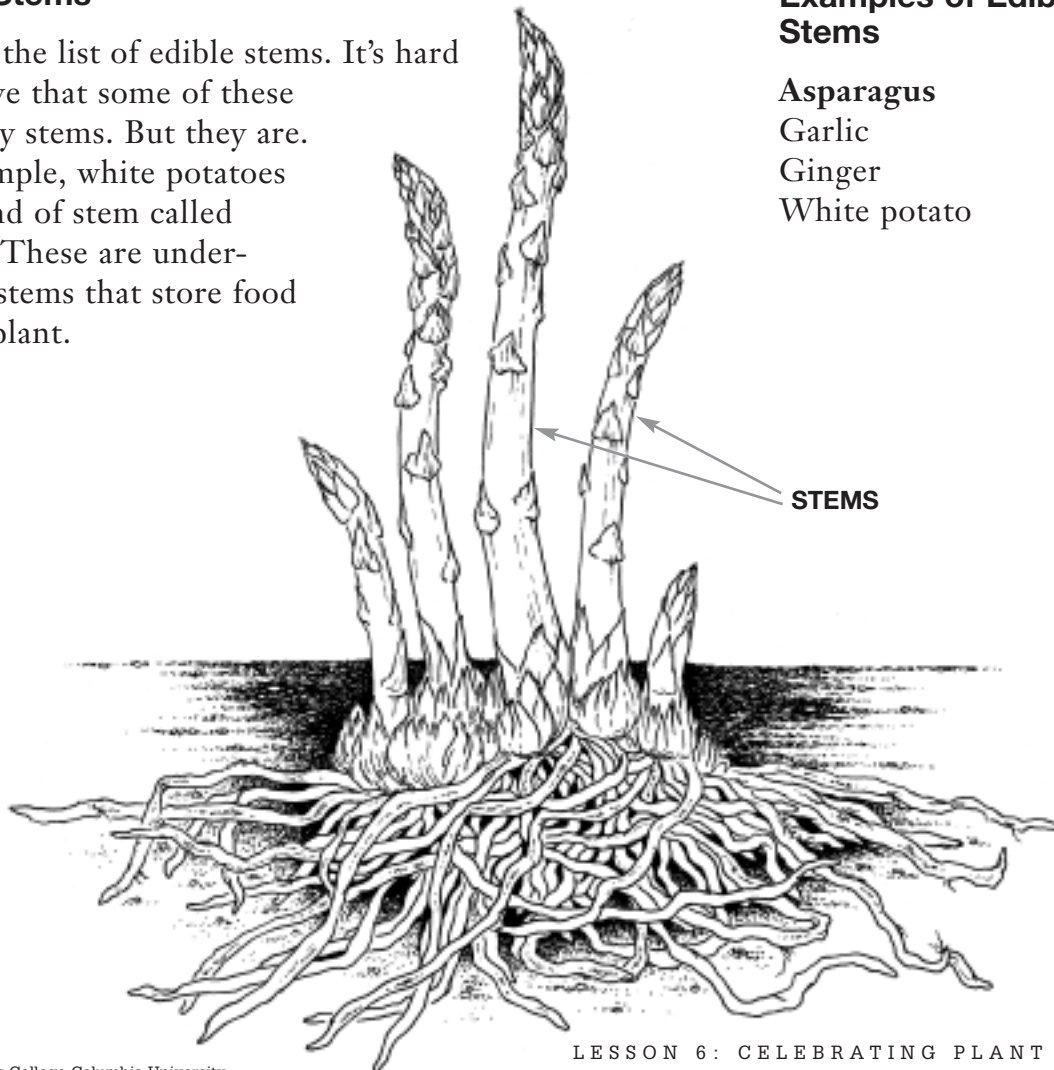
The stem connects the plant's roots to its leaves. The xylem carries nutrients and water from the roots to other plant parts, including the leaves. The phloem moves the food from the leaves to other parts of the plant. Some stems are modified for storage, like white potatoes. Stems also help support the plant's leaves.

Edible Stems

Look at the list of edible stems. It's hard to believe that some of these are really stems. But they are. For example, white potatoes are a kind of stem called a tuber. These are underground stems that store food for the plant.

Examples of Edible Stems

Asparagus
Garlic
Ginger
White potato





Name

Date

Leaves

Structure

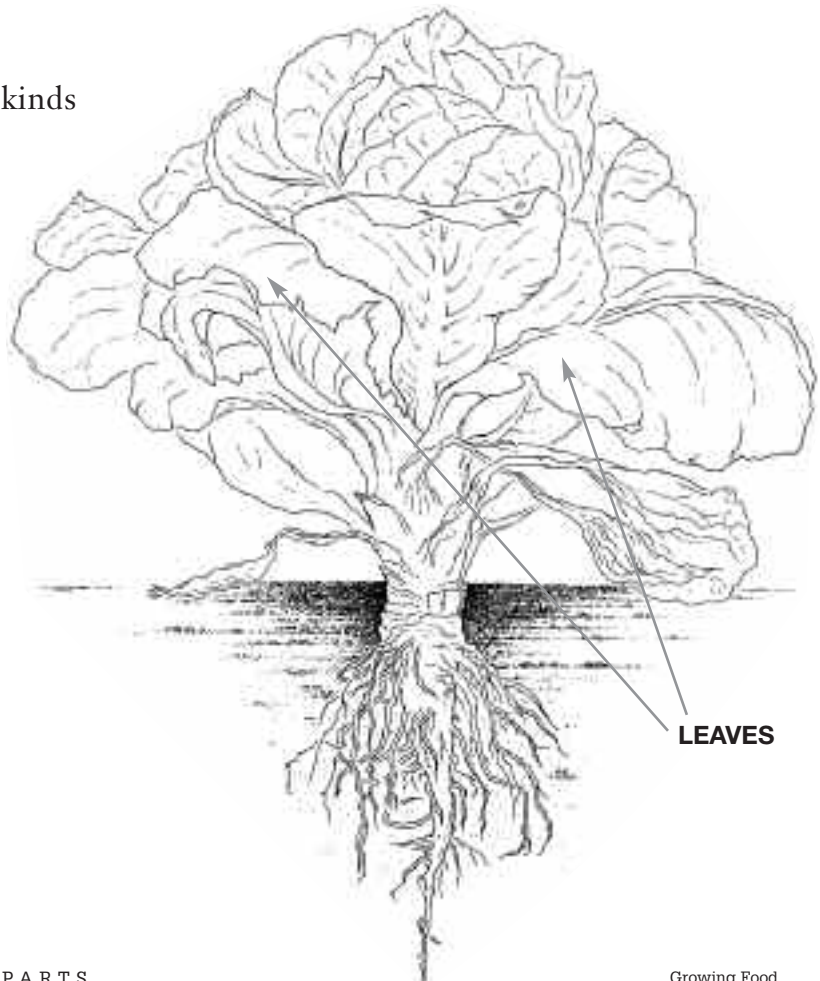
Leaves can be put into two categories: simple and compound. A simple leaf is one blade, or leaf, that connects to the stem by a stalk called the **petiole**. An oak or a maple leaf is a simple leaf. Compound leaves, like clover, are made up of small leaves, or leaflets, that attach to the stem by a petiole. The vascular system found in the stem goes through the petiole and into the leaves. The veins carry water and nutrients from the soil into the leaves and also carry sugars produced by the leaves away from the leaves. The shape of the leaf blade is one way to help identify different kinds of plants.

Function

The main function of leaves is to absorb sunlight to make food through a process called **photosynthesis**. The large flat surface of the leaf makes it possible to absorb lots of light energy from the sun. The plant uses the light energy, carbon dioxide from the air, and water from the soil to make sugars, which are the plant's food.

Edible Leaves

We eat the leaf blade of different kinds of crops. For example, we eat spinach leaves, parsley, kale, and lettuce leaves. Some of the leaves we eat form a large head, like cabbage, head lettuce, and Brussels sprouts. Some of the bulbs we eat, like leeks and onions, are really clusters of leaves. The celery stalk we eat is the petiole that joins the celery leaves to the stem.



Examples of Edible Leaves

| | |
|----------------|---------|
| Cabbage | Mustard |
| Collards | Parsley |
| Kale | Spinach |
| Lettuce | |



Name _____

Date _____

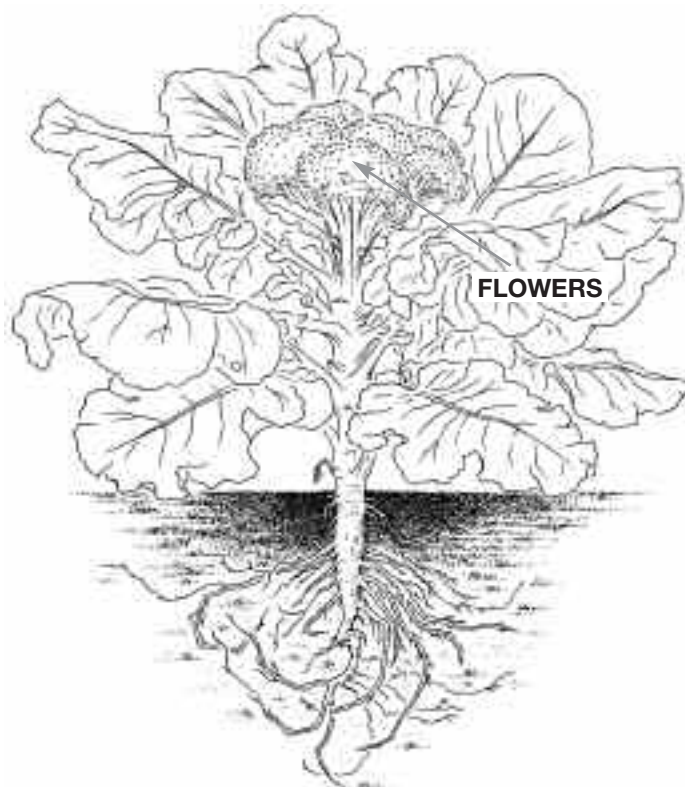
Flowers

Structure

The parts of a flower are the **pistil**, the **stamen**, the **sepals**, and the **petals**. The pistil is the female reproductive part. It is usually found in the center of the flower. It has three parts: the **stigma**, the **style**, and the **ovary**. The stigma is at the top of the pistil. It is attached to the style, a long, tube-like structure. The style leads to the ovary, which contains the female egg cells, called **ovules**. After the egg is fertilized, the ovule develops into a seed. The stamen is the male reproductive part of the flower. It is made up of the **anther**, a pollen sac, and a long filament. The filament holds the anther in place so the pollen can be scattered by the wind or carried away by **pollinators**, like insects, bats, or birds. The sepals are green leaf-like structures at the base of the flower that protect the bud. The **petals** are the colorful part of the flower and are often fragrant.

Function

Even though flowers may be pretty to look at, their primary function is for reproduction. Seeds are formed when pollen moves from an anther to a stigma. The fragrant petals attract pollinators that help transfer the pollen. The pollen lands on the stigma and moves down the tube-like style and enters the ovary. If pollination is successful, the male sperm cells fertilize the ovules, which develop into seeds. The ovary becomes the fruit.



Edible Flowers

Not all flowers are edible. It's important to know which ones are and to check before you eat any flowers. Only eat flowers that are grown as a crop. Eating flowers was very popular during Victorian times and has even been traced back to Roman times. Some edible flowers are used to make flavored vinegars. Some flowers, like squash blossoms, are perfect for stuffing.

Examples of Edible Flowers

| | |
|-----------------|-----------------|
| Borage | Garlic blossoms |
| Broccoli | Nasturtium |
| Calendula | Squash blossoms |
| Chive blossoms | Violets |



Name

Date

Fruit

Structure

The scientific meaning of the word “fruit” is not the same as the everyday one. When most people think of fruit, they think of a food, like apples, bananas, or strawberries. When scientists talk about fruit, they mean the part of the plant that surrounds one or more seeds. Fruit like apples and tomatoes have flesh that surrounds the seeds. However, some kinds of fruit, like Brazil nuts, do not have soft flesh. The nut’s hard shell is the fruit and the seed inside is what we eat.

Function

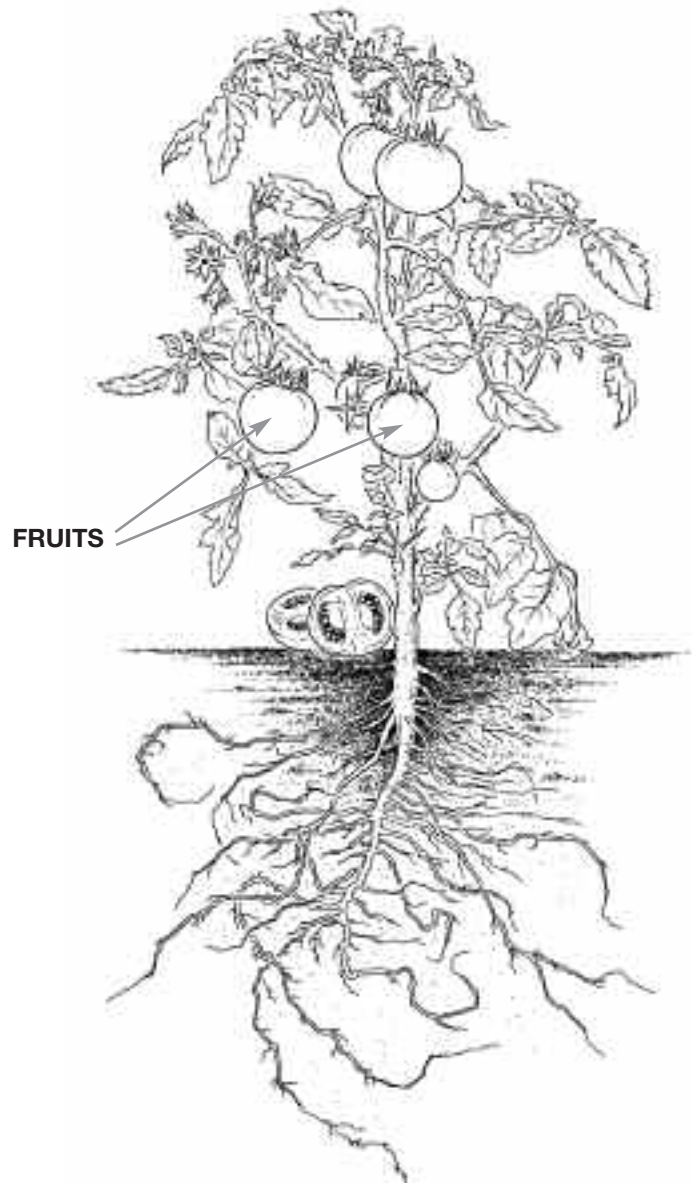
Fruits help in spreading seeds. For example, colorful, fragrant fruit is attractive to animals. The animals eat the ripe flesh, including the seeds. The seeds survive the digestion process and end up in the animal droppings on top of soil. A new plant begins to grow, and the life cycle starts all over again.

Edible Fruit

Not all fruits are edible. We don’t eat the dry pods of milkweed or the winged fruits of the maple. But there are many kinds of fruit that we do eat. These include berries, avocados, cucumbers, olives, and many more. Some of the spices we use, like nutmeg and allspice, are also fruit.

Examples of Edible Fruit

| | |
|----------|---------------|
| Apple | Pepper |
| Cucumber | Pumpkin |
| Grapes | String beans |
| Peach | Tomato |
| Pear | |





Name

Date

Seeds

Structure

A seed contains all that is needed for a new plant to grow. Seeds have three basic parts: the **embryo**, the **endosperm**, and the **seed coat**. The embryo inside the seed develops into the new plant. The endosperm is the stored food that nourishes the embryo when it begins to develop. The seed coat protects the embryo until conditions such as temperature and moisture are right for the plant to begin to grow.

Function

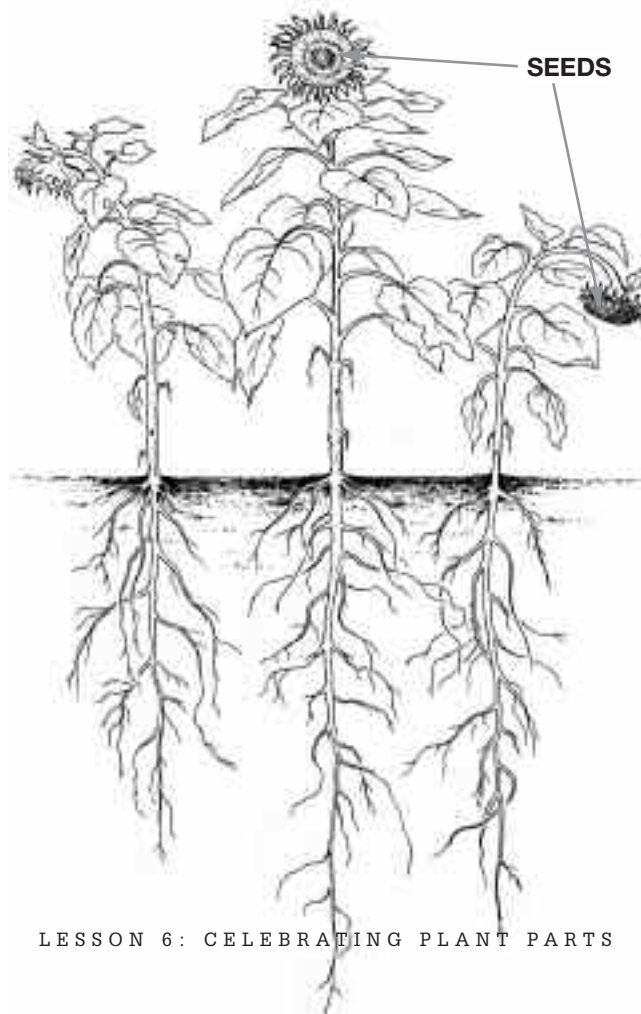
Seeds are the way plants can increase their populations. A major function of the seed is to protect the embryo until conditions are right for the plant to begin to grow. Since plants cannot move to new locations to live and grow, they have to have ways of scattering their seeds to new places where they can grow. There are lots of different ways that seeds “travel.” How they travel depends on the properties of the seeds. Some seeds travel on the wind, others float in the water, and still others “hitchhike” by sticking to animal fur or human clothing. Sometimes animals, like squirrels, carry the seeds to new locations and bury them. When the time is right, the new plants begin to grow.

Edible Seeds

Seeds also include the food we call “nuts.” When you eat almonds, Brazil nuts, cashews, or macadamias, you crack open the hard fruit to get to the kernel, or seed. Sunflower seeds are the seeds you find inside the grayish “husk.” Not all seeds are edible. Some are poisonous and some may have been treated with chemicals. Never eat seeds from a garden seed packet. Be sure to check with an adult before you eat any seeds.

Examples of Edible Seeds

| | |
|-------------|------------------------|
| Almonds | Peas |
| Brazil nuts | Pumpkin seeds |
| Cashews | Sunflower seeds |





| | |
|------|------|
| Name | Date |
|------|------|

Plant Parts We Eat

List as many edible roots, stems, leaves, flowers, fruit, and seeds as you can. You can ask your family and friends for help.

| Plant Parts We Eat | | |
|--------------------|--------------|---------------|
| Roots | Stems | Leaves |
| Flowers | Fruit | Seeds |



Name _____

Date _____

Take-home Salad

Serves 4–6

In class, we have been learning about plants and plant parts. To celebrate what we have learned, we made a plant-part salad using a recipe like this one. Take this recipe home and make it with your family. Share what you learned about plant parts with your family.

SALAD INGREDIENTS

- 1 head of a dark-green lettuce such as romaine or 1 bag mixed salad greens
- 2 carrots, cut into thin slices by an adult
- 2 stalks celery
- 1/2 bunch of broccoli
- 2 tomatoes
- 2 ounces ready-to-eat sunflower seeds

DRESSING INGREDIENTS (OPTIONAL)

Yield 2 cups

- 3/4 cup olive oil
- 3/4 cup red vinegar
- 4 tablespoons honey
- 3 tablespoons Dijon mustard
- 2 shallots, minced
- 2 cloves garlic, minced
- Salt and pepper to taste

MATERIALS

- 1 large salad bowl
- 1 sturdy plastic knife
- 1 cutting board
- 1 vegetable peeler
- 1 colander

DIRECTIONS

1. Thoroughly wash all vegetables to remove any soil that may still be on them from the farm.
2. Use your hands to tear the lettuce into bite-sized pieces. Place the lettuce in the salad bowl.
3. Use a vegetable peeler to peel the carrots.
4. Use a plastic knife to cut the carrots, celery, broccoli, and tomatoes into bite-sized pieces. Place them in the salad bowl.
5. Take a small handful of sunflower seeds and gently sprinkle them over the salad.
6. Carefully toss the salad just until it looks mixed. Be careful not to overmix. You don't want to damage the vegetables.
7. (Optional) If you are making dressing, place all ingredients in a bowl and mix with a whisk.
8. Serve the salad on a plate. Add salad dressing as desired.
9. Sit, relax, eat, and enjoy.