

*READY,  
SET,  
GROW!*

6-8



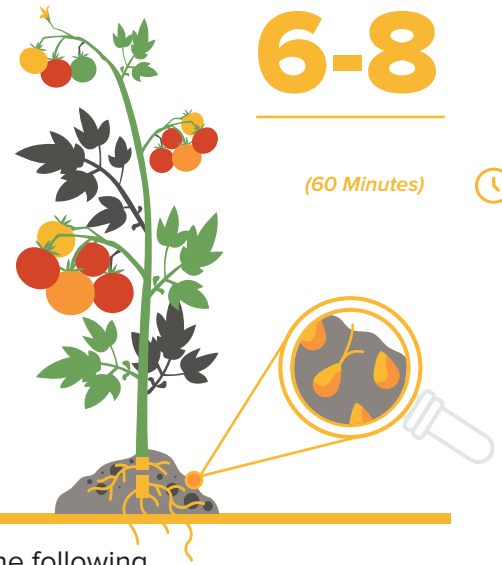


If students have not had any exposure to Claim-Evidence-Reasoning models prior to Garden Bites, teachers may need to conduct a CER introductory activity.



## Essential Question

## WHAT CAN I LEARN ABOUT PLANTS IN THE GARDEN?



## Learning Targets

- **I can** explain how plants are part of a healthy diet. ([HBO 3, 12](#))
- **I can** explain how a garden can provide a wide variety of healthy foods. ([HE 1.8.1, HE 1.8.7](#))
- **I can** gather evidence to support a claim. ([CCSS ELA RI 7.1](#))
- **I can** analyze evidence and explain how the evidence supports a claim. ([NGSS Practice](#))



plants using any one of the following claims:



- Plants are an essential part of a healthy diet.
- Plants are used by people from all cultures, including my own, to maintain a healthy diet.
- Eating a variety of plants and plant parts is necessary to get the most nutritional benefits.
- Students will record their sample CERs in their Garden Journals.

## SPROUT



- Form pairs or triads.
- Provide the Garden Journals (assembly of student resources needed for the Garden Bites).
- Give students a discussion prompt regarding Claim-Evidence-Reasoning structures:
  - When have you used the CER structure before?
  - How can CER help us with investigations and learning?
  - Create an example of CER with something you are familiar with or have done before.
- Call on various groups to create definitions and examples of CER.
- Students will create a CER based on what they already know about



## INVESTIGATION (35 Minutes)

### PREPARATION AND MATERIALS:



- Garden Journals
- Text of your choice (some links provided below)
- Nutrition labels (6 sets)




### READING TO LEARN: JIGSAW



- Form pairs.
- Distribute reading material and allow students to choose their text:
  - One of these articles, or a resource of your own:
    - » [Your Plant-Based Diet Needs These 10 Foods](#)
    - » [Whole-Foods, Plant-Based Diet: A Detailed Beginner's Guide](#)
  - Nutrition labels for any plant or plant-based food.
- Students will use a close reading strategy like text marking or highlighting to locate evidence supporting the claim. Students will record evidence in the Garden Journals.
- Form groups of four by joining partner teams.
- Use a discussion protocol: Numbered Heads Together. The



question posed by the teacher is the claim:

-  • What evidence suggests that the garden can provide much of what people need for a healthy diet?
-  • Students all share evidence and record it in their Garden Journals.
-  • The teacher will call out a number from the group (1-4). Students with that number will provide evidence when called on.





If students are experienced in offering critiques respectfully, a response could be added to build a discussion using sentence stems.



- Continue with this activity until there is sufficient and appropriate evidence displayed to allow students to write a summary statement.

### **CLOSURE/ASSESSMENT** (10 Minutes)

-  • Individually or in pairs, students will write a summary that connects the evidence and the claim for this lesson.
-  • Collect Garden Journals. Review of summary statements could be a launch into a future lesson.

### **DIGGING DEEPER:**

- Show the TED Talk from Darryl D'Souza: [How I cured myself from chronic illness and reversed aging](#). Use this as a thinking prompt allowing students to map his CER or a more simple claim/evidence analysis.



**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
PLANTS IN THE GARDEN?**

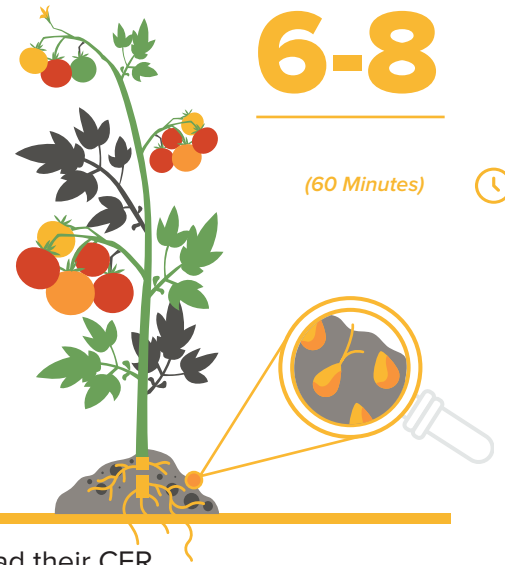
- I can explain how plants are part of a healthy diet.
- I can explain how a garden can provide a wide variety of healthy foods.
- I can gather evidence to support a claim.
- I can analyze evidence and explain how the evidence supports a claim.

Vocabulary	Illustration/Example	Definition
<b>CLAIM</b>		A conclusion about a problem. Answers: What do you know?
<b>EVIDENCE</b>		Data that is sufficient and appropriate to support the claim. Answers: How do you know it?
<b>REASONING</b>		A justification that shows why your evidence supports the claim. Answers: Why can this evidence be used in support of the claim?
<b>SAMPLE CLAIM</b>	<b>Select one:</b> <ul style="list-style-type: none"> <li>• Plants are an essential part of a healthy diet.</li> <li>• Plants are used by people from all cultures, including my own, to maintain a healthy diet.</li> <li>• Eating a variety of plants and plant parts is necessary to get the most nutritional benefits.</li> </ul>	
<b>SAMPLE EVIDENCE</b>		
<b>SAMPLE REASONING</b>		
<b>INVESTIGATION:</b> Plants from the garden can provide much of what I need in a healthy diet.		





<p>What evidence is provided about my claim in the article?</p>	
<p>What evidence is provided about my claim in the nutrition labels?</p>	
<p><b>SUMMARY:</b> Write a summary statement or statements that explain how the evidence you gathered supports the claim for this investigation.</p>	



## Essential Question

## WHAT CAN I LEARN ABOUT SEEDS IN THE GARDEN?

### Learning Targets

- **I can** explain the role seeds play in the life cycle of a plant.
- **I can** classify seeds into monocot and dicot based on evidence I observe. ([NGSS MS-LS1-4](#), [NGSS MS-LS1-5](#))



### SPROUT



- Organize students into pairs or triads.
- Provide each student with a copy of their Garden Journal.
- Give students a discussion prompt:
- What did we learn about the role of the garden in helping us eat a healthy diet?
- Select a discussion protocol to help students generate/activate background knowledge:
- Musical Shares
- Think, Pair, Share
- Give One, Get One, Move Along
- Popcorn, Pass It On
- After several rounds, solicit three to five responses from students selected at random.
- Optional review to deepen CER skills:
- Direct students to their Garden Journals.



- Have students silently read their CER from the previous lesson.
- The teacher will provide a student sample that gives a good model of scientific reasoning to share. Ask students to offer support for the summary statement using sentence stems (ex: I like that the summary explains that the nutritional evidence from many plants provides support for eating a variety of plants in order to be healthy).
- Direct students to their Garden Journals.
- Ask students to brainstorm background knowledge about seeds with their partners.



### GARDEN INVESTIGATION

#### | READING TO LEARN: TEXT MARKING



- Distribute The Garden Thymes: Seeds
- Provide students with highlighters or pens/pencils to mark the text where they find information that:
  - Clarifies the vocabulary with an illustration or example
  - Describes how seeds are structured similarly or differently
  - Explains how seeds can be eaten as part of a healthy diet
- With a partner or triad, share examples from the text and add to notes.



### INVESTIGATION

(15-20 Minutes)



- Group students into pairs, triads, or individuals.
- Students will be looking for evidence in the garden that could be used to determine whether the seed for each plant is a dicot or monocot. Reference the chart in the Garden Journal.



- Students record data in the Garden Journal. Data may include words, numbers, and/or sketches.



### CLOSURE/ASSESSMENT

(5-10 Minutes)



- Cue students to select one plant from their data that they believe came from a monocot seed and one that came from a dicot seed.
- Using Give One, Get One, students will take turns giving one example for each until they find at least one other student that has reached the same conclusion but was not in their garden group. Do several rounds, until all students have found at least one person to confirm their conclusion.
- Explain to students:



- When a scientist makes a conclusion from evidence, the conclusion can be strengthened by corroborating the evidence gathered by other scientists.

- Students complete the summary statements in their journals, independently or with a partner.



- Collect Garden Journals and review summaries.



**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
SEEDS IN THE GARDEN?**

- I can explain the role seeds play in the life cycle of a plant.
- I can classify seeds into monocot and dicot based on evidence I observe.

What do you already know about seeds?

Vocabulary	Illustration/Example	Definition
<b>SEEDS</b>		The part of a plant that contains all of the necessary materials and information for plant life.
<b>COTYLEDON</b>		One or more leaves contained in a seed.
<b>DICOT DI-COT</b>		A seed that has two cotyledons and produces other unique plant features.
<b>MONOCOT MON-O-COT</b>		A seed that has one cotyledon and produces other unique plant features.
<b>SEED COAT</b>		Protects the seed from insects, disease, and moisture.
What structures do seeds have that support the beginning of a plant?		
What parts of the plant can be used to predict whether a plant's seed was dicot or monocot?		
How can seeds be used to support a healthy diet?		







What evidence can I gather in the garden to classify a plant as a monocot or dicot?

**Plant 1:**

Roots	Stems	Leaves	Flowers

**Classification:**

**Plant 2:**

Roots	Stems	Leaves	Flowers

**Classification:**

**Plant 3:**

Roots	Stems	Leaves	Flowers

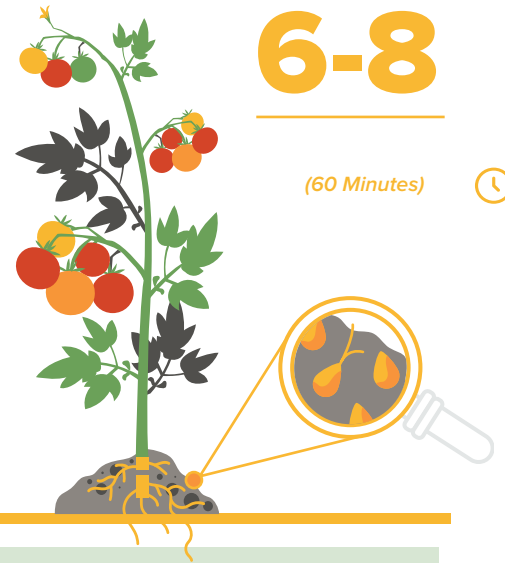
**Classification:**

**Plant 4:**

Roots	Stems	Leaves	Flowers

**Classification:**

**SUMMARY:** Write a summary statement or statements that explain how the evidence you gathered supports the claim for this investigation.



## Essential Question

## WHAT CAN I LEARN ABOUT SEEDS IN THE GARDEN?

### Learning Targets

- I can explain the role that seeds play in the life cycle of a plant.
- I can make predictions about how seeds are dispersed based on evidence I collect.
- I can defend a claim that adult plants transfer genetic information to their offspring.
- [\(MS-LS1.B - Growth and Development of Organisms: Plants\)](#)

Tell students:

Today you will be investigating seeds to find evidence of how the seed structures have adapted for successful dispersal.



### PREPARATION AND MATERIALS:



- Garden Journal
  - Variety of seeds (or seed pictures) gathered from the garden, surrounding environment, or purchased, including:
    - Fruit seeds
    - Nut seeds
    - Wind seeds (dandelions, cottonwood, maples)
    - Water seeds (not likely in the garden, but a sample might be a picture or video of seeds from plants living in or near water such as: mangrove, silver birch, willow, coconut; video available [here](#))
    - Fire seeds (pine cones)
    - Explosive seeds (beans, seeds, other pods; an example of explosive seeds can be found [here](#))
  - Magnifying glasses or microscopes
  - Beaker of water
  - Stuffed animal or furry animal fabric
  - Access to internet and devices
  - Group students into lab groups of four. Ensure students greet their lab partners by introducing themselves. Provide sentence stems as needed.
- Seed dispersal kits can be purchased from [www.carolina.com](http://www.carolina.com) or [wardsci.com](http://wardsci.com)



### SPROUT

(15-20 Minutes)



Use an attention signal to focus students.



Reference the Garden Journal for the essential question and learning targets.



Students will record definitions and respond to questions based on information provided in the video:

[Seed Dispersal: The Great Escape.](#)

Students will compare evidence with a partner and amend their notes.



Call on a variety of students and clarify any concepts or vocabulary.



## **SCIENCE INVESTIGATION**

 (30 Minutes)



- Students will investigate a variety of seeds and make observations and predictions about how the seed is dispersed based on its structure.
- They will record observations using words and sketches and make predictions about how that particular seed is dispersed.



## **CLOSURE/ASSESSMENT**

 (5-10 Minutes)



- Gather lab groups with attention signal.
- Allow a few minutes for students to compare data with other groups if time allows.
- Students will complete the CER frame in the Garden Journal.



**Essential Question**

**WHAT CAN I LEARN ABOUT SEEDS IN THE GARDEN?**



Vocabulary	Illustration/Example	Definition
<b>SEED</b>		
<b>DISPERSAL</b>		
What ways can seeds be dispersed?		
What do seeds need to survive?		
<p><b>PROCEDURE:</b></p> <ol style="list-style-type: none"> <li>1. Look at all the seeds available at your lab station.</li> <li>2. Select each seed and observe it. Create an illustration of each seed.</li> <li>3. Attempt three tests on each seed:               <ol style="list-style-type: none"> <li>a. Use air: Blow on the seed to see if and how far it will travel.</li> <li>b. Use water: Place the seed in a beaker of water to see if it will float.</li> <li>c. Use fur: Place the seed on the fur to determine if it sticks.</li> </ol> </li> <li>4. If none of the methods above seem correct, examine the seed structure further to make a hypothesis about how else the seed may be dispersed.</li> <li>6. Record evidence for any claims for seed dispersion.</li> <li>7. Clean lab station as directed by the teacher.</li> </ol>		
Seed 1. Record the name of the plant if possible:		
Description/Illustration	Type of Seed Dispersion	Evidence for Claim
Seed 2. Record the name of the plant if possible:		
Description/Illustration	Type of Seed Dispersion	Evidence for Claim



**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
SEEDS IN THE GARDEN?**



**Seed 3:** Record the name of the plant if possible:

Description/Illustration

Type of Seed Dispersion

Evidence for Claim

**Seed 4:** Record the name of the plant if possible:

Description/Illustration

Type of Seed Dispersion

Evidence for Claim

**Seed 5:** Record the name of the plant if possible:

Description/Illustration

Type of Seed Dispersion

Evidence for Claim

**SUMMARY:** CER - Use complete sentences.

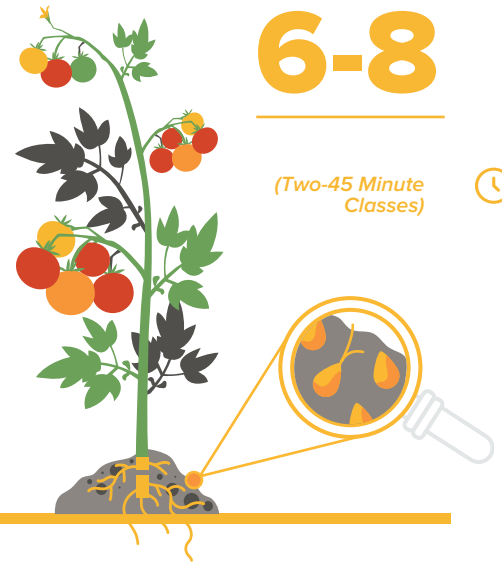
Write a claim about how plants use seed structures to ensure reproduction is successful.

Evidence 1:

Evidence 2:

Evidence 3:

Reasoning: Provide a reason that shows the evidence provided supports the claim.



## Essential Question

## HOW CAN SEEDS HELP ME BE HEALTHY?

### Learning Targets

- **I can** explain why seeds are an important part of a healthy diet.
- **I can** prepare seeds in a way that is healthy and delicious.
- **I can** prepare moderate portions that follow recommended serving sizes. ([NHES 7.5.1, 7.5.2](#))
- **I can** describe barriers that exist to accessing healthy food and/or making good choices about which foods to choose. ([NHES 1.8.7, 5.8.1](#))



If time and resources are barriers, you may make one of the recipes below as a whole class tasting activity.



### KITCHEN INVESTIGATION: BATTLE OF THE BARS

*\*This Kitchen Investigation contains tree nuts and other nuts. Ensure you are aware of allergy concerns with your students. One variation on the recipe has a nut-free/gluten-free option.*



### SPROUT

(15-20 Minutes)



- Gather attention of students using attention signal.
- With an elbow partner, ask students: What type of seeds do you or your family eat?
- Solicit answers, which should include seeds in fruits such as tomato/ cucumber, pumpkin seeds or sunflower seeds, nuts, and grain seeds like corn, rice, wheat, and beans.
- Tell students:

Today in the kitchen, teams will compete to make the healthiest, tastiest, and least expensive bar or ball from seeds.



- Several seed variations such as oats, chia, sunflower, pepitas, and flax, and cereals such as puffed rice or oat rings
- Variety of nuts: Peanuts, walnuts, pistachios, cashews
- One or more options of nut/seed butter: Peanut, almond, cashew, sunflower
- Other add-ins, such as chocolate chips, unsweetened coconut, dried fruits
- Sweeteners: Honey, maple syrup, sugar, stevia, etc.
- Salt, pepper, cinnamon, chili powder or other spices (optional)
- Simple baking materials (bowls, spoons, measuring cups/ spoons, baking sheet, parchment, glass or metal baking pan, plastic wrap/foil)
- Food processor or blender (optional) for making seedy/ protein balls
- Oven is ideal to cook bars; if no oven is available, bars can be refrigerated for 1 hour before serving instead



- Access to internet and student devices
- Calculators
- Tasting rubrics, four per kitchen
- Review Kitchen Norms
- Provide mentor recipes if you feel this is needed depending on the experience of the group:
  - [Super Seedy Granola Bars](#) (Minimalist Baker)
  - [Chocolate Oatmeal Energy Bars](#) (nut free; The Pretty Bee)
- Create kitchen groups of four students (group size may be determined by access to materials)
- Students will follow the procedure in their Garden Journals and document the steps

### **PLANNING** (30 Minutes)



- Students will complete the planning for this activity on the first day. If time is a constraint, classes may proceed to preparing the recipe provided and create a nutritional analysis based on the Cost Calculator Chart.
- Students need access to the internet for planning.

### **COOKING: BATTLE OF THE BARS**

*\*Tasting may need to wait if bars/balls need refrigeration.*

- Students will complete the preparation on the second day of this lab.
- When tasting, students should be aware of nuts and allergies.
- Students will complete a tasting rubric for each sample.

### **CLOSURE/ASSESSMENT** (10-15 Minutes)



- Students complete the summary individually or in pairs.



The summary in this activity presents challenges for students to consider and should be processed as part of a debrief using discussion prompts such as Whip Around or Four Heads Together. These questions will become part of the Gardeners Take Action lesson for this series.





**Essential  
Question**

**HOW CAN SEEDS HELP ME  
BE HEALTHY?**



**Day 1:**

1. Review the mentor recipe if provided.
2. Review the Cost Calculator Chart in The Garden Journal.
3. Determine five to seven ingredients you will use for your recipe. You must have:
  - a. At least one seed
  - b. At least one grain (oat or rice)
  - c. One sweetening agent
  - d. One binding ingredient
4. (Spices do not count as ingredients.)
5. Complete the additional nutrition information section using the resources provided on the Cost Calculator Chart.
5. With your group, determine the proportions of each ingredient you will need to create four servings (you will offer eight half-sized portions). This is your recipe!
6. Record recipe in the space below.
7. Calculate the cost and nutritional value of your recipe and record them.

**Day 2:**

1. Create 8 half-size portions. Four portions are for your group; four portions may be sampled by other students.
2. Select two to four other stations to sample from and complete a tasting rubric for each.
3. Clean the station with your group members.
4. Complete the reflection/summary in your Garden Journal.

**Recipe:**

**Cost per serving:**

Estimate the cost per serving of each ingredient by using the following formula:  
 Number of servings for each ingredient in the recipe X the cost of each serving =  
 Ex: 2 servings of almonds (½ cup) X \$0.40/serving = \$0.80 for the recipe







**Essential  
Question**

**HOW CAN SEEDS HELP ME  
BE HEALTHY?**



Product	Serving Size *estimated	Calories per Serving	Other Nutrients per Serving	Cost per Serving
Walnuts	1/4 cup	183		\$0.45
Pistachio	1/4 cup	156		\$0.39
Peanuts	1/4 cup	166		\$0.10
Almonds	1/4 cup	163		\$0.40
Chia Seeds	2 3/4 cup	137		\$0.28
Flax Seeds	1 Tbsp	55		\$0.15
Rolled Oats	1/2 cup	80		\$0.12
Puffed Rice	1 cup	56		\$0.15
Peanut Butter	2 Tbsp	193		\$0.15
Sunflower Butter	2 Tbsp	200		\$0.38
Raisins	1/4 cup	85		\$0.16
Chocolate Chips	1/8 cup	70		\$0.51

- For ingredients not included here try searching on:
- [Walmart](#) for cost per ounce.
- [USDA - FoodData Central](#) for nutrition information including calories, vitamins, minerals, sugar, and fat.

**?** TASTING RUBRIC



Criteria	Beginning (1)	Acceptable (2)	Recommended (3)	Award-Winning (4)
<b>NUTRITION VALUE</b>	Recipe has some elements of the chef's plate but also has some ingredients that are less healthy choices.	Recipe uses mostly healthy foods but does not include all elements of the chef's plate or they are not in the recommended portions.	Recipe uses ingredients that are healthy and it contains foods from the chef's plate in correct portions.	Recipe uses all healthy ingredients and the proportions are nearly the same as what is recommended on the chef's plate.
<b>TASTE AND PRESENTATION</b>	The recipe is good to try but not something I would choose again.	The recipe is good. I would eat it again, but it could be improved.	This recipe is something I would select again.	The recipe is delicious and presented well. I would recommend or make it for others.
<b>TOTALS</b>				



## Essential Question

## WHAT MUST I SHARE OR DO RELATED TO SEEDS IN THE GARDEN?

### Learning Targets

- **I can** evaluate the costs and benefits of eating a healthy diet. ([NHES 5.8.1, 5.8.2](#))
- **I can** identify possible barriers that prevent people from eating healthy diets that include seeds ([NHES 1.8.7](#))
- **I can** use what I know to inform someone how can use seeds or other plant parts as part of a healthy diet. ([NHES 8.8.1, 8.8.2](#); [CCSS ELA - SL8.1A-D, SL8.3, SL 8.4](#))



- Place the four summary questions on poster paper around the room.
- What did you learn about seeds as part of a healthy diet?
- What was challenging in this activity and/or for people to be able to use seeds in their diet?
- Were there any barriers to this lab for some members of the class?
- How does that play out in real life or with others you know?



- Divide the class into four groups. (You could also do eight groups and have them rotate in opposite directions to improve management.)
- Provide one marker to each group. One student will be the recorder at each station.
- Send each group to one poster area.
- Students will offer thoughts on the question in the summary. They may consult the Garden Journal if appropriate.
- Allow 1-2 minutes for each rotation.



### SPROUT

(10-15 Minutes)



- Gather the attention of students with an attention signal.
- Reference Garden Journals for this lesson.



If students did not do the Garden to Kitchen lab, skip the World Cafe Protocol and go to the Philosophical Chairs activity.

- Use a variation of Four Corners/ World Cafe to broaden the discussion from the Kitchen Summary.

If time allows, you could conclude this with a gallery walk. Alternatively, leave the posters up as a version of a solution station when preparing for the Philosophical Chairs activity.





- Tell students:
- Today you are going to engage in a debate with other students, but in a way that is informative and respectful. It is a game and the goal will be to convince others that your position is the best one for today. **The claim will be: Eating healthy is too expensive.**
- Determine if students have participated in Philosophical Chairs before to see how much instruction/facilitation will be needed. If this is the first time for the strategy, teachers may want to model how it works with a simple topic like “Cats are better pets than dogs.”
- If appropriate, you could show a model to students so they can see it in action.
  - [Edutopia Overview of Philosophical Chairs](#)
  - [Teaching Channel Example, 7 minutes](#)
  - [Walker Middle School Example, 6 minutes](#)

### Eating Healthy Is Affordable

- [The Price of Healthy Eating](#) (Harvard Magazine)
- [The Price We Pay for Eating Unhealthy](#) (Vancouver Health Coach)

### Eating Healthy Food Is Expensive

- [A High Price for Healthy Food](#) (New York Times)
- [The Price Difference Between Healthy Food & Fast Food](#) (SFGate)

- Have students read their assigned article and highlight information that supports or refutes the claim: eating healthy food is too expensive.
- Students should circle important words and place a bracket around words they do not understand.

Articles could be provided electronically to access via text to speech or they could be offered in advance.



- Students record evidence in their Garden Journal T-Charts.

### PHILOSOPHICAL CHAIRS:

*\*This may take longer if a demonstration is needed.*

Display and review the rules for Philosophical Chairs with all students:

- Be sure you understand the statement before deciding if you agree or disagree.
- Move to the line on the side of the argument you support and face the people across from you.
- Think before you speak and organize your thoughts.



## INVESTIGATION: (40 Minutes) GARDENERS TAKE ACTION



### PLANNING:

- (20 minutes)
- Divide students into pairs.
- Provide students with a copy of one article from each point of view (or another source you know). The group could also be subdivided into four and use a jigsaw method to save time.

- Philosophical Chairs Rules

Continued:

- Briefly summarize a previous speaker's point before starting your own.
  - Address the idea, not the person.
  - After your turn, wait until two others have spoken before speaking again.
  - Only one speaker is allowed at a time.
  - Every student should offer one thought.
  - You may switch sides at any time during the discussion and can switch more than one time.
  - Cite the source of the evidence using, "According to..."
- Ensure students have the Garden Journals with them turned to the T-Chart.
  - Begin the round by stating the claim again and allow students 1 minute to decide where they will line up.  
Claim: Eating healthy is too expensive.
  - Begin the discussion by calling on a volunteer from each side.

- Ensure all students participate.  
Tokens can be used as a way to mark participation. Students toss in their token when they have made a comment.
- Determine which side was more persuasive today and congratulate them on winning this round.  
Students can shake hands.

 **CLOSURE/ASSESSMENT**  (5-10 Minutes)



- Ask students to complete the summary in pairs or individually.
- Provide a homework assignment: Conduct an interview with a family member or other person. Ask them how they use seeds in their diets and offer ways to increase healthy choices by considering other seeds you know about.



**Essential  
Question**

**WHAT CAN I SHARE  
WITH OTHERS ABOUT THE  
IMPACT OF AND BARRIERS  
TO HEALTHY EATING?**

**Cost:** Something given up to gain something else.

Ex: The cost of a head of kale is \$2.

**Benefit:** Something gained through a decision.

Ex: Kale is among the most nutrient-dense foods available, providing many vitamins and minerals for very few calories.

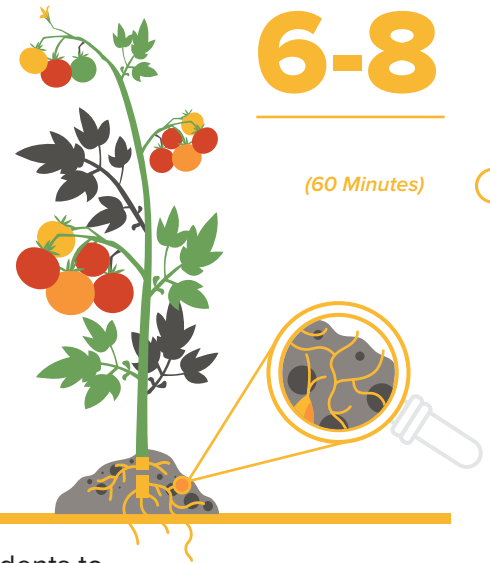
Use the texts to find reasons supporting both sides of this discussion.

**Healthy eating is too expensive.**

**Healthy eating is not too expensive.**

**SUMMARY:** Who in my family or neighborhood can I share this information with this week? What are the most important ideas for me to tell them? How does what I learned about seeds connect with the discussion about access to healthy food choices?





## Essential Question

## WHAT CAN I LEARN ABOUT ROOTS IN THE GARDEN?

### Learning Targets

- **I can** explain the role roots play in the lifecycle of a plant.
- **I can** use observations to make predictions about what types of roots plants in the garden have.
- **I can** make predictions about how root structures are related to the needs of plants. (NGSS MS-LS1-4, 5)



### SPROUT

(10-15 Minutes)



- Organize students into pairs or triads.



- Reference Garden Journal from the seeds lesson.



- Give students a review discussion prompt:
  - What did you learn about seeds, classifications, and a healthy diet?
  - Select a discussion protocol to help students generate/activate background knowledge:
    - Musical Shares
    - Think, Pair, Share
    - Give One, Get One, Move Along
    - Popcorn, Pass It On
  - After several rounds, solicit three to five responses from students selected at random.
- Direct students to their Garden Journals on roots.

- With their partners, ask students to brainstorm background knowledge about roots.



### INVESTIGATION

#### READING TO LEARN: TEXT MARKING



- Have students locate The Garden Thymes: Roots Part A in their Garden Journals—and distribute the text.



- Provide students with a highlighter or pen/pencil to mark the text where they locate information that:

- Clarifies the vocabulary with an illustration or example
- Describes how roots are structured similarly or differently
- Explains how roots have a job that is important to the growth of the plant



- Have students compare notes with a partner and add to their notes.



### GARDEN INVESTIGATION AND HARVESTING

#### INVESTIGATION:



- Students can be grouped into pairs, triads, or explore independently for this investigation.



- Students will need their Garden Journals to reference classification traits and to record data.



- Explain that students will be looking for evidence in the garden that could be used to determine whether a plant has a taproot or fibrous root system.
- Students will reference data gathered in the garden activity with seeds. From that, students will draw a connection to the monocot/dicot investigation. Students should also look to other characteristics that might explain why a plant needs



one type of support and transport structure.

- Students record data in their Garden Journals. Data may include words, numbers, and/or sketches.

#### **HARVESTING:**



- Provide students with Harvest Cards.
- Students will harvest:



- For Nutrition Lesson: Whole Grains: Kale, parsley, garlic
- For Roots: Kitchen Extension:
  - » Roots: Jicama, parsnips, carrots, and turnips
  - » Other seasonings/flavorings: Herbs, garlic, onions, chives, etc.



#### **CLOSURE/ASSESSMENT** ⌚ (10-15 Minutes)



- Students should check predictions against the actual evidence once plants are harvested.
- Students will work in pairs or individually to complete summary in the Garden Journal.



**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
ROOTS IN THE GARDEN?**

- I can explain the role roots play in the life cycle of a plant.
- I can use observations to make predictions about what types of roots plants in the garden have.
- I can make predictions about how root structures are related to the needs of plants.

What do you already know about roots?

Vocabulary	Illustration/Example	Definition
<b>ROOTS</b>		The part of the plant that provides an anchor and takes up water and nutrients that the plant needs to grow.
<b>TAPROOTS TAP-ROOTS</b>		A roots system where there is one larger root and many other smaller roots.
<b>FIBROUS ROOTS FIB-ROUS</b>		A root system where there are many roots that are the same or similar size.
<b>OSMOSIS OS-MO-SIS</b>		The process by which molecules of a solvent pass through a semipermeable membrane (some cells can pass through; others cannot) from an area of higher concentration to lower concentration.
What structures do roots have that help them support the <b>growth</b> of a plant?		
What roots can be eaten as part of a healthy diet?		





**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
ROOTS IN THE GARDEN?**



What evidence can I gather in the garden to determine if a plant has a taproot or fibrous root system?

**Plant 1:**

Type of seed:

Other evidence that would help determine the root structure:

Classification prediction:

**Plant 2:**

Type of seed:

Other evidence that would help determine the root structure:

Classification prediction:



Plant 3:

Type of seed:

Other evidence that would help determine the root structure:

Classification prediction:

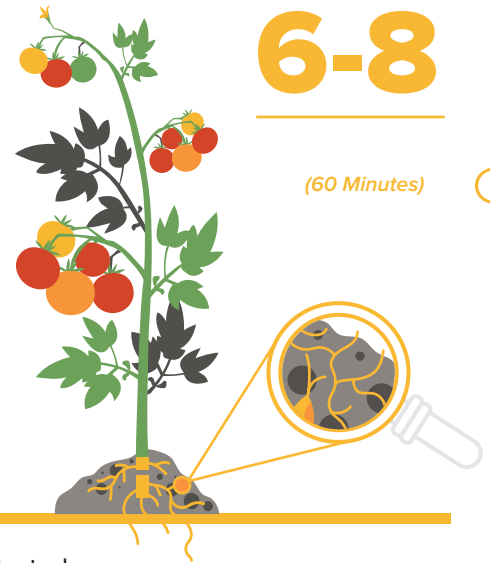
Plant 4:

Type of seed:

Other evidence that would help determine the root structure:

Classification prediction:

**SUMMARY:** How do the root structures of plants relate to other parts of the plant?



## Essential Question

## WHAT CAN I LEARN ABOUT ROOTS IN THE GARDEN?

### Learning Targets

- **I can** explain how plants use their roots to support growth using osmosis. ([NGSS MS-LS1-7](#))
- **I can** use observations to support a claim about how roots provide nutrients to plants. ([NGSS MS-LS1-7](#))
- **I can** explain how roots can be a source of nutrients for humans. ([NHES 7.8.2](#))



### PREPARATION & MATERIALS

(5-7 Minutes)



- Set up lab groups in which each group has:
  - 1 potato
  - 3 beakers (100 ml)
  - 1 metric ruler
  - 1 scale
  - 1 knife for slices or cork borer for tubes in the lab
  - 4 Tbsp salt
- Organize lab groups of two to three students.



### SPROUT

(5-7 Minutes)



- Ask students to review their Garden Journals to define the function of roots. Students can volunteer or turn and talk.



- Show a video to demonstrate how osmosis works:



- [Root Osmosis](#)



### LAB INVESTIGATION

#### READING TO LEARN: TEXT MARKING



- Group students into lab groups of three to five students.
- Ensure each group conducts introductions with sentence stems: "Hello, I am \_\_\_\_\_. I am glad to be working with you today in the lab."



- Allow groups to assume lab roles: materials manager, data manager (keeps the master data template), timekeeper, procedure manager, etc.
- Materials manager should be called to get materials for the lab as listed above. Data manager will measure results. Procedure manager will ensure the lab group is following the protocol.
- There is a period of 20 minutes during which the osmosis process occurs. Students could use this time to further investigate osmosis through additional videos or text material. [This video](#) helps explain why the variable of salt affects the osmosis process in this demonstration.



### CLOSURE/ASSESSMENT

(5-10 Minutes)



- Use remaining time to reinforce osmosis to students and how it affects the water level in diagram. There could be confusion about diffusion vs. osmosis.
- Once the lab is completed, have students work independently or in pairs to complete the summary CER.



**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
ROOTS IN THE GARDEN?**

**PROCEDURE:**

1. Pour 100 ml water into each beaker.
2. Add 1 Tbsp Of salt to one beaker and 3 Tbsp of salt into another beaker. One beaker contains no added salt.
3. Slice potatoes into three even slices. Cut each slice into squares that are all the same dimensions. Cut squares in half. (If using a cork borer, do the same procedure to make two equal-sized tubes for each beaker.)
4. Add both halves of each slice to each beaker. Each beaker will have two equal-sized potato parts.
5. All potatoes sit in solution for 20 minutes.
6. Record data for each potato in the data chart below.
7. After data is recorded, discard potatoes and solution.

**Data:**

Beaker 1: No Salt	Beaker 2: 1 Tbsp Salt	Beaker 3: 3 Tbsp Salt
Color:	Color:	Color:
Measurements Length: Width: Weight:	Measurements Length: Width: Weight:	Measurements Length: Width: Weight:
Description: Turgid (stiff/crisp) Flaccid (puffy/soft)	Description: Turgid (stiff/crisp) Flaccid (puffy/soft)	Description: Turgid (stiff/crisp) Flaccid (puffy/soft)
Other Observations:	Other Observations:	Other Observations:

In the space provided, or on separate paper create a data table to record the results of the experiment:





**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
ROOTS IN THE GARDEN?**



How does your data demonstrate the concept of osmosis?

How does the osmosis process help plants get what they need?

Making Predictions: Based on what you know about how roots function, explain what humans might gain from eating roots and what we might need to be cautious about when eating roots.

**SUMMARY:** How do the root structures of plants relate to other parts of the plant? Use the CER format to support a claim based on the data collected above and other observations you have made.

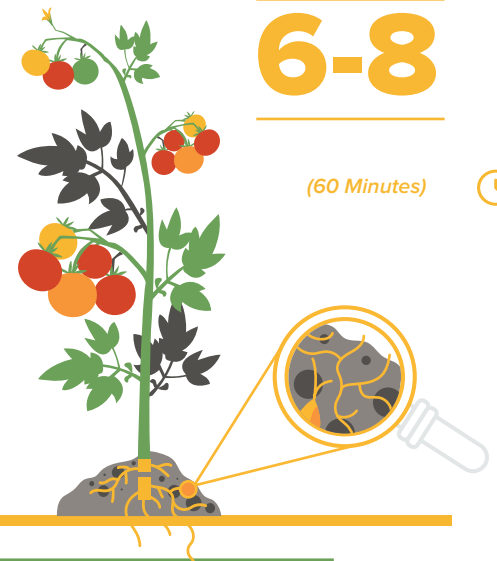
**Claim:**

**Evidence 1:**

**Evidence 2:**

**Evidence 3:**

**Reasoning:**



## Essential Question

## HOW CAN ROOTS HELP ME BE HEALTHY?

### Learning Targets

- **I can** explain why roots are an important part of a healthy diet. [\(NHES 7.8.2\)](#)
- **I can** prepare root vegetables in a way that is healthy and delicious. [\(NHES 5.8.6, 7.8.2, HBO 1\)](#)



This a good time to share that in the kitchen all of those examples are called root vegetables. Scientifically speaking, the potato, sweet potato, and onion are actually stems that grow underground. The others are true taproots we can eat, and that are good for us because they take in nutrients and store food for the plant that we benefit from.

- Tell students:
- Today we will be making samples of root vegetable fries and deciding which ones are the most healthy and tasty.



### SPROUT (5-7 Minutes)



- Gather attention of students using attention signal.
- With an elbow partner, ask students why most of the roots we eat are taproots?
- Solicit various answers which should include that the function of taproots is to store nutrients for the plant in addition to taking in nutrients from the ground.
- Ask students:
  - What is a root vegetable?
- Students will give various answers, such as carrot, beet, radish, rutabaga, parsnip, and jicama. Students will also give answers such as potato, sweet potato, and onion.



### PREPARATION & MATERIALS (5-7 Minutes)



- Gather a variety of harvested root vegetables (jicama, parsnips, carrots, and turnips) and a variety of other garden items such as herbs, garlic, onions, and chives.
- One small bottle of olive oil, divided for kitchen groups.
- Have as many sets of Nutrition Cards out as cooking stations.
- Oven is needed for this recipe.
- Assemble other kitchen utensils as directed for the recipe.
- Use a knife appropriate for cutting root vegetables, herbs, and stems. If knife skills are new to students, share this video in preparation: [Basic Knife Skills](#).
- Sample cups/utensils if appropriate.
- Paper towel, parchment, foil.
- Review recipes to ensure you have enough kitchen utensils.
- Recipe for Root Fries is in the Garden Journal Procedure for this lesson.
- Form teams of four students.





## **KITCHEN INVESTIGATION** (45 Minutes Including Sampling)



- Assign different root vegetables to different kitchen groups.
- Students will follow procedure noted in the Garden Journal.
- Ensure students wash hands, vegetables, and preparation area.
- When selecting ingredients, students should also select a Nutrition Card.
- Teams will have 35 minutes to prepare the recipe as directed.
- Students should prepare eight tasting samples. Four are for the group, the others for classmates to sample.

Even when doing a whole class recipe, teams could be challenged to add one seasoning/herb as a way to experiment or differentiate and still offer a tasting.



- Using the cooking rubric, students will sample a recipe offered by other groups and rate the recipe for the team.
- Students will clean their prep area and cooking materials.

## **CLOSURE/ASSESSMENT** (5 Minutes)



- Students should complete the summary individually or in pairs.

- Collect rubrics.



- If time allows, offer a discussion prompt with kitchen groups about what they can commit to this week to maintain a healthy diet with vegetables.



Essential  
Question

HOW CAN ROOTS HELP ME  
BE HEALTHY?



KITCHEN  
INVESTIGATION

Preparing roots I like  
to eat.

RECIPE:

4 cups of root vegetable straws (sliced evenly)  
1-2 tablespoons of olive oil  
Pinch of salt/pepper  
Other seasonings of your choosing (rosemary, basil, garlic, onion, thyme, chili pepper, oregano)

PROCEDURE:

1. Wash hands and ensure cooking area is clean.
2. Preheat oven to 425 degrees.
3. Line a baking sheet with foil or parchment.
4. Peel the root vegetable with a vegetable peeler or knife.
5. Slice vegetable into half-inch square sticks.
6. Use a paper towel to blot moisture off of vegetables.
7. Place vegetable straws in a bowl and toss with 1 Tbsp of olive oil.
8. Add salt, pepper, and other seasonings as available and toss again.
9. Spread vegetable straws onto baking sheet so there is only one layer.
10. Bake for 20-25 minutes at 425 degrees.
11. Remove from oven.
12. Using a spatula and oven mitt, transfer vegetable sticks to a plate lined with paper towels.
13. Blot off excess oil.
14. Serve topped with chives or other herbs.
15. Prepare tasting samples for the class (four for the group, four for others).
16. Place Nutrition Card for ingredients out with sample as available.
17. Using the cooking rubric, sample one or two recipes offered by other groups and rate the recipe for the team.
18. Clean the prep area and cooking materials.

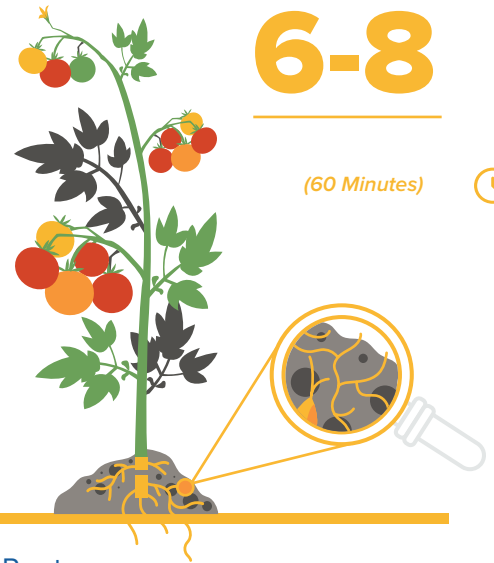
SUMMARY: What can I share with someone I care about to help them make root vegetables a part of their healthy diet?



**🔍 TASTING RUBRIC:**



Criteria	Beginning (1)	Acceptable (2)	Recommended (3)	Award-Winning (4)
<b>NUTRITION VALUE</b>	Recipe has some elements of the chef's plate but also has some ingredients that are less healthy choices.	Recipe uses mostly healthy foods but does not include all elements of the chef's plate or they are not in the recommended portions.	Recipe uses ingredients that are healthy and it contains foods from the chef's plate in correct portions.	Recipe uses all healthy ingredients and the proportions are nearly the same as what is recommended on the chef's plate.
<b>TASTE AND PRESENTATION</b>	The recipe was good to try but not something I would choose again.	The recipe is good. I would eat it again, but it could be improved.	This recipe is something I would select again.	The recipe is delicious and presented well. I would recommend or make it for others.
<b>TOTALS</b>				



## Essential Question

## WHAT CAN I SHARE ABOUT ROOTS IN THE GARDEN?

### Learning Targets

- **I can** explain why roots are an important part of a healthy diet. ([NHES 7.8.2](#))
- **I can** describe how root vegetables are used by people from various cultural backgrounds, including my own.
- **I can** use primary and secondary sources to draw conclusions about how food is related to culture. ([CCSS ELA RI 6.1, 6.2, 6.7; Social Studies C3: D1.Geo.5.6-8, D2.Geo.2.6-8, D2.Geo.4.6-8.](#))

- [Come Out to the Farm: Root Vegetables](#)



- Tell students:
- Roots are part of food systems all over the world. Today you will explore how people around the world produce and eat roots as part of their diets.



- Students will record information in their Garden Journals.



### INVESTIGATION

(40 Minutes)



- Divide students into pairs or triads.
- Ask students to review [this interactive map](#) and select two or three regions to investigate.
- Review how interactive maps work. In the diet model, students can hover over the outer ring to see what plants are primarily grown and consumed in that region. When they select the line connecting the regions, they also see where the crop is exported to, which provides insights into the diets in that location.
- Using the Garden Journal, students will record data they find about where various roots are eaten. The outer ring of the diet map is clickable and will change based on what is selected along the top row: calories, fat, protein, or food weight.



### SPROUT (10-15 Minutes)



- Gather the attention of students with an attention signal.



- Using an elbow partner, ask students:



- What types of roots does your family eat?



- Call on students to volunteer and make a list.



- Share one or more of the following resources with students:

- [A Guide to the Roots and Tubers \[i.e., stems that grow underground\] You Didn't Know You Loved](#)
- [Roots from A-Z: 26 Things to Know](#)



### CLOSURE/ASSESSMENT

(10-15 Minutes)



- Ask students to complete the summary in pairs or individually.
- Provide a homework assignment: Conduct an interview with a family member or other person. Ask them about their

cultural or ethnic heritage and what type of roots are part of the diet within a group they identify with. Students can share the Garden Journal page to see if there would be a new root or root recipe they could prepare together.

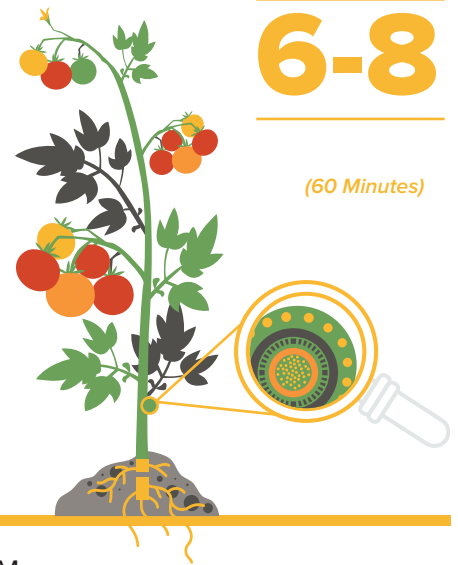


**Essential  
Question**

**WHAT CAN I SHARE ABOUT  
ROOTS IN THE GARDEN?**



<p><b>Region 1:</b></p> <hr/> <p>What roots are eaten as a part of the diet?</p>	
<p><b>Region 2:</b></p> <hr/> <p>What roots are eaten as a part of the diet?</p>	
<p><b>Region 3:</b></p> <hr/> <p>What roots are eaten as a part of the diet?</p>	
<p>How can those roots be used to make food? Select one or two roots and locate a recipe from an online search or database. Provide a link or print the recipe.</p>	
<p><b>SUMMARY:</b> What can I share with someone I care about to help them make root vegetables a part of their healthy diet?</p>	



## Essential Question

## WHAT CAN I LEARN ABOUT STEMS IN THE GARDEN?

### Learning Targets

- **I can** explain the role stems play in the life cycle of a plant. ([NGSS LS1.A](#))
- **I can** use observations to classify a plant's stem system. ([Scientific Practice](#))
- **I can** make predictions about how stem structures are related to the needs of plants. ([Scientific Practice](#))
- **I can** identify variations as adaptations that help the plant survive. ([NGSS MS-LS1-5](#))
- **I can** identify stems we can eat as part of a healthy diet. ([HBO 1](#))

- Give One, Get One, Move Along



- Popcorn, Pass It On
- After several rounds, solicit three to five responses from students selected at random.
- Direct students to the Garden Journals.
- With their partners, ask students to brainstorm background knowledge.



### INVESTIGATION

**READING TO LEARN: TEXT MARKING** (15-20 Minutes)



- Have students locate The Garden Thymes: Stems.
- Provide students with a highlighter or pen/pencil to mark the text where they find information that:
  - Clarifies the vocabulary with an illustration or example
  - Describes how stems are structured similarly or differently depending on the needs of the plant
  - Gives examples of how stems have a job that is important to the growth of the plant
  - Describes a variety of stems that can be eaten as part of a healthy diet
- With a partner or triad, students can share examples from the text and add notes.



### SPROUT

(10 Minutes)



- Organize students into pairs or triads.
- Provide the Garden Journals.
- Give students a discussion prompt:



- What have we learned about plants and plant parts so far?
- Select a discussion protocol to help students generate/activate background knowledge:
  - Musical Shares
  - Think, Pair, Share



### GARDEN INVESTIGATION

(35 Minutes)

- Students can work individually, in pairs, or in triads.
- Use Garden Journals to reference classification traits and to record data.

- Use Garden Journals to reference classification traits and to record data.

## **HARVESTING**



- Students should harvest the following:
  - For Kitchen Extension: Onions, garlic, potatoes, carrots, celery, and asparagus
  - For Healthy Hydration Lesson: Various herbs and edible flowers

## **CLOSURE/ASSESSMENT** (10-15 Minutes)



- Have students find a partner different from their garden partner.
- Using Give One, Get One, students will take turns giving one example for each type of stem until they find at least one other student that has reached the same conclusion, but who was not in their garden group. Do several rounds until all students have found at least one person to confirm their conclusion.



- Remind students that when a scientist makes a conclusion from the evidence, the conclusion can be strengthened by corroborating the evidence gathered by other scientists.



- Students should complete the summary statements in their journals, independently or with a partner as determined by the teacher.



- Collect Garden Journals and review summaries.





**Essential Question**

**WHAT CAN I LEARN ABOUT STEMS IN THE GARDEN?**



• What do you already know about stems?

Vocabulary	Illustration/Example	Definition
<b>STEM</b>		The part of a plant that transports water, nutrients, and food to the entire plant.
<b>XYLEM (XY-LEM)</b>		Plant tissue that moves water and nutrients from the roots to the leaves.
<b>PHLOEM (PHLO-EM)</b>		Plant tissue that moves food from the leaves to the rest of the plant.
<b>CAMBIUM</b>		Cells that make new xylem/phloem as the plant grows.
<b>EPIDERMIS</b>		Exterior of the stem that provides protection and minimizes water loss.
<b>AERIAL STEMS</b>		Stems that grow above the ground.
<b>SUBAERIAL STEMS</b>		Stems that grow across or parallel to the ground (runners and suckers).
<b>UNDERGROUND STEMS</b> <ul style="list-style-type: none"> <li>• Rhizomes</li> <li>• Tubers</li> <li>• Bulbs</li> </ul>		Stems that grow below the surface and can sometimes be confused with roots.
What structures do stems have that help them support the growth of a plant?		





<p><b>Plant 3:</b></p>	<p>Observation: Describe or illustrate the stem system in this plant.</p>         <p>Classification: What type of stem system does this plant have?</p>
<p><b>Additional Evidence:</b></p>	
<p><b>SUMMARY:</b> How do the stem structures of plants promote their growth? How can stems become part of a healthy diet?</p>	



## Essential Question

## WHAT CAN I LEARN ABOUT STEMS IN THE GARDEN?

### Learning Targets

- **I can** explain the role stems play in the life cycle of a plant. ([MS-LS1A and LS1B](#))
- **I can** use observations to describe how plant stem modifications support the life of all and the reproduction of some plants. ([MS-LS1A and LS1B](#))
- **I can** create a model of how stems function to support plants. ([Scientific Practice](#))
- **I can** identify stems we can eat as part of a healthy diet. ([HBO 1](#))

concepts. Use a circled question mark to indicate ideas or concepts the student is unsure about.



- Pose the question for this investigation:

How do stem structures support the life of a plant? Why are there variations in stem structures (stem modifications)?



- Tell students that today they will be creating models that demonstrate the function and modifications of stems present in the garden and surrounding landscape.



### PREPARATION & MATERIALS

- Gather sample stems from the harvest if possible so a real plant sample is available to observe during this activity.
- Gather a variety of materials that would help students create stem models:
  - Empty paper towel/toilet paper tubes
  - Straws of various diameters
  - Coffee stir sticks
  - Wooden dowels
  - Stuffing material such as tissue
  - Pipe cleaners
  - Yarn
  - Card stock
  - Rubber bands/tape/glue
- Devices that can access the internet to research specific plants



### SPROUT (5-10 Minutes)



- Gather attention of the class using attention signal: Real Food/Grows Here.



- Guide students to their Garden Journals to review data collected in the Garden Investigation.



- With a partner, have students review the notes and amend their own notes after collaboration. Add new ideas, facts, observations in a different color. Use a highlighter to emphasize important points or

- Garden Journals
- Magnifying glasses or microscope
- Access to a stem tutorial on modifications as an additional resource: [Stem - Modification](#) (Tutorials Point)
- Students should work in lab groups of four (2 pairs).
- Ensure lab members introduce themselves using sentence stems if needed.



## LAB INVESTIGATION

(30 Minutes)



- Lab groups will choose two plants (one for each pair) growing in the garden that have different stem structures, and the groups will use a real sample of that plant as the inspiration.
- Students will observe the stem and stem modifications and add to notes from the garden observation.
- Take a cross section of the stem to identify the stem parts.
- Conduct a search to find images of the plant to be modeled to ensure proper identification and classification before constructing the model.
- Complete construction of the model as instructed in the Garden Journal and in the Stem Model Checklist.
- Clean up lab stations. Compost any plant parts or discard.



## CLOSURE/ASSESSMENT (15 Minutes)



- To allow for deeper processing of stem structures and modifications, conduct an abbreviated version of a Fish Bowl or Inner Circle/Outer Circle activity.

- Combine two lab groups, but keep partners together so there can be an inner circle/outer circle.



- One partner will serve as the spokesperson, the other as a coach.



- The four students in the inner circle will provide a one-minute explanation of their model to the group.

- The four students on the outside are considering affirmations and extensions. Affirmations are statements that affirm something another group created in their model. Extensions are suggestions that could help the model be more effective, accurate, or complete.

- One-minute conference: Lab partners confer about affirmations and extensions.

- Switch roles. The four students on the outside will move to the inside and each student will offer one affirmation and one extension based on what was presented.

- Students should thank their classmates at the conclusion of the activity.

- Complete summary in the Garden Journal.



**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
STEMS IN THE GARDEN?**

**INVESTIGATION VOCABULARY:**

- Stem
- Vascular bundle (xylem/phloem)
- Cambium
- Epidermis
- Stem modifications (runners, suckers, rhizomes, tubers, bulbs, thorns)

**PROCEDURE:**

**Phase 1 (10 minutes)**

- Select two plants growing in or near the garden as samples for the investigation. Four-person lab groups will work in pairs to start.
- Make observations about the stem's exterior parts and modifications.
- Make a cross section of the stem to view its interior structures.
- Use a microscope or magnifying glass to further investigate the interior structures in the stem.
- Access an illustration or diagram of that plant online to ensure proper identification of stem parts.
- Create a diagram of the stem parts and modifications with labels.

**PROCEDURE:**

**Phase 2 (20 minutes)**

- Select two plants growing in or near the garden as samples for the investigation. Four-person lab groups will work in pairs to start.
- Make observations about the stem's exterior parts and modifications.
- Make a cross section of the stem to view its interior structures.
- Use a microscope or magnifying glass to further investigate the interior structures in the stem.
- Access an illustration or diagram of that plant online to ensure proper identification of stem parts.
- Create a diagram of the stem parts and modifications with labels.

**Diagram of Stem  
Sample with Labels:**

Xylem, phloem, cambium, epidermis, stem modifications, other observed elements

**Exterior:**

**Interior:**





<b>Diagram of Stem Sample with Labels:</b> Xylem, phloem, cambium, epidermis, stem modifications, other observed elements	<b>Exterior:</b>	<b>Interior:</b>
<b>Affirmation/ Extension 1</b>	<b>Affirmation</b>	<b>Extension</b>
<b>Affirmation/ Extension 2</b>	<b>Affirmation</b>	<b>Extension</b>
<b>SUMMARY/ANALYSIS:</b> Explain various ways that stems work to support the growth and reproduction of a plant.		



## Essential Question

## HOW CAN STEMS HELP ME BE HEALTHY?

### Learning Targets

- **I can** describe how stems are part of a healthy diet. ([HBO 3](#))
  - **I can** prepare a healthy snack using a variety of stems. ([HBO 2,3](#), [HE 1.8.2](#))
  - **I can** demonstrate how to prepare food safely. ([HBO 10](#))
  - **I can** demonstrate how to make healthy serving sizes of foods we eat. ([HBO 10](#))
  - **I can** explain how a food we made is similar or different from foods my family eats. ([NHES 2.8.1](#))
  - **I can** show how I will eat healthy foods this week and/or help someone I care about do so. ([NHES 7.8.2](#), [8.8.2](#))
- Remind students that some stems are edible and can provide delicious and nutritious choices for people.
  - Ask students to make a prediction about which type of stems have more calories or more nutrients and explain why. (Student responses might note underground stems are going to be more calorically dense because they also store food for the plant.)
  - Let students know they are going to make recipes with stems today.



### SPROUT (5-10 Minutes)



- Gather attention of students using attention signal.
- With an elbow partner, ask students to name some stems people eat or ones they eat in their family. Solicit answers from a variety of students and make a list on the board/chart paper.
- Ask students which stems grow above ground and which ones grow below ground.



### PREPARATION & MATERIALS

(40 Minutes)

- Form teams of four students.
- You will need a variety of stems and herbs from the garden and other ingredients as determined by the selected recipe(s).
- Have as many sets of Nutrition Cards out as cooking stations.
- A hot plate may be needed for some recipes.
- Assemble other kitchen utensils as directed for the recipe.
- Sample cups/utensils if appropriate.



- If concerns exist around students slicing the vegetables, they can be sliced ahead of time. Likewise, if the vegetables need to be boiled, that can be done ahead of time.
- Review recipes to ensure you have enough kitchen utensils.
- Print recipes for student groups to select from or one the whole class can make:
  - [Raw Rhubarb Compote](#) (Clean Eating) \*Rhubarb leaves cannot be eaten and should be removed prior to offering rhubarb to students.
  - [Strawberry-Rhubarb Salad with Mint and Hazelnuts](#) (Bon Appetit) \*Note nut allergies
  - [Clumpy Granola with Stewed Rhubarb/Honey Roasted Rhubarb with Power Greens](#) (Shape)
  - [Sautéed Garlic Asparagus](#) (All Recipes)
  - [Sautéed Sweet Potatoes and Spinach](#) (Martha Stewart)



## KITCHEN INVESTIGATION ⌚ (35-45 Minutes)

- Students wash hands and prep area as instructed for safe food handling.
- When selecting ingredients, students should also select a Nutrition Card.
- Teams will have 20-30 minutes to prepare the recipe as directed.
- Students should prepare eight tasting samples for the class if appropriate, four samples for the group and four for other students.
- Using the cooking rubric, teams should sample the recipe offered by all groups and rate the recipe for the team.
- Students will clean their prep areas and cooking materials.



## CLOSURE/ASSESSMENT ⌚ (20 Minutes)



- At the conclusion of the lab, ask students to discuss the following prompt with a partner (see Instructional Strategies and Protocol Resource).
  - How can food be an important part of our culture?
  - How can I use what I learned today to eat healthy options this week?



- Individually or with a partner, have students complete their Garden Journals.



- Collect Garden Journals.



Essential  
Question

HOW CAN STEMS HELP  
ME BE HEALTHY?

**PROCEDURE:**

- Wash hands and prep area as instructed for safe food handling. Select
- ingredients based on the recipe and Nutrition Cards for as many ingredients as possible.
- You will have 20-30 minutes to prepare the recipe as directed.
- Prepare eight tasting samples for the class if appropriate. Four will be sampled by the group and four are for other classmates.
- Use the tasting rubric to rate all items sampled.
- Clean prep area and cooking materials.

What are the key ingredients of the recipe we chose?

What health benefits are part of this recipe?  
**\*Nutrition Cards**

What do I like about this recipe?

What could be improved in this recipe?

What did I learn from the other kitchen groups?

How are the recipes I tried similar or different from those I eat at home?

**SUMMARY:** Using your experience in the lab and/or kitchen, describe ways that you can eat stems to promote health for you and/or your family.

# TASTING RUBRIC

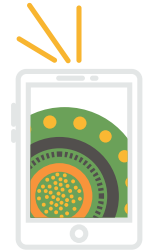


Criteria	Beginning (1)	Acceptable (2)	Recommended (3)	Award-Winning (4)
<b>NUTRITION VALUE</b>	Recipe has some elements of the chef's plate but also has some ingredients that are less healthy choices.	Recipe uses mostly healthy foods but does not include all elements of the chef's plate or they are not in the recommended portions.	Recipe uses ingredients that are healthy and it contains foods from the chef's plate in correct portions.	Recipe uses all healthy ingredients and the proportions are nearly the same as what is recommended on the chef's plate.
<b>TASTE AND PRESENTATION</b>	The recipe was good to try but not something I would choose again.	The recipe is good. I would eat it again, but it could be improved.	This recipe is something I would select again.	The recipe is delicious and presented well. I would recommend or make it for others.
<b>TOTALS</b>				



## Essential Question

## HOW CAN I SHARE WHAT I LEARNED ABOUT STEMS?



## Learning Targets

- **I can** write to inform about stem structures, functions, and modifications by comparing/contrasting two different plants.
  - **I can** explain various edible stems and describe how they can be consumed.
  - **I can** organize my ideas into categories or sections that include transitions.
  - **I can** use headings, illustrations, or other strategies to make it easy and fun to read.
  - **I can** use facts, quotes, definitions, and details so people learn about roots.
  - **I can** write concisely, clearly, and in a formal tone.
  - **I can** write a conclusion for my piece so people know what to do next.
  - **I can** create a piece that meets publication criteria, including a bibliography. ([ELA - Writing 6-8.2 A-F, 6-8.7.7, 6-7.7.8, 6-8.7.9](#))
- informational texts that are available, particularly newspapers and magazines.
  - With a partner or triad, have students review the samples and ask them: What do you like about how the author presented this information? What makes the information interesting and easy to understand? Answers should refer to text features such as headings, diagrams, illustrations, sections, and bold text.
  - Allow students the option to consider what structure or layout they like best and share why.
  - Tell students they will soon begin an informational writing piece using structures of a news or magazine article to compare two plants from the garden, showing how their stem structures are similar (compare) and different (contrast). Some submissions could go into *Our Food Chronicles*.



### SPROUT (15 Minutes)



- Call student attention with an attention signal: Real Food/Grows Here or other.
- Provide students with samples of



### INVESTIGATION: (60-100 Minutes)



#### PLANNING: (20 Minutes)

- Guide students to the Garden Journal: Stems - Gardeners Take Action.
- Review the elements of the organizer model provided, ensuring students understand all of the sections that need

to be completed.

- Have students review their sources of information for this piece. Students could highlight material they wish to include rather than rewriting it during the planning phase.
- Students will determine the topic sentence or provide one based on the needs of the class and available time. Ex: Stems are vital to the growth of all plants, but some plants have developed modifications that best meet the plant's needs.
- If time is a constraint, the graphic organizer could serve as a quick write-up or one-pager and be sufficient to conclude the lesson series.

*\* The remaining parts of this lesson extend into the full writing process and allow students to reach the level of the CCSS - ELA standard. It is recommended that all writing be archived. Students can submit written products to a classroom collection called Our Food Chronicles, which is a locally created archive that can be built to showcase all of the learning that has come from the garden. Teachers can think broadly about what the Chronicle should look like based on available resources and technology. The teacher and class should determine the criteria needed to be considered "publish-ready" for any writing project and for submission to Our Food Chronicles.*

#### **DRAFTING:** ⌚ (20 Minutes)

- Review the Writer's Checklist for this task with the students and ensure they have access to it before beginning to write.
- Students will use their graphic organizers to create a short

informational piece about stems.

- Ideally students could use a publishing program that allows for columns, images, and text boxes so they can reach the level in the standard.
- Allow time for students to complete the task, referring to the Writer's Checklist and the Our Food Chronicles criteria for submission.

#### **REVISING:** ⌚ (10 Minutes)

- Provide students with time to make revisions to their work and cross-check to the Writer's Checklist and make edits.

#### **PUBLISHING:** ⌚ (50 Minutes)

- Group students into partners for a peer feedback opportunity.
- Students will use Praise, Question, Suggest to offer feedback on the story thus far. Partner A begins and Partner B listens and offers feedback. Then they switch roles.
- Allow remaining time for students to create a publish-ready piece. Ensure students have their Writer's Checklists at hand.

#### **CLOSURE/ASSESSMENT** ⌚ (5 Minutes)

- Collect student projects or establish a due date for projects if more time is permitted.
- Determine the process and timeline to submit to *Our Food Chronicles* if appropriate.



**Essential  
Question**

**HOW CAN I SHARE WHAT I  
LEARNED ABOUT STEMS?**



What are the structures that support Plant A?

What are the structures that support Plant B?

Topic Sentence or Thesis

Concluding Sentence

What vocabulary must be defined for the reader? Is there a way to visually support them?

Categories and Headings that will make this piece most clear and concise.

**SUMMARY/ANALYSIS:** What do you want people to do after learning about the function of stems for plants and people?



### WRITER'S CHECKLIST: INFORMATIONAL WRITING

#### My Writing:

- Compares and contrasts structures, functions, and modifications of two plants in the garden
- Includes various edible stems and describes how they can be consumed
- Is organized into categories or sections that include transitions
- Provides headings, illustrations, or other strategies to make it easy and fun to read
- Uses facts, quotes, definitions, and details
- Is concise, clear, and formal in tone
- Has a conclusion for my piece that provides the reader with a next step or action
- I can create a piece that meets publication criteria, including a bibliography

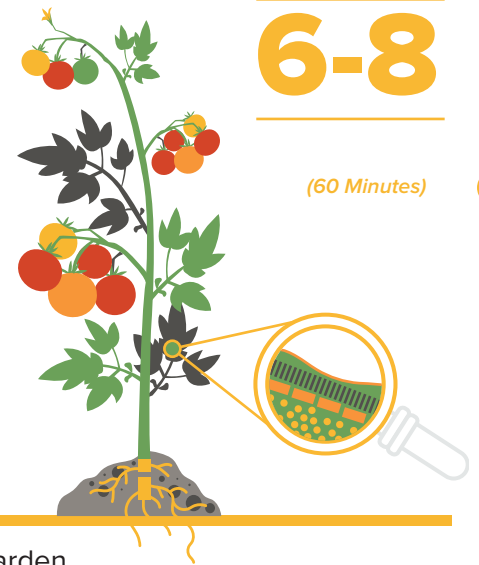
#### My writing is ready for submission for publishing in Our Food Chronicles when it:

- Uses proper punctuation including:
  - Uses complete and high-quality sentences which have:
- Uses correct vocabulary and definitions.
- Other criteria our class established including:



## Essential Question

# WHAT CAN I LEARN ABOUT LEAVES IN THE GARDEN?



## Learning Targets

- **I can** explain the role leaves play in the life cycle of a plant. ([NGSS MS-LS1-5](#))
- **I can** investigate several leaves in the garden and identify their parts. ([NGSS MS-LS1-4](#))
- **I can** make predictions about the leaf's characteristics and its environment. ([NHES 7.8.1](#))

- Direct students to the Garden Journals.
- With their partners, ask students to brainstorm background knowledge about leaves.



### INVESTIGATION: (40 Minutes)

#### READING TO LEARN: TEXT MARKING

(15-20 Minutes)



- Students should locate The Garden Thymes - Leaves.
- Students should use a highlighter or pen/pencil to mark the text where they find information that:
  - Clarifies the vocabulary with an illustration or example
  - Describes how leaves are structured similarly or differently depending on the needs of the plant
  - Explains how leaves have a job that is important to the growth of the plant
  - Describes leaves that can be eaten as part of a healthy diet
- With a partner or triad, students can share examples from the text and record notes in their Garden Journals.
- Show a video to students to build their background knowledge about how photosynthesis works in leaves and leaf characteristics:
  - [Photosynthesis](#)
  - [Travel Deep Inside a Leaf](#) (turn closed captioning on)
  - [Leaf Characteristics](#)



### SPROUT (5-10 Minutes)





- Organize students into pairs or triads.
- Provide each student with a copy of the Garden Journal.
- Give students a discussion prompt: What have we learned about plants and plant parts so far?
- Select a discussion protocol to help students generate/activate background knowledge:
  - Musical Shares
  - Think, Pair, Share
  - Give One, Get One, Move Along
  - Popcorn, Pass It On
- After several rounds, solicit three to five responses from students selected at random.






 **GARDEN INVESTIGATION:**  (10 Minutes)





*Students can be grouped into pairs, triads, or explore independently for this investigation.*

-  • Garden Journals will be used to reference classification traits and record data.
- Throughout the garden, students will find examples of several types of leaves.
-  • Use attention signal to gather students for the harvesting section of the lesson.

**HARVESTING:**  (10 Minutes)

 *Students should harvest the following: Kale, lettuce (several varieties), cilantro, spinach, basil, chives, and additional vegetables such as cucumber, tomato, radish, and carrots.*

 **CLOSURE/ASSESSMENT**  (10 Minutes)

-  • Use Give One, Get One to have students share data for these prompts. During each round, ask a different prompt from those below:
  - How is the shape and size of your leaf similar or different from your partner's?
  - How are the veins of your leaf similar or different from your partner's?
  - How is the arrangement of the leaves on the stem similar or different from your partner's?
  - How is the margin (outside edge) similar or different from your partner's?
-  • Remind students that in science we can make predictions or hypotheses based on observations. Using the CER method, students will attempt to make a claim about how the structure of a leaf relates to its function.
-  • Students will write summary statements in their journals, independently or with a partner as determined by the teacher.
-  • Collect Garden Journals and review summaries.



Essential  
Question

WHAT CAN I LEARN ABOUT  
LEAVES IN THE GARDEN?



What do you already know about leaves?

Vocabulary	Illustration/Example	Definition		
<b>LEAF</b>	The part of the leaf that makes food for the plant to grow.			
<b>PHOTOSYNTHESIS</b>	A chemical reaction that converts sunlight, carbon dioxide, and water into sugar (food) for plants.			
<b>CHLOROPLASTS</b>	Plant organelles (part of a plant cell) that contain chlorophylls and are the site of photosynthesis.			
<b>CHLOROPHYLL</b>	A green pigment found in leaves that is photosynthetic and uses energy from the sun to create food. It is the reason leaves appear green.			
Diagram and the parts of a leaf:	<table border="1"> <tr> <td>Simple Leaf</td> <td>Compound Leaf</td> </tr> </table>		Simple Leaf	Compound Leaf
Simple Leaf	Compound Leaf			
Leaf Characteristics:	<b>Arrangement:</b> opposite/alternating <b>Margins:</b> smooth/wavy, toothed, bristle-top <b>Base:</b> rounded, tapering, uneven, heart-shaped.			



<b>Plant 1:</b>	Classification  Type:  Arrangement:  Margin:  Base:
<b>Plant 2:</b>	Classification  Type:  Arrangement:  Margin:  Base:
<b>Plant 3:</b>	Classification  Type:  Arrangement:  Margin:  Base:
<b>ADDITIONAL EVIDENCE/ OBSERVATIONS</b>	



**SUMMARY:** Write a CER to answer the question: How does the structure of a leaf help the plant to grow and/or predict the type of environment it needs?

**Claim:**

**Evidence 1:**

**Evidence 2:**

**Evidence 3:**

**Reasoning (how the evidence supports the claim):**

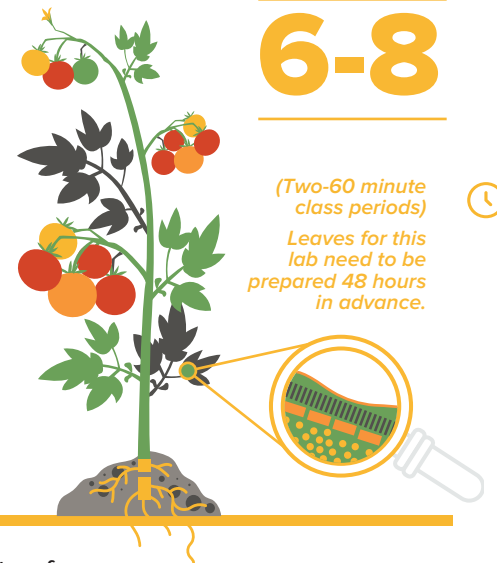
**READY,  
SET,  
GROW!**

**LEAVES  
WE EAT**

**GARDEN AS A LAB**

**6-8**

Day 1: Demo, lab, class observation  
Day 2: Discussion, text reading, summary/analysis



## Essential Question

## WHAT CAN I LEARN ABOUT LEAVES IN THE GARDEN?

### Learning Targets

- **I can** explain the role leaves play in the life cycle of a plant. ([MS-LS1-4](#))
- **I can** conduct an experiment about the role of the leaf in photosynthesis. ([MS-LS1-7](#))
- **I can** explain how environment and genetics influence the growth of plants. ([MS-LS1-5](#))

#### DAY 1:

#### SPROUT (10 Minutes)

- Gather attention of the class using attention signal: Real Food/Grows Here.
- Use Garden Journals to collect data in the Garden Investigation.
- With a partner, students will review observation notes and amend their own notes after collaboration. Add new ideas, facts, observations in a different color.
- Pose the question for this investigation:
  - How do leaves with different structures respond to changes in sunlight?
- Tell students that they will be looking for evidence of

photosynthesis in a variety of leaves.



#### LAB INVESTIGATION (45 Minutes)

##### PREPARATION:



- Take half of the leaves for this experiment and place them in a dark place (closet, cupboard, or under a dark covering) for 48 hours to draw down the chlorophyll.
- The remaining leaves should remain in the sun for several hours prior to the lab.
- Gather:

- Materials for each lab group:

- » Two leaves from the same kind of plant, one leaf should have been in the sun, one out of the sun. Different lab stations should have leaves with different characteristics.
- » 1 Bunsen burner, tripod stand, wire mesh
- » 250 mL beaker
- » 2 boiling tubes
- » Forceps
- » 2 tiles or petri dish
- » Ethanol (90%)
- » Iodine



- Students should work in lab groups of four.
- Students will access the procedure in the Garden Journal.
- Ensure lab members introduce themselves using sentence stems if needed.

##### PROCEDURE:

- Direct students to the Garden Journal to review the procedure.

- Demonstrate the lab for students with a leaf that has been in the sun for several hours. Use this as a time to explain:
- Glucose is produced in leaves as a result of photosynthesis and is quickly converted to starch for storage.
- Follow the demonstration in either video:
  - [Video 1](#)
  - [Video 2](#)
- Direct students to complete the lab according to the procedure in the Garden Journal (20 minutes).
- Call student attention with an attention signal.
- Instruct students:
- You will travel to four stations other than your own. You will have 1-2 minutes at each lab station to make a sketch/describe the leaf and the outcome for both samples. Record data carefully and completely.
- Upon completion, students will clean up lab areas for the day.



**INVESTIGATION:** ⌚ (25 Minutes)

**READING TO LEARN: MARKING THE TEXT**

- Distribute article: [Why is leaf shape important to plants?](#) by Andy Lowe
- Using a highlighter or a pen/pencil, students will mark the text where they find information about:
  - How leaf structures support growth
  - What evidence exists that plants adapt themselves in response to genetics and environment
- With a partner or triad, students can share examples from the text and record notes in the Garden Journal.



**CLOSURE/ASSESSMENT** ⌚ (25 Minutes)



- Students will work in pairs to review the available evidence from the garden and the lab.
- Individually or in pairs, students will complete the CER Framework in the summary.
- Submit Garden Journals.

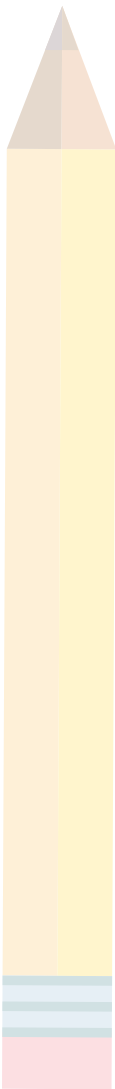
**DAY 2:**



**SPROUT** ⌚ (10 Minutes)



- Gather attention with attention signal: Real Food/Grows Here.
- Ensure students have Garden Journals from the previous day.
- Organize students into lab groups.
- Allow students time to review peers' observations from the previous day.



**Investigation Vocabulary** (see Garden Journal or Garden Thymes for complete definitions)

**Chlorophyll**

**Photosynthesis**

**Starch:** A substance containing sugar that is found in leaves as a result of photosynthesis.

**PROCEDURE:**

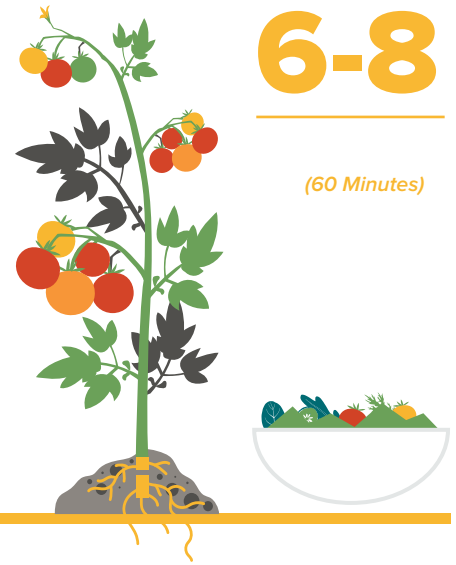
1. Lab groups of four.
2. Locate two leaves from the same plant at your lab station.
3. Fill a 250 mL beaker halfway with water. Turn on Bunsen burner, heat until it boils, and maintain boiling point.
4. Fill two boiling tubes halfway with ethanol.
5. Use forceps to place both leaves in boiling water for about 2 minutes.
6. Use forceps remove leaves from water and place leaves in tubes.
7. Place both tubes in the beaker and leave them in until the ethanol turns green (10 minutes).
8. Remove tubes from beaker and remove leaves from tubes using forceps and place them on tile or petri dish.
9. Turn off the burner.
10. Use the dropper to cover both leaves with iodine.
11. Observe and record the changes to the leaves.
12. Wait for instructions to compare data across lab groups.
13. Complete data collection and clean up lab station.

Lab Sample 1	Illustration/Description of Leaf	Changes observed in the leaf after iodine is applied to leaf:
Lab Sample 2	Illustration/Description of Leaf	Changes observed in the leaf after iodine is applied to leaf:
Lab Sample 3	Illustration/Description of Leaf	Changes observed in the leaf after iodine is applied to leaf:
Lab Sample 4	Illustration/Description of Leaf	Changes observed in the leaf after iodine is applied to leaf:



Lab Sample 5	Illustration/Description of Leaf	Changes observed in the leaf after iodine is applied to leaf:
Identify the claim and evidence presented in the article provided.		
<p><b>SUMMARY/ANALYSIS:</b> Consider all of the evidence collected in the various investigations thus far. Record the following:</p> <p>Claim:</p> <p>Evidence 1:</p> <p>Evidence 2:</p> <p>Evidence 3:</p> <p>Reasoning:</p>		





## Essential Question

## HOW CAN OUR GARDEN HELP ME BE HEALTHY?

### Learning Targets

- **I can** describe how leaves are part of a healthy diet. [\(HBO 3\)](#)
- **I can** prepare a healthy snack using a variety of leaves. [\(HBO 2,3; NHES 5.8.6\)](#)
- **I can** demonstrate how to prepare food safely. [\(HBO 10\)](#)
- **I can** demonstrate how to make healthy serving sizes of foods we eat.
- **I can** explain how a food we made is similar or different from foods my family eats. [\(NHES 2.8.1\)](#)
- **I can** show how I will eat healthy foods this week and/or help someone I care about do so. [\(NHES 7.8.2, 8.8.2\)](#)

- Solicit answers from a variety of students and make a list on the board/chart paper.

- Tell students:

- Today you are going to adapt a commercially prepared food to one that includes leaves and other plant-based ingredients.



### KITCHEN INVESTIGATION (45 Minutes)

#### PREPARATION:



- Form teams of four students.
- Gather a variety of leaves, vegetables, and herbs from the garden and other ingredients as determined by the selected recipe(s).
- Gather additional ingredients based on the recipe options below:
  - Canned/cooked beans (pinto, lentil, black, garbanzo, black-eyed peas, white)
  - Onion, garlic, shallots, chives
  - Spices, seasoning packets, sauces (chili powder, salt, pepper, taco, soy, buffalo, apple cider vinegar, etc.)
  - Lemon or lime
- Have as many sets of Nutrition Cards out as cooking stations.
- A hot plate may be needed for some recipes.
- Assemble other kitchen utensils as directed for the recipe (salad spinner for harvested greens).
- Sample cups/utensils if appropriate.
- Review recipes to ensure you have enough kitchen utensils.
- Print recipes that student groups can select from or choose one the whole class can make.
- Devices students can access to research recipes.



### SPROUT (5 Minutes)



- Gather attention of students using attention signal.
- Ask the prompts one at a time and have students discuss with an elbow partner:
- What are some leaves people eat or which ones do students eat in their family?
- How do people eat leaves? (salads, smoothies, on sandwiches, etc.)



- Mentor recipes if appropriate:
  - [Lentil Tacos](#) (Allrecipes)
  - [Veggie and Hummus Lettuce Wrap](#) (feedfeed)
  - [Power Bowl](#) (Run to the Finish)



*\*Careful attention should be paid to cleaning leaves because they often hold dirt. Use the salad spinner for one or two cycles. Depending on the age and experience of the students, an adult may need to ensure the leaves are fully clean before preparing.*

**COOKING:**

- Wash hands as instructed for safe food handling.
- Wash vegetables as directed in the Harvest Card or recipe.
- When selecting ingredients, students should also select a Nutrition Card.
- ⌚ • Teams will have 20-30 minutes to prepare the recipe as directed. (For an added challenge, students could create their own recipe based on the mentor recipe and available ingredients.)
- 👥 • Students will prepare eight tasting samples, four samples for the group and four for classmates to sample.
- Students will use a device to find an online source for nutrition information about a comparable recipe that is available commercially (CalorieKing or other apps available). Print, display, or copy nutrition information into Garden Journal.
- Students should display as many Nutrition Cards as they can collect for their recipe and place them out for other students to view during sampling.
- Students will use the tasting rubric to rate each sample.
- Students will clean their prep area and cooking materials.



**CLOSURE/ASSESSMENT** ⌚ (5 Minutes)



- At the conclusion of the lab, ask students to discuss the following prompt with a partner (see Options for Making Pairs):
  - How can food be an important part of our culture?
  - How can I use what I learned today to eat healthy options this week?



- Individually or with a partner, have students complete their Garden Journals.



- Collect Garden Journals.



What are the key ingredients of the recipe we chose?	
What health benefits are part of this recipe? <b>*Nutrition Cards</b>	
What do I like about this recipe?	
What could be improved in this recipe?	
What did I learn from other kitchen groups?	
How are the recipes I tried similar or different from those I eat at home?	
<b>SUMMARY:</b> Using your experience in the lab and/or kitchen, describe ways that you can eat leaves to promote health for you and/or your family.	



Criteria	Beginning (1)	Acceptable (2)	Recommended (3)	Award-Winning (4)
<b>NUTRITION VALUE</b>	Recipe has some elements of the chef's plate but also has some ingredients that are less healthy choices.	Recipe uses mostly healthy foods but does not include all elements of the chef's plate or they are not in the recommended portions.	Recipe uses ingredients that are healthy and it contains foods from the chef's plate in correct portions.	Recipe uses all healthy ingredients and the proportions are nearly the same as what is recommended on the chef's plate.
<b>TASTE AND PRESENTATION</b>	The recipe is good to try but not something I would choose again.	The recipe is good. I would eat it again, but it could be improved.	This recipe is something I would select again.	The recipe is delicious and presented well. I would recommend or make it for others.
<b>TOTALS</b>				

READY,  
SET,  
GROW!

LEAVES  
WE EAT

GARDENERS  
TAKE  
ACTION

6-8

(Two-60  
Minute Lessons)



## Essential Question

HOW CAN I SHARE WHAT I LEARNED IN THE GARDEN?

## Learning Targets

- **I can** write to persuade someone to make healthy food choices.
- **I can** provide a compelling introduction and organize the argument logically.
- **I can** support my claims with credible and related evidence.
- **I can** use phrases and clauses to show relationships.
- **I can** acknowledge counter-claims or arguments (optional for 6th grade).
- **I can** write concisely, clearly, and in a formal tone.
- **I can** write a conclusion that provides closure and a call to action.
- **I can** create a piece that meets publication criteria, including a bibliography. ([CCSS ELA - Argument Writing: W8.1A-E](#); [NHES 5.8.2, 8.8.1, 8.8.2](#))

[Infographics](#) (Top 25 Design Magazine).

- With a partner or triad, students will review the samples.



- Ask:
  - What do you like about how the author presented this information?
  - What makes the information interesting and easy to understand?
  - How does the information present an argument?



- With a partner, students will discuss and select a model/format to use.
- Tell students:
  - You will create an argumentative piece using the structure of an infographic to persuade people to consume healthy foods. Some submissions could go into *Our Food Chronicles*.



## INFORMING OTHERS: ⌚ (60-100 Minutes) GARDENERS TAKE ACTION

PLANNING: ⌚ (20 Minutes)



- Guide students to the Garden Journal for this lesson.
- Review the elements of the organizer model provided and ensure that students understand all required sections.
- Students will review their notes from previous Garden Journal entries and highlight material they wish to include.
- Students will consult outside resources for additional evidence and images.
- Students will determine their claims or the teacher can



## SPROUT ⌚ (15 Minutes)



- Call student attention with an attention signal: Real Food/ Grows Here or other.
- Select and display five to seven high-quality sample



- infographics. Samples available: [Top 25 High Quality](#)



provide one based on the needs of the class and available time.

- Complete the graphic organizer. If time is a constraint, the graphic organizer could serve as a quick write-up or one-pager and be sufficient to conclude the lesson series.

The remaining parts of this lesson extend into the full writing process and allow students to reach the level of the CCSS - ELA standard. It is recommended that all writing be archived. Students can submit written products to a classroom collection called *Our Food Chronicles*, which is a locally created archive that can be built to showcase all of the learning that has come from the garden. Teachers can think broadly about what the Chronicle should look like based on available resources and technology. The teacher and class should determine the criteria needed to be considered “publish-ready” for any writing project and for submission to *Our Food Chronicles*.

**DRAFTING:** ⌚ (30 Minutes)

- Review the Writer’s Checklist for this task with students and ensure they have access to it before beginning to write.
- Using the graphic organizers, students will plan the text and images of leaves that they will share.
- Provide access to an app or software that can create high-quality infographics. [Free and paid options available.](#)

- Complete the infographic while referring to the Writer’s Checklist and the *Our Food Chronicles* criteria for submission.

**REVISING:** ⌚ (10 Minutes)

- Provide students with time to make revisions to their work and cross-check to the Writer’s Checklist.

**PUBLISHING:** ⌚ (40 Minutes)

- Group students into partners for a peer feedback opportunity.
- Students will use Praise, Question, Suggest to offer feedback on the story thus far. Partner A begins and Partner B listens and offers feedback. Then they switch roles.
- Allow remaining time for students to create a publish-ready piece. Ensure students have their Writer’s Checklists at hand.

**CLOSURE/ASSESSMENT** ⌚ (5 Minutes)



- Collect student projects or establish a due date for projects if more time will be permitted.
- Determine process and timeline to submit to *Our Food Chronicles* if appropriate.

READY,  
SET,  
GROW!

LEAVES  
WE EAT

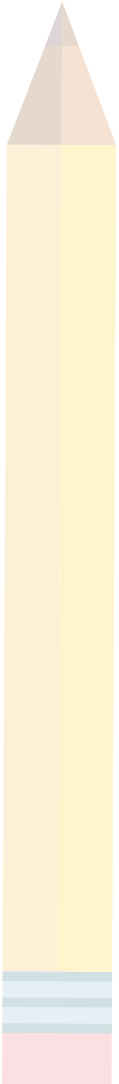
GARDENERS  
TAKE  
ACTION

6-8



## Essential Question

**HOW CAN I SHARE WHAT I LEARNED ABOUT LEAVES?**



What is my claim about leaves as part of a healthy diet?

What will I include in my infographic as evidence to persuade the reader?

Text

Images, Charts, Symbols

**SUMMARY:** (serves as a concluding sentence) What do you want people to do after learning about the function of leaves for plants and people?



**WRITER'S CHECKLIST: INFORMATIONAL WRITING**

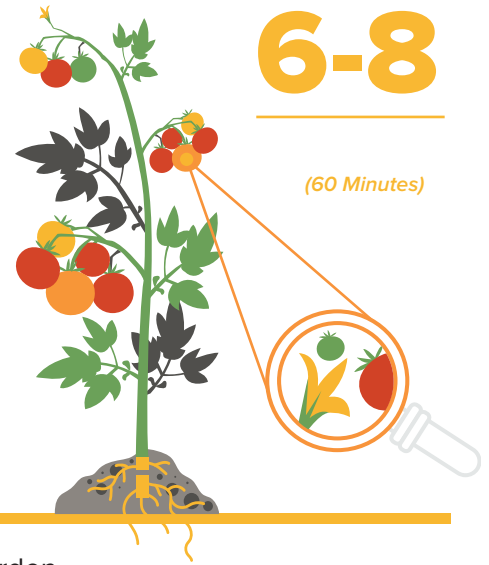
**My Writing:**

- Provides a claim that is clear and compelling
- Provides relevant, valid evidence to support the claim
- Includes images, charts, symbols, maps, or other graphics that make the argument more compelling and visually interesting
- Presents and/or refutes a counterclaim (7th/8th grade only)
- Is concise, clear, and formal in tone
- Has a conclusion for my piece that provides the reader with a next step or call to action
- Meets publication criteria, including a bibliography

**My writing is ready for submission for publishing in *Our Food Chronicles* when it:**

- Uses proper punctuation including:
  - Commas
  - Apostrophes
  - Colons
  - Semicolons
  - Quotation marks
  - Parentheses
  - Brackets
  - Dashes
  - Hyphens
  - Ellipses
  - End of sentence punctuation
- Uses complete and high-quality sentences which have:
  - A subject
  - A verb
  - A complete thought
- Uses correct vocabulary and definitions.
- Other criteria our class established including:





## Essential Question

## WHAT CAN I LEARN ABOUT FRUITS AND FLOWERS IN THE GARDEN?

### Learning Targets

- **I can** explain the role fruits and flowers play in the life cycle of a plant. ([MS-LS1-5](#))
- **I can** make observations to classify flowers and fruits and their adaptations. ([MS-LS1-4](#))
- **I can** identify why flowers and fruits are important parts of a healthy diet. ([NHES 7.8.1](#))



### SPROUT (15 Minutes)



- Organize students into pairs or triads.
- Provide each student with a copy of the Garden Journal.
- Give students a discussion prompt:
- What have we learned about plants and plant parts so far?
- Select a discussion protocol to help students generate/activate background knowledge:
  - Musical Shares
  - Think, Pair, Share
  - Give One, Get One, Move Along
  - Popcorn, Pass It On
- After several rounds, solicit three to five responses from students selected at random.



- Direct students to the Garden Journals.



- Alert students that as of the lesson today, they will have learned about all parts of a plant and how they work together.



### INVESTIGATION: (40 Minutes)

#### READING TO LEARN: TEXT MARKING (20 Minutes)



- Students should locate The Garden Thymes - Fruits and Flowers.
- Using a highlighter or pen/pencil, students should mark the text where they find information that:
  - Clarifies the vocabulary with an illustration or example
  - Describes how flowers or fruits are structured similarly or differently
  - Explains how fruits and flowers have a job that is important to the reproduction of the plant
  - Describes a variety of flowers and fruits that can be eaten as part of a healthy diet
- With a partner or triad, students can share examples from the text and record notes in their Garden Journals.
- It may be useful to show a video to students as a visual to support their understanding of how the flower-to-fruit process works:
  - [Time lapse of pear](#)
  - [Time lapse of a pumpkin](#)



 **GARDEN INVESTIGATION**  (15-20 Minutes)



- Use pairs, triads, or independent grouping options for this investigation.



- Use the Garden Journal to reference classification traits and to record data.
- Throughout the garden, students will find examples of flowers with male parts, female parts, perfect flowers, and at least two fruits with different exocarps.
- Gather students for the harvesting section of the lesson.
- Harvest:
  - If completing kitchen extension, gather a variety of food to preserve. Options are: Beans, beets, asparagus, cauliflower, broccoli, squash, berries, brussels sprouts, corn, herbs, peppers, sweet potatoes, rhubarb, spinach, tomatoes, turnips/parsnips, zucchini.
  - For Nutrition Lesson: Beet Ravioli, gather beets, parsley, thyme.



**CLOSURE/ASSESSMENT**  (10 Minutes)



- Use Give One, Get One to share data for these prompts. During each round, use a different prompt:
  - How are fruits and flowers similar and different?
  - How do fruit and flower structures support the lifecycle of the plant.
- Remind students that in science, we can make predictions or hypotheses based on observations. Using the CER method, students will attempt to make a claim about how the structure of fruits and flowers relates to their function.



- Students should complete the summary statements in their journals, independently or with a partner as determined by the teacher.



- Collect Garden Journals and review summaries.



**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
FRUITS AND FLOWERS IN  
THE GARDEN?**



What do you already know about fruits and flowers?

Vocabulary	Illustration/Example	Definition
<b>FLOWER</b>		The part of the plant that supports plant reproduction (often beautiful in many ways).
<b>FRUIT</b>		The part of the plant that protects the seed from the surrounding environment. It is the ripened ovary of the flower.
<b>STAMEN</b>		Male reproductive part of the flower which includes an anther and filament.
<b>PISTIL</b>		Female reproductive part of the flower which includes the stigma, style, ovary, and ovule.
<b>EXOCARP</b>		The outer layer of the fruit.
<b>MESOCARP</b>		The fleshy inner layer of fruit between the exocarp and the seed.
How are the fruits and flowers of plants similar and different?		
How do variations in fruit and flower structures help each plant survive in its environment?		



How can eating fruits and flowers help us maintain a healthy diet?	
What evidence can I find to show that all flowers and fruits have some similar structures, but also have unique structures that support growth?	
<b>Plant 1:</b>	Observation: Describe or illustrate the flower structure.  Classify as Perfect or Imperfect
<b>Plant 2:</b>	Observation: Describe or illustrate the flower structure.  Classify as Perfect or Imperfect
<b>Plant 3:</b>	Observation: Describe or illustrate the flower structure.  Classify as Perfect or Imperfect
<b>Additional Evidence/Observations</b>	
<b>SUMMARY:</b> How do fruits and flowers help plants continue their life cycle?	

**READY,  
SET,  
GROW!**

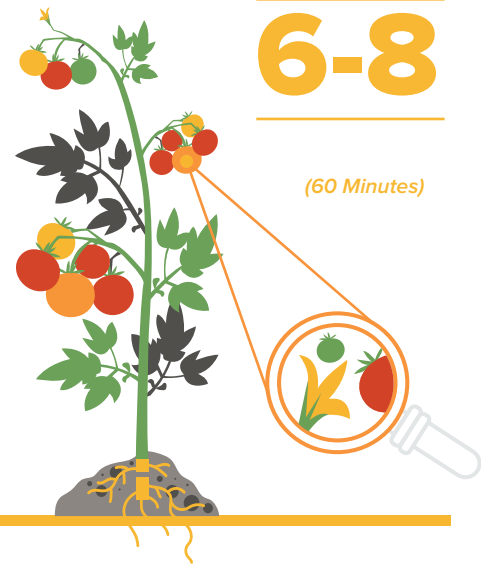
**FRUITS AND  
FLOWERS WE EAT**

**GARDEN  
AS A LAB**

**6-8**

Data for this lab will be collected over a period of time. See procedure for details.

(60 Minutes)



## Essential Question

**WHAT CAN I LEARN ABOUT FRUITS AND FLOWERS IN THE GARDEN?**

## Learning Targets

- **I can** explain why and how fruits ripen as part of the reproductive stage of a plant's life cycle. ([MS-LS1-5](#))
- **I can** conduct an experiment about the variables that affect ripening. ([MS-LS1-7](#))
- **I can** explain how environment and genetics influence plants. ([MS-LS1-4](#))



## PREPARATION & MATERIALS:



- Ensure you have enough garden fruit for each group. It is best to choose smaller fruits for this process.



- Materials for each lab group:
  - 3 brown paper bags
  - 3 bananas
  - 4 unripened fruits
  - A location that can serve as the control (window sill, shelf, or ledge)
  - Various locations to test variables: Dark, light, cold, warm, etc.
  - Thermometer
  - Procedure in the Garden Journal

- Ensure lab members introduce themselves using sentence stems if needed.



## SPROUT

(10 Minutes)



- Gather attention of the class using attention signal: Real Food/Grows Here.



- Use Garden Journals to review data collected in the Garden Investigation.



- With a partner, students review and amend notes.
- Add new ideas, facts, and observations in a different color. Use a highlighter to emphasize important points or concepts.



- Pose the questions for this investigation:

- How does the fruit contribute to the reproductive process in plants?
- What variables impact the ripening process of fruits?

## LAB INVESTIGATION: READING TO LEARN (45 Minutes + additional days to collect samples)



- Distribute the article, [The Science of Ripening](#) (Fine Cooking) or [Fruit Ripening](#) (Ross Koning). Both could be used and jigsawed with a partner group.
- Using a highlighter or pen/pencil, students should mark the text where they find information for any of the following:
  - The chemical process that happens during ripening
  - Rationale for why fruit ripens as a part of the reproductive process
  - Variables that affect the ripening process
- With a partner or triad, students can share examples from the text and record notes in their Garden Journals.
- Review and complete the lab procedure in the Garden Journal.



**CLOSURE/ASSESSMENT** ⌚ (25 Minutes)



- Students will work in pairs to review the available evidence from the garden and lab to complete the CER Framework in the summary.
- Submit Garden Journals.



**Essential  
Question**

**WHAT CAN I LEARN ABOUT  
FRUITS AND FLOWERS IN  
THE GARDEN?**

**Investigation Vocabulary** (see Garden Journal or Garden Thymes for complete definitions)  
Ethylene  
Enzyme

What is the purpose of ripening in the reproductive cycle of the plant?

What is the chemical process(es) that cause ripening to occur?

What variables affect the process of ripening?

**PROCEDURE:**

1. Lab groups of four.
2. Using information from the articles, identify three variables that will affect the ripening process of the fruit you have selected.
3. Place one fruit sample in a location designated as the control location.
4. Place one fruit in a paper bag with a banana in the same location.
5. Take the temperature of the control location.
6. Place the other two fruits in separate bags with a banana in each.
7. Identify two separate locations for the other two bags that present a variable to test.
8. Record the temperature in those locations.
9. Wait for instructions to compare data across lab groups.
10. Complete data collection and clean up lab station.

**DAY 1:**

Lab Sample 1	Control	Temperature	Observation of test fruit





Lab Sample 2	Variable	Temperature	Observation of Fruit
Lab Sample 3	Variable	Temperature	Observation of Fruit
Lab Sample 4	Variable	Temperature	Observation of Fruit
Day 2:			
Lab Sample 1	Variable	Temperature	Observation of Fruit
Lab Sample 2	Variable	Temperature	Observation of Fruit
Lab Sample 3	Variable	Temperature	Observation of Fruit
Lab Sample 4	Variable	Temperature	Observation of Fruit





Day 3:			
Lab Sample 1	Control	Temperature	Observation of Fruit
Lab Sample 2	Variable	Temperature	Observation of Fruit
Lab Sample 3	Variable	Temperature	Observation of Fruit
Lab Sample 4	Variable	Temperature	Observation of Fruit
Day 4:			
Lab Sample 1	Control	Temperature	Observation of Fruit
Lab Sample 2	Variable	Temperature	Observation of Fruit
Lab Sample 3	Variable	Temperature	Observation of Fruit
Lab Sample 4	Variable	Temperature	Observation of Fruit



**SUMMARY:** Write a CER to explain what you learned about the ripening process of fruit.

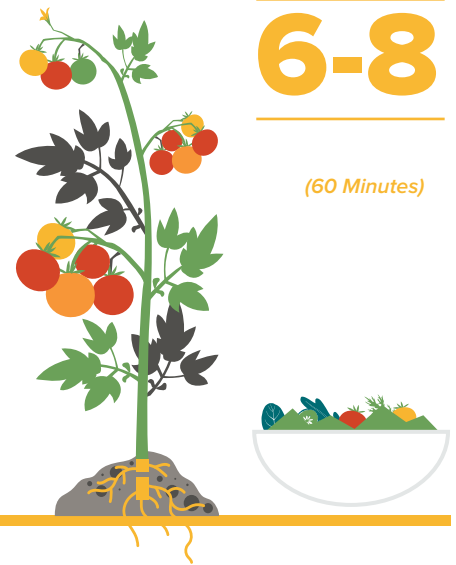
Claim:

Evidence 1:

Evidence 2:

Evidence 3:

Reasoning:



## Essential Question

## HOW CAN OUR GARDEN HELP ME BE HEALTHY?

### Learning Targets

- **I can** describe how fruits and flowers are part of a healthy diet. ([HBO 3](#))
- **I can** prepare a healthy snack using a variety of fruits and flowers. ([HBO 2,3](#); [NHES 5.8.6](#))
- **I can** demonstrate how to prepare food safely. ([HBO 10](#))
- **I can** demonstrate how to make healthy serving sizes of foods we eat. ([HBO 10](#))
- **I can** demonstrate how to make healthy serving sizes of foods we eat. ([NHES 2.8.1](#))
- **I can** show how I will eat healthy foods this week and/or help someone I care about do so. ([NHES 7.8.2](#), [8.8.2](#))

- Let students know they are going to work on a process to preserve a fruit from the garden.



### PREPARATION & MATERIALS:



- Teams of four students.
- Cue [food preservation video](#) and/or print article, [Home Food Preservation](#), about methods of food preservation.
- Print any resources that would be helpful or provide students the link to access with their own devices. [National Center for Home Food Preservation](#)



- Harvests from the garden including anything from the National Center for Home Food Preservation above for freezing.
- Additional supplies based on the options below:
  - Plastic freezer bags
  - Paper towels
  - Cookie sheets if applicable
  - Hot plate and pot for blanching
  - Bowl for ice bath
  - Ice
- Have as many sets of Nutrition Cards out as cooking stations.
- Assemble other kitchen utensils as directed for the recipe.
- Sample cups/utensils if appropriate.
- Review recipes to ensure you have enough kitchen utensils.
- Print recipes for student groups to select from or one the whole class can make.
- Devices that students can use to access and/or research recipes.
- Garden Journals for the procedure.



### SPROUT

(10 Minutes)



- Gather attention of students using attention signal.



- Ask students to discuss with an elbow partner:
  - What are ways that fruits can be preserved to last beyond their normal life cycle?



- What form of preservation have they eaten before or how do they preserve food at home?



 **KITCHEN INVESTIGATION:** ⌚ (45 Minutes)

**READING TO LEARN:** ⌚ (15 Minutes)



- Identify which text/video about methods of food preservation will be used or use both as a jigsaw:
  - Video option: [Food preservation video](#)
  - Text option: [Home Food Preservation](#)
- Using a highlighter or pen/pencil, students should mark the text where they find information that:
  - Clarifies the vocabulary with an illustration or example
  - Provides details on methods for food preservation
  - Offers details about why certain methods of food preservation are effective
  - Provides pros/cons to various methods
- With a partner or triad, students can share examples from the text and record notes in their Garden Journals.

**COOKING LAB:** ⌚ (20-30 Minutes)



- Wash hands as instructed for safe food handling.
- Wash vegetables as directed in the Harvest Card.
- When selecting ingredients, students should also select a Nutrition Card.
- Access the link on [Food Preservation](#) and review steps for the produce available.
- Teams will have 20-30 minutes to prepare the recipe as directed.
- Students will clean their prep areas and cooking materials.
- Food for freezing should be placed in a freezer until frozen.

 **CLOSURE/ASSESSMENT** ⌚ (5 Minutes)



- At the conclusion of the lab, ask students to discuss the following prompt with a partner:
  - How can food be an important part of our culture?
  - How can I use what I learned today to eat healthy options this week?
- Individually or with a partner, have students complete their Garden Journals.
- Collect Garden Journals.



**Essential  
Question**

**HOW CAN THE GARDEN  
HELP ME BE HEALTHY?**



What important vocabulary is related to food preservation?	
List/describe five or more methods for food preservation and why those methods are effective.	
Identify any advantages (pros) or disadvantages (cons) related to food preservation.	
How is food preservation similar or different from how my family preserves or eats preserved food?	
<b>PROCEDURE:</b> Access the freezing process for the fruit or flower you have chosen for this lab. Follow the procedure described.	
<b>SUMMARY:</b> Using your experience in the lab and/or kitchen, describe ways that you can eat fruits and flowers to promote health for you and/or your family.	



## Essential Question

## HOW CAN I SHARE WHAT I LEARNED IN THE GARDEN?

### Learning Targets

- **I can** identify the arguments and evidence related to local and commercially produced food.
- **I can** determine if evidence provided by an author is credible and relevant.
- **I can** prepare for a discussion to improve understanding about a selected topic.
- **I can** acknowledge counter-claims or arguments (optional for 6th grade).
- **I can** follow agreed-upon procedures for respectful dialogue.
- **I can** formulate my own opinions based on review of evidence related to food production and distribution practices. ([CCSS ELA - Speaking and Listening: 8.1A-D, 8.4, 8.6; ELA-Reading Information 8.1, 8.2, 8.3, 8.9](#))

the Food). Use the prompt:

- While watching the video, identify factors that may influence how people get and use food.
- Review the video with a second prompt and repeat Think, Pair, Share:
- Consider evidence in this video that would show how our food choices impact other people and the environment.
- Elicit responses from each group and, with input from students, identify some categories.
- Tell students:
- You will engage in a discussion (Socratic Seminar) related to the question: What is the impact of food choices on ourselves, other people, and the environment?



### INFORMING OTHERS: GARDENERS TAKE ACTION

(85 Minutes)

PLANNING: (45 Minutes)



### SPROUT (15 Minutes)



- Call student attention with an attention signal: Real Food/Grows Here or other.
- Use a Think, Pair, Share structure to process the video: [The Extraordinary Life and Times of Strawberry](#) (Save



- Guide students to the Garden Journal for this lesson.
- Review the elements of the organizer model provided, ensuring students understand all of the sections that need to be completed.



- Students will research the following question:



- What is the impact on humans and the environment of



locally produced food as compared to commercially produced food?



• Students should review and gather evidence for the discussion:

- Review notes from the Garden Journal.
- Locate and review resources that identify the challenges and advantages of both food systems to prepare for a Socratic Seminar. Sample resources include:

- » [The Great Food Fight: Local vs. Global](#) (Sharon Ayala)
- » [40 maps that explain food in America](#) (Vox)
- » [Trends in U.S. Local and Regional Food Systems: A Report to Congress](#) (USDA)
- » [Eating Local: The Pros and Cons of a Divisive Food Movement](#) (Arcadia Publishing and The History Press)
- » [What is “Local” Food?](#) (Michael Hand, USDA)

• Text marking strategies should be used with all materials that students plan to include as part of the discussion. Information from both perspectives should comprise the research phase.



• Students will complete the organizer in preparation for the discussion. If time is a constraint, the graphic organizer could serve as a quick write-up or one-pager and be sufficient to conclude the lesson series.

**DISCUSSION:** ⌚ (40 Minutes)



- Group students into partners (A and B roles). Provide time (5-7 minutes) for students to compare notes, identify arguments, and assemble evidence gathered from the text(s).
- Student A will enter the inner circle first as a speaker. Student B is on the outer circle listening and taking notes.
- Provide inner circle students with two tokens. A token is tossed into the circle when the student offers something to the discussion.
- Establish norms:
  - Address ideas not people.
  - Rephrase previous ideas.
  - Use sentence starters if needed.
  - Cite evidence from the text in each contribution.



• Facilitator will launch with the prompt:  
 • What is the impact of food choices on ourselves, other people, and the environment?



- Students take turns offering perspectives. Each student may only speak twice in the round.
- Facilitator can rephrase or focus the discussion with specific questions if needed.
- Allow enough time for each student to participate at least once.
- Call for a Conference. Allow students to confer with Student B about the prompt and evidence.
- Student B enters the inner circle.
- Discussion resumes with one token per student (two if time allows).



**CLOSURE/ASSESSMENT** ⌚ (15 Minutes)



• Allow students time to complete the summary in the Garden Journal. An extension would be to expand the task to include a formal argument piece for Our Food Chronicles if appropriate.



• Collect Garden Journals.



**Essential  
Question**

**HOW CAN I SHARE WHAT  
I LEARNED ABOUT FOOD  
FROM THE GARDEN?**



**Critical Vocabulary:**

Local Food: Food grown within 100 miles of the point of consumption.

Industrial Agriculture: Food grown in large-scale production for the purpose of wide distribution to consumers across the globe, nation, or large regions.

Arguments supporting local food.

Arguments supporting commercial food sources.

**SUMMARY:** In your opinion, what argument is most compelling as the best source of food for people and the environment?