Edible Schoolyard NYC Garden Curriculum

Fourth Grade

Food Origins (September)*: Students simulate the trade of corn from Mexico to New York and do a scavenger hunt to learn about the origins of other common foods.

The Lenape (October)*: Students read a story about the Lenape people, detailing the agricultural techniques they used, create a skit about one of those techniques, and do garden work using Native American methods.

Squanto's Ad Agency (October): Students study Native American agricultural techniques promoted by Squanto, create persuasive ads about these techniques, and use the techniques in the garden.

Food Miles (November)*: Students play a game to study the distance traveled by out-of-season foods and figure out local alternatives.

Winter Food (December): Students listen to a read-aloud about preserving the harvest in pioneer days and do their own preservation project.

What's for Dinner (January)*: Students play a game show to learn the roles of different creatures in making compost.

I Ate Dirt for Breakfast (February)*: Students learn the major nutrients in soil and test our garden soil for nutrients.

Pizza Museum (February): Students are visitors in a pizza "museum." They use pictures and captions in the museum to understand that pizza has a geography and a history.

Making Potting Soil (March)*: Students calculate different recipes of potting soil and make their own soil.

Soil Around the World (April)*: Students study profiles of people across the world who are working to keep soil healthy and rich.

Soil Conservation (May)*: Students simulate erosion and study Dust Bowl photos and plant cover crops to protect our garden from erosion.

Grain Processing (June)*: Students learn about the history of grain processing and process wheat into flour.

* Part of current scope & sequence at Edible Schoolyard NYC at P.S. 216

Food Origins Scavenger Hunt

Aim
Students will understand the historical geography of corn and other foods from the garden.

Summary
Students explore the garden using a scavenger hunt that directs them to find the geographic origins of different plants.

Standards
CCSS: ELA, Grade 4, SL4: Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

NYS: Social Studies, 1.3a: Gather and organize information about the accomplishments of individuals and groups, including Native American Indians, living in their neighborhoods and communities.

NYS: Science, LE 7.1c: Humans, as individuals or communities, change environments that can be either helpful or harmful for themselves and other organisms.

Materials

- Ear of corn to pass around
- Teosinte vs. Modern Corn worksheets (one per pair of students)
- Maps of the United States and Mexico (one per pair of students)
- Food Origins Scavenger Hunt worksheets (one per student)
- Scavenger hunt signs
- Exit Tickets. ("Where did the food in our garden come from? List as many places as you can remember.")
- Clipboards
- Pencils
- Tasting

Vocabulary

- teosinte

Adapted from ESY Berkley, http://edibleschoolyard.org/berkeley/

- Mesoamerica
- native

Procedure: Day One

Opening Circle (5 minutes)

- *Who can remember planting the three sisters last year? Who can remind me what the three sisters are? Today we are going to focus on one of the three sisters: corn.*
- *We are going to learn where corn came from and how it got to us here in New York. We are also going to learn about where many other foods in our garden came from before they grew here.*

Inquiry Activity One (20 minutes)

- Explain that the person at one end of the circle is in Mexico, where corn comes from, and the person at the other end of the circle is in New York. Everyone else is located between the two places, trading corn.
- Remind students that the person they are handing the corn to will never have heard of corn before, so they have to persuade them that corn is good.
- Model the game with your co-teacher or a student.
    - The first person in the circle says: *This is an ear of corn.*
    - Second person: *A what?*
    - First person: *An ear of corn.* (Rubs belly.) *It's delicious!*
    - Second person: *Oh! An ear of corn.*
- Now model how the corn continues around the circle. The second person takes on the role of the first person and passes the corn one step farther.
    - Second person: *This is an ear of corn.*
    - Third person: *A what?*
    - Etc.
- Note: some students enjoy the structured dialogue. Other students might prefer to improvise a persuasive reason the student next to them should try corn.
- Tell the students that every once in a while, you will shout "freeze" – at which point they should freeze – and you will give them a different instruction. There will be two places to freeze during the game. You can pick when and where they occur.
- The first time you tell the students to freeze, pass out the pictures of teosinte and modern corn – one per pair of students.
- Have the students turn and talk about the differences between the two plants and why people tried preferred modern corn.
- Continue game.
- The second time you tell the students to freeze, hand out the map of the United States and Mexico. Have the students turn and talk about how far corn had to travel from its point of origin to New York.

- Continue game until the corn makes it all the way around the circle – to New York (or, until students start to lose focus).

Inquiry Activity Two (15 minutes)

- *So corn originally came from Mexico, in Central America, or what we sometimes call Mesoamerica.*
- *Most of the food in our garden came from some place else before it grew here – although you will find at least one plant that is native to North America.*
- *You are going to go on a scavenger hunt to find out where different plants in the garden came from originally.*
- Hand out scavenger hunt sheets on clipboards and pencils.
- Model and explain how students will do the scavenger hunt:
  - *You are going to walk through the garden looking for white signs. These white signs will be next to certain plants. They will tell you where the plants are from, along with other information.*
  - *One of the plants you will find is eggplant. When you find the sign, read it and see where eggplant came from. When you know, you can write eggplant in one of these columns. Is it from North America? Central America? South America? Africa? Asia? Europe? You are going to find out!*
- Divide the class into four groups so that you can send each group into a different section of the garden to begin.
- Once the students are walking around, circulate to help as needed.

Closing Circle (10 minutes)

- Have students share some of their answers. Was anything a surprise?
- Hand out exit tickets: "Where did the food in our garden come from? List as many places as you can remember."
- Collect exit tickets.

Procedure: Day Two

Opening Circle (15 minutes)

- Review some of the places the food in our garden comes from.

Garden Activity (30 minutes)

- Explain the garden jobs of the day, and go out into the garden.

Closing Circle (5 minutes)

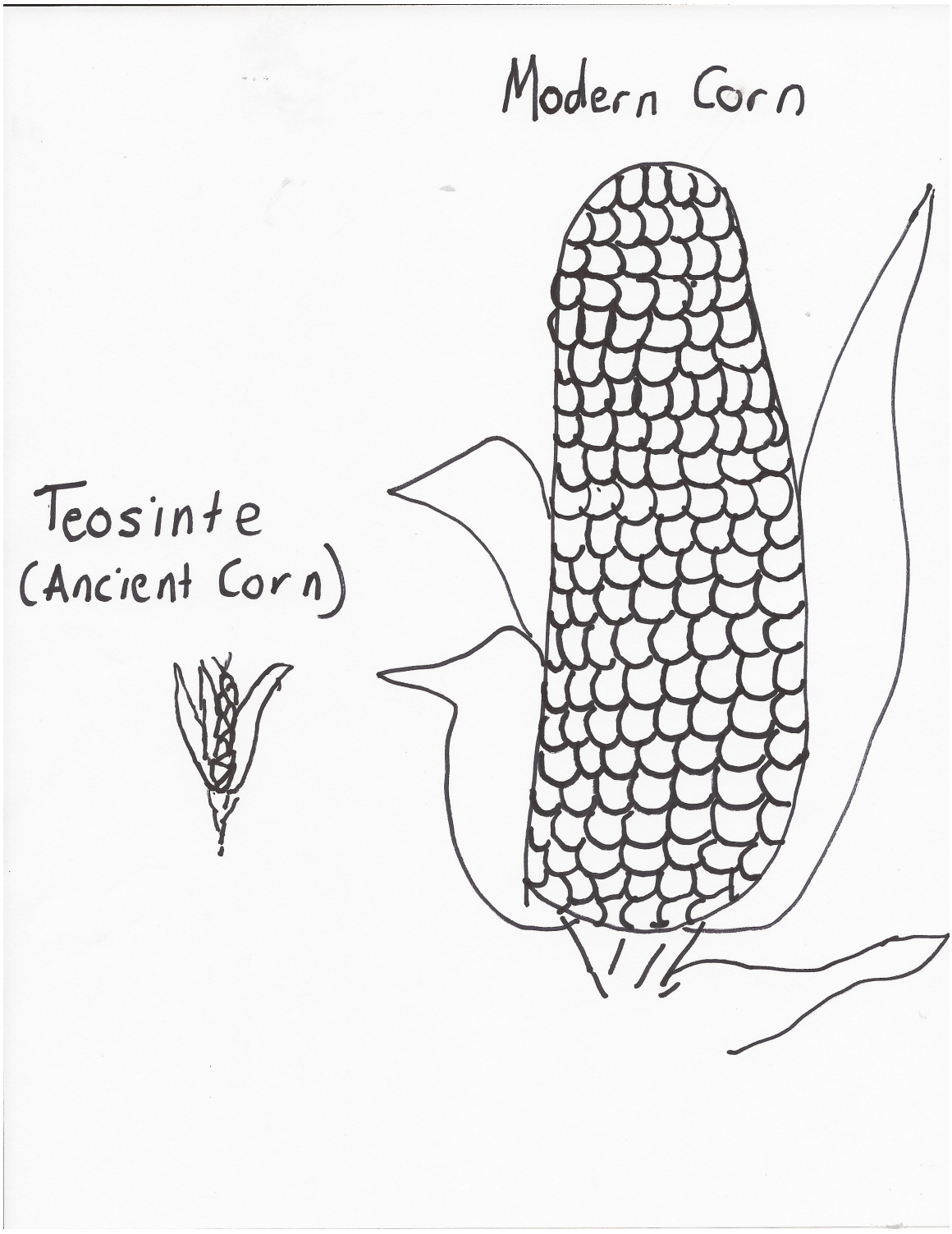
- Share a tasting from the garden – tomatoes, raspberries, ground cherries, etc.

Adapted from ESY Berkley, http://edibleschoolyard.org/berkeley/

Common Core State Standard Extensions

ELA, Grade 4, W 2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- Have students write the "biography" of a shopping list made of any five foods they found in the garden during their scavenger hunt. Students need to explain generally how food first moved from its point of origin to locations around the world. Then, for each individual food, they should say where it came from originally.



North America

Label New York and Mexico on this map.

Name: _____

FOOD ORIGINS SCAVENGER HUNT

Today we are learning about where certain foods were originally grown. Look for signs posted in the beds. Each sign will tell you where that fruit or vegetable comes from. Write the name of each fruit or vegetable on the chart, below the column for the region where it comes from. Can you find all 15 signs? Here's a hint: the numbers below tell you how many signs you have to find for each region!

North America	Central America & Mexico	South America	Asia	Europe	Africa
1.	1.	1.	1.	1.	1.
	2.		2.	2.	2.
	3.		3.	3.	
	4.			4.	

The **tomato** was originally grown in Central America.

This vegetable is a **pumpkin**. It was originally grown in Central America.

Did you know that the **sunflower** was first grown here in the Eastern United States, in North America?

Corn is part of the Three Sisters Garden. All three of the sisters are from Central America.

Lettuce was first grown as a crop in Ancient Egypt, in Africa, where the Egyptians used oil from the seeds and also ate the leaves.

Eggplant was first grown in Asia, in the area that is now India, Pakistan and Bangladesh.

Amaranth was an important food of the Aztec people in Mexico.

Sweet potatoes were originally discovered in Peru in South America.

Asparagus was grown in Egypt (in Africa) in 2000 BC.

Kale comes from Europe where it was one of the most common vegetables.

There are many different colors of **raspberries**. In this garden we grow golden and red varieties! All of them come from the continent of Europe.

Cabbage was first grown in Europe. Soon it spread all over the world because it is so delicious!

Apples were first found in Kazakhstan, a country in Asia. Many researchers believe that apples were the first fruit tree ever grown by people!

Broccoli was first grown in Italy, a country in Europe.

The delicious **fig** was first grown in Asia. It is one of the most ancient foods in the world

The Lenape Farmers and Skits

Aim
Students will learn about the legacy of Native American agriculture.

Summary
Students read a story about the Lenape people, detailing the agricultural techniques they used, create a skit about one of those techniques, and do garden work using Native American methods.

Standards
CCSS: ELA, Grade 4, W1: Write opinion pieces on topics or texts supporting a point of view with reasons and information.

NYS: Social Studies, 1.1a: Know the roots of American culture, its development from many different traditions, and the ways people from a variety of groups and backgrounds played a role in creating it.

Materials

- Dry erase/chalkboard and markers
- The Lenape People reading
- Paper
- Clipboards
- Pencils
- Seasonal tasting

Vocabulary

- Lenape
- fertilizer
- mound
- erosion
- skit
- dialogue

Adapted from Mannahatta: A Natural History of New York City.

Procedure: Day One

Opening Circle (5 minutes)

- *Imagine that it is the year 1608 here in New York. What would it have looked like? How would it have been different from what New York looks like today? Were there buildings? Were there animals? What people lived here?* Have students turn and talk to a partner.
- *1609 was the year that a European explorer named Henry Hudson first came to New York. But it turns out that before European explorers arrived, there was a lot already going on in the Americas! Today, we are taking a look back in history at what New York was like hundreds of years ago, before European explorers arrived.*

Inquiry Activity One (15 minutes)

- Share the reading, "The Lenape People."
- *What was surprising to you about this reading?* Take student answers.
- *What were the three farming techniques that the Lenape used in this area?* Solicit student responses. On the board, write down the three techniques: fertilizer, mounds, and Three Sisters.
- Ask students to describe why the Lenape used each of these techniques. *What did the ash do for the soil? What did the mounds do for the soil?*

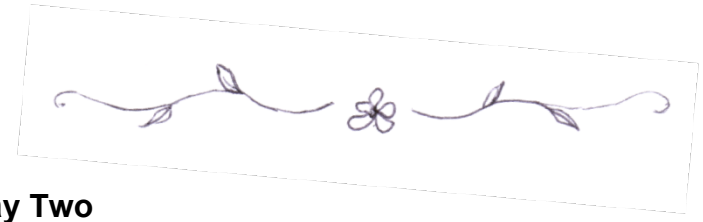
Inquiry Activity Two (20 minutes)

- *Next we're going to make skits explaining these farming techniques. What is a skit? What do skits or short plays normally have? They include dialogue (speaking), characters, a problem, and a solution or ending!* Write this list up on the board. Help them come up with examples of problems to write a skit around. M*aybe you are a new gardener and your plants aren't growing very well and you need a Lenape farming expert to help show you how to grow healthy plants!*
- Divide students into groups of 4. Assign each group one of the farming techniques to create a skit about. Make sure the groups know that each student has to have a role in the skit.
- Give each group a blank piece of paper, pencil, and clipboard to write down some of their ideas.
- Circulate and help students to create skits.

Closing Circle (10 minutes)

- If time share skits, or ask classroom teachers if they are interested in continuing the activity back in their classrooms
- Share a seasonal tasting.
- *Good job everyone, I loved your skits, thanks for acting out why all these farming techniques are so important, that's why we still use them here in our garden!*

Adapted from Mannahatta: A Natural History of New York City.



Procedure: Day Two

Opening Circle (10 minutes)

- *Who can remember some of the farming techniques that the Lenape used? Who can remember the reasons for these techniques? Do we use any of these techniques in our garden?*

Garden Job (30 minutes)

- Lead students in a gardening job. Try to have it tie in with one of the Lenape techniques: amending soil, planting in mounds, companion planting, etc.

Closing Circle (5 minutes)

- Ask students to make connections between the Lenape techniques and the gardening job they did.
- *When we care for our garden in this way, we are taking care of the land in some of the same ways as the Lenape did.*

Common Core State Standard Extensions

ELA, Grade 4, W1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

- Students can extend the work from their skits and create a persuasive poster or paper convincing new gardeners to use Lenape farming techniques.
- The above can take the form of a "letter to the editor."

Adapted from Mannahatta: A Natural History of New York City.

Other Extensions

Math: Add math to your persuasive writing. Let's say, hypothetically, that the Lenape techniques will produce four times more food for the gardeners. If the gardeners originally grew 25 pounds of turnips, 18 pounds of beet, and 34 pounds of cabbage, figure out how many they will grow once they switch to the Lenape methods.

Social Studies: Have students do further research on the Lenape people, as well as any other Native people who lived closer to your region. What food did they eat, what were some of their traditions and what sort of class structures did they live in? Have students share what they learned with the class.

The Lenape People

What were North and South America like before European explorers arrived? Some might guess that it was an empty place where no one lived. Before European explorers arrived, there were 20 million people living in North and South America! These people had been living in America for at least 14,000 years.

The tribe that lived in the area that is now New York City were called the Lenape people. The Lenape people lived in all parts of New York City and moved from place to place. They might have gone to the island of Manhattan in the summer to hunt and collect wild plants. In the winter, they might have gone back to their warm longhouses in Brooklyn or Queens.

The Lenape people got their food in many ways. They gathered wild foods, like chestnuts, cherries, plums, and berries. They hunted deer and caught many types of fish, clams, and oysters. They also were farmers and grew their own food.

First, in April, the Lenape would burn a small part of the forest. This would make space for them to grow their food. The ash acted as a natural form of fertilizer, which made the soil very rich and the plants that grew there very healthy.

Then, in May, the Lenape would build mounds. The Lenape planted their vegetables in mounds, rather than a flat garden bed, which helped prevent soil erosion.

Finally, in June, the Lenape would plant the Three Sisters. The Three Sisters were corn, beans, and squash. Corn, beans, and squash were plants that grew well together in New York. They were also plants that helped each other out. The corn grew tall and made a pole for the beans to climb. The beans helped make the soil healthy for the corn and the squash. And the squash kept pests and weeds away from the beans and the corn.

When corn, beans, and squash were harvested, they did not have to be eaten right away. They could be preserved, which meant they would not spoil for a long time. The Three Sisters could be kept and eaten throughout the cold New York winters.

Unfortunately, the Lenape people were not able to continue their way of life in New York. The Lenape had to move away when the Europeans moved onto their land. Many Lenape people got sick and died from European diseases. There are 16,000 Lenape people still alive today. There are many thousands more people today who have Native American heritage.

Adapted from Mannahatta: A Natural History of New York City.

When we garden and take care of the earth, we can remember that we are doing the same thing that people have been doing in New York for thousands of years. Even today, we use some of the same techniques that the Lenape used to help the soil and grow their food.

Squanto's Ad Agency

Aim
Students will learn about the legacy of Native American agriculture.

Summary
Students read a story about Squanto, detailing the agricultural techniques he taught the English, and do garden work using Native American methods.

Standards
CCSS: ELA, Grade 4, W 1: Write opinion pieces on topics or texts supporting a point of view with reasons and information.

NYS: Social Studies, 1.1a: Know the roots of American culture, its development from many different traditions, and the ways people from a variety of groups and backgrounds played a role in creating it.

Materials
- Dry erase/chalkboard and markers
- The First Thanksgiving reading
- Paper
- Crayons or colored pencils
- Tasting

Vocabulary
- Squanto
- amend
- fertilizer
- mound
- erosion
- persuasive

Procedure: Day One
Opening Circle (5 minutes)
- *Has anyone heard of a Native American named Squanto? Today we are going to tell his story.*

Inquiry Activity One (15 minutes)

- *When the English first came to what we now call the United States, they did not know how to grow food, and many people starved. We are going to talk about what happened next.*
- Pass out the reading to students, and have them follow along as you read the story of "The First Thanksgiving." If you or they are up for it, you can have them pantomime various parts after they are read. When the reading is done, ask for students' feedback to the story. *Why did Squanto place a fish beneath his planting mound? This was his people's way of fertilizing the soil. How do we fertilize our garden soil?*
- On the board, write out the three techniques that Squanto taught to the colonists: using fertilizer, planting in mounds, and planting Three Sisters gardens. Explain why each of these techniques is beneficial in the garden.
-

Inquiry Activity One (20 minutes)

- Tell students that they are going to pretend that they are members of Squanto's advertising agency. *You are trying to spread the word to colonists about the best farming techniques to use in the New World.*
- *In order to do this, you will need to use persuasion. Who can explain what it means to be persuasive or to persuade someone*
- *Pick one of the techniques you learned about in "The First Thanksgiving" and create a poster which:*
  - *Explains the technique*
  - *Explains why the technique will help colonists grow food*
  - *Convinces your fellow colonists to try the technique—remember that people are sometimes reluctant to give up what they know—how can you persuade them that Squanto's way is better? Be creative.*
- Circulate and help students to create posters

Closing Circle (10 minutes)

- Share out student posters.
- Share a seasonal tasting.

Procedure: Day Two

Opening Circle (10 minutes)

- *Who can remember some of the farming techniques that Squanto taught the colonists? Who can remember the reasons for these techniques? Do we use any of these techniques in our garden?*

Garden Job (30 minutes)

- Lead students in a gardening job. Try to have it tie in with one of Squanto's techniques: amending soil, planting in mounds, companion planting, etc.

Closing Circle (10 minutes)

- Ask students to make connections between Squanto's techniques and the gardening job they did.
- *This is the wisdom that Native Americans passed on to colonists a long time ago. Without this gift, colonists may not have survived these early days in America.*

Common Core State Standard Extensions

ELA Grade 4, W 1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

- Students can extend the work from their advertising posters, writing a persuasive essay about why Squanto's techniques will help the Pilgrims increase their harvest.
- The above can take the form of a "letter to the editor" to a colonial newspaper.

Other Extensions

- Math: Add math to your persuasive writing. Let's say that Squanto's techniques will produce four times more food for the settlers.* If the settlers originally grew 25 lbs. of turnips, 18 lbs. of beets and 34 lbs. of cabbage, figure out how many they will grow once they switch to Squanto's methods. (*4x figure is made up.)
- Have students research the Patuxet people (Squanto's tribe) as well as any Native people who lived closer to your region. *What food did they eat other than corn, what were some of their traditions, and what sort of class structures did they live in?* How students share what they learn with the class.
- Have students write a version of the Thanksgiving story from the point of view of the Native Americans.

Squanto Reading

The First Thanksgiving:
What We Learned from Native Americans

1. For most of us today, Thanksgiving is a time to eat delicious food and celebrate with family and friends.

2. Many of us also take time during our meal to do what the name of the holiday suggests: to give thanks for something in our lives. Think for a moment about something you are thankful for.

3. The first Thanksgiving was also a special meal and a time for giving thanks. It was celebrated in Plymouth, Massachusetts in the fall of 1621. It was a way for English men and women, who were called Pilgrims, to thank the Native Americans for saving their lives.

4. How did the Native Americans save the lives of the Pilgrims? By showing them how to feed themselves so they wouldn't starve for a second winter. The Pilgrims' first winter in America had been very tough, and more than half of them died from starvation.

5. The Pilgrims had brought seeds with them from England, but they discovered that their seeds did not grow very well in the new land.

6. When spring finally came, the Pilgrims were worried. It was time to plant again, but how could they make sure their plants would do better this time? How could they make sure they would have enough to eat through another winter?

7. As the Pilgrims were worrying about planting their spring gardens, they were visited by a Patuxet Indian. To their surprise, he spoke to them in English!

8. His name was Squanto, and he had an amazing story to tell. Many years earlier, Squanto had been kidnapped by an English explorer and taken from his village to England—where he learned to speak English.

9. After many years in England, Squanto was able to join another group of explorers and return to his home—which was very near Plymouth, where the Pilgrims were now living.

10. When he returned to his home, he made a terrible discovery: all of his family and tribesmen had died from diseases they had caught from the English explorers. Now there were Pilgrims living where his family and friends had once lived.

11. You might think that Squanto would be very angry at these new English people he found living on his land. After all, he had been kidnapped by an Englishman and English diseases had killed everyone from his home.

12. But, instead, Squanto felt sorry for these new English people. He understood that they had suffered during their first winter and that they, too, had lost many of their family members and friends.

13. So Squanto decided to help them, by showing them better ways to find and grow food.

14. First, he showed them how to catch fish and eels from the nearby ocean. He showed them that they could preserve these fish in salt and eat them through the winter.

15. Even more amazingly, he showed them how these fish could also be buried in the soil to help the plants grow. The fish were a natural form of fertilizer, and burying them made the soil very rich and the plants that grew there very healthy.

16. Squanto also showed them how to clear the land in a way that helped the soil. Instead of just pulling up the bushes and trees to make room for gardens, he showed the Pilgrims how to burn them and return the ash to the soil. Like the fish, this ash helped make the soil healthy enough to grow plants.

17. Finally, Squanto gave the Pilgrims seeds from plants that the Patuxet and other Native Americans grew. These plants were known as the "three sisters." They were: corn, beans and squash.

18. Corn, beans, and squash were plants that could grow well in Plymouth. They were also plants that helped each other out. The corn grew tall and made a pole for the beans to climb. The beans helped make the soil healthy for the corn and the squash. And the squash kept pests and weeds away from the beans and the corn.

19. Squanto showed the Pilgrims how to plant these three plants together, and he showed them how to create mounds, rather than a flat garden bed, which helped prevent soil erosion.

20. Corn, beans and squash turned out to be delicious food that grew well in Plymouth.

21. More importantly, they could be preserved and eaten throughout the winter.

22. The Pilgrims were so grateful for Squanto's help that they decided to throw a big feast for members of the neighboring Wampanoag tribe. This feast was the first Thanksgiving.

23. Historians do not think the first Thanksgiving looked much like the meal that many of us eat today. There was almost certainly no turkey, no cranberry sauce, and no pumpkin pie.

24. We know from historical records that the Native American guests brought several deer to the feast. While the colonists would not have had any sugar to make pumpkin pie, it's possible that pumpkin or other squash would have been part of the meal, along with the beans and corns the colonists had learned out to grow. Fish and other seafood were also almost certainly part of the meal.

25. If there was corn at the first Thanksgiving, it probably wasn't served the way that most of us eat it today. Instead, the Pilgrims probably ground the kernels into corn meal, cooked the meal into a mush, and sweetened it with molasses.

26. Whatever you eat on Thanksgiving Day, it's a good time to think back to the gift of knowledge that Squanto gave to the Pilgrims.

27. And, believe it or not, we still use many of Squanto's farming methods today in our garden.

Food Miles

Aim
Students will identify parts of the world that their food comes from, understand that out-of-season food travels a great distance to get to them, and weigh the benefits of buying food locally.

Summary
Students will play a game in which they are assigned miles based on foods they choose. They will evaluate whether the winner of the game should be the team with the most or least miles based on their discussion of the impact of each kind of food.

Standards
CCSS: ELA, Grade 4, RI 7: Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

NYS: Social Studies, 3.2b: Gather and organize geographic information from a variety of sources and display in a number of ways.

NYS: Science, LE 7.1: Identify ways in which humans have changed their environment and the effects of those changes.

NYS: Science, LE 7.1c: Humans as individuals or communities change environments in ways that can be helpful or harmful for themselves and other organisms.

Materials
- Dry erase board and markers
- Food Miles map
- Food Miles chart
- Food Miles game cards
- Food Miles markers
- Seasonal tasting

Vocabulary
- food miles

- seasonal

Procedure: Day One

Opening Circle (5 minutes)

- *So, why aren't there any strawberries in the garden right now?* Using their answers if possible, explain that strawberry plants can't grow in the cold weather.
- *Is it possible to buy strawberries from the grocery store in New York in November? How do you think it is possible if they aren't growing here? Where do you think the strawberries we buy in November come from? How do they get to us? Do you ever look at your lunch and wonder, "Where did that come from?"*
- *Today we're going to learn about all the places where our food can come from.*

Inquiry Activity One (25 minutes)

- *What do you think I mean when I say "food miles"? Food miles means the number of miles that food takes to get to us. We are going to look together at a map to see some of the places that our food can come from.*
- Hand out Food Miles maps.
- *On the bottom of our map is the key, which tells what each of the numbers on our map represent. This map tells us the food miles that food travels to get to us here in New York.*
- *Let's find number one in our map. Number one is New York. Why does it say "0 miles" next to New York? If I go out to my garden and pick some food, how many miles does it travel to get to me?*
- *All the other numbers on the map represent places that our food comes from when it's not growing here. Can someone read out number two? Can anyone tell me why we can get strawberries from Mexico in April even though we can't grow them in New York?* Using their answers, if possible, explain that different places have different climates, and that we get out-of-season food from places that have warm weather when we don't.
- Have students read out the remaining numbers and locations on the key.
- Have students flip over their paper to the Food Miles chart. *What does the first column tell us? What does the second column tell us? The first column tells us when each food is available in New York, and the second tells us where the food comes from when it's not available in New York.* Pick some examples, i..e "You eat a cantaloupe in December," and have student look at their chart to figure out where it would have to come from.
- Explain: *We're going to use this chart to play a game. We're going to have two teams for our game. For each round, a representative from each team is going to pull a card from the envelope. Your team as to help you figure out if we can get that food from New York in that month, and, if not, where it would have to come from.*

- Show students the markers on the ground, if they haven't seen them already. Explain: *For each round, the representative will have to stand on the spot where that food comes from.*
- Divide the students into two teams. Have each team choose a fruit or vegetable to be the team name (i.e. Team Carrot, Team Pear).
- Ask for one volunteer from each team to tabulate the food miles on the white board, or do it yourself.
- Let one person from the first team pick a card and read the food they purchased.
- Tell the students to use their Food Miles charts to figure out the food miles of this food. Remind them that if it's available locally grown from New York, the mileage is 0. The team tabulator writes the number on the board.
- A person from the second team picks a card and reads the food they purchased. Students figure out the food miles and the tabulator writes the number on the board.
- Continue playing the game for several rounds. Ask a volunteer to add the total for each team.

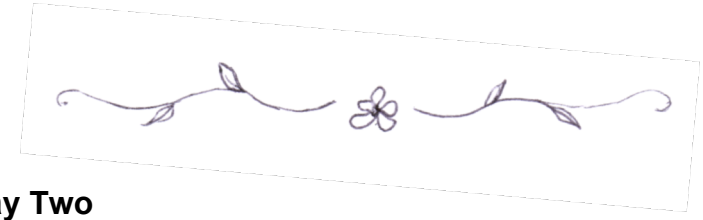
Inquiry Activity Two (10 minutes)

- *Now, we've finished the game, and we have two different scores. But which team should be the winner? What are some reasons why it might be good to have more food miles? What are some reasons why it might be good to have fewer food miles?*
- *How does our food get to us when it comes from someplace like Chile or Mexico? It has to come on a boat, plane, or truck. What do these vehicles burn and use? What is produced when vehicles use or burn gasoline? Pollution!*
- *Some people think that too many food miles might mean added pollution. But other people think that, because places like Chile or Mexico send so many fruits and vegetables on planes or trucks, that per item of food, the amount of pollution produced might not be so much.*
- Solicit additional student answers, and write up a list of pros and cons on the board. If necessary, ask them prompting questions. *Do you think food is fresher if it comes from close by or nearby? How does buying food from nearby help local farmers? If I get food from far away, can I get different things than if I just buy food from New York?*
- *There are perfectly good reasons to get food from nearby, and also good reasons to get food from far away. You are all growing up to be gardeners and cooks, so you get to decide, as adults, whether you want to get food from close by or from close away, or some combination of both.*

Closing Circle (5 minutes)

- Encourage students to think about where their food might come from during their next meal. *The next time you go to the grocery store, check the stickers on fruits and vegetables. Where are our fruits and vegetables coming from? Can you buy foods from New York in your grocery store?*

- Share a seasonal tasting.



Procedure: Day Two

Opening Circle (10 minutes)

- Ask students to remind you of what is meant by "food miles."
- Tell students that one way to get our food from nearby is to grow a garden, as they are doing.

Inquiry Activity (30 minutes)

- Explain the garden jobs of the day, and go out into the garden.

Closing Circle (10 minutes)

- Ask the students what local foods they will eventually have as a result of their gardening.

Common Core State Standard Extensions

ELA, Grade 4, Writing 1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

Students can write letters to the editor or skits or other forms of persuasive writing to persuade a chosen audience—peers, parents, etc.— of the merits of eating locally or the merits of eating food from far away.

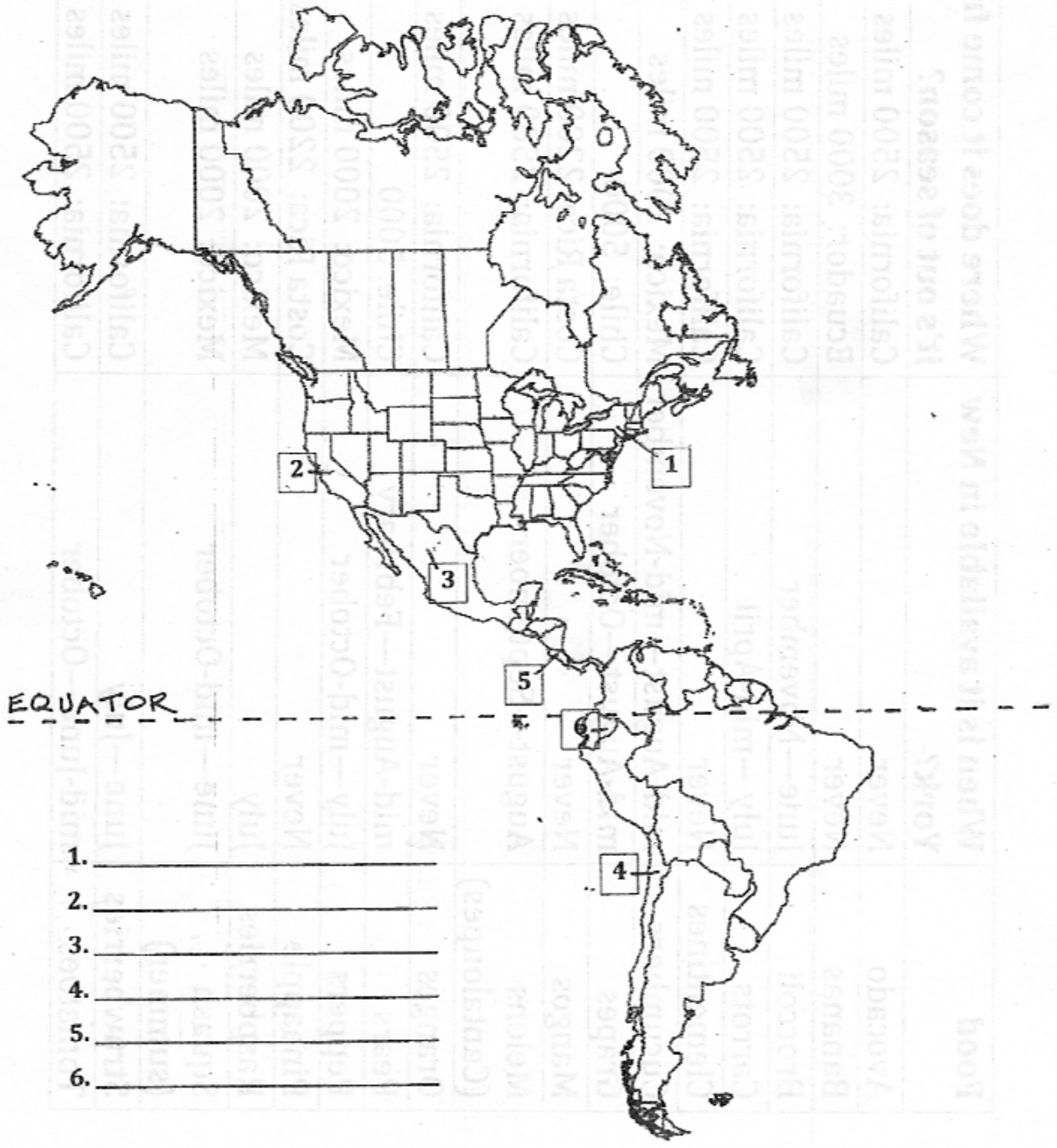
Other Extensions

Math: Using the worksheets from the garden, have students calculate the total mileage of a recent meal.

FOOD MILES MAP

- Identify each of the numbered countries that food comes from.
- Draw a line from the country to New York City.
- Label each line with the number of food miles for each country.

Look at your Food Miles List to help figure it out!



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Food	When is it available in New York?	Where does it come from when it's out of season?
Avocado	Never	California: 2500 miles
Bananas	Never	Ecuador: 3000 miles
Broccoli	June—November	California: 2500 miles
Carrots	July—mid-April	California: 2500 miles
Clementines	Never	California: 2500 miles
Cucumbers	mid-August—mid-November	Mexico: 2000 miles
Grapes	mid-August—October	Chile: 5000
Mangos	Never	Costa Rica: 2200 miles
Melons (Cantaloupes)	August—September	California: 2500 miles
Oranges	Never	California: 2500 miles
Pears	mid-August—February	Chile: 5000
Peppers	July—mid-October	Mexico: 2000 miles
Pineapple	Never	Costa Rica: 2200 miles
Raspberries	July	Mexico: 2000 miles
Squash (summer)	June—mid-October	Mexico: 2000 miles
Strawberries	June—July	California: 2500 miles
Tomatoes	mid-June—October	California: 2500 miles

You eat an avocado in September	You eat a banana in June.
You eat broccoli in October.	You eat broccoli in February.
You eat carrots in August.	You eat carrots in May.
You eat a clementine in February.	You eat a Mango in November.
You eat a grapes in December.	You eat grapes in October.
You eat cucumber in January.	You eat cucumber in September.

You eat melon in May.	You eat melon in August.
You eat pineapple in March.	You eat an orange in January.
You eat tomatoes in November.	You eat tomatoes in July.
You eat pears in October.	You eat pears in April.
You eat a pepper in November	You eat a pepper in August.
You eat strawberries in March.	You eat strawberries in June.

You eat summer squash in September.	You eat summer squash in January.

Winter Food from the Garden

Aim
Students will understand historically why people have preserved food.

Summary
Students will learn about why we preserve food, will learn methods by which food is preserved, and will do their own preservation project.

Standards
CCSS:ELA, Grade 4, RI1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

NYS: Social Studies, 1.2b: Recognize how traditions and practices were passed down from one generation to the next.

Materials

- Little House in the Big Woods excerpt, pp. 12-13, p. 19
- Photos from root cellar
- Jars with lids
- Carrots
- Garlic
- Apple cider vinegar
- Salt, sugar, dill seed
- Bowls
- Ladles
- Hand sanitizer
- Permanent marker, for labeling the jar
- Seasonal tasting

Vocabulary

- preserve
- seasonal
- harvest
- root cellar

Procedure: Day One

Opening Circle (10 minutes)

- *Let's think back to last month, when we were studying food miles. Why do we not grow strawberries in December here in New York? The weather here is too cold, so if we want to eat strawberries in December, we have to get them from someplace warmer. We talked last time about how food that comes from far away produces pollution as it travels.*
- *But now I'd like you to close your eyes and imagine that you live right here in Brooklyn about 200 years ago. There are no trucks, no planes, no electricity, and no way to get your food from a place like Mexico or Chile. Maybe you're a farmer. It's getting cold, and you need to feed your family. What do you give them to eat? How do you make sure it isn't spoiled by the time spring arrives? Take student answers until you arrive to the idea of preserving food.*
- *What are some ways that we preserve food today? If necessary, prompt students with some ideas. I'm thinking of something made of fruit that we spread on bread with peanut butter. What is it?*

Inquiry Activity One (10 minutes)

- Read the part in Little House in the Big Woods in which Laura describes the attic, full of food that is stored for the winter, pp. 12-13, p. 19 (and picture, p. 20)
- *What kind of food do you think might keep for a long time? What might damage your food if you store it? How can you prevent that kind of damage? How can we make sure we can get to our food even if there's a big snowstorm?*
- Pass out pictures of root cellars and get students to share their observations about what is being kept, etc.
- *Remind me again why we like to get our food from as close by as possible. What are some of the disadvantages of getting our food from far away? How does preserving food allow us to eat more food from nearby? That's right – by preserving our food for the winter, we can eat food from our garden even when it's not growing!*

Inquiry Activity Two (20 minutes)

- *Today we're going to make pickles to preserve the food from our garden!*
- Ask students to name some of the ways by which food is preserved: drying, putting in jars, storing in a cellar, etc. Explain that, like with cucumber pickles, our pickles are preserved with salt and vinegar.
- Pass around some of the ingredients that students will be using in their preserving recipe: garlic, carrots, vinegar, dill. Ask students to use their senses, especially smell, to see if any of these ingredients are familiar. Connect the preserving recipe to other recipes: *Have you ever used vinegar before in cooking? How about in a salad dressing?*

- Enumerate the steps that students will be doing to make their pickles: filling the jar with cut carrots; ladling brine into the jars to fill them; and closing and labeling the jar.
- Divide students into two groups, to do the same job simultaneously. Sanitize students' hands prior to starting work.
- If you have limited materials or space, have each half of the class make one jar of pickles. Have students line up to each put a piece of carrot into the jar from the bowl. Rotate through until all students have a chance. Then have students rotate through to each ladle a small amount of brine into the jar. You may want to portion the amount of brine in the ladle for them, to ensure that each student has a chance. Choose one student to close and label the jar at the end.
- If you have sufficient materials and space, you can put students into small groups of 3-4 to do this project. Assign one student to do each job, or have students take turns filling carrots and filling brine.
- Alternately, do a similar preserving job. Some options might include making simple cheese, yogurt, jam, or dehydrating fruits or vegetables.

Closing Circle (10 minutes)

- *Who can remind us of why we preserved our food? What was the method we used to preserve our food?*
- *You're going to taste our preserved food next month! Do you think it will be good? How do you think it will taste different? What dishes do you think we can make with our stored winter foods?*
- If possible, have students do a tasting of the food (i.e. blanched carrots) as it is before it is preserved, so that they can compare later.

Common Core State Standard Extensions

ELA, Grade 4, Writing 2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- Students pretend they are leading an expedition back in time to colonial New York, using a time machine. They have to write an instructional manual for their fellow travelers teaching them how to store food and explaining why this is necessary for their survival through winter.

Other Extensions

Math: Students can research where non-seasonal foods come from in New York in the winter, noting the number of miles traveled when a food is out-of-season. What foods travel the farthest? What foods came from closest to home?

What's for Dinner?
Decomposition in the Garden

Aim
Students learn how decomposition works and examine some of the most common garden decomposers.

Summary
Students will play a game in which they learn about decomposers and discern what kinds of garbage decompose. They will examine compost to look for decomposers and items which have partially decomposed.

Standards:
CCSS: ELA. Grade 4, RI 4.3: Explain events, procedures, ideas or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

NYS: Science, PS2.1d: Soil is composed of broken-down pieces of living and nonliving earth material.

Materials

- empty compost bucket
- bucket of finished compost
- Decomposer cards
- "What's for Dinner?" cards
- Hat
- Trays with compost for students to examine
- Compost checklist

Vocabulary

- Decomposer
- Decomposition
- Compost
- Nitrogen
- Carbon

Procedure

Opening Circle (5 minutes:

- *What if I was walking around the garden, eating an apple, and when I finished the apple I put it down and forgot about it? What would that apple look like in a day? In a month? In a year?*
- *There are many insects, animals and tiny little critters called bacteria and fungus that are constantly around us, turning things back into dirt. That process is called decomposition.*
- Define decomposition: When living things (or things that used to be living) turn back into soil.
- *What would happen if they was no decomposition? Our world would fill up with apple cores, leaves, rotten trees, etc.*
- *Sometimes people use decomposition on purpose, to turn their old food scraps and dry leaves into new dirt. We do this in our garden. Does anyone know what this called?*
- Define compost: Doing decomposition on purpose to help the garden.

Inquiry Activity One (20 minutes)*:*

- *Can anyone think of some creatures in our garden that help with turning things back into dirt? I'm thinking of something pinkish and wiggly that lives in the soil of our garden. Yes—an earthworm! In fact there are many little critters who are working as decomposers in our garden. Do you want to meet some of these decomposers? We're going to play a game show called "What's For Dinner!"*
- Have everyone practice saying that in unison: "What's for Dinner!"
- *Can I have a volunteer? You are the slug. Please go sit in the chair in front of the class.*
- Student holds up the card for the slug and reads its biography. After each bio ask: "What are some things you learned about the _____?"
- Repeat for earthworm, mushroom, pill bug and bacteria.
- *In our game show today we are going to help our decomposers decide what to eat for dinner.*
- Decomposers will put a card out of a hat and the class will help them decide whether they should eat it for dinner or not (whether it is decomposable or not). Before each drawing the whole class yells "What's for Dinner?" Time permitting, students can volunteer to share why they think it is decomposable or not. Repeat until out of cards.

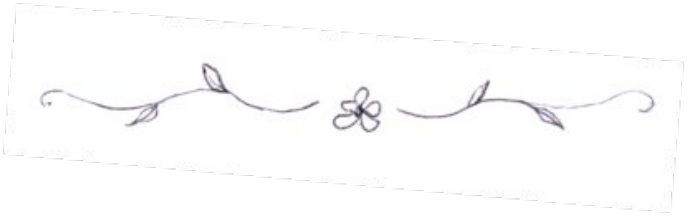
Inquiry Activity Two, Time and Materials Allowing (15 minutes):

- *Let's take a look at some compost from our garden and see if we can find any examples of decomposers or the things they ate for dinner.*
- Hand out compost checklists.
- Explain the checklist: *You are going to look through some compost and see if you can find any of the decomposers we just met in our game. Circle any of the decomposers you find.*

- *See if you can also figure out what the decomposers ate. Anything that comes from the green part of a plant or from food is called "greens" in the compost pile. Greens supply a nutrient called nitrogen to our decomposers.*
- *Anything that comes from the brown part of a plant (twigs, bark) or from paper or cardboard is called "browns" in the compost pile. Browns supply our decomposers with a nutrient called carbon.*
- Gather students around compost trays and have them examine the compost and fill out the checklist.

Closing Circle (5 minutes):

- *OK, now that you saw some real life compost, let's pretend we are decomposers and let's figure out what to decompose.*
- Students go around in a circle and name one decomposable thing they are going to pantomime throwing into the compost bin in the middle of the room.
- *Great now I'm going to need all of you to be decomposers: slugs, fungi, earthworms, bacteria and pill bugs. Now let's eat this compost up.*
- Have students "eat the compost" by all making loud munching noises. Remove the compost bucket and replace with the bucket of finished compost. *What happened to our objects?*
- *Over a few months in the compost pile the decomposers ate them and turned them into dirt. Thank you, decomposers. Now we can use this good dirt for our plants.*



Common Core State Standard Extension

CCSS, ELA, W.4.3: Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

- Students write a "day in the life" about a decomposer of their choice. Where do they live? What do they eat? Who are their neighbors?

January, 4th grade

Decomposer Cards

Front of Card:

SLUG

Back of Card

Slug:

Hi! I'm slug. Slugs can be lots of different colors. We can huge or tiny. I'm a lot like my cousin the snail, except that snails have shells and we slugs don't. I slide along the ground and wherever I go I leave a long trail of slime. My slime may seem gross to you but it's actually really important. That slime helps keep soil stick together. I love to eat rotten, decomposing plants. YUMMY!

January, 4th grade

Front of Card

Pill Bug

By Walter Siegmund (Own work) [GFDL (http://www.gnu.org/copyleft/fdl.html) or CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

Back of Card

Pill bug:

Hey! I'm a little grey pill bug. I love to eat the tiny fungus and bacteria that grows on rotten plants. Delicious! When it gets really cold outside, I can hibernate for long periods of time. When I get scared, I roll into a tight little ball and use my hard shell to protect myself. Some people call me "pill bug," but I have lots of other names including: sow bug, potato bug, roly poly and wood louse. But you can call me Francis!

Front of Card

Bacteria

CSIRO [CC BY 3.0 (http://creativecommons.org/licenses/by/3.0)], via Wikimedia Commons

Back of Card

Bacteria:

Oh, hi. I'm some bacteria. I'm really small. So small that you can't even see me without a microscope. But just because I'm small doesn't mean I'm weak. I'm tough! In fact, if you put all the bacteria on the planet together, we would weigh more than all of Earth's people and animals combined. Bacteria are in all soil, quietly munching away on rotten stuff. I have a super special important job, too. I help all the nutrients from the decomposing plants get back into the soil so that other plants can use them. I'm a super composter!

Front of Card

Mushroom

Back of Card

Mushroom:

Hello, I'm a mushroom. I'm not a plant or an animal; I'm a totally different kind of living thing called a fungus. Mushrooms like me come in many shapes, sizes and colors. Sometimes I grow on the sides of an old tree and munch on the rotting bark. Tree bark is a great snack. You should try it sometime. Well, maybe not if you're a human. I like to eat rotting trees and leaves. I'm a huge part of decomposition. Some mushrooms are edible for humans. But please don't eat me!

January, 4th grade

Front of Card

Earthworm

By Luis Miguel Bugallo Sánchez (Lmbuga Commons)(Lmbuga Galipedia) Publicada por/Publish by: Luis Miguel Bugallo Sánchez (Own work) [GFDL (http://www.gnu.org/copyleft/fdl.html) or CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0/)], via Wikimedia Commons

Back of Card

Earthworm:

Hello there, I'm a red, wiggly earthworm. I have a super long stomach that goes all the way from my mouth to my bottom. I don't have any bones in my body. That makes me really bendy and able to squeeze into the ground. I have a very important job in the compost pile: I love to eat tons of old fruits, vegetables and plants and turn them into soil. When I slide into an apple to snack, I love to bring my decomposer friends with me so we can all eat together. Sharing is caring!

January, 4th grade

“What’s for Dinner?” Cards

Plastic Bottle

By Mj-bird (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

Apple Core

Roberta F. [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

Glass Cup

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Tree Bark

By Tomwsulcer (Own work) [CC0], via Wikimedia Commons

Grass

"(Unmowed) grass 6" by Natubico - Own work.
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http://commons.wikimedia.org/wiki/File:(Unmowed)_grass_6.JPG#mediaviewer/File:(Unmowed)_grass_6.JPG

Metal Fork

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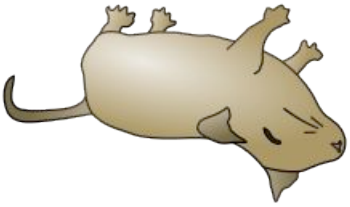
Newspaper

Dead Mouse



"Dead mouse". Licensed under CC BY-SA 3.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Dead_mouse.svg#mediaviewer/File:Dead_mouse.svg

Penny

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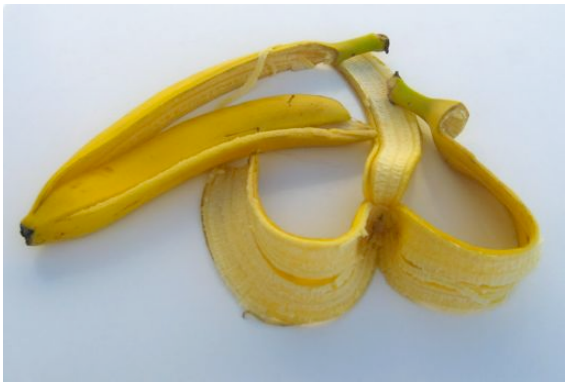
Banana Peel



"Banane-A-05 cropped" by Priwo - photo taken by de:Benutzer:Priwo.
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edible schoolyard nyc

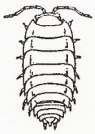
Do we have everything we need to make COMPOST? Check the box if we have this compost ingredient and circle and decomposers that you see:

1. Decomposers (FBI) ☐

Centipede
By J. STERLING KINGSLEY [Public domain], via Wikimedia Commons

Earthworm
By Pearson Scott Foresman [Public domain], via Wikimedia Commons

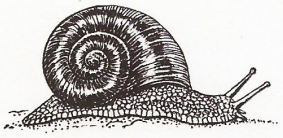
Slug
By William Greene Binney (1833-1909; U.S.A.) [Public domain], via Wikimedia Commons



Sow Bug
Public Domain via Wikimedia Commons

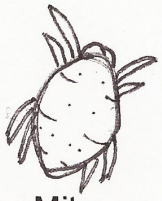
Spider
Published by D. Lothrop Company, Public domain], via Wikimedia Commons

Ant
By Pearson Scott Foresman [Public domain], via Wikimedia Commons



Snail
By Pearson Scott Foresman [Public domain], via Wikimedia Commons

Millipede



Mite

2. Greens (Provides nitrogen so the decomposers can multiply) ☐
3. Browns (Provides carbon so that decomposers can eat) ☐
4. Air ☐
5. Water ☐

I Ate Dirt for Breakfast

Aim
Students will understand that nutrients are the component of soil that supports plant health and growth.

Summary
Students will identify three major soil nutrients – nitrogen, phosphorus, and potassium -- and test our garden soil for these nutrients.

Standards
CCSS: ELA, Grade 4, W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

NYS: Science, LE 1.1b: Plants require air, water, nutrients, and light in order to live and thrive.

NYS: Science, LE 1.2a: Living things grow, take in nutrients, breathe, reproduce, eliminate waste, and die.

Materials

- Dry erase board and markers
- Soil samples
- NPK testing kits
- Water
- Measuring cups
- Small plastic spoons
- Soil Test worksheets
- Pencils
- Seasonal tasting

Vocabulary

- soil
- nutrients
- nitrogen
- phosphorus
- potassium

Adapted from: Life Lab, The Growing Classsroom, "Soil Doctors," p. 86-87.

Procedure: Day One

Opening Circle (5 minutes)

- *I think every single one of you ate dirt for breakfast. Does anyone here think they can prove me wrong?*
- Have students describe what they ate for breakfast and, using the whiteboard, trace each item back all the way to the soil that the plants grew in.
- Notice the looks of shock on students' face. *But I had eggs and toast for breakfast. Eggs don't grow in dirt, right? Well, eggs come from chickens, and they eat grains and bugs from the soil. Bread comes from a grain, such as wheat, which we harvest from the soil. The cow eats grass, and where does the grass grow? Down in the dirt! And to add to that, soil is responsible for many of the clothes we wear and the houses we live in. What about those jeans you're wearing? You wouldn't have those if it weren't for soil.*
- Pick out the ingredients from their breakfast that can most plausibly be traced to dirt—in other words, avoid showing how chemical artificial flavors can be traced to dirt, since this is misleading. So, if there is a sugary cereal, trace the cereal, not the artificial flavors/colors. And, if you can trace a healthy choice (whole, unprocessed) use that instead.
- *Okay, so you didn't really eat dirt itself for breakfast, but everything we eat has to do with the dirt, or the soil. So soil is super important! We're going to be studying a lot about soil, starting today.*

Inquiry Activity One (10 minutes)

- *Let's start with what we know about soil. What does it do for plants? What is in it?* Take student answers.
- *Let's talk more about the question of what is in soil. If I were to dig up some soil, what might I see in it?* Take student answers. *Are there some things in soil that I can't see?* Take student answers.
- *There are definitely lots of things in soil that we can't see. Maybe there are tiny eggs, or bacteria, but there are also nutrients. When we say that our food that we eat is nutritious, it means that it has nutrients in it, and that's what makes it healthy for us.*
- Write three vocabulary words on the board: "nitrogen," "phosphorus," and "potassium." *These are the three major nutrients that plants need to grow.*
- *Nitrogen makes the plant green and helps it to grow. Phosphorus helps the roots to keep growing. Potassium helps the plant's structure be strong and fight off plant sicknesses.* You can also draw up a plant on the board and use arrows to indicate the different parts of the plant that are aided by each nutrient.
- To help students remember the different soil components, introduce the following song (to the tune of "La Macarena"). You can add hand motions as well:

  Nitrogen helps my leaves absorb light
  Phosphorus helps my roots hold tight

Adapted from: Life Lab, The Growing Classsroom, "Soil Doctors," p. 86-87.

Potassium gives me strength and might
Hey, healthy soil!

- *Why does it matter if plants grow in nutritious soil? We need plants to grow us food! And the more nutritious the soil is, the more nutritious the food is, and the more nutrients for our bodies!*
- *Plants need just the right amount of each nutrient. If they have too little, that can mean they don't grow as well. But if they have too much, that can be bad, too.*
- *Let's say that I am a plant, and I am growing in soil that has way too much potassium. And I am hungry for potassium! So I start taking up as much potassium as I can through my roots.* Mime drinking up potassium through roots, or eating a large amount of food. *Mmm, that was good! But, oh no! I got so full that I can't eat up any more nitrogen! That's a problem for me!*

Inquiry Activity Two (25 minutes)

- *Today, we are going to do a study of our own soil in the garden. We are going to see if our soil has enough nitrogen, phosphorus, and potassium.*
- Explain to students how the soil testing kits are used. Demonstrate at the front how to add the soil sample, add chemicals from the capsule, shake it up, and match the color to the correct grading level.
- You may want to pass around the demonstration kit so that students can see how to match the water color to the appropriate grading for the test.
- Show students the Soil Test worksheet. *Each of you will be testing for one of the three nutrients: nitrogen, phosphorus, or potassium. On your paper, you need to write what test you are doing and what that nutrient does for plants.*
- Show students that they need to observe their soil sample before doing the test, and that after the test, they need to hypothesize about how the plant might grow in that soil. *Let's give an example. Let's say I did a test on nitrogen, and we know that plants need nitrogen to grow leaves. And in my soil sample, there is not enough nitrogen. How might that affect the plant in my soil?* Have students share responses.

Closing Circle (5 minutes)

- Ask different groups to report back on what they found. *Did your soil have too much nitrogen, too little, or the right amount? How do you think plants would grow in your soil?*
- *We work really hard in our garden to be sure that our soil has all the things that plants need. We are going to be studying soil a lot in our next few garden classes, so stay tuned!*
- Share a seasonal tasting. *What did this tasting grow in? Soil!*

Adapted from: Life Lab, The Growing Classsroom, "Soil Doctors," p. 86-87.

Common Core State Standard Extensions

ELA, Grade 4, W7: Conduct short research projects that build knowledge through investigation of different aspects of a topic.

- From their findings, have students recommend a plan for improving the soil health in the garden. Have them research different ways that gardeners might change the levels of nitrogen, potassium, and phosphorus.

Other Extensions

Science: Do a data share with other school gardens. At each school, have students test soil in multiple sites (i.e. in the compost, in the broccoli bed, in the orchard, etc.). Students can then write a brief report about the nutrient levels in their garden soil. Then, have schools exchange data. Students can offer each other feedback on their reports.

Adapted from: Life Lab, The Growing Classsroom, "Soil Doctors," p. 86-87.

SOIL STUDY

Name: _____

What nutrient from the soil are you studying?

_____

How does this nutrient help plants growing in soil?

_____

_____

Look at your soil test. Match the color of the sample on the left with the colors on the right. What is the result of your test?

_____

Based on your test results, do you think that plants would grow well in your soil? Would plants in your soil be strong or weak? What parts of your plant might grow well or might not grow well in your soil?

_____

_____

_____

_____

_____

_____

Adapted from: Life Lab, The Growing Classsroom, "Soil Doctors," p. 86-87.

Where Does Pizza Come From?

Aim
Students will begin to understand some of the historic and geographic origins of the food they eat.

Summary
Students are visitors in a pizza "museum." They use pictures and captions in the museum to understand that pizza has a geography and a history.

Standards
CCSS:ELA, Grade 4, RI 3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

NYS: Social Studies, 2.1c: Study about different world cultures and civilizations focusing on their accomplishments, contributions, values, beliefs and traditions.

NYS: Social Studies 1.2a: Gather and organize information about the traditions transmitted by various groups living in their neighborhood and community.

Materials
- Pizza Museum exhibit slides
- Pizza Museum worksheets
- Pencils
- Clipboards
- World map
- Potato Museum reading (optional)
- Pizza tasting (or other seasonal tasting)
- Photo of Greek lagana
- Dry lasagna noodle

Vocabulary
- geography
- origins
- mozzarella
- flatbread
- ancient
- B.C.

Opening Circle (10 minutes)

- *What did we do last time we were together?* We made a lasagna garden. *Where do you think lasagna comes from? We think of lasagna as an Italian food, but lasagna may have a connection to ancient Greece. The ancient Greeks had a flat, thin bread, which they called lagana.* Show photo of lagana. *The Italians learned about lagana, which may have inspired them to create a flat, thin noodle that we call lasagna.* Show lasagna noodle.
- *But enough about lasagna. Today we're going to figure out where pizza came from. Where do you think pizza came from? New York is very famous for its pizza, but before it could get here, it had a long journey. Where did it come from before its arrival here in New York? Italy also has an important place in pizza history.*
- *Today, you will visit the pizza museum where you can explore the places that pizza came from. Just like lasagna, you may find that pizza has connections to several places around the world. Here is your pizza museum guide. Answer these questions as you look at the exhibits, and soon you will be experts on the geography and history of pizza!*

Inquiry Activity One (30 minutes)

- Give students the pizza museum guides on clipboards. Tell students that they do not need to visit the exhibits in order. However, for certain exhibits, they must read the slides in order; point out these exhibits. Tell students that when they have completed the museum guide, they can turn it over and either list or draw/label their favorite pizza toppings.
- Circulate and help as needed.
- When all students are done, gather them to discuss the answers to the museum guide.
- Have students come to the World Map to show all the places that contributed to pizza: Persia/Iran, Greece, Uzbekistan, Egypt, South America, Italy, North America.
- You can also point out that five of the seven continents contributed to pizza as we know it today: Europe, Asia, Africa, North America, and South America.
- *So where is pizza from, in the end?* You can emphasize that there is no right answer to this, that really pizza turns out to be from many different places in the end.
- *What are some pizza toppings that we could grow in the garden?*

Closing Circle (10 minutes)

- Share a pizza or tomato, basil, mozzarella tasting.

Common Core State Standard Extensions

ELA, Grade 4, W 1: Write opinion pieces on topics and texts, supporting a point of view with reasons and information.

- Write a restaurant review of a pizzeria.
- Where is pizza from? State your opinion and support it with facts from the pizza museum.

ELA, Grade 4, W 7: Conduct short research projects that build knowledge through investigation of different aspects of a topic.

- Students create a museum for another type of food of their choice, researching its origins and other interesting facts and creating exhibits.
- Students write a research paper about the origin of another type of food of their choice.

Other Extensions

- Math: Pizza fractions. You have three equal-sized pizzas. One is cut into four slices. One is cut into six slices. One is cut into eight slices. Draw the three pizzas and show the slices. Which pizza has the biggest slices? Which pizza has the smallest slices? What fraction represents 3 slices out of the 8-slice pizza? What fraction represents 5 slices out of the 6-slice pizza? What fraction represents 2 slices out of the 4-slice pizza? Shade in these fractions on the pizzas. Write the fractions in order from smallest to largest.

Name: _____

Pizza Museum: Where Does Pizza Come From?

Flatbread (#1-4): Flatbread is like an early pizza crust. ***Where*** did it come from?

Tomato Sauce (#1-4): ***Why*** was pizza sauce invented?

Pizza History (#1-7): ***What*** are the 3 main ingredients in a Pizza Margherita?

Pizza in the U.S.A. (#1-4): ***Who*** brought pizza to America?

Growing a Pizza: List or draw/label your favorite toppings in the pizza on the back of this page.

Asia

A man in Burma makes a kind of flatbread called “chapati.”

Africa

An Egyptian woman makes flatbread. Egyptians have been eating this bread since the time of the pharaohs – for thousands of years.

Iran—The Middle East

People in Iran, also known as Persia, have been eating flatbread for more than 2,000 years. Persian soldiers used to bake flatbread on their shields and cover the bread with cheese and dates. Persia is in the Middle East, where Africa, Europe, and Asia all come together.

Europe—Ancient Greece

This ancient Greek figure is putting flatbread in the oven. Ancient Greeks covered their flatbread with herbs, or ate it with cheese or honey. The people of Greece have been eating flatbread for at least 2,500 years.

Luis Egidio Meléndez [Public domain], via Wikimedia Commons

The first pizzas in Italy were not made with tomato sauce.

In fact, the people of Italy and the rest of Europe had never even seen a tomato until after Christopher Columbus landed in America in 1492.

That's because tomatoes are originally from America.

When tomatoes were first brought back to Europe in the 1500's, people did not eat them because they believed that they were poisonous. Tomatoes belong to a family of poisonous plants called nightshades.

David Hawgood [CC BY-SA 2.0 (http://creativecommons.org/licenses/by-sa/2.0)], via Wikimedia Commons

Bittersweet nightshade

By Jon Sullivan [Public domain], via Wikimedia Commons

Cherry tomatoes

But soon, poor people in Italy began to eat tomatoes because the plants produced so much food and were so easy to grow. Italians quickly realized that tomatoes are not poisonous after all!

A tomato plant can produce a lot of tomatoes in one season. It would be difficult to eat all of the tomatoes from the garden fresh – you would be very full!

So to prevent tomatoes from spoiling and going to waste, Italians started preserving the tomato harvest by making tomato sauce.

Near the end of summer, tomatoes were harvested, cooked, and stored in jars.

This way, tomato sauce could be used throughout the winter.

Giorgio Sommer [Public domain], via Wikimedia Commons

Before pizza was invented in Italy, Italian workers would buy pasta on the street and eat it with their hands.

By Civica Raccolta delle Stampe « Achille Bertarelli » 1830 (http://pizzagrandtour.posterous.com/il-pizzajuolo) [Public domain], via Wikimedia Commons

Pizza was born almost 300 years ago in Naples, a city in southern Italy. The pizza back then was flatbread with simple toppings like olive oil, tomatoes, cheese, garlic, and anchovies.

Pizza was only eaten by the working, poor people who needed a cheap food that could be eaten quickly. Pizza was sold by street vendors or in casual restaurants.

Unknown author [Public domain], via Wikimedia Commons

The pizza that we know and love today was inspired by Italy's Queen Margherita in 1889.

When visiting the Italian city of Naples, the queen heard that poor people were eating a food called pizza. She asked chef Raffaele Esposito to make a pizza for her.

By see below [Public domain], via Wikimedia Commons

Chef Esposito decided to create a pizza that looked like the Italian flag.

These are the toppings that Chef Esposito chose:

By Paul Goyette (http://www.flickr.com/photos/pgoyette/201492949/) [CC BY-SA 2.0 (http://creativecommons.org/licenses/by-sa/2.0)], via Wikimedia Commons

Basil

By Jon Sullivan [Public domain], via Wikimedia Commons

Mozzarella cheese

By Xufanc (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

Tomato sauce

The pizza that Chef Esposito made for Queen Margherita is known today as a Pizza Margherita.

Pizza continues to be a cheap and quick street food for people on the go, especially in New York City.

MULBERRY BEND, THE ITALIAN QUARTER.

[Public domain], via Wikimedia Commons

Italians began immigrating to the United States in large numbers in the early 1900's. The very first pizzeria to open in America was Lombardi's in New York City, which still exists today, in the part of town known as "Little Italy," which is pictured above.

Before the 1940's, only Italian immigrants and their ate pizza.

But soon, American soldiers started returning home World War II, and they were hungry for the pizza tha had enjoyed in Italy. Pizza's popularity skyrocketed throughout America!

Our love for pizza began to grow, and pizza began to change:

By Janine from Mililani, Hawaii, United States (do you like...pineapple? Uploaded by Fæ) [CC BY 2.0 (http://creativecommons.org/licenses/by/2.0)], via Wikimedia Commons

The “Hawaiian pizza,” topped with pineapples and ham, was created in Canada.

By Bobak Ha'Eri (Own work) [CC BY 3.0 (http://creativecommons.org/licenses/by/3.0)], via Wikimedia Commons

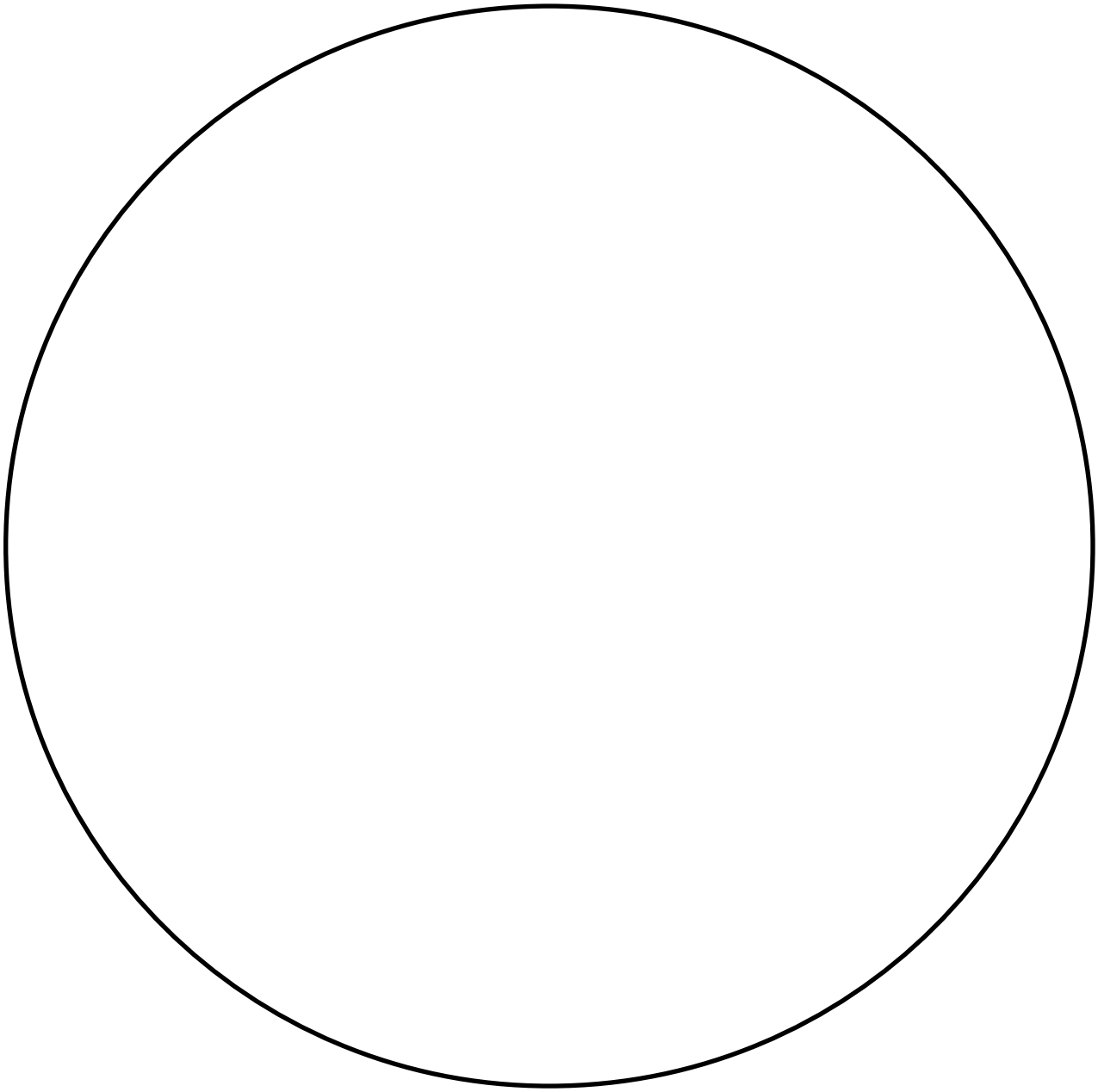
Deep-dish pizza, which looks more like a pie than a flatbread, was born in Chicago.

Pepperoni is an Italian-American sausage that became very popular in America.

Today, it is the most popular topping in America.

We can grow many pizza ingredients in our garden: wheat for the crust, tomatoes for the sauce, and lots of yummy herbs and vegetables for the toppings. This pizza is topped with peppers, eggplant, basil, and summer squash – all of which grow in a garden.

Growing a Pizza: List or draw/label your favorite toppings in the pizza.



Making Potting Soil

Aim
Students will be able to explain that different components of soil have different roles in helping plants grow.

Summary
Students will make potting soil, following a recipe and investigating the different components and their functions.

Standards
CCSS: Math, Grade 4, OA1: Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplications equations.

NYS: Science, PE 2.1d: Soil is composed of broken down pieces of living and nonliving material.

Materials

- Dry erase board and markers
- Large bins to mix soil in
- Let's Make Soil worksheets
- Pencils
- Oyster shell, kelp, perlite, coco coir, and compost, or ingredients from other soil recipe
- Cup and spoon measures
- Seasonal tasting

Vocabulary

- recipe
- perlite
- compost
- oyster
- kelp

Procedure: Day One

Opening Circle (10 minutes)

- Ask students to think of a recipe they have made. Ask for a few responses.
- Pick one of the recipes and ask if the student can remember one ingredient. If there are no student responses you can use an example of your own. Ask what would happen if you put twice as much of that ingredient in, but kept everything else the same.
- Explain that there are recipes for soil, just like there are recipes for food, and that the students will have to calculate the right amounts of all the ingredients to make sure the soil turns out right—just as in a recipe for food.
- Write up the ingredients on the board, each with a small description of what each ingredient's role is in the recipe. Have students take turns reading these out loud.
    - *Oyster shells add calcium, which helps a plant grow strong.*
    - *Kelp helps plants to grow more quickly.*
    - *Perlite helps the soil hold water and also makes room for water to drain through the soil.*
    - *Coconut fiber helps keep air in the soil for the roots of the plants.*
    - *Compost adds nutrients to the soil and beneficial bacteria.*
- Pass around cups of the ingredients for students to examine.

Inquiry Activity One (10 minutes)

- Hand out Let's Make Soil worksheets and pencils.
- Walk students through how to do the worksheet. Have students fill in the original recipe on the left column for the first part of the worksheet. Multiply each times two to get the doubled amount. Tell students that each small group will make a doubled amount of the recipe.
- Tell the group how many groups the class will have in total. Have students calculate on their worksheets how much total they will use of each ingredient.
- Have groups circle the doubled recipe at the top of the paper. Tell them these are the amounts they'll use in their soil recipe.

Inquiry Activity Two (15 minutes)

- Once the students show you a recipe with the correct amounts, they can begin to mix the soil. Rotate between groups to be sure that students are taking turns and following the recipe directions.

Closing Circle (10 minutes)

- Review the ingredients in the soil and the functions of each. Review the math they did to double the recipe and to find out how much of each ingredient the class as a whole used.

Procedure: Day Two

Opening Circle (10 minutes)

- *Who remembers any of the ingredients we used in our potting mix yesterday? Who can describe any of the ingredients?*
- *Who can remind me of what soil does for plants?* Go over answers, and make sure you get the ones you need.

Garden Job (25 minutes)

- If possible, do a garden job using the potting soil that they made. Students can transplant starts into pots, then water them.
- Alternately, do a different garden job.

Closing Circle (10 minutes)

- *What did we do to give our plants a great start in life today?*
- *Who can remind me of what coco peat does for plants? What about compost?*
- *When you come back to the garden next month, you can see how our plants are doing!*
- Share a tasting.

Common Core State Standard Extensions

ELA, Grade 4, W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- Use the basic amounts given in the classroom recipe to write a more detailed set of instructions about how to make potting soil, step-by-step, in a format that would be suitable in a "soil cookbook."

ELA, Grade 4, W3: Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

- Write a "restaurant review" of the soil from the point of view of a plant, explaining how each component of the soil is delicious and/or nutritious for the plant.

Other Extensions

Math: Calculate amounts for a triple recipe, a half recipe, etc.

Science: Make small mixtures which vary the recipe. Record your new recipes. Try growing seeds in different combinations of soil, including the original recipe. Note observations about the plants.

Name:_____

LET'S MAKE SOIL!

Recipe

- 1 spoonful oyster shell
- 2 spoonfuls kelp
- 6 spoonfuls perlite
- 3 cups coco peat
- 1 cup compost

Now—double the recipe!

_____ (original amount) x _____ (double) = _____ spoonfuls of oyster shell

_____ (original amount) x _____ (double) = _____ spoonfuls of kelp

_____ (original amount) x _____ (double) = _____ spoonfuls of perlite

_____ (original amount) x _____ (double) = _____ cups of coco peat

_____ (original amount) x _____ (double) = _____ cups of compost

Now—make the doubled recipe!

Figure out how much material we used today in total:

There were _____ groups. How much of each material did the whole class use?

_____ (doubled amount) x _____ (# of groups) = _____ spoonfuls of oyster shell

_____ (doubled amount) x _____ (# of groups) = _____ spoonfuls of kelp

_____ (doubled amount) x _____ (# of groups) = _____ spoonfuls of perlite

_____ (doubled amount) x _____ (# of groups) = _____ cups of coco peat

_____ (doubled amount) x _____ (# of groups) = _____ cups of compost

Soil Around the World

Aim
Students will learn about how people around the world are working as stewards of the land to conserve the health of their soil.

Summary
Students will read text to research the ways in which people today are conserving their soil and positively impacting themselves, their communities, and their environment.

Standards
CCSS: ELA, Grade 4, RI2: Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS: ELA, Grade 4, RI3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

Materials

- Dry erase board and markers
- Soil Museum stations
- Soil Museum worksheet
- Clipboard and pencils
- Seasonal tasting

Vocabulary

- conservation
- nutrients
- erosion

Procedure: Day One
Opening Circle (5 minutes)

- *Welcome back to garden class. We've been talking a whole lot about soil. Why is good soil so important? What happens if you don't take care of your soil and it loses its nutrients, like what happened during the Dust Bowl?* Have students recap what they remember from the previous lesson.

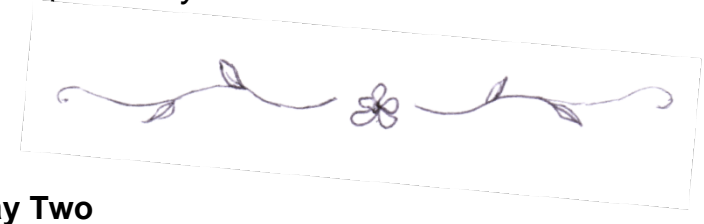
- *Unfortunately, even today, we don't always take the best care of our soil. Scientists, farmers, and politicians are worried that the way we are taking care of our soil is going to negatively impact our ability to grow food. Today, we are going to do some in-depth study about how people today are working to be sure that our soil stays healthy and rich in nutrients!*

Inquiry Activity One (30 minutes)

- *What does the word "conservation" mean?* Define conservation on the board.
- *We are going to be studying a Soil Museum today. We are going to be reading four stories about places in the world that were suffering from poor soil. As part of these stories, we are going to read about the efforts of people who are now working instead to conserve the soil – to keep is healthy and rich in nutrients.*
- Pass out clipboards with Soil Museum worksheets. Explain to students how you would like them to rotate through the stations in the Soil Museum, either independently or in groups. You may want them to read the questions for each station before going out to the Soil Museum.
- Let students circulate through the Soil Museum, researching from the readings and answering questions.

Closing Circle (10 minutes)

- Return students to the large group. Review what they learned at each of the stations.
- *What were the things that people did in order to conserve their soil? What were some of the methods that they used?*
- *We do some of these things in our garden! The next time we see each other, we're dgoing to talk more about the ways that gardeners can use these techniques today.*



Procedure: Day Two

Opening Circle (5 minutes)

- Remind students about what they discussed last time. *In our Soil Museum, what were people doing that was hurting their soil? What are some techniques that people used instead to make their soil healthy and nutritious again?*

Garden Job (30 minutes)

- Lead a seasonal garden job. If possible, make connections to content in the Soil Museum. Reference lesson plans for composting, amending, or mulching.

Closing Circle (10 minutes)

- Have students review the garden jobs that they did today.
- Share a seasonal tasting. *Thank you, healthy soil, for growing this food for us!*

Common Core State Standard Extensions

ELA, Grade 4, W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- Assign students different regions, countries, or areas to study. Have them conduct research about issues of land and soil conservation. Be sure that students also find information about how people in that place are working to conserve soil. Have students write a report or prepare a presentation on that topic.

Other Extensions

Social Studies: Take students on a field trip to volunteer with a local organization that is doing land stewardship work. This could involve cleaning up garbage, caring for street trees, or raking leaves to use for compost or mulch in a park. Help students to connect this work with soil conservation work across the world.

Soil Conservation

Aim
Students will understand the importance of topsoil and the impact of erosion, both historically and in the present day.

Summary
Students read about the Dust Bowl and conduct a demonstration of erosion. Students then do a garden job to prevent soil loss.

Standards
CCSS: ELA, Grade 5, RI3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

NYS: Science, PS 2.1d: Explore how erosion and deposition are the result of interaction between air, water, and land.

NYS: Social Studies Standard 1: Students will use a variety of intellectual skills to demonstrate their understanding of major ideas, eras, themes, developments, and turning points in the history of the United States and New York.

Materials

- Dry erase board and markers
- Watering cans
- One tray of soil
- One tray of cover crop sprouts
- Dust Bowl handouts
- Seasonal tasting

Vocabulary

- topsoil
- erosion
- cover crop
- drought
- Dust Bowl

Procedure: Day One

Opening Circle (10 minutes)

- *Let's start off today with an experiment.*
- Have one student hold a tray with soil and another student hold a tray planted with cover crops. Ask them to hold the flats at an angle.
- *What's the difference between these two trays? This experiment is going to represent two different things we can do in our garden. The first tray represents our garden if we left it completely bare all winter. The second tray represents our garden when we leave it planted during the winter with something called "cover crops." That's the kind of plant growing in the second tray.* Write the phrase "cover crop" on the board.
- *Now, we're going to see what happens when it rains on these flats. Before we do that, who would like to predict what is going to happen?*
- Once a few predictions have been made, have two more students volunteer to be the rain. The rain volunteers pour water on the two flats. Ask students to share their observations about what happened.

Inquiry Activity One (5 minutes)

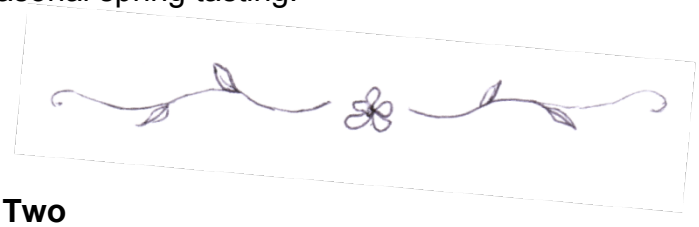
- After you get a few ideas, pull out a plant to show the mat of soil and roots underneath. *What do you see? What are the roots doing? Why do you think that less soil washed off the flat that was planted with the barley?*
- *Why do you think we call these kinds of plants "cover crops"? What are they covering?*
- *The soil in these flats—which is the soil we plant in—is called "topsoil." Who can guess why it's called that?* Solicit student answers.
- *Why would it be a problem for the topsoil to get washed away like it did in the unplanted flat?* Take student answers, *Topsoil is where the nutrients that plants need are. And, without cover crops, a whole inch of topsoil can be eroded in one year. Who can show me how much an inch is?* Using their answers if possible, demonstrate that it's the tip of their thumbs. Have the students hold up their thumbs to see an inch.
- *An inch doesn't seem like a big deal, but who can guess how long takes for nature to make one inch of topsoil?* Take some guesses. *It will take 500 years to recreate that one little inch. So, do you think cover crops are important?* Time allowing, you could ask them how nature makes topsoil, and then tell them.

Inquiry Activity Two (20 minutes)

- Hand out Dust Bowl photos, one per pair of students. Have students read the captions and discuss with their partner.
- Ask students about the photos. *What did the Great Plains look like before people started farming? What happened to all the cover crops when people started farming? What happened to the soil without cover crops? What effect did that erosion have on the land? What effect did it have on the people who lived on that land?*
- Share out responses.

- If time allows, give students a tour of cover crops in the garden.

Closing Circle (10 minutes)
- Ask students: *Remind me what would happen to the garden if we left it bare all winter? What do cover crops do for the garden?* Ask students to share their sensory observations of the cover crops and the garden.
- Share a seasonal spring tasting.



Procedure: Day Two

Opening Circle (5 minutes)
- *How do we prevent erosion in the garden?*
- *What happened during the Dust Bowl when the farmers didn't plant cover crops?*
- *Today, we are going to do a garden job to prevent erosion.*

Garden Job (30 minutes)
- If possible, have students plant cover crops.
- If you do not need to have cover crops planted in your garden, do another job that relates to soil conservation. Reference the lesson plans for amending, mulching, or composting.

Closing Circle (10 minutes)
- Ask students to share their sensory observations from their garden work.
- *Thank you for your work to conserve our soil!*

Common Core State Standard Extensions

ELA, Grade 4, W1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

- Have students write from the point of view of government officials promoting the Soil Conservation Act of the 1930s. Have students create posters, brochures, letters, or speeches convincing Dust Bowl farmers to use cover crops.

Other Extensions

Math: Have students do erosion word problems. If one inch of soil is lost a year, and it takes 600 years to make an inch of soil, how many years will it take to make up for 15 years of soil loss?

Before settlers arrived on the Great Plains in the middle of the United States, the land was covered with different grasses. Grass was a natural **cover crop,** which helped prevent **erosion.**

When the settlers arrived in the 1800s, they began to clear the natural cover crops to plant wheat.

After the wheat was harvested, the farmers left the fields bare for the winter.

In the 1930s, there was a terrible **drought** – a long period of time with no rain. This caused enormous dust storms, which blew great clouds of dust into the air.

We call this time and place in history the **Dust Bowl.**

The erosion that happened during the Dust Bowl ruined farmland all over the Great Plains, especially in Oklahoma and Kansas.

Thousands of people from Oklahoma lost their farms and homes as a result of these terrible storms. Since then, we have learned more about how important cover crops are to our land.

Food Processing Through History

Aim
Students will understand how and why we process food.

Summary
Students will process grain by threshing, winnowing, and grinding wheatberries into flour.

Standards
CCSS: ELA, Grade 4, SL1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

NYS: Social Studies, 1.2B: Recognize how traditions and practices were passed from one generation to the next.

Materials

- Dry erase board and markers
- Wheat stalks
- Wheatberries
- Old pillowcases
- Small bowls
- Mortar and pestles
- Grinders
- Grain Processing visuals
- Bread with jam, or other seasonal tasting

Vocabulary

- grain
- thresh
- winnow
- grind
- chaff

Procedure: Day One

Opening Circle (15 minutes)

- Show wheat stalks. *Does anyone know what this is? Is this what it looks like when you eat it?* Solicit student answers about what it is and how it is usually eaten.
- *This is wheat. Wheat is a kind of grain, which means it grows on a grassy plant like this. We don't eat it like this. Usually, we eat it in things like bread and cereal. Today we are going to find out how you go from this wheat stalk to bread.*
- *Today we're going to learn about processing food. What does processing mean? Processing food changes it from its original form in some way.*
- *What are some ways in which we process food, or change food?* Solicit student answers, including grinding, cutting, freezing, canning, etc.
- *What are some tools we use every day to process food?* Solicit student answers including knives, peelers, and blenders.
- *What are some reasons why food is processed? We may want to change the taste, the texture, or the appearance of food. Some foods have to be processed for us to eat them, like wheat.*
- *People have been processing food for all of these reasons for thousands of years. There are three main steps to processing grain: threshing, winnowing, and grinding.* Write these three words up on the board, and define each.
- *How did people process food before we had factories to do it? Some people today still practice the traditional ways of processing food. We're going to look at some pictures of people processing grain. Notice what tools they are using.* Pass around visuals of grain processing.
- *Today we are going to learn how to process wheat to make whole wheat flour, which can be used to make whole wheat bread. We are going to do it in a traditional way, using simple tools.*
- Split class in half – one half will do Activity 1, the other half will do the garden job. They will switch on day 2.

Inquiry Activity One (20 minutes)

- Demonstrate threshing: put the grain in a pillow case and smash it on a hard surface. Show the students how the grain and chaff separate.
- Pour the threshed grain into a bowl and demonstrate threshing. When you thresh, you blow gently on the wheat so that the chaff blows away but the wheat stays in the bowl.
- Demonstrate grinding the grain with a mortar and pestle.
- Demonstrate further grinding the grain with a grinder.
- Assign jobs: one group threshing, one group winnowing, one group using mortar & pestle, one group using grinders. Grinders require the most adult supervision.
- Kids rotate through the 4 jobs so they each try every job. Divide the time you have into four segments. At the end of each segment, move the students. Threshers go to winnowing, winnowers go to mortar and pestle,

mortar and pestlers go to grinding, grinders go to threshing, etc. Collect the finished ground flour into bowls for later.

Garden Job (20 minutes)

- Lead students in a seasonally appropriate garden job. Make connections to processing, if possible. Reference lesson plans for watering, planting, transplanting, or other appropriate garden jobs.

Closing Circle (10 minutes)

- Have both groups share out what they did today, making connections if possible.
- Show the flour that students made today.
- *What did you think of the process of making grain into flour? Was it hard work? It takes a lot of seeds to make flour! Now, every time you have cereal, bread, or something else with wheat, you'll know all the steps it has to go through to become food for us.*
- Share a tasting of bread with jam, or some other seasonal tasting, preferably grain-related.

Procedure: Day Two

Opening Circle (10 minutes)

- *Welcome, students. Can anyone remind me what we did last time?*
- Have students who did the grain processing activity last time explain the three major steps: threshing, winnowing, and grinding.
- *Remind me again, why do we have to process grain? What are some of the reasons why we might process food in general?*
- Switch groups from the previous day.

Inquiry Activity (30 minutes)

- Have students switch activities so they can try the one they did not try the day before. (Please see above for lesson plan instructions.)

Closing Circle (5 minutes)

- Have students share out their experiences from both groups, making connections if possible.
- Thank students for their good work in the garden today.

Common Core State Standard Extensions

CCSS, Grade 4, W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- Have students write a picture book or comic book about processing grain. They should explain why grain needs to be processed and show each of the three major steps.

Other Extensions

Social Studies: Have students research the ways in which grains have traditionally been processed in different countries or geographic regions. What are the most commonly grown grains in each area? How have those grains been traditionally processed? How are they traditionally eaten? Have students do research and present, either orally or with visuals.

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