

Key Message:

Know your food. Fruits and vegetables are foods from plants that help you eat smart and play hard.

Subject Connections:

Science, English Language Arts, Health

Learning Objectives:

Students will be able to...

- Identify fruits and vegetables that come from different parts of plants (root, stem, leaf, flower, fruit, and seed).
- Describe the function of each plant part.
- Explain how foods from plants fit into the five food groups.

Supplies:

- Plastic forks or toothpicks, paper plates, napkins
- **Garden Journals** (see p.13)
- Student handouts (pp. 63-65):
 1. **Deliciously Edible Plant Parts**
 2. **Fruits and Veggies on MyPlate**
- Art supplies (for **Garden Journals**)
- **Eat Smart To Play Hard With MyPlate** poster

Featured Fruits and Vegetables:

Chickpeas (garbanzo beans) (seeds)

Broccoli (flowers)

Zucchini (fruits)

Celery (stems)

Green leaf lettuce (leaves)

Carrots (roots)

Provide samples for students to observe and taste, either from the garden or purchased from a market. Provide water (and cups) for students to drink as they taste the vegetables.

Lesson 1: The World of Edible Plants

TOTAL TIME REQUIRED: 165 minutes / 3 sessions

Session 1: Getting Started 45 min (Science)

Session 2: Activity I “Deliciously Edible Plant Parts” 60 min (Science)

Session 3: Activity II “Fruits and Vegetables on MyPlate” 40 min (Science/Health);
Reflect 20 min (English Language Arts)

LESSON OVERVIEW:

In this first lesson, students will discover how foods from the garden fit into a healthy diet. Students will explore different types of gardens, and form their garden rules and garden teams. They will learn the function of different plant parts, and classify plants according to what part is edible. Finally, students will be introduced to the **MyPlate** icon, a reminder to eat from the five food groups, and discover how they can eat smart to play hard with fruits and vegetables!

ESSENTIAL QUESTIONS: *What is a garden and what types of gardens exist? What plants do we eat? Why do we eat some plants and not others? What fruits and vegetables can we grow in the garden?*

PREPARATION AND ADDITIONAL SUPPLIES:

- Prepare the following before class:
 - For observation only: Garden Groceries Bag or covered tray** containing whole broccoli with stalk, carrot with green leafy top, chickpeas in clear plastic bag, whole zucchini, green leaf lettuce, and a celery stalk. Provide cut samples that allow students to see both the outside and inside of the vegetable. Cut them in half ahead of time. *(If you have a large class, you may want to provide more samples of each item for students to observe.)*
 - For tasting:** Prepare and set up six **Plant Part Tasting Stations** with enough samples to allow each child to taste each plant part.
- ⚠ **Note:** See p. 4 for information on the safe handling and preparation of foods for tasting. Use fresh food samples; do not reuse foods that have been touched and handled in the **Garden Groceries** activity.
- Access to sink with warm, running water and soap
- Images of different types of gardens sourced online to display via a projector, or printed out (for example, flower, herb, vegetable, rock, roof, container, royal, and water gardens)
- **Optional Class Experiment “A Colorful Dissection” (p. 17):** *Celery (stems with leaves), clear vase, food coloring, white flower (carnation) with stem, paring knife (for teacher only)*
- **Optional “Grow Celery From Celery” (p. 18):** *Celery (base only), small dish, water*

TEACHING PROCEDURE:


Introduce: Introduce students to the unit **Dig In!** Explain that the class will embark on an exciting journey through the garden where they will explore fruits and vegetables by learning how to grow, prepare, and taste them, and discover how they can help us grow and stay healthy.


1. Begin by asking students: *What is a garden? What types of gardens do you know of, or have you seen? How are gardens used?* Invite students to share their answers and then show them images of different types of gardens (for example, flower, herb, vegetable, rock, roof, container, royal, formal water-garden). Discuss how gardens are planned spaces for the enjoyment of nature as well as for the purpose of growing specific plants on a comparatively small scale, such as fruits, vegetables, or flowers. Gardens can be small or large, indoors or outdoors, in the ground or in a container, and can incorporate natural or man-made materials (such as planters or fountains) into the design.
2. Ask students if they think farms are the same as gardens. Explain that farms are larger gardens, or agricultural spaces, specifically designed for the purpose of growing or producing food (such as fruits, vegetables, grains, or animals), flowers, fibers (such as cotton or wool), or fuel (such as wood or corn) to sell or to sustain the farmer's family and livestock.




DIG IN! STARTERS

Garden Journals: Introduce students to their **Garden Journals**, a notebook they will use throughout the unit for observations, predictions, questions, reflections, and notes. Encourage students to write neatly, as this journal will be their personal resource. Help them organize their notes by designating sections for class notes, new vocabulary, and personal reflections. Invite students to create their own unique cover designs, make drawings of plants, craft collages, and collect recipe clippings, articles, and garden samples.

Garden Orientation: If you already have a school garden, tour it with your students. If not, discuss the different types of gardens you can create ( pp. 92-93), explain the advantages and disadvantages of each, and take a tour of the school campus to identify possible sites.

Garden Rules and Safety: Take this opportunity to identify and discuss the important features of the garden (tools used, water source, compass orientation, access to sunlight). Explain or establish rules for the garden (for example, return tools to the shed when finished using). ( p. 92)

Garden Teams: Divide your class into garden teams (of four to five students), and rotate teams through various garden jobs each week so that they all get a chance with every task. ( p. 94) Notice suggestions for garden teams in each lesson, whether you already have a garden or are just starting one.



Tasting Etiquette Guidelines: Explain to students that they will prepare and try different foods throughout the unit. As a class, collaborate to create rules for all tasting activities. (For example, if you don't like something, spit it out discreetly into a napkin, don't make faces, be respectful to others, don't let your personal preferences influence your peers, chew slowly to truly taste the food.) Write these rules on the board and have students copy them into their **Garden Journals**. You may want to create a colorful poster with these guidelines to keep on display at all times. Remind students of them before every tasting activity. Point out that sometimes a person does not like a food the first time he or she tries it. But, after tasting that same food many times, or perhaps prepared a different way, it can become a food that the person loves to eat.

IMPORTANT FOOD SAFETY STEPS!

Please see p. 4 for a reproducible handout to post in a visible location in your classroom. It is important that you follow these steps to keep yourself, your students, and any parents or volunteers safe and healthy.

Hand Washing:

All persons participating in the food preparation activity (teachers, students, volunteers, parents) should wash hands before and after preparing, handling, or sampling foods.

DIG DEEPER!



- Pair up students to research a plant part and its function using at least two sources, and invite them to report back to the class what they learned. Ask them questions like: *What does the plant part do? Which plant parts are involved in the following plant processes: germination, transpiration, photosynthesis, pollination, and respiration?*
- Assign each pair a featured fruit or vegetable. Have them diagram the life cycle of that fruit or vegetable's plant and "life" (i.e., seed, germination, root/seedling growth, plant development, flowering plant, pollination, fruiting plant/seed production, and death of plant/decomposition).

LEARNING ACTIVITIES

Prepare: Bring students into the garden if any of the following items are growing and/or ready to harvest. (🌿 p. 104)

For the **Garden Groceries** activity, provide samples of the following foods (for observation only) in a large grocery bag or hidden on a tray: chickpeas/garbanzo beans (if using canned, rinse and drain) contained in a clear plastic baggie, whole broccoli with stalk, whole zucchini, celery stalk with base and leaves, green leaf lettuce, and a carrot with green leafy top. Provide the whole item, so students can see how it grows. Offer a cut example of each plant part so that students can see both the exterior and interior of the fruit or vegetable. It is valuable for children to touch and observe actual produce, but if this is not possible, you can still perform the activity using images.

For the six **Plant Part Tasting** activities, provide samples of the following foods at different stations (all rinsed and ready-to-eat): canned chickpeas/garbanzo beans (**seed**), broccoli florets (**flower**), zucchini slices (**fruit**), celery sticks (**stem**), green leaf lettuce (**leaf**), and carrot sticks (**root**). Provide each student with a paper plate, a plastic fork or toothpick, and a napkin.

Alternate options may be used if the above are not available: sunflower seeds (**seed**), cauliflower (**flower**), melon (**fruit**), asparagus (**stem**), romaine lettuce (**leaf**), and beet* (**root**). *Beets for tasting should be cooked ahead of time, or use canned beets.

Activity I. Deliciously Edible Plant Parts (60 minutes, Science)



Teacher Tip! Use this activity as an introduction to studying plant cells.

1. Introduce students to fruits and vegetables by playing a guessing game called **Garden Groceries**. Invite volunteers, one at a time, to pick an item from the **Garden Groceries** tray or bag. Ask them to identify the produce for the class to see.
2. Ask: *What are we eating when we eat a fruit or vegetable?* List the parts of a plant on the board: **seed, flower, fruit, stem, leaf, and root**. Explain that we are not eating an entire plant – we are eating an edible part from a plant. "Edible" means that it is safe for you to eat.

Note: It is important to explain that not all plants or plant parts are edible. Some plants are poisonous, while others have parts that are edible, as well as parts that are not. (For example, rhubarb stems are edible, while the leaves are poisonous.)

3. Distribute the handout **Deliciously Edible Plant Parts** (pp. 63-64) to each student. Challenge students to identify each fruit or vegetable pictured, and then guess the plant part it comes from. Have students share their answers.

Plant Anatomy and Edible Plant Parts



A carrot is the **root** of the plant. **Roots** grow underground, provide support for a plant by holding it into the ground, and collect food (water and nutrients) from the soil.



Celery is the **stem** of the plant. **Stems** provide aboveground physical support to the plant, and contain the “highways” of vessels to move water and nutrients through the plant. (See **Science Extension** sidebar on p.18 for an experiment with celery that demonstrates how this plant part functions.)



Salad comes from the **leaf** of the lettuce plant. **Leaves** make food for the plant from sunlight (**photosynthesis**).



Broccoli is the **flower** of the plant. **Flowers** attract pollinators (bees, butterflies, moths, flies, hummingbirds) and mature into fruits.



Zucchini is the **fruit** of the plant. **Fruits** grow from flowers, and protect and hold the seeds.



Chickpeas (also known as garbanzo beans) are the **seeds** of the plant. **Seeds** contain all the information needed for plant life. They grow into new baby plants when conditions are right.

4. Identify each plant part clearly and show what parts we eat when consuming carrots, salad, broccoli, celery, zucchini, or chickpeas. Once students are familiar with, and can correctly identify, each plant part, explain that each part is designed to support an important function necessary for the plant to live. Review each plant part and its function together using the **Plant Anatomy** sidebar above. Have students create a three-column chart in their **Garden Journals**, writing each plant part in the left-hand column, explaining its function in the middle, and drawing a small diagram of each part on the right.
5. Have students notice the texture and color of the outside and inside of each plant part sample while discussing the function of each. (For example, show students the fleshy fruit of a zucchini that surrounds the seeds.) Explain that a fruit protects and holds the seeds. Do the same type of observation with other plant parts, and ask students to discuss their similarities and differences in shape, size, texture, and color, reminding them to take notes in their **Garden Journals**.
6. Next, students will taste fruit and vegetable samples from each plant part. Remind students of the **Tasting Etiquette Guidelines**. Have students and any adult volunteers wash their hands following the proper hand-washing steps (see p. 5). Split students into six groups and direct them to the **Plant Part Tasting Stations** (p.12), where students will observe, study, taste, and take notes on various edible plant parts in their **Garden Journals**. For each fruit or vegetable sample they try, ask them to chew slowly, then write down their tasting observations, noting the flavor, texture, and appearance.
7. What other fruits and vegetables can students think of, and what edible plant parts are they? Have students challenge and quiz one another by reading a function and identifying an edible plant part that matches that function. Discuss student answers and list them on the board under **seed, flower, fruit, stem, leaf, or root**. (See **Plant Part Groceries** sidebar on p.16 for more options.)

PLANT PART GROCERIES

Introduce students to other edible plant parts by showing a variety of fruits and vegetables in their full plant form. They may recognize them when displayed in the produce section of the market, but not when part of the plant. Show pictures from the Internet or a gardening book or visit a garden or farmers market to view them firsthand.

Roots: beet, radish, turnip, carrot, parsnip



Stems: rhubarb, asparagus, celery



Leaves: spinach, kale, arugula, collard greens, Brussels sprouts, cabbage



Flowers: artichoke, cauliflower, broccoli



Fruits: strawberry, melon, pepper, tomato, pumpkin, cucumber, winter squash

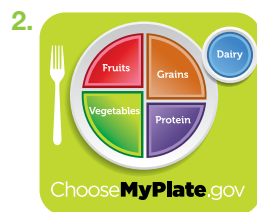


Seeds: chickpeas (garbanzo beans), sunflower seeds, pumpkin seeds, corn, green peas, black beans



Activity II. Fruits and Vegetables on MyPlate (40 minutes, Science/Health)

1. Explain that the way we group and organize living things in science is called **classification**. To **classify** is to arrange things in groups according to common characteristics. Edible plant parts can be classified in a variety of ways. **Botanists** (*plant scientists*) and **nutritionists** (*food and health experts*) classify plant parts differently. Botanists classify edible plant parts based on their function and where in the plant they are located. (For example, tomatoes, zucchini, and red bell peppers are considered by botanists to be fruits because they contain seeds). Nutritionists, however, call them **vegetables** and organize foods (including those that come from edible plant parts) into different food groups based on what they provide to keep the body healthy, how they taste, and also how they are normally eaten. (For example, tomatoes are normally eaten as a vegetable, such as in a garden salad or with lettuce and onion on a sandwich.) Tomatoes are also not tart and sweet like cherries and other foods we consider to be fruits. That's why nutritionists consider tomatoes a vegetable instead of a fruit.



Distribute the handout **Fruits and Veggies on MyPlate** (p. 65). Ask: *What other plant foods can you think of that are classified differently by botanists and nutritionists?* (For example, cucumbers, pumpkins, yellow squash.) Show students the **MyPlate** icon on the **Eat Smart To Play Hard With MyPlate** poster. Ask students

to identify the different plate segments (i.e., food groups) on the **MyPlate** icon: **Fruits, Vegetables, Grain, Protein Foods, and Dairy**. Explain that most of the foods we eat belong to one of these food groups, and edible plants can be found in many of them. It's important to eat foods from all five food groups; that's how we eat smart to play hard. Ask students what food groups they think include edible plant parts. Allow students to answer. Explain that the **Fruit Group**, the **Vegetable Group**, and the **Grain Group** all include foods that come only from plants. Students may not realize that grains also come from plants.

Any food made from wheat, rice, oats, cornmeal, or barley is a grain food. Tell students that grains, such as wheat, oats, and rice, come from the seed part of plants. Ask students if they can name any foods from the **Grain Group**? (For example, bread, cereal, tortillas, and pasta.)

The remaining two food groups are the **Dairy Group** and the **Protein Foods Group**. The **Protein Foods Group** contains some edible plant products like beans, split peas, nuts, and seeds, as well as nonplant (animal) foods like seafood, meat, eggs, and poultry. The **Dairy Group** includes milk and milk products.

3. Explain that the **MyPlate** icon reminds us to eat foods from each food group. What does the icon tell us about how much of our plate should be fruits and vegetables? (*Half of our plate at meals should be fruits and vegetables, with a little more coming from the **Vegetable Group**.*)

Have students work in pairs to complete the handout, **Fruits and Veggies on MyPlate**. They will analyze a sample school lunch menu consisting of cheese pizza (with a whole-wheat crust), baked sweet potato fries, broccoli florets, applesauce, and fat-free milk. Students will identify the ingredients, what food groups are represented, whether it comes from a plant, and, if so, what part of the plant. The first food item (the pizza crust) is provided as an example on the handout.

4. Go over the student handout activity using the answer key, allowing students to first share their answers and reasoning. Correctly identify the fruits and vegetables featured in the lunch menu.

STUDENT HANDOUT ANSWER KEY: Fruits and Vegetables on MyPlate

| Menu Item | Original Ingredient | Food Group | Does it Come From a Plant? | Edible Plant Part |
|---|---------------------|------------|----------------------------|-------------------|
| Whole-Wheat Cheese Pizza¹ | | | | |
| a. Crust | wheat flour | Grain | yes | seed |
| b. Tomato Sauce² | tomato | Vegetable | yes | fruit |
| c. Cheese | milk | Dairy | no | x |
| Baked Sweet Potato Fries | sweet potato | Vegetable | yes | root |
| Broccoli Florets | broccoli | Vegetable | yes | flower |
| Apple Sauce | apples | Fruit | yes | fruit |
| Fat-Free Milk (8 oz)³ | milk | Dairy | no | x |

¹ Pizza is a combination food with three main ingredients: crust, tomato sauce, and cheese (topping). What other combination foods can your students think of? (For example, a sandwich, taco, burrito, mixed salad, or chili.)

² Remind students that tomatoes are the fruit part of the plant. Nutritionists consider them a vegetable because of the nutrition tomatoes provide and how they are eaten.

³ Explain that milk comes from an animal, a cow, and therefore is not a food that comes from a plant. However, cows eat plants, which give them energy to make milk.



DIG DEEPER! Optional CLASS EXPERIMENT (SCIENCE)

A Colorful Dissection

Time Required: 20 minutes for preparation and reflection; 6 hours for observation

This experiment is best done first thing in the morning to observe throughout the day. There is a lot going on inside a plant, and sometimes the best way to understand that is to open up the plant and take a look. This experiment will show, both outside and in, how a stem works to bring water and nutrients up from the plant's roots, through the stem, and out to the tips of its leaves or petals. Ask for students to help you in all steps except those marked (T) for teacher only.

You will need:

- Celery, with as many leaves as possible on the tops
- A white flower, such as a carnation, with stem
- 2 tablespoons of food coloring (red or blue work best)
- A clear vase
- A paring knife (T)

Steps:

1. Fill the vase with water and add the food coloring.
2. (T) Cut $\frac{1}{2}$ " off the bottom of the celery stem with a knife and do the same to the flower stem. Make sure you leave the flower blossom and the celery leaves intact.
3. Place the cut end of each stem into the colored water.
4. Ask students to hypothesize what will happen.
5. After 6 hours, observe the outside of the plants – the celery's leaves and the petals of the flower. Does the colored water appear in the leaves and petals?
6. (T) Take the flower and the celery out of the vase, use the knife to cut the stem, and look at the cross section. Observe the vein-like tubes filled with colored liquid. This will be especially noticeable with the celery.



GROW CELERY FROM CELERY! (SCIENCE)

Grow celery using the base of your celery stalks. Students will be interested in learning that a plant part they are accustomed to throwing out can be “recycled” into a new plant!

Cut off the base of a celery stalk. Let students then place the celery base upright in a small dish of water. They should make notes on how long it takes for new leaves to appear in the center of the celery base (approximately one week). Have students note the color of the leaves (yellow) and ask if that color surprised them. Were they expecting the leaves to be green? Once the leaves grow and turn green, the celery base is ready to plant in the ground or in a pot. The students have grown their own celery plant!

REFLECT (30 minutes, English Language Arts)

1. Have students reflect in their **Garden Journals** on what they have learned. Ask: *What was your favorite fruit or vegetable? Were there any foods you tried for the first time? What were they? What surprised you the most about this lesson?*
2. Next, have students imagine what their school garden might be like. Review the different types of gardens discussed in the beginning of the lesson. Encourage students to draw or make notes about the characteristics of their imagined garden, such as whether it will be in-ground or in a container, and to list what they would like to grow. Remind students that their **Garden Journals** are for their personal thoughts and reflections (in addition to new vocabulary, notes, and drawings).

EXTENSIONS

Cafeteria Connection. Arrange a visit to the cafeteria so students can meet the Food Service Director and staff, and learn what they do. Have students study the lunch menu to discover how many edible plant parts are featured in that day’s lunch.

Plant Invasion. Discuss how edible plants could take over their after-school snack. Can students think of a tasty snack made out of at least three edible plants?



Nature’s Rock Stars. Have students create an original fruit and/or vegetable rock star as a fun exercise to demonstrate the edible parts of plants. They can either build a new plant person using parts of the fruits and vegetables you gathered for them, assembling them with toothpicks, or, if not using real fruits or vegetables, they could use images to create collages or drawings. (For example, their rock star could have the body of a carrot, celery arms, lettuce clothes, a zucchini slice for the face, a broccoli floret for the hair, and chickpeas for eyes.) When they are done, they should identify the plant parts used.

