

the  
**GIVING  
GROVE**

## **CLASSROOM LEARNING ACTIVITIES FOR ELEMENTARY STUDENTS**

**N**UTRITION FROM TREES

**E**NVIRONMENTAL BENEFITS OF TREES

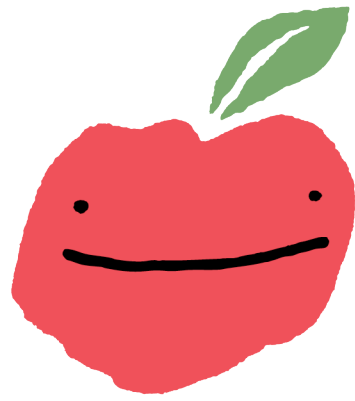
**S**OIL BIOLOGY FOR GROWING HEALTHY TREES

**T**REE BIOLOGY FOR MAINTAINING HEALTHY TREES

Curriculum provided by Kansas City Community Gardens  
and sponsored by EPA Region 7

**300 WEST 39TH STREET, KANSAS CITY, MISSOURI 64111**

**PHONE | 816-912-0594 WEB | [www.givinggrove.org](http://www.givinggrove.org) EMAIL | [info@givinggrove.org](mailto:info@givinggrove.org)**



the  
**GIVING  
GROVE**

# ELEMENTARY TABLE OF CONTENTS

## SECTION FOUR: NUTRITION FROM TREES

Lesson 17: Seeds Grow Trees

Lesson 18: Let's Go Nuts

Lesson 19: What Type of Fruit?

Lesson 20: Healthy Plate

**300 WEST 39TH STREET, KANSAS CITY, MISSOURI 64111**

**PHONE | 816-912-0594 WEB | [www.givinggrove.org](http://www.givinggrove.org) EMAIL | [info@givinggrove.org](mailto:info@givinggrove.org)**

# SEEDS GROW TREES

**Lesson Objective:** The Learner will identify the different parts of a seed and describe their function in the process of germination.

**Key Questions:** What are the parts of a seed? How does a seed grow into a tree/plant? What do seeds need to grow?

## **Background Information:**

Everything that lives on earth has a life cycle. Life begins, it grows, it reproduces, it dies. But what is a plant's life cycle? Plants start their lives as tiny seeds. Seeds can be as tiny as a grain of sand or as big as a coconut! Some are round, while others are flat or tear-shaped. Inside a seed is an embryo, which is a tiny plant, and the endosperm, which are small leaves which supply the embryo food. The outside of the seed has a seed coat, which protects the embryo from injury or drying out

Plants come from seeds. This happens when the seeds are planted in the ground and sprout (begin to grow). Before a seed can sprout, it must go through a process called germination. The process of germination happens inside the seed. To learn more about the process of germination, let's take a look inside a seed.

Before we look at the inside of a seed, let's talk about the outside of the seed. The outside of a seed is called the seed coat. The seed coat is the hard outer layer of the seed. It is the part we see and hold in our hands before we plant them in the ground or a pot of soil.

Not all seed coats are alike, though. Some are hard (corn, beans, peas, okra, morning glories). Other seeds have soft seed coats (marigolds, tomatoes, zinnias, peppers, cucumbers).

The inside of a seed has four main parts. The four main parts of the inside of a seed are:

- The Epicotyl
- The Hypocotyl
- The Radicle
- The Cotyledon

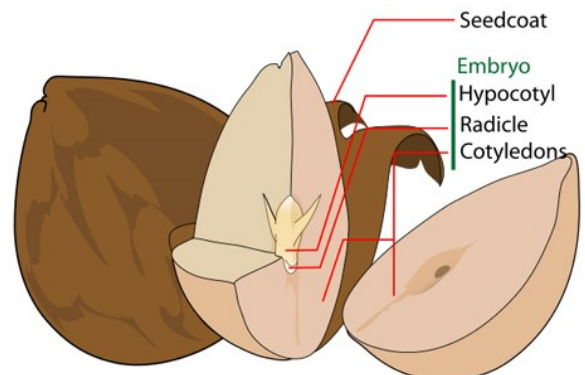
Now let's look at what each of these parts becomes once the seed becomes a plant.

**The Epicotyl** are the parts of the seed that become the first leaves of a plant.

**The Hypocotyl** is the stem of the plant.

**The Radicle** is the first root the plant has.

**The Cotyledon** is the inner protective layer of the seed that stores food for the seed to use during the process of germination and until the seed comes through the soil and has leaves that can be used for photosynthesis.



STRUCTURE OF A SEED

If you have ever planted a seed, you know how exciting it is to see the plant that comes from that seed break through the soil. Have you ever thought about how it happens?

When you plant seeds in some soil, it is important to keep the soil watered (not too much). The reason this is so important is because the seeds you plant need to be able to take in oxygen and minerals from the soil and water through the seed coat's tiny pores (holes) to give the inside of the seed the food it needs to break open and make its way through the soil so it can grow into a plant. When the seed is full enough, it pops open. The first parts of the seed to come through the seed coat are the cotyledon and the radicle (root). The root takes hold of the soil and starts to take in food from the soil. But because it is still so small, the cotyledon is still the main source of food for the seed.

The next part of the seed that appears is the hypocotyl. The hypocotyl is sometimes called the understem because it first appears under the cotyledon. The hypocotyl continues to grow upward with the epicotyl. The epicotyl becomes the first leaves of the new plant.

By the time the epicotyl are showing, the plant is now above the ground. When this happens, the cotyledon (which is sometimes called the seed leaves and looks like thin, dried brownish-white skin) has finished its job. Because their job is done, they fall off the plant and become part of the soil.



Once the cotyledon are gone, the plant's tiny leaves take over the job of supplying food to the new plant. And that is the process called germination.

If you look at different kinds of seeds, you can easily see that they are not all alike. Seeds come in different sizes, shapes and colors. And like you've already learned, some seeds have softer seed coats than others. All these differences mean that seeds germinate differently.

Seeds with hard seed coats usually germinate slower than seeds with soft seed coats. Why do you think this is?

The reason seeds with hard seed coats take longer to germinate is that it takes longer for the seed to drink enough water to soften the seed coat enough that the inside parts of the seed can break through.

There are also other reasons some seeds take longer to germinate than others. Here are a few of them:

- ◆ The amount of sunshine. Seeds don't see the sun, but the sun heats the soil to make it warm and cozy—which is just what a seed needs to germinate.
- ◆ The amount of water in the ground. If the soil is too dry, the seed cannot get the water it needs. If it is too wet, the ground will not have enough oxygen in it to give the seed what it needs to germinate.
- ◆ Planting the seed too deep. If you plant a seed too deep, it will use all the energy and food stored in the cotyledon before it can break through the ground so the leaves can come out and take over feeding the plant.
- ◆ The seasons. Most seeds will not germinate in the fall or winter. The ground is too cold during these two seasons for a seed to germinate. Instead, the seeds sleep until spring. When a seed sleeps, it is dormant.

## Materials:

Lima beans  
Egg cartons

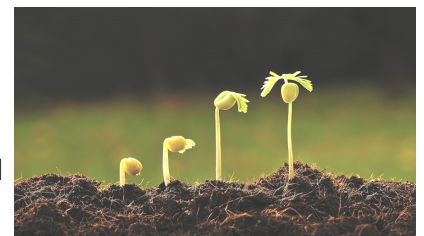
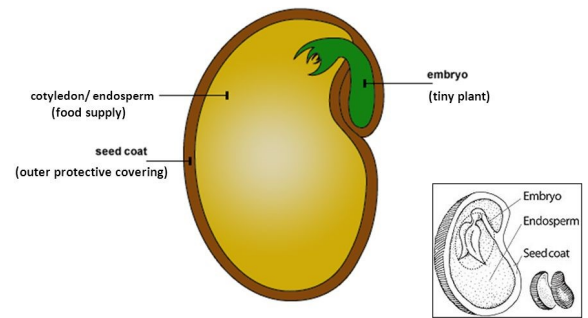
Microscope/magnifying glasses  
Potting soil

Popcorn or Shredded Coconut  
Various seeds for germination

## Learning Activity:

- Most seeds have three main parts in common; the seed coat, endosperm and embryo.
- Seeds have a thick or thin seed coat. Seed coats are used to protect the internal parts of the seed. This coat is what you see and feel when you hold a seed. The thicker seed coat keeps out water and sunlight. Seeds with thick coats are generally meant to be swallowed, digested and passed through the feces of animals. This process weakens the thick seed coat to allow for easy germination along with providing natural fertilizer for the seed. A thin seed coat is easily germinated because water and light can penetrate it easily.
- To learn about seed coats, soak a lima bean in water overnight. The seed coat should now slip off the lima bean with a gentle pull. View the seed coat under a microscope.
- The endosperm provides the embryo of the seed with nutrients, usually in the form of starch and proteins. These nutrients allow the seed to remain viable while it waits to be germinated. The endosperm is located right underneath the seed coat and completely surrounds the embryo in most seeds.
- A great way for kids to learn about the endosperm is to eat it. Foods like popcorn, shredded coconut and white rice are all endosperms. Two-thirds of all human calories come from endosperms.
- The embryo is the central station and most important part of a seed. Within the embryo consist all the cells needed to develop into a mature plant. The embryo has three main parts; the primary roots, cotyledons, and embryonic leaves. The primary root is the first thing to emerge from the seed during germination. It creates a long anchor root deep in the soil to support the plant. The cotyledon provides nourishment to the various parts of the embryo during germination. It can resemble a tiny leaf in some plants or be fleshy in other plants like beans. It often emerges from the soil with the seedling as it grows. The embryonic leaves are the plant's first leaves to appear above the ground.
- To learn about the embryo, split a seed in half to view how the embryo looks on the inside. Plant several of the same type of seed and dissect them during different parts of the growing phase.
- Fill each section of an empty egg carton with moist potting soil. Place a different kind of seed in each section. Make a chart showing what seeds are planted in each section of the egg carton. Keep the seeds in a warm, sunny place and keep the soil moist—but not too wet. Write down how many days it takes for each seed to germinate and pop through the soil.

## Three Main Parts of a Seed



## **Lesson Extension:**

Materials:    Lima beans                  Paper towels                  Gallon size storage bags                  Soil  
                  Plastic cups (9 oz)    Science journal                  Water                                  Cola

- *How a Seed Grows* by Helene J Jordan is a great literature connection for this lesson. Plants and what they need to grow are the topic, and sharing the book will help build prior knowledge before beginning the activities.
- Will a Plant Grow Without Soil? Give every student a paper towel and a Lima bean. Allow students to wet their paper towels, and then have them place the Lima bean inside of it. After that, pass out a gallon sized storage bag to every student. Write students' names on the bags. Then, hang them somewhere in the classroom or the hallway.
- Explain to students that the Lima bean will act like a seed. Ask students what they think will happen to the Lima beans. Ask them if they think the Lima bean will sprout without soil. Have students draw a picture of what they think is going to happen.
- These usually sprout within a couple of days. Have students check their plants daily. Have them replace the paper towels as they dry out. Have students sketch a drawing of their plants every few days, which they could place in their science journals.
- Will a Plant Grow Without Water? Divide students into groups of two or three. Give every group two cups and a handful of Lima beans. Go around and scoop soil into both cups for every group. Have students place the Lima beans into the cup. Make sure that they place the Lima beans into the soil.
- One cup will be watered with water, and the other cup will be watered with cola. Be sure to mark which cup will be water and which one will be cola. Talk about what students think is going to happen. Talk about if students think the plant watered with cola will grow and if it will grow as fast. Have students make predictions.
- Water the plants every other day with water or cola. Be sure not to over water. Have students check on their plants daily and sketch something every few days.
- After finishing these activities, a group measurement project would provide another math connection. Have students measure how much their Lima bean grew in the storage bag. Have students brainstorm ideas that might help their plants grow more next time.
- After the cola activity, simply have students compare the lengths of the plant watered with water and the plant watered with soda. Help students use a basic ruler to measure how big each plant grew.



## **Additional Resources**

<http://www.scienceforkidsclub.com/seed-germination.html>

<https://sciencing.com/parts-seed-elementary-children-7334174.html>

<https://www.brighthubeducation.com/preschool-lesson-plans/41656-lima-bean-experiment-and-lesson/>

# LET'S GO NUTS

**Lesson Objective:** The Learner will explore different types of nuts/how they grow, and investigate the many benefits of including nuts in a healthy diet.

**Key Questions:** What is the difference between a seed and a nut? How are nuts grown? What are the health benefits of eating nuts? How do you know if you are allergic to nuts?

## **Background Information:**

Nut is a simple enough word, yet it has many meanings. Nut is the name of the ancient Egyptian goddess of the sky, a hardware fastening device, “nuts and bolts”, a piece of metal wedged into rocks for protection by rock climbers and a source of food.

If we look more closely at how we define a nut in the food sense, more definitions start to appear!

There is a difference between seeds and nuts.

What is a seed? A seed is a mature fertilized ovule of a plant, consisting of three parts: the embryo, a food store and a protective coating. Seeds typically naturally open and free themselves from the shell.

What is a nut? Technically, nuts are a type of fruit. Fruits develop from a plant's ovary, and as the ovary matures it forms a wall around the fruit. For common fruits like apples and peaches, the ovary wall is the fleshy outer skin. For nuts, the ovary wall is the hard, outer shell.

The botanical definition of a nut in its simplest form is a seed contained within a hard shell, which does not naturally open to release the seed on maturity.



The culinary definition of a nut incorporates a whole range of edible plant parts. It is often considered to be any edible kernel surrounded by a shell.

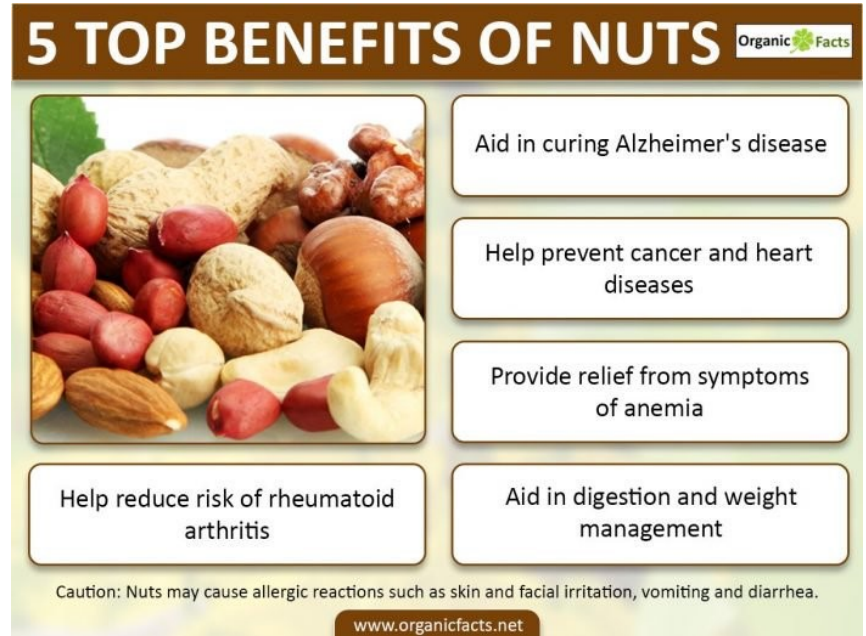
A nut can also be a seed but a seed by definition is not a nut.

Seeds that are commonly thought of as nuts:

- ⇒ Despite nut being in the name, peanuts are not nuts, at least not in the botanical sense. The peanut grows underground, in a pod like peas and lentils. This means it is not classified as a nut but rather as a legume, which is reflected in the “pea” part of the name.
- ⇒ The cashew nut grows on the cashew tree, which goes to extraordinary lengths to prevent it from being eaten. Cashew nuts grow at the bottom of the cashew apple in a pod filled with an acidic liquid which will burn any unsuspecting grazer. This extreme method is employed by the tree to protect its seed – the cashew.
- ⇒ The botanical definition for nut means many foods we call nuts are not nuts, but in fact seeds. Almonds, Brazil nuts, cashews, macadamias, pecans, pistachios, pine nuts and walnuts all fall into this trap. The term tree nut is often used to cover this group of seeds we so instinctively think of as nuts.

Nuts are extremely beneficial parts of any diet, and they contain a wide variety of health benefits that include their ability to

- ⇒ balance cholesterol levels
- ⇒ increase heart health
- ⇒ reduce blood pressure and clots
- ⇒ boost the immune system
- ⇒ aid in weight loss
- ⇒ help manage diabetes
- ⇒ improve digestive function
- ⇒ optimize the body's metabolism
- ⇒ increase skin health
- ⇒ reduce the risk of cancer
- ⇒ increase cognitive function
- ⇒ protect against viral and fungal infections
- ⇒ increase red blood cell count.



### Word of Caution

Unfortunately, despite all of the health benefits of nuts, there is a downside. Nuts tend to be a highly allergenic substance, and it can manifest in a variety of ways. Being allergic to one nut is not the same as another, so you must be careful whenever you eat a new type of nut. If you are allergic the reactions can range from mild to extremely severe and include skin and facial irritation, swelling of the throat, respiratory malfunctions, anaphylactic shock, heart arrhythmia, vomiting, diarrhea, and gastric discomfort. As long as you are aware of what your body can and can't handle, nuts are an extremely valuable boost to your overall health!



The oldest Walnut remains were discovered in Iraq and they are believed to be from 50,000 B.C.



The Romans considered Walnuts as the royal nut because the whole kernel resembles the brain. The slang word of 'nut' for the head came into being about 1820, but gradually it acquired the meaning of 'something wrong in the head'. Now a person who is mentally ill may be referred to as 'nuts' or 'nutty'. And all of this is because the walnut meat resembles the brain! Walnuts were introduced in California by the Franciscan Fathers of Spain in the 18th century, and today California produces much of the world's supply. We have native Black Walnuts!



The Pecan nut is native only to North America, and remains of Pecans were found in excavations in Texas with other artifacts that date back to 6100 B.C. The United States produces about 80% of the world supply of Pecans, with Georgia and Texas leading in production.



Historians say that Almonds were among the earliest cultivated foods. The pharaohs of Egypt were served breads containing Almonds, and Almonds were found in King Tut's tomb. South Africa, Australia, Spain, Greece, Portugal, Morocco, Turkey and Italy produce Almonds, but the United States leads in their production.



The Hazelnut, or Filbert was first known in Asia where it has been known to have been cultivated for 5,000 years. Some think the Hazelnut and Filbert are the same, while others think they are cousins. The Hazelnut was introduced to America by a shipment of seeds in 1629, and today it is grown mostly in Oregon and Washington. We have native Hazelnuts, too!



The Brazil nut is native to South America, growing well in the Amazon basin. Brazil nuts are actually large seeds with 15 to 24 arranged in a pod much like the sections of an orange. This pod weighs 4 to 6 pounds and hits the ground with such force that a man could be killed if hit. Natives gather the pods when they fall and open them with machetes to remove the seeds.





We associate the Macadamia nut with Hawaii, but it is native to the rain forests of Queensland, Australia. It is a beautiful tree and was originally grown for ornamental purposes. The Macadamia nuts were introduced to Hawaii in 1882, and today Hawaii produces 95% of the world's supply.



Peanuts? While many people include the peanut when speaking of nuts, it is really not a nut, but a legume, growing not on a tree, but underground.



Cashews are a tropical plant that produces an apple-like fruit and a nut that grows out of each fruit. The apple, which starts out yellow and becomes red when ripe, is edible and high in vitamin C, but it's reportedly not that tasty. Each fruit produces only one nut. If you've noticed that you can't buy cashews in the shell, there's a reason: the shells are toxic — they contain the same chemical as poison ivy and can cause rashes.



Chestnuts grow on trees in prickly green husks that eventually dry out and split open. It takes a seedling about five years to start producing fruit.



Pine nuts are edible seeds that grow in pine cones. Each cone contains about 50 seeds, but they're hard to harvest, which partially explains why pine nuts are soooo expensive (about \$25 a pound!).



The pistachio tree is a desert plant that grows fruit in clusters. When the shells are ripe, they change from green to yellow and split open, revealing the nut. The coolest part? That split often happens with an audible pop.

WHAT OTHER TYPES OF NUTS DO YOU KNOW ABOUT?



## Materials:

Science journal

Chart paper

Access to Internet for research

Materials for students to create media presentations

Nuts for tasting (if no allergies)

## Learning Activity:

- Where does the term “going nuts” come from? Maybe “nuts” is only a term you use to describe a certain friend of yours, but you may be surprised how big the nut industry truly reaches. Whether it is because they are a popular trail mix ingredient, a source of biodiesel oil or because they can be a deadly allergen, nuts are a common product that can be processed and used in numerous ways that have made them well known. It is easy to think of nuts being used only in their whole, edible form, but the reality is that nuts can be a very versatile product.
- Have students brainstorm a list of any nut they can think of. Engage in a discuss to determine what students already know about nuts. If there are no nut allergies in the class, bring in a variety of nuts for students to break open and taste.
  - ⇒ Do you know how these nuts are grown?
  - ⇒ Are there any nuts on your list that aren't really nuts?
  - ⇒ What is the difference between a seed and a nut?
  - ⇒ Which of these nuts have you actually tasted before?
  - ⇒ Do you know someone who allergic to nuts?
  - ⇒ Why are certain people allergic to nuts?
  - ⇒ What do we use nuts for in our daily lives?
  - ⇒ Can you think of ways that nuts are used besides for food?
- Have students create an “Are You Nuts?” media campaign. Students can work individually or in small groups. Select your favorite nut and do some research.
- Provide the students with Essential Questions to lead their investigation:
  - ⇒ What are the health benefits of this nut?
  - ⇒ How is this nut used in daily life?
  - ⇒ Can people be allergic to this nut? What are the signs of nut allergy?
  - ⇒ What would be a good “tag line” or “slogan” for this nut?
  - ⇒ Can you create a mascot character for this nut?
  - ⇒ Can you write a “theme song” for this nut?
  - ⇒ Can you include a favorite recipe for this nut?
- Create a poster, a song, a skit—about your nut! Share projects with the class.

## *Are You Nuts?*

*You are nuts if you don't  
eat these nutritious powerfoods!*



## Additional Resources

[http://www.kidslovenutcrackers.com/All\\_About\\_Nuts.htm](http://www.kidslovenutcrackers.com/All_About_Nuts.htm)

# WHAT TYPE OF FRUIT?

**Lesson Objective:** The Learner will categorize different types of fruit.

**Key Questions:** What is a fruit? How can you tell differences between types of fruit?

## **Background Information:**

Seeds develop from flowers once the egg cell in the ovary of a flower is fertilized. Generally, the ovary ripens into the fruit and provides a protective structure around the seed. Sometimes, the ripened fruit comes from another part of the flower such as the ovary wall, receptacle of the flower, or the fleshy tissue of the ovary. Fruit is the ripened ovary and the other structures that surround it at maturity.

Did you know there are many different types or groups of fruits?

Pomes, drupes, berries, melons and citrus fruits are all types or groups of fruits.

- ⇒ **Pomes** hold their seeds in a little paper-like core. Apples and pears are both pomes.
- ⇒ **Drupes** are fruits with a single seed inside a hard pit. Did you know when you eat apricots, cherries and coconuts you're eating drupes?
- ⇒ **Berries** are small fruits with lots of seeds. The seeds can be on the inside or outside of the fruit. Strawberry seeds cling to the outside, while blueberry seeds sit inside the fruit. Blueberries seeds are so tiny you might not even see or feel them.
- ⇒ **Melons** like berries have many seeds, but their seeds are always on the inside. Melons are much bigger than berries. They have a tough outside layer called a rind. Watermelon and honeydew are both melons.
- ⇒ **Citrus fruits** like lemons and limes grow on trees. They have many sections inside a peel. You may find seeds in some or all of the sections.
- ⇒ Other fruits, like **tropical fruits** don't seem to fit into any of these groups. Bananas, papayas, mangos and pineapples grow near the equator where it's hot and are called tropical fruits.



Did you know that these are all ripened ovaries and are really fruits - the products of fertilization?

## Materials:

Picture cards (tree, bush, vine)

Fruit Picture Cards

Hand lenses

Plastic knife

Paper towel

Cafeteria-style tray

Activity Sheet "What Type of Fruit"

Activity Sheet "Fruit Facts"

### Fruits from the various categories:

Pome (apple, pear)

Drupe (peach, plum)

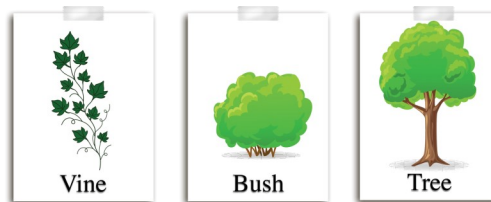
Berry (strawberry, raspberry, blackberry)

Melon (cantaloupe, watermelon)

Citrus (clementine, tangerine, lemon)

## Learning Activity:

- Print 1 copy of the vine, bush, and tree pictures. Cut out the individual fruit pictures.
- Place the pictures of the tree, bush, and vine, on the board. Describe each plant to the students and explain that most fruit grows on one of these three types of plants.



- ⇒ **Tree:** Many trees produce various types of fruits and nuts. Fruit trees have a stem and branches made of wood. They produce flowers in the spring, which mature into fruit.
  - ⇒ **Bush:** A fruit bush is fairly low to the ground. It has small wooden stems that branch out. The bush is covered in leaves and the flowers mature into fruit.
  - ⇒ **Vine:** Some fruits grow on vines. Vines such as those for grapes or kiwi fruits grow from a woody stem and are usually supported on a trellis. Watermelon and cantaloupe are examples of fruits that grow from vines with a soft, herbaceous stem.
- Choose twelve students in your class and give them a picture of a fruit. Ask each student to place their fruit card on the board by the type of plant that it comes from. You could have the students guess or allow them to research the fruit to find out where it grows.
    - ⇒ **Fruits that grow on trees:** Lime, grapefruit, orange, apple, pear, cherry, peach, banana.
    - ⇒ **Fruits that grow on a bush:** Pineapple, raspberry, blackberry and blueberry.
    - ⇒ **Fruits that grow on a vine:** Grape, Strawberry, watermelon, and cantaloupe.
  - Summarize that the fruit we eat is grown on a farm. Fruit farms are found in many areas of the United States and the world. California, Florida, and Washington are the top 3 fruit producing states in America.

- Review the different classifications of fruit (Pomes, Drupes, Berries, Melons & Citrus Fruit) by using the Activity Sheet “What Type of Fruit”.
- Divide the class into groups of four. Provide a variety of fruit samples from the various fruit groups. Cut fruit ahead of time if you don’t want students to handle the plastic knife.
- Ask one student from each group to use a cafeteria style tray to collect the fruit for their group.
- Students will complete the Activity Sheet “What Type of Fruit” by studying and drawing the inside and outside of each piece of fruit.
- Using cherry as an example, students will record their findings on the Activity Sheet “Fruit Facts” table.
- Ask students “Why fruits have rinds and peels?” (for protection) and “Why fruits have seeds?” (for reproduction).

### **Lesson Extension**

Did you know some fruits will quickly turn brown when they are cut open? Some fruits quickly turn brown after they are cut. Apples seem to turn brown almost as soon as they are cut. The cut tissue or inside of the apple turns brown because of oxygen in the air. Before an apple is cut oxygen can’t get inside the fruit. Once the apple’s skin is cut and air gets inside, a chemical reaction begins. A substance in the apple’s tissue called **phenolase** mixes with **oxygen** in the air. Together, the phenolase and oxygen make the apple’s tissue turn brown. Bananas, peaches and pears also quickly turn brown after they are cut.

**Materials:** Apples, paper plates, plastic knives/spoons, cafeteria-style trays, sugar, lemon juice, cream of tarter, water, Activity Sheet “Who Likes Brown Apples?”



- Divide the class into four groups.
- Students will use a cafeteria style tray to collect supplies for their group.
- Each group will need apple slices, 1 T sugar, 1 T lemon juice, 1/2 t cream of tarter mixed with 1 t water, 4 paper plates.
- You can pre-slice the apples, or allow students to slice their apples with a plastic knife.
- Each group will perform their experiment using the Activity Sheet “Who Likes Brown Apples?”.
  1. For each person in your group, place one slice of apple on a paper plate. Leave the plate uncovered. Wait 15 minutes.
  2. For each person in your group, place one slice of apple on a paper plate. Sprinkle the apple pieces with sugar. Gently stir. Wait 15 minutes.
  3. For each person in your group, place one slice of apple on a paper plate. Cover the apple pieces with lemon juice. Gently stir. Wait 15 minutes.
  4. For each person in your group, place one slice of apple on a paper plate. Cover the apple pieces with cream of tarter mixture. Gently stir. Wait 15 minutes.

- During the lab, ask probing questions “Which group’s apples do you think will brown the most? The least?”
- After 15-20 minutes have passed, students will return to the experiment.
- Give each student a piece of all four apples. After studying and tasting the apples, the students will complete the Browning Reactions table.
- Complete the activity with a class discussion: “Why did the lemon juice keep the apples from browning? Do you think sugar or cream of tartar is an acid? Did any of the additional ingredients change the taste? How?”

### Lesson Extension

- Most students are familiar with berries, so this is a good topic to extend their learning about fruit and its nutritional value.
- Your class may be growing various berries in your Giving Grove. Many berries grow in our gardens as well as in the wild. Lead a discussion about what berries grow in our state.
- The botanical definition of a berry is a fruit produced from one ovary, which would make tomatoes and other larger fruits berries too. The common way we use the word berry in English refers to small fruits that are either sweet or tart.
- Try these leading questions:
  - ⇒ How many of you have ever eaten berries?
  - ⇒ How many have berries growing in their backyard? In the woods near your house?
  - ⇒ What are some berries that can grow in our state?

### **NUTRITION & BACKGROUND ON COMMON BERRIES**

- **BLUEBERRIES:** Huckleberry, deerberry, and sparkleberry are only a few of the names that have been given to wild blueberries. Blueberries are considered a superfood because they are loaded with nutrients and antioxidant protection that can support eyesight, and help with some memory loss due to aging. Blueberries are ancient, dating back 13,000 years. They are native to North America and have deep roots in our country. Native Americans called blueberries “star berries” due to the blossom at the end of each berry that forms a 5-pointed star. There is twice the antioxidant power in a cup of wild blueberries versus the cultivated type.
 
- **STRAWBERRIES:** Strawberries have more vitamin C than an orange. One serving, about 8 strawberries has 140% of the Vitamin C needed for one day. The first garden strawberry was grown in France in 1750, but wild strawberries come from North and South America, and have been around much longer. The USA grows the most strawberries in the world, with Turkey a distant second.
 

- **RASPBERRIES:** Raspberries are high in fiber and vitamin C. Raspberries come in many colors including gold, black and purple, but red is the most common. Russia is the top producer of raspberries, with Poland second and Serbia third. When settlers came from Europe to America, they found Native Americans already eating and planting berries. In 1761, George Washington moved to Mount Vernon, Virginia and started cultivating raspberries.



- **BLACKBERRIES:** Blackberries have the highest antioxidant content per serving of any food. They are great for health, athletic performance and lowering disease risk. Blackberries are a delicate fruit that grows on very thorny bushes. They are closely related to raspberries and have biennial canes. Interesting fact: blackberries and raspberries are not true berries. Each little bump in the “berry” is a fruit, or “drupelet” containing its own seed.



- **GOOSEBERRIES:** One of the earliest spring-blooming, edibles is the gooseberry. Reddish-brown, prickly branches unfurl their three lobed leaves just as bright-colored songbirds begin their annual courtship serenades. In April and May, clusters of drooping, greenish-white, slender flowers appear. Soon after, tiny green spheres start to dangle from thin stems. It is when these tart, smooth berries reach a size of approximately a quarter of an inch that they are collected and dropped into buckets. The berries are not ripe, but are considered just right for homemade pies. If a gooseberry escapes the bucket it will become dark purple and less tart. Gooseberry shrubs grow 2 to 3 feet tall and may be found scattered throughout much of the state. These hardy plants are well adapted to a mixture of rocky woodlands, pastures, and forest edges. The green berries can be used to make pies, jams, and preserves, provided that you have plenty of sugar on hand to combat that super tart pucker.



- **DEWBERRIES:** Dewberries look so much alike that it’s easy to confuse one species with another. Dewberries are cousins of the Blackberry. Some grow in low, wet bottomlands, while others prefer open ground along roadsides. You may find your pant legs caught by the thorns of these low-trailing plants as you hike along sunlit wooded trails and pasture areas. Dewberries bloom between April and June with small, rose-like, white to blush-pink flowers. The blossoms are composed of five petals and stand well above trailing canes and foliage. Dewberries produce large, black berries in June and July that resemble those of their blackberry cousins. These juicy fruits may be used in the same manner as raspberries and blackberries to make jelly, jam, and other treats. They are fabulous when eaten fresh or as a dessert topping.



## OBSERVE & DRAW BERRIES

- Writing in journals or on blank paper, students may observe and draw the samples of available berries.
- At an age-appropriate level, discuss nutrition and origin of each plant. What color is this? How is it good for you? (refer to berry facts section). What part of our bodies does it help? (Put the food on the body: eyes, brain, heart, stomach, if you have a diagram in your classroom.) What part of this plant are we eating? (A: fruit) Review that plant part’s job. Where does this food grow? (A: In gardens and in the wild).



## COMPARING WILD BERRIES & CULTIVATED BERRIES

- Discuss differences between wild and cultivated berries. Make a Venn diagram comparing and contrasting the two varieties of berries.
- Example—Compare Blueberries: Wild or lowbush blueberries (36% of total) grow low to the ground in bunches of 3-4 and the fruits are much smaller than the blueberries we find in stores. They look deep purple-blue, to almost blue-black. Wild blueberries grow in Canada and North America where soils are acidic and climate is cool. Cultivated or domestic varieties of blueberries (64% of total) are called highbush plants. The berries are much larger than the wild ones, and the bushes can grow quite large. If not trimmed, the plants can grow to more than 10 feet tall. The berries are generally available at stores and the flavor is not as intense as the wild type. Cultivated fruits are deep blue in color. Blueberries are often called a superfruit for its high concentration of antioxidants. The disease fighting antioxidants are found in the skin of the fruit, and because the wild variety is smaller, there is more surface area of the skin, and therefore more helpful antioxidants.

## BERRIES IN OUR GARDENS

- Does your school or community garden grow berries? With kids, draw a map of your school or town.
- Mark where existing berries are growing (wild or planted), and in your dream world, where other berries could be planted. Take this to your farm to school committee and administration to see if any of these locations are feasible for adding berries to school grounds.
- Have students incorporate their math skills and draw a dream garden either in a real or imagined location using graph paper. The following measurements will be helpful:
  - ⇒ Blueberries need 2.5 feet if you are going to plant them in hedgerows, and 6 feet apart if you are going to grow them as separate plants. More than one variety is required for pollination.\*
  - ⇒ Blackberries and raspberries should grow in hedgerows 8-10 feet apart, with individual plants 2 feet apart.\*
  - ⇒ Strawberries should be planted 1 foot apart, with 3 feet between rows.\*
  - ⇒ \*The exact distances will depend on the varieties of berries chosen.

### Additional Resources

Lesson adapted from:

[https://naitc-api.usu.edu/media/uploads/2015/06/03/Student\\_Handouts\\_2.pdf](https://naitc-api.usu.edu/media/uploads/2015/06/03/Student_Handouts_2.pdf)

<https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=259>

Lesson Extension on Berries adapted from:

[http://www.vermontharvestofthemonth.org/uploads/2/8/9/6/28966099/07\\_berry\\_lesson.pdf](http://www.vermontharvestofthemonth.org/uploads/2/8/9/6/28966099/07_berry_lesson.pdf)



Tree

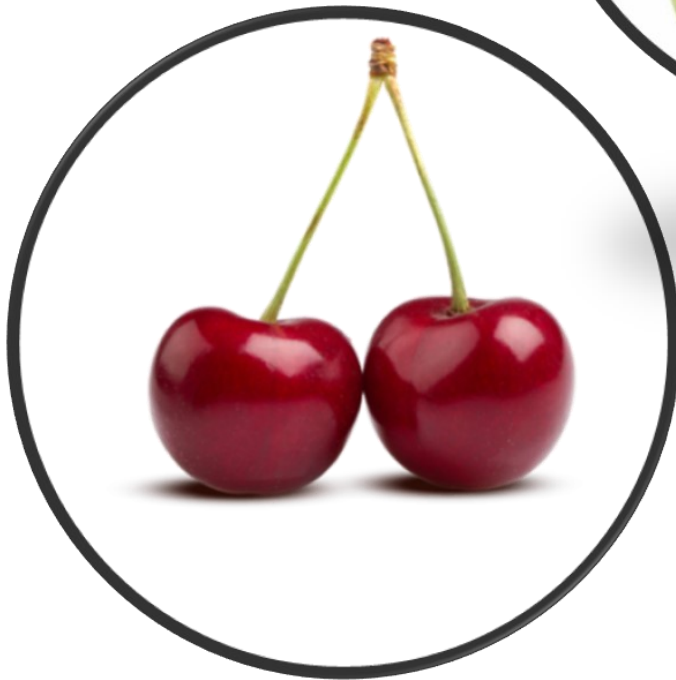
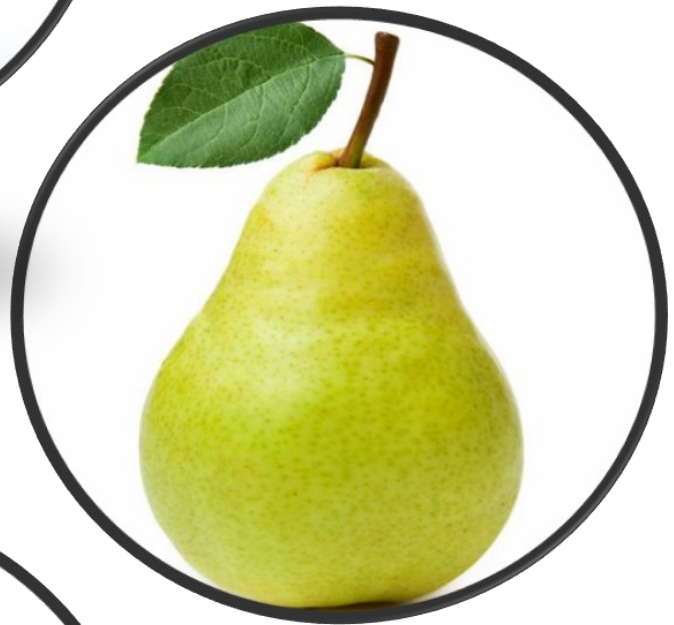
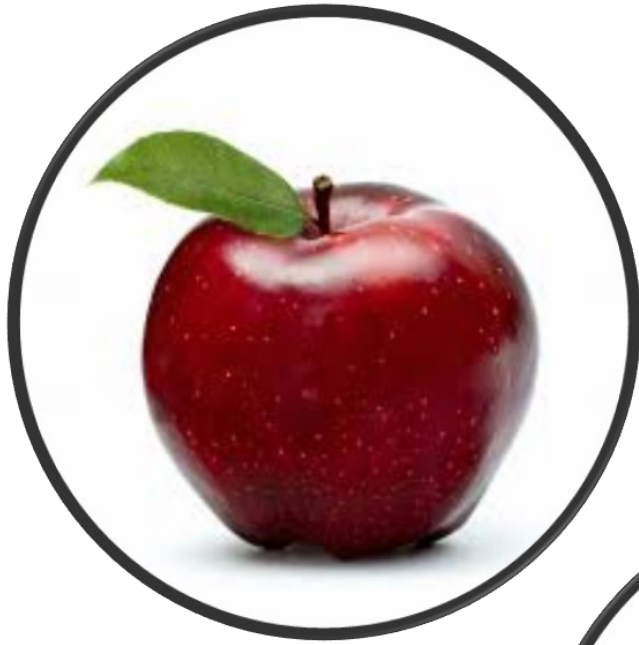


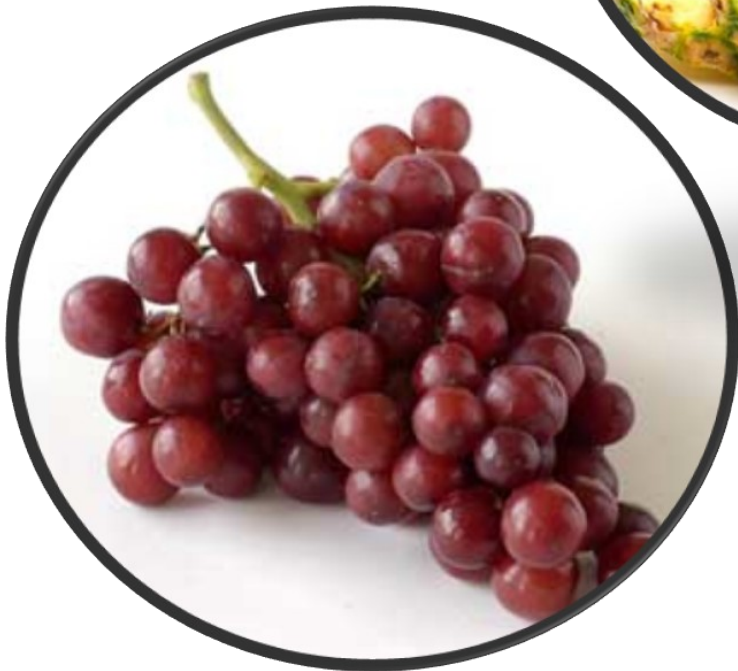
**Bush**

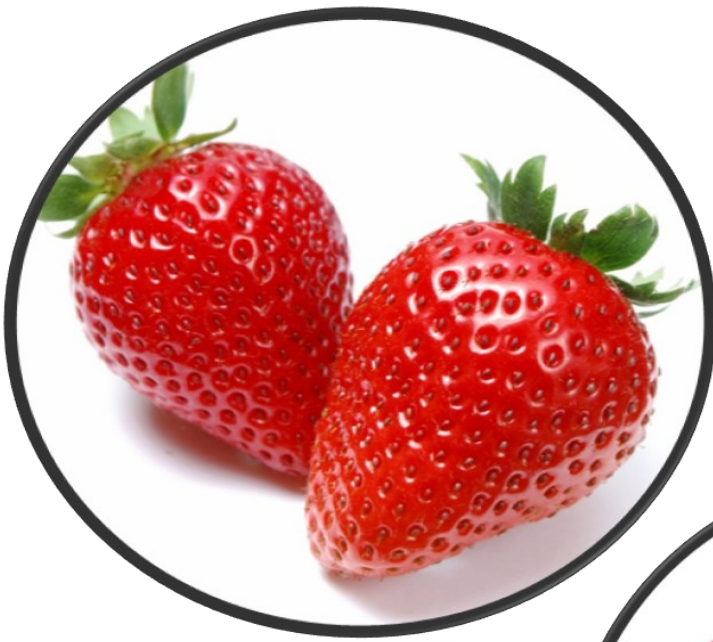


Vine

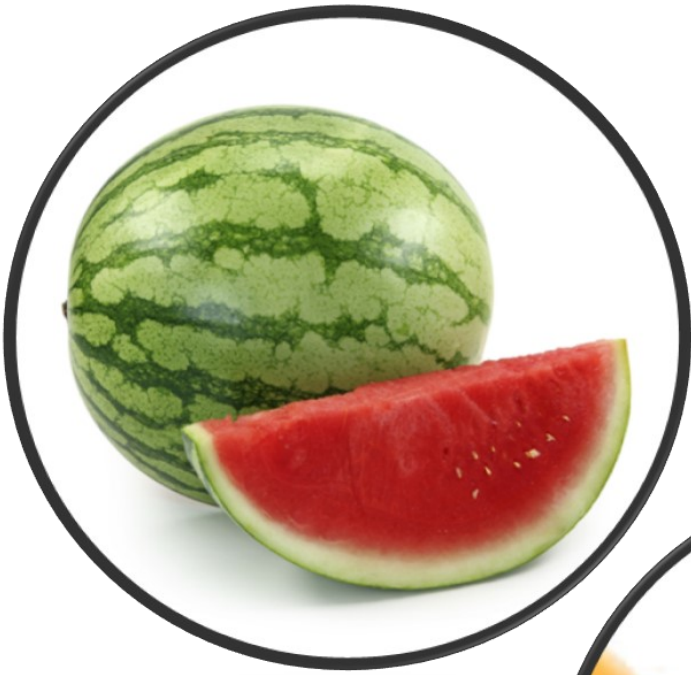












## WHAT TYPE OF FRUIT?

In the blank, beside each fruit group, write the letter of the definition that best matches.

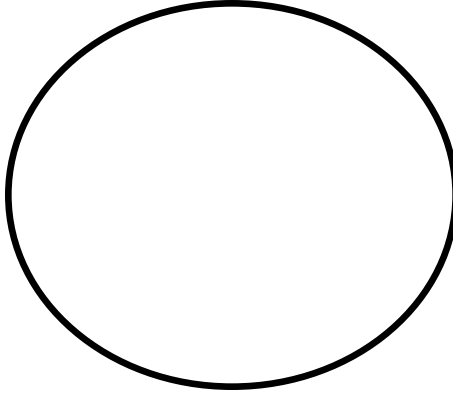
- |                        |  |
|------------------------|--|
| 1. _____ <b>Drupe</b>  | A. Fruit with a paper-like core with seeds   |
| 2. _____ <b>Pome</b>   | B. Large fruit with lots of seeds and a rind |
| 3. _____ <b>Berry</b>  | C. Fruit with many sections inside a peel    |
| 4. _____ <b>Melon</b>  | D. Fruit with a single pit                   |
| 5. _____ <b>Citrus</b> | E. Small fruit with lots of seeds            |

Use a hand lens to study different fruits. Draw a detailed picture of each fruit in the circles below. Be sure to show the seeds and both the inside and outside of the fruit.

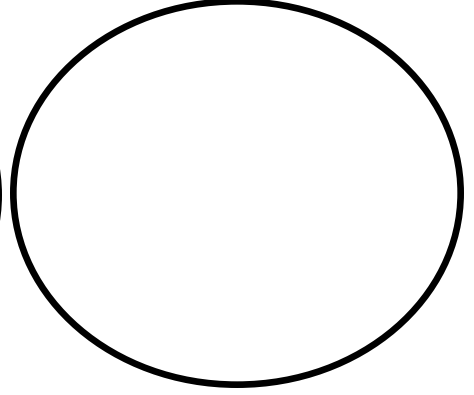
**FRUIT: Cherry**



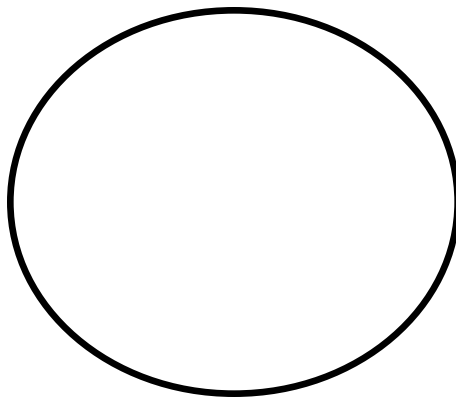
**FRUIT:** \_\_\_\_\_



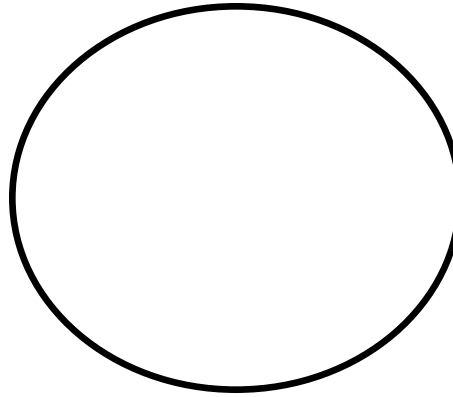
**FRUIT:** \_\_\_\_\_



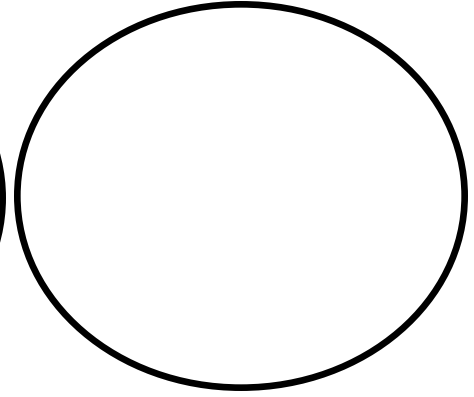
**FRUIT:** \_\_\_\_\_



**FRUIT:** \_\_\_\_\_



**FRUIT:** \_\_\_\_\_



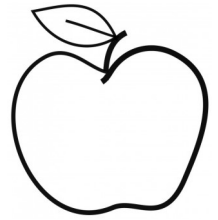
# FRUIT FACTS



Using your fruit samples, complete the table below.

Fruit	# of Seeds/Pits & location	Color of fruit on the Inside & Outside	Type of Fruit (pome, drupe, berry, melon, citrus)
Cherry	1 pit in the center of the fruit	Outside: bright red Inside: greenish	Drupe
		Outside: Inside:	
		Outside: Inside:	
		Outside: Inside:	
		Outside: Inside:	
		Outside: Inside:	

## WHO LIKES BROWN APPLES?



Have you noticed that some fruits quickly turn brown after they are cut? What are some fruits you can think of that turn brown quickly? Can you keep an apple from turning brown? Try this experiment:

- A. For each person in your group, place one slice of apple on a paper plate. Leave the plate uncovered. Wait 15 minutes.
- B. For each person in your group, place one slice of apple on a paper plate. Sprinkle the apple pieces with sugar. Gently stir. Wait 15 minutes.
- C. For each person in your group, place one slice of apple on a paper plate. Cover the apple pieces with lemon juice. Gently stir. Wait 15 minutes.
- D. For each person in your group, place one slice of apple on a paper plate. Cover the apple pieces with cream of tarter mixture. Gently stir. Wait 15 minutes.

After 15 minutes, take one piece of apple from each different plate. Study the color of each piece. Then taste all 4 pieces. Complete the table below. What is the best way to keep your apples from turning brown? Can you explain why?

Group	Appearance	Taste	Was browning stopped? Why?
<b>Plain: Experiment A</b>			
<b>Sugar: Experiment B</b>			
<b>Lemon Juice: Experiment C</b>			
<b>Cream of Tarter: Experiment D</b>			

# HEALTHY PLATE

**Lesson Objective:** The Learner will categorize food into the 5 **MyPlate** categories, with a special emphasis on making half the plate fruits and vegetables.

**Key Questions:** What are the 5 food groups that I should include in my eating habits? What quantity should I be eating from each group? Why should half my plate be fruits & vegetables?

## **Background Information:**

This lesson focuses on concepts from the US Department of Agriculture program **MyPlate**.  
<https://www.choosemyplate.gov/>

**MyPlate** was developed by the United States Department of Agriculture and provides a visual cue that reminds consumers how to make healthy food choices; **MyPlate** replaced **MyPyramid** in 2011.

The 2015-2020 Dietary Guidelines for Americans promotes the importance of a healthy eating pattern to maintain health and reduce the risk of disease. Everything you eat and drink — the food and beverage choices we make day to day and over our lifetime — matters. By eating a variety of foods from each food group, we give our bodies what they need to be and stay healthy. Start with small changes to make healthier choices you can enjoy.

The **MyPlate** logo serves as a colorful visual that a person should eat foods from the five food groups each day. It is important to eat a variety of healthy foods. Find your healthy eating style and maintain it for a lifetime. Try to:

- ⇒ Make half your plate fruits and vegetables.
- ⇒ Focus on whole fruits
- ⇒ Vary your veggies.
- ⇒ Make half your grains whole grains.
- ⇒ Move to low-fat and fat-free milk or yogurt.
- ⇒ Vary your protein choices.
- ⇒ Drink and eat less sodium, saturated fat, and added sugars.
- ⇒ Children 6-17 years old should move at least 60 minutes each day.



This lesson will focus on encouraging students to choose foods based on the 2015-2020 Dietary Guidelines for Americans and **MyPlate** recommendations, with special attention to the goal:

## Make half your plate fruits and vegetables!



## **Materials:**

1 c measuring cup

2 Dominoes (equal 1 ounce)

Science journal

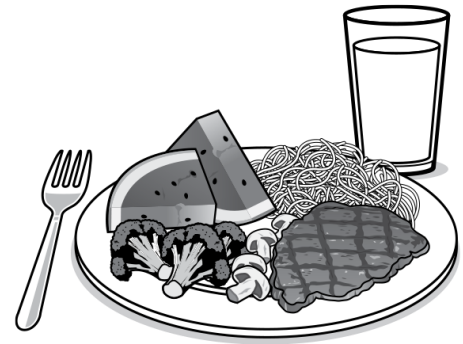
Activity Sheet “Healthy Plate”

Activity Sheet “Healthy Plate Checklist”

Activity Sheet “What’s For Lunch?”

## **Learning Activity:**

- Ask your students to hold up five fingers.
- Once they have their hand held up, explain to them that just like we have five fingers, there are five food groups that are a part of a healthy diet.
- Ask students to help you list the five food groups. Allow them to use their prior knowledge, then give clues as needed.
- Distribute the Activity Sheet “Healthy Plate” to each student. Briefly review the five food groups. The fruits and vegetables sections take up half the plate, with the vegetable food group being slightly larger than the fruit group. The grains section is larger than the protein section. Each food group’s size is slightly different because our bodies need different amounts from each food group to stay healthy.
- Have students write a one-minute “quick list” of foods that could be listed in each of the five groups.
- Note: Beans are unique because they fit in both the protein and vegetables group. For more information about beans and peas visit the “Beans and Peas are a Unique Food” webpage <https://www.choosemyplate.gov/vegetables-beans-and-peas> .
- Have students share their answers and record them in a chart on the board. Create a spelling list from select words.
- Lead students through a discussion of five reasons why they should make half their plate fruits and vegetables daily. Discussion points may include:
  - ⇒ Fruits and vegetables are the only source of vitamin C in the diet. Vitamin C helps the body heal wounds and lowers the risk of infection. It also helps keep the body from bruising and builds the tissue that holds muscles and bones together. Vitamin C is also known as ascorbic acid and helps the body absorb the iron found in foods and strengthens the immune system.
  - ⇒ Vitamin A serves several functions in the body. It helps maintain good vision, fight infection, support cell growth, and keep skin healthy. Leafy greens, carrots, sweet potatoes, squash, spinach, apricots, and green peppers are all excellent sources of vitamin A.
  - ⇒ Fruits and vegetables are a good source of complex carbohydrates, whose energy release is slow, gradual, and long lasting. Sugar provides quick energy, but its effects are short lived. This knowledge is important when choosing foods to eat before an athletic event.



- ⇒ Fruits and vegetables are quick, often ready to eat, easy to carry, and tasty foods to have as snacks. They provide the energy needed to function throughout the day.
  - ⇒ Eating a variety of fruits and vegetables provides health benefits— people who eat more fruits and vegetables as part of a healthy eating style are likely to have a reduced risk of some chronic diseases.
  - ⇒ Fruits and vegetables provide nutrients that help us grow and stay healthy.
  - ⇒ They are naturally low in fat and calories. None have cholesterol.
- Briefly discuss what foods are in the fruit and vegetable groups. You can use the Activity Sheet “Healthy Plate Checklist”.

### **Fruit Group:**

- ⇒ Any fruit or 100% fruit juice counts as part of the Fruit Group. Fruits may be fresh, canned, frozen, or dried, and may be whole, cut-up, or pureed. For more information and fruit group photos visit the Fruits Gallery.
- ⇒ Focus on whole fruits
- ⇒ Choose whole or cut up fruits more often than 100% juice.
- ⇒ Snack on fresh, frozen, canned, or dried fruits instead of cookies, brownies, or other sugar-sweetened treats.

### **Vegetable Group:**

- ⇒ Any vegetable or 100% vegetable juice counts as a member of the Vegetable Group. Vegetables may be raw or cooked; fresh, frozen, canned, or dried/dehydrated; and may be whole, cut-up, or mashed.
  - ⇒ Vegetables are organized into 5 subgroups based on their nutrient content:
    - ◇ Dark-Green Vegetables (e.g., broccoli, spinach, romaine lettuce, bok choy, collard greens)
    - ◇ Red and Orange Vegetables (e.g., acorn or butternut squash, carrots, pumpkin, red peppers, sweet potatoes, tomatoes)
    - ◇ Beans and Peas Vegetables (e.g., chickpeas/garbanzo beans; lentils; black, kidney, navy, or pinto beans)
    - ◇ Starchy Vegetables (e.g., corn, green peas, green lima beans, plantains, potatoes)
    - ◇ Other Vegetables (e.g., celery, cucumbers, green beans, green peppers, iceberg lettuce, zucchini)
- What other fruits and vegetables do you like? Have you ever tried a fruit or vegetable that you would consider to be unusual, or that is not grown in the United States?

- Discuss the importance of eating a variety of vegetables from each of the subgroups throughout the week. Vegetable subgroup recommendations are given as amounts to eat WEEKLY. It is not necessary to eat vegetables from each subgroup daily. Most people need to eat more vegetables from the Dark-Green, Red and Orange, and Beans and Peas subgroups.
- Ask students to name their favorite vegetables in each of the subgroups. Write the subgroup categories on the board.
- Review the amount of food students need from each of the five food groups each day. You can use the Activity Sheet “Healthy Plate Checklist”.
- Direct the students to identify what foods are measured in cups vs. ounces. (The amounts of foods are listed in cups for fruits, vegetables, and dairy, and in ounce equivalents for grains and protein foods.) To help students see what these foods might look like on a plate, use measuring cups for volume and two dominoes for one-ounce equivalents.
- Show students what a 1/2 cup of fruits, vegetables, and cooked grains look like. Display the food on a plate. Have the students measure 1 or 2 cups of food to compare. Have the students hold 2 dominoes in their hand. Explain that the 2 dominoes are equal to one ounce.
- Have students complete the Activity Sheet “What’s For Lunch?”.
- After conducting these activities, review and summarize the following key concepts:
  - ⇒ Fruits and vegetables are part of a healthy diet and should constitute half of the proportions of our plates.
  - ⇒ Fruits and vegetables provide vitamins, minerals, and fiber to our diet.
  - ⇒ Serving sizes help us know how much of each food group we should eat per day.

### **Lesson Extension:**

- Create a large classroom model of the “Healthy Plate” diagram. Have students identify and cut out their favorite fruits and vegetables from grocery ads. Students take turns sharing and taping their fruits and vegetables to the classroom model.
- Have students find healthy recipes found online or bring a family recipe from home. Students can share recipes with each other. If possible, create a classroom meal using the students’ recipes.
- Using the list of fruits and vegetables the students created in the lesson, have the students determine which produce items are high in vitamin A. This can be done using the “dark color test.” Produce high in vitamin A is dark orange, dark yellow, or dark green throughout.
- Have students compare the fat, protein, and carb profiles of fruits, berries and nuts.

### **Additional Resources:**

Lesson adapted from <https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=333>

<https://www.choosemyplate.gov/fruit>

<https://www.choosemyplate.gov/teachers>

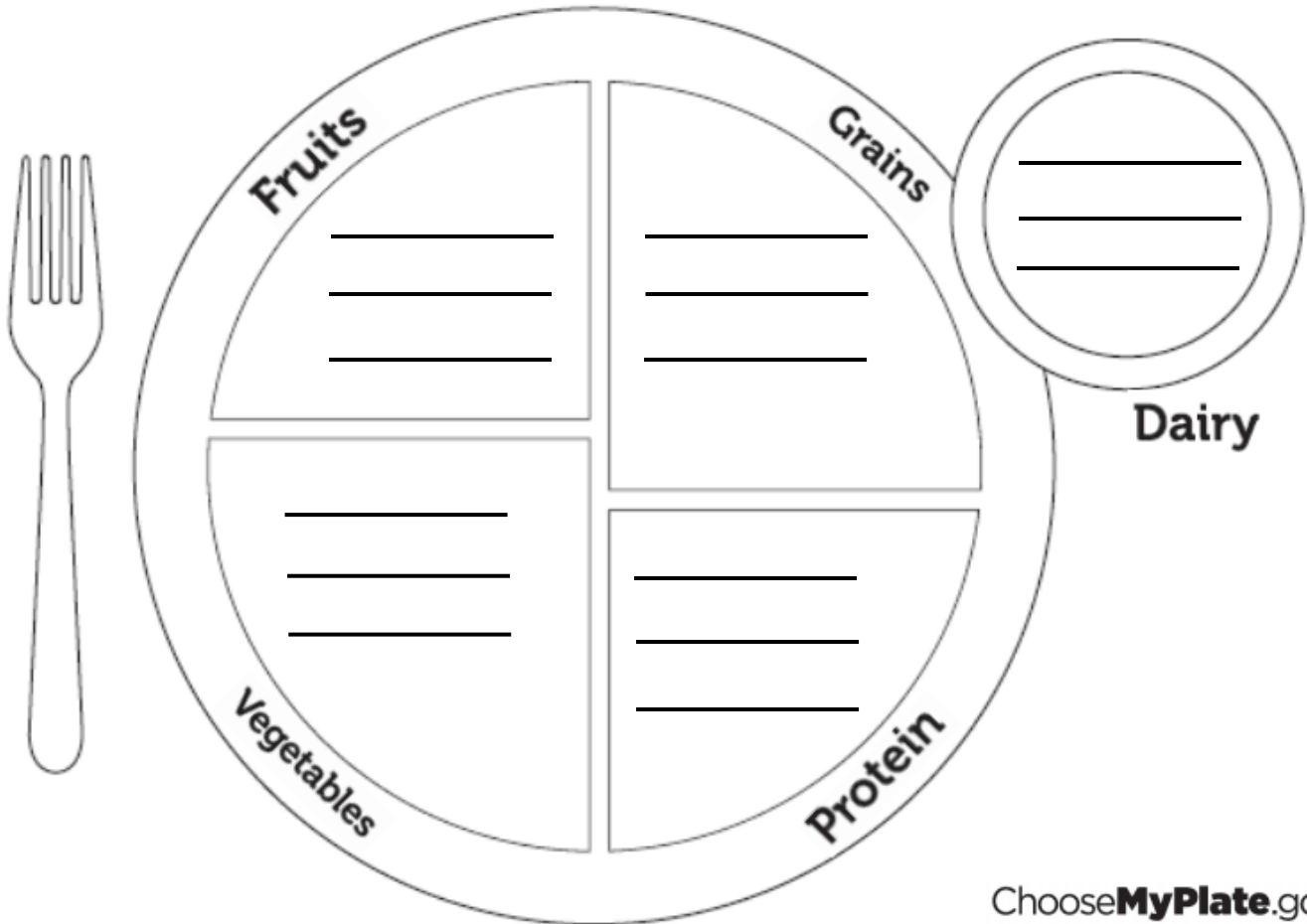
[https://naitc-api.usu.edu/media/uploads/2017/09/21/MyPlate\\_Daily\\_Food\\_Plan\\_Checklist.pdf](https://naitc-api.usu.edu/media/uploads/2017/09/21/MyPlate_Daily_Food_Plan_Checklist.pdf)



## HEALTHY PLATE

Use the word bank to place each food into its proper food group.

rice	fish	bread	apple	grapes
eggs	cheese	broccoli	corn	yogurt
cereal	banana	carrots	milk	chicken



Each of these 5 food groups provide some, but not all, of the nutrients you need to be healthy. At least 1/2 of your plate should be fruits and vegetables.

What are your favorite fruits to eat? \_\_\_\_\_  
 \_\_\_\_\_

What are your favorite vegetables to eat? \_\_\_\_\_  
 \_\_\_\_\_

What happens to your body if you don't eat healthy foods? \_\_\_\_\_  
 \_\_\_\_\_

## HEALTHY PLATE CHECKLIST

Children have different calorie needs based on their height, weight, and physical activity level. For example, the food group amounts for 1,800 calories a day for children ages 9 and up that are active for 30 minutes or more per day are:

### Fruits: 1½ cups

1 cup of fruits:

- 1 cup raw or cooked fruit
- 1/2 cup dried fruit
- 1 cup 100% fruit juice



**What's your favorite fruit?**

### Vegetables: 2½ cups

1 cup of vegetables:

- 1 cup raw or cooked vegetables
- 2 cups leafy salad greens
- 1 cup 100% vegetable juice

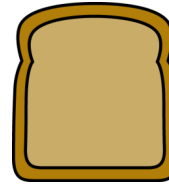


**Do you like raw or cooked vegetables?**

### Grains: 6 ounce equivalents

1 ounce of grains:

- 1 slice of bread
- 1 cup of ready-to-eat cereal
- 1/2 cup of cooked rice, pasta, or cereal



**What protein do you like to eat on your bread?**

### Protein: 5 ounce equivalents

1 ounce of protein:

- 1 ounce lean meat, poultry, or seafood
- 1 egg
- 1 Tbsp peanut butter
- 1/4 cup cooked beans or peas
- 1/2 ounce nuts or seeds



**What kind of nuts do you like to snack on?**

### Dairy: 3 cups

1 ounce of grains:




- 1 cup milk
- 1 cup yogurt
- 1 cup fortified soy beverage
- 1½ ounces natural cheese or  
2 ounces processed cheese



**Have you ever tried a different kind of milk than cow's milk?**

# WHAT'S FOR LUNCH?

Look at the school lunch menu below and fill in the table.

Lunch Menu Item	Original Ingredient		Food Group	Does It Come From a Plant or Animal?
<b>Whole Wheat Cheese Pizza</b> 	Crust	Wheat Flour	Grains	Plant
	Tomato			
	Cheese			
<b>Baked Sweet Potato Fries</b> 				
<b>Broccoli</b> 				
<b>Applesauce</b> 				
<b>Fat-Free Milk</b> 				

Design a lunch menu that has food from each food group: