Kindergarten

NUMI®
FOUNDATION
Celebrating People, Planet & Possibility

Kindergarten gardening is a basic introduction to everything garden-related. The goal for this curriculum is that students will finish the year with a general understanding of the rhythms, cycles, and interactions within a garden. This year provides an important foundation for lessons and discoveries to come.

At the end of the year, students will be able to articulate the general cycle of the seasons, and the associated changes in nature. They will be able to discuss the nutrient cycle, and the basic life cycle. Students will be versed in the importance of composting and recycling, and will know how to identify common garden plants and animals. Continually encourage students to touch, feel, smell and ask. This sensory input will guide them through their thinking. Find the activities that you and your students love, and keep coming back to them.

The Numi Foundation is deeply grateful to the writers of open-source materials for their contributions and inspirations to this curriculum.

Table of Contents

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Welcome to the Garden

STANDARDS
K.SL.6

OBJECTIVES
- Students are introduced to the garden
- Students learn about what takes place in a garden
- Students create their rules for the year

MATERIALS
- Large poster board
- Markers

Preparation:
The kids are going to develop their own agreements for how to use the garden. While the students should establish their class agreements of how to respect the garden and each other, there are some safety rules that you need to decide on beforehand and explain. (For example, always walk, always ask permission to use tools, always ask before harvesting). Also decide if you want to allow students to touch bugs or not, and be prepared to stand by your decision. Think about what rules you want to establish and be ready to explain and practice them.

Background Information:
It is important to establish that the garden is a special place, and emphasize that it is a classroom even though it is outside. Procedures for staying safe in the garden must be established on day one!

Procedure:

- Students come into the garden for the first time, and sit in a circle.
- Students are asked to describe what they see.
- "What is a garden? What happens in a garden? Who and what lives in a garden? How can we take care of the garden?"
- "What rules can we agree on to make sure we take care of the garden and each other?" List student responses on the poster board.
- Students sign the poster board (Review these garden rules before entering the garden in following weeks).
- Students explore the garden, practicing the rules they just learned.

Wrap up:

Teacher shows students where to line up at the end of class.

Notes/Feedback:

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Garden Journals

MATERIALS
- Journals, pencils

Preparation:
Review garden rules before going outside.
Think about the procedures you would like to establish around journal-writing.

Procedure:
- Students enter and explore.
- Gather students. Distribute journals, “These are your garden journals. We will be using them to draw, and to write. Take good care of them. Now take 2 minutes to find something you want to draw.”
- Discuss procedures around journaling—where students can sit, what they can do when they are done, and so forth.
- Students should find something beautiful and draw it.
- Share and discuss drawings.

Wrap up:
Return journals.

Notes/Feedback:

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Garden Names

STANDARDS
K.SL.6, K.W.8, K.L.5.a

OBJECTIVES
- Review and practice garden rules
- Students are oriented to different places in the garden
- Learn the names of garden tools and objects

MATERIALS
- Class agreements poster from Lesson 1
- Garden tools: watering can, shovels, trowels, gloves, etc

Preparation:
Gather your garden tools and have them ready in your classroom circle.

Background Information:
Students practice their rules, and learn the names of garden locations and tools.
They also begin to develop a routine their classroom rituals.

Procedure:
- Students sit in opening circle
- Students and teacher review rules from the class agreements, and after each one, students get up and practice

- Organize the students in a line, and walk them through the garden. Name each place in the garden, and have them repeat it. (e.g. Bed 1, Bed 6, the Nursery, the Apple Tree)
- Students return to their circle. Tell the students to go explore the garden, and when students hear the gathering signal, the Teacher will tell them where to meet: "We are going to practice exploring the garden safely, and then gathering as a class. When you hear me clap like this (demonstrate), you repeat my clap. (Practice). When we do this, your eyes and ears are on me. I will tell you where to meet, for example, at bed 1 or at the tree. Let's practice". Repeat, until students move through this ritual easily. The last time, have them meet you in your opening circle.
- "We learned the names of the different places in the garden, now we are going to learn the names of all the tools and objects in the garden." Teacher names tool, and students repeat. Teacher can choose to pass the tools around, and teach how to properly hold them.
- "We have more parts of the garden to learn, we are going to walk in a line and learn their names, too" Students line up behind teacher, who walks the students through the garden. Again, repeat after the teacher. (e.g. Soil, garden bed, hose, worm box, etc)
- Check for understanding: Students return to circle. Teacher tells students to touch the soil, and then does gathering signal. Repeat with different prompts (e.g. garden bed, watering can, etc).

Wrap up:
Return all materials.

Notes/Feedback:

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Naming and Drawing

STANDARDS
K.W.3

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students have extended explore time. Have them practice meeting you at different places in the garden. Push them to use the correct names for places in the garden, and to describe what they are seeing.
- In their journals, students draw themselves using a tool.

Wrap up:
Return journals.

Notes/Feedback:

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Color Matching Game

STANDARDS
K.SL.6, K.L.5.c, K.SL.1

OBJECTIVES
- Learn about seasons
- Discover colors in the garden

MATERIALS
- Planting a Rainbow by Lois Ehlert
- Paint chips or colored construction paper, cut into squares

Preparation:
Gather your paint chips from a hardware store, or a store that sells paint. Cut the strips into squares. Alternatively, you can cut out squares from different colored construction paper.

Background Information:
This lesson introduces that the season is fall, and the assumption is that students are learning about the seasons inside their classroom as well.

Procedure:
- Students sit in opening circle.
- "Every day that we come into the garden, we will begin by exploring. When I gather you, we will sit in this circle. I will ask you what the season is, what the weather feels like, and then we will recite a poem. It will sound like this: "The season is fall, and

the weather is feeling _____ today." Now, we will learn this poem, and recite it every gardening class until it is no longer fall."

- Teach the poem. This can be done as "repeat after me" until the students know the poem as well.

Here is a tree with its leaves so green
(stretch arms out)
Here are the apples that hang between
(clench fists)
When the wind blows, the apples will fall
(drop arms)
Here is a basket to gather them all.
(interlock fingers)

- "Today we are going to look for the different colors in the garden. Let me tell you a story."
- Read "Planting a Rainbow". It is fun to have students name the colors with you. Also, this book mentions several garden tools and materials. See if they can name them.
- Tell the students this story, adding or changing details as you see fit: "A long time ago, when I was very little, I was on a walk through this neighborhood, not far from here. It was raining, hard at first, and then gently. When the clouds pulled apart, the sun came out and in the distance, I saw a beautiful rainbow. It was the most beautiful rainbow I had ever seen, and it seemed so close. I began to run towards it, faster and faster, I really wanted to touch it. No one had told me that you're not supposed to touch rainbows. I got so close to it I could barely see and reached out my hand and……the rainbow exploded into millions of pieces! I caught some of the pieces in my pocket (pull out paint chips). The pieces that I didn't catch landed in the garden, making it beautiful and bright. Can we find all the colors in our garden?"
- Hand each student a color and ask them to match it to something in the garden (living or nonliving, as long as it's not someone's clothes). For more common colors, like green, you can challenge students to find multiple things that are green. When they have found their color, have them trade.
- Gather students, and as a whole class find one plant or object of each color.

Wrap up:
Have students return paint chips to you.

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Taking Turns

STANDARDS
K.W.8

MATERIALS
- Garden tools

Preparation:
Gather different garden tools and objects in the opening circle.

Procedure:
- Students enter the garden and explore.
- In opening circle, hold up different tools and objects and ask students to name them.
- Have kids role play a scenario in which two students want to use the watering can at the same time. Be as explicit as possible, coaching students to say things like “May I use that when you’re done?”.
- Do multiple scenarios. (For example: There is a ladybug in the garden and 5 students are trying to see it at the same time, There is an ant crawling on your arm, what do you do? There is a bee flying nearby, what do you do with your body?)
- In their journals, students find a plant with 3 colors on it, and draw it.

Wrap up:
Return journals.

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Tree Anatomy

STANDARDS
K.W.3, K.ESS3.1, K.SL.1, K.ESS2.1, K.ESS2.2

OBJECTIVES
- Students can identify the parts of the tree
- Students can describe a tree's colors
- Students learn to draw a tree

MATERIALS
- Season Drawing printed template
- Clipboards, one per student
- Pencils, crayons

Background Information:
Deciduous trees are those originally from colder climates, and lose their leaves in the fall and winter. Coniferous trees have leaves year-round.

Preparation:
Before this activity, find a deciduous tree, preferably in your garden. Ideally its leaves are changing color, and it's a fruit tree. Choose carefully, because students will draw this tree as it changes through the seasons, and visit it frequently to notice and discuss its changes.
Then, make a drawing sheet similar to the one that follows, and make enough copies for students in your class.

Fall	Winter
Spring	Summer

Procedure:

- Students enter garden and explore
- Gather students in opening circle. Check in about the season and weather.
- Recite the fall poem.
- Meet students at the tree that you have chosen. Learn its name. Have students point to the roots, trunk, branches, leaves. Let them observe its colors, and the state of the leaves. Tell them to remember these colors, because they are about to draw.
- Explain "Right now the season is fall. Trees change throughout the seasons, and right now we are observing one big change, that the leaves on many trees are changing color and falling off. We are looking at the _(name of tree)__, and we are going to draw it all year long."
- Return to gathering place, and distribute materials: One clipboard, sheet, pencil per student.
- Have students identify the box that says fall. Have them follow you, as you draw on your whiteboard. First, draw a line across the bottom of the rectangle "This represents the soil. What part of the tree is underground? (Roots!)." You draw roots, and let the students copy on their sheets. "What part of the tree comes up from the roots? (Trunk!)", and so forth. When students have finished, distribute crayons to color their work. They can color the sky depending on the weather, or draw worms underground.

Wrap up:

Gather drawings to use again later.

Self Portrait: Hot and Cold Weather

STANDARDS
K.W.3, K.ESS3.1, K.SL.1, K.ESS2.1, K.ESS2.2

MATERIALS
- Students' tree drawings
- Clipboards, one per student
- Pencils, crayons
- Journals

Procedure:
- Enter and explore.
- Students can finish their fall tree drawing if they haven't already.
- Journal prompt: It is fall and leaves are changing colors and falling. The falling leaves keep the tree warm in the winter. Draw a picture of yourself and the clothes you wear in the summer, and a picture of yourself wearing the clothes you wear in the fall.

Wrap up:
Return journals.

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Planting Bulbs

STANDARDS
K.ESS2.1, K.ESS2.2

OBJECTIVES
- Students learn what plants need to grow
- Students learn that plants have weather preferences
- Students plant bulbs

MATERIALS
- Bulbs, enough for each child to plant
- Craft sticks to mark where bulbs are to be planted
- "Planting the Rainbow", if you read it to the students two weeks ago
- Hand trowels, and watering cans
- A ruler
- Optional: Oakland planting calendar

Preparation:
Find a place for students to plant. Mark each spot with a craft stick, at least one foot apart. Have the hand trowels ready, and watering cans filled.
There are many planting calendars available online, should you choose to print one and have one on hand. This is very helpful to have when students start asking questions about when they can grow different fruits and vegetables. Planting calendars are very specific to region, to be sure to find one for Oakland.

Procedure:

- Students enter garden and explore.
- Gather students in classroom circle.
- Check in about the season and weather, recite the fall poem.
- "We have spent the last several weeks learning about how to take care of the living things in the garden, and how to respect the space. Today we are going to plant! But first, we are going to learn about what plants need to grow."
- Ask students what they need to grow. (Food, water, sun)
- "Plants are the same! They also need food to grow. They get their food from two places, from the sun and from the soil. And just like us, they need water to drink. Plants need soil, sun, water, and air to grow."
- Ask students if they prefer hot weather in the summer, or cool weather in the winter.
- "Just like us, plants also prefer different weathers. But when we are cold, we can wear a sweater. Plants can't change their clothes, so it's important to know what season they prefer before you plant. For example, tomatoes love to grow in the hot summer, and will not grow in the cold winter, even if they have enough soil, sun, water and air."
- "Today we are going to plant bulbs. Bulbs are not seeds. (Show picture of the bulbs being planted in "Planting the Rainbow). Bulbs love to be planted in the cool fall, they rest all winter, and they start to grow in the spring."
- It is helpful to draw this on the whiteboard as you talk: "Bulbs sleep all fall, and all winter. They grow little roots to drink. They know spring is coming because the soil warms up, and they start to send up leaves, and eventually a flower!"
- Before you gather students at the planting place, you can review the proper way to use a hand trowel, and a watering can. You can have them practice taking turns as well.
- Gather at the planting place, and have students find a craft stick. Have students dig a hole about 6 inches deep-the ruler is useful here. Allow them to explore their bulbs, then show them how to gently lower their bulbs, pointy side up, into the hole. Cover with soil, gently, and water thoroughly.
- Ask, "Do the bulbs have everything they need to wait until spring? Do they have soil? Do they have air? (There is air in the soil, to be sure not to pat the soil down) Are they in a place that gets sunlight? Can we be sure to water them when it's not raining?" Be sure students see that they planted the bulbs so that get everything they need.

Assessment:

Observe how students move through the garden safely, use tools properly, and gather when called. Depending on their progress, you may want to take the time to review garden procedures in the following lesson.

Wrap up:

Have students return tools to where they belong.

Watering and Coloring

STANDARDS
K.SL.1

MATERIALS
- Journals, pencils, crayons
- Watering cans

Procedure:
- Students enter and explore.
- Have students look for signs of fall: leaves changing colors, fall-colored leaves, acorns.
- Water the bulbs, if the soil is dry.
- In their journals, students can draw a plant in the garden (or in nature) getting everything it needs to grow.

Wrap up:
Share in partners.

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The Five Senses: Sight

STANDARDS
K.SL.6, K.L.5.a, K.L.5.c, K.ESS2.1

OBJECTIVES
- Students describe objects in the garden
- Students can call objects by name

MATERIALS
- Garden tools

Preparation:
Gather garden tools, and have them ready in the classroom.

Procedure:
- Students enter garden and explore.
- Students gather in opening circle, check in about season and weather and recite fall poem.
- "Today we are going to learn about the Five Senses. Has anyone heard of the five senses before?"
- "The Five Senses are five different ways we can explore the world. One way we explore the world is through our eyes. What do we do with our eyes? (We see!). Another way we can explore is with our nose. What do we do with our nose? (We smell!)" Continue with all five senses. You can have students point to their eyes, or nose as you describe each sense.
- "Today we are going to focus only on our eyes. We are going to use our eyes to see everything we can in the garden. First, I am going to show you some garden tools. Raise you hand and name them, please". Practice naming garden tools.

- “Now we are going to go into the garden and look at parts of our garden with our eyes. You and a partner will try to describe different things you see.” You may want to give an example, such as “This is a sunflower. I can see that it is tall, and has green leaves. I see it has yellow petals. I see that the flower is large. I can see the stem looks fuzzy. I see an ant crawling on it.” Be clear with the students that they are going to describe everything they see, without touching.
- Put students in pairs. Line them up with their partner, and begin to walk through the garden. Every time you stop, have them turn to their partner and take turns explaining to each other everything they see. Be diligent about not letting them touch anything during this activity. Push students to come up with as many describing words as possible.

Wrap up:
Have students look for different colors in the garden. You can guide them, or not.

Notes/Feedback:

Journaling Prompt: Seeing

STANDARDS
K.SL.1

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Encourage students to use just their eyes this week.
- Have students find something in the garden that is beautiful. It can be anything they want. Have them look at it for one whole minute before letting them draw it in their journal.

Wrap up:
Share, in partners.

Notes/Feedback:

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Five Senses: Smell

STANDARDS
K.SL.6, K.L.5.c, K.W.8, K.ESS2.1

OBJECTIVES
- Students explore the garden through their sense of smell
- Students can describe different smells

Preparation:
Find the flowers and herbs in your garden that are good to smell.

Background Information:
Most herbs release their smell through their oils, which you can smell by crushing the leaves. To do this, rub an herb's leaves with your thumb and forefinger, and then smell your fingers.
Smell is the sense that connects us to memories most profoundly. Take your time with this lesson, perhaps what your students smell this week will be locked in their memories for years to come!

Procedure:
- Students enter garden, and explore.
- Gather students in opening circle.

- Check in about the season, and weather. Recite the fall poem.
- "Does anyone remember what we talked about last week? Can anyone name all five senses?"

- “Last week we used our eyes to explore. Today we are going to use our noses to explore!”
- Allow students to explore the garden on their own. Encourage them to smell flowers, trees, and especially the soil. Ask them to try to describe what they are smelling. Again, be diligent about not letting them describe things by sight or by touch.
- Bring students to the herbs and tell them “These are special plants called herbs. They are using in cooking to make food taste good. Some common herbs are mint, oregano, thyme and rosemary. People use herbs around the world. These are the herbs that we have in our garden. Herbs have oil in them, and sometimes don’t smell strong when we just smell with our noses.” Teach them to rub the herbs with their fingers, and then smell their fingers.
- Continue to allow students to explore, using this technique.
- If time permits, bring students out of the garden and onto campus to continue exploring by smell.

Wrap up:
Have students find and stand by their favorite smelling plant in the garden. Teach them the name of their favorite smelling plant.

Notes/Feedback:

Journaling Prompt: Smell

STANDARDS
K.SL.1

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter garden and explore, again, encouraging them to smell.
- In their journals, have students draw their favorite smelling plant in the garden. When they have finished, have them draw their favorite smell in the world!

Wrap up:
Share, in partners.

Notes/Feedback:

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Five Senses: Touch

STANDARDS
K.SL.6, K.L.5.c, K.W.8, K.ESS2.1

OBJECTIVES
- Students explore the garden through touch
- Students can describe what they are touching

MATERIALS
- One half of an egg carton per student

Preparation:
Find a place where students can sink their hands deep into the soil to feel its temperature.
Also, collect egg cartons, and cut them in half so they are two rows of three (not one row of six). If you don't have access to enough egg cartons, you can do this activity using a piece of paper and tape. Instead of placing their findings in an egg carton, students will tape their findings onto a piece of paper.

Procedure:
- Students enter the garden and explore.
- Gather students in the opening circle.

- Check in about season and weather. Recite the fall poem.
- "We have been talking about the five senses. Can anyone name all of them for me?"
- "We have explored by sight, and by smell, today we are going to explore with our hands, using touch."
- Have students practice how they would touch a plant, or an insect (if they are allowed to touch insects). Show them how to feel without grabbing, or harming. Show them how to hold soil without throwing or dropping.

- Allow them to explore the garden by touching everything. Encourage them to describe what they are feeling.
- Gather students and tell them they are going to be looking for plants in the garden that are soft, and plants that are rough. Distribute the egg cartons, and say “Every time you find a plant that is soft, I want you to gently tear a piece of it and put in the egg carton. You should find three things that are soft. Every time you find a plant that is rough or poky, I want you to tear a tiny piece off and put it in your carton as well. You should find three plants that are rough.”
- Demonstrate how to tear plants, and then let them do the activity.
- Gather students, and do show and tell.
- Bring students to a place in the garden where they can sink their hands. “A few weeks ago, we talked about how different plants like different seasons. Some plants can be planted in the fall, but those plants like cold soil. As gardeners, are hands are very important tools, and they help us feel the soil temperature.” Allow students to sink their hands deep into the soil, and ask them to describe what they feel. “Is it cool? Is it wet? If so, how did it get wet? If you were a seed that loved warm soil, would you be happy here?”

Wrap up:
Have students wash their hands.

Notes/Feedback:

Journaling Prompt: Touch

STANDARDS
K.W.8

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Encourage students to continue their exploration of touch. They can do a modified soil temperature test using just one finger. Test temperatures of soil in different places in the garden.
- In their journal, have students draw at least five activities that they do with their hands.

Wrap up:
Wash hands, return journals.

Notes/Feedback:

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Five Senses: Hearing

STANDARDS
K.SL.6, K.L5.c, K.W.8, K.ESS2.1

OBJECTIVES
- Students explore through their sense of hearing
- Students learn songs

MATERIALS
- Song sheets

Preparation:
Find at least two songs to teach the students. Two examples are provided below.

Procedure:
- Students enter the garden and explore.
- Gather students in the opening circle.
- Check in about season and weather. Recite the fall poem.
- "We have been talking about the five senses. We have explored the garden through our (point to eyes (sight!), point to nose (smell!), point to hand (touch!). Today we

are going to explore with our ears. We are going to listen, and try to hear everything in our garden. And then we are going to learn some songs.

- Have students close their eyes and sit silently for 30 seconds. Afterwards, have them raise their hands to say what they heard. It could be anything from a person walking by, to a car, or a bird. If there is a breeze, ask if they can hear the breeze blowing in the leaves. Ask what animals they can hear in the garden. Ask them which animals live in the garden, who we almost never hear.
- Teach students to have “deer ears”. Cup your hands and place them behind your ears. You can tilt your ears in different directions to hear better around you. “Animals do this naturally. They can stand still and move their ears to help sense what is going on around them. Why do you think an animal like a deer or a rabbit needs to always be listening to what’s around it?”
- Have students explore the garden with their deer ears. If a bird enters the garden, have students stop and point their ears towards the bird.
- Gather students. “Not only are we going to listen to what’s happening in our garden, we are going to learn songs and listen to our beautiful voices!”
- Teach students the songs you have chosen. Encourage students to close their eyes and enjoy the sound.

Notes/Feedback:

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Song Examples

I Am a Tree
I am a tree, I am a tall, tall tree.
When the winter comes, rain falls on me.
I glisten, I glisten.

I am a tree, I am a tall, tall tree.
When the spring comes, blossoms bloom on me.
I bloom, I bloom.

I am a tree, I am a tall, tall tree.
When the summer comes, the breeze blows through me.
I bend, I bend.

I am a tree, I am a tall, tall tree.
When the fall comes, apples fall off me.
They fall, they fall.

A Little Seed
A little seed, for me to sow.
A little soil, to help it grow.
A little sun, a little shower,
A little wait (pause),
And then a flower!

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Exploring Sounds

STANDARDS
K.L5.c

MATERIALS
- Watering can

Procedure:
- Students enter garden and explore. Have them focus on what they can hear.
- Sing your songs with your students.
- Water the bulbs, if the soil is dry.
- Have students try to find objects in the garden that can make music. For example, a stick beating against a bucket. Or a seed pod that rattles.

Notes/Feedback:

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Five Senses: Taste

STANDARDS
K.SL.6, K.L.5.c, K.W.8, K.ESS.2.1, K.SL.5

OBJECTIVES
- Students enjoy a harvest celebration!
- Students can describe different tastes, and can politely say when they don't like something

MATERIALS
- Cutting board and knife (if preparing food from the garden)
- Fall fruit (if buying food from the store)
- Soap, to wash hands before eating.

Preparation:
Find at least two or three plants in the garden that are ready to harvest. If there are none, or none available to you, see if you can buy fall fruit to sample, like apples, pears and grapes.

Procedure:
- Students enter the garden and explore.
- Gather students in the opening circle.

- Check in about season and weather. Recite the fall poem.
- "We have been talking about the five senses. There is only one left that we have not explored. Does anyone know what it is? What are some words we can use to describe how foods taste?"

- “This is our last lesson of the fall, and we are going to taste some fall fruits (or vegetables). These are plants that are ready to harvest now. Traditionally, many foods are ready to harvest in the fall. Different people from all over the world have celebrations this time of year. They celebrate the foods of the fall, they thank Mother Nature for providing us with everything we need, and they are grateful to rest after working long and hard all spring and summer long. Can anyone think of the festival we celebrate here in the United States, where we give thanks?”
- “We are going to celebrate the fall and use our sense of taste today.” If harvesting from the garden, you can have students watch you harvest, or you can harvest all together. Wash and cut the produce, wash hands, and let them taste the different foods.
- Teach students that if they don’t like something, they can say “It’s not for me” or “It’s not my favorite”, instead of saying it is gross or disgusting. Always thank them for trying something new. Uneaten food can go into the compost.
- During your tasting, encourage students to describe what they taste, beyond just liking it or not liking it.

Wrap up:
What was your favorite taste today?

Notes/Feedback:

Gratitude

STANDARDS
K.SL.6

MATERIALS
- Journals, pencils, crayons

Procedure:
- Enter the garden and explore.
- See if students can find plants that are ready to harvest.
- Have students find a part of the garden they are grateful for. It could be the soil that grows the food, or the tree that gives shade, or the flower that makes the garden beautiful. Have them draw it in their journals.
- If they finish early, let them draw other things they are thankful for.

Assessment:
As students are working: check in with each student one by one and ask them to name the five senses.

Wrap up:
Gather students. Each student names one thing they are thankful for.

Notes/Feedback:

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Winter

STANDARDS
K.W.8, K.SL.6, K.ESS2.1, K.ESS2.2

OBJECTIVES
- Students know that the season has changed to winter
- Students can describe the weather patterns of the winter
- Students know that some animals move to warmer places for the winter

MATERIALS
- "Animals in Winter" by Henrietta Bancroft & Richard G. Van Gelder (or something similar)
- Tools, if necessary, for garden work.

Preparation:
Prepare garden work for students to complete.

Background Information:
This is a good opportunity to make the distinction between season and weather; there can be cold days in the summer, and warm days in the winter.

Procedure:
- Students enter the garden and explore.
- Gather students, and check in about the season and weather. The season has changed to winter. Discuss the weather changes that they may have noticed. Has it

rained yet? Is it dark or light outside when they eat dinner? Discuss typical weather patterns in Oakland.

- Teach students their winter poem (which can be recited, or sung to the tune of Frère Jacques)

Winter's Coming
Winter's coming, Winter's coming.
It is dark, it is cold.
I am bundled, snug and warm.
Animals sleep safe from harm.
Sleds and snow.
Cold winds blow.

- Read the story you have chosen. Discuss what different animals do as the weather changes. Ask students what they do when the weather changes.
- Sudents explore the garden to find evidence of the change in seasons. Can they find trees without leaves? Are there many bees and butterflies about?
- Have students feel the soil, and have them describe the temperature. Ask, "If you were a seed, would you feel comfortable in the cold soil?"
- Gather students to do garden work. Explain, "As gardeners, our jobs change with the seasons. In the fall and spring we can plant. In the winter, the soil is too cold for most plants. In the winter, our job is to keep plants warm (which we will do in the coming weeks), water them when it is not raining, and to pull weeds". Explain the garden job you have prepared.

Wrap up:
Have students wash hands, and return tools.

Notes/Feedback:

Journaling Prompt: Winter

STANDARDS
K.W.3

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- See if students can find animals and insects in the garden.
- Have their bulbs sprouted? Are plants growing quickly or slowly?
- In their journals: “In the winter, many animals travel to warmer places. Draw a picture of a butterfly traveling to a warmer place. Where is she going? Draw her adventures along the way.”
- If students finish, have them draw themselves in winter clothes staying warm.

Wrap up:
Share drawings in partners.

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Winter Tree

STANDARDS
K.W.3, K.ESS3.1, K.SL.1, K.ESS2.1, K.ESS2.2

OBJECTIVES
- Students learn and draw the parts of the tree
- Students learn that trees change through the seasons

MATERIALS
- Clipboards, pencils and crayons
- The Tree Drawing that students started in Week 4

Preparation:
Organize your clipboards and Tree Drawings beforehand, it will make the transition into drawing much easier.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Recite the winter poem.
- Ask students to point to their head, then their feet, their shoulders, etc. “You have different parts of your body, and they each have different jobs. What do your hands do? Your eyes? Your legs?”
- “Just like you, plants have different parts, and each part has a job. Today we are going to focus on trees, and then we are going to draw the same tree we drew weeks ago. Can anyone name all the parts of a tree before we learn them?”

- Have students stand up, sit in their circle. Have them stand so their feet touch. “Your roots are underground, keeping you strong in the soil, and drinking water and food. Point to your roots.” Students should be pointing at the soil. “Even though you can’t see them, the roots are still there!” If there is a tree nearby, you can try to push it over, demonstrating to students that the roots keep the tree in the soil.
- “Your trunk keeps you standing straight and tall. It also pulls water from the roots to your leaves. Point to your trunk.” Students should point to their legs.
- “Your branches stretch out big and strong towards the sky (stretch out your arms) and from your branches grow your leaves (wiggle your fingers). Can everyone stretch out their branches and show me their leaves?” Repeat several times.
- “Because it is winter, we are going to drop our leaves. Can everyone show me dropping leaves?” You can have students with their fists clenched, with no more leaves.
- Gather students at the tree that you chose to draw each season. Have them point to the roots, trunk, and branches. Ask students where the leaves went. Will they grow back? Explain “Winter is a time when the earth rests. There are less hours of sunlight in the winter, and so trees hibernate in the winter as well. They drop their leaves, which take a lot of energy to grow, and focus on finding food from their roots. We will see the tree ‘come back to life’ in the spring.”
- Have students study the tree, because they are going to draw it.
- Similar to the procedure in Week 4, gather students in the outdoor classroom with their clipboards and drawings. Have them find the box that says Winter. As you draw the tree on the whiteboard, have them follow along in their box. They can draw an underground scene and a wintry sky.

Wrap up:
Have students collect materials.

Notes/Feedback:

Journaling Prompt: Trees

STANDARDS
K.SL.1

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Have them explore other plants that seem to be undergoing winter changes.
- See if they can name the parts of the tree without your guidance.
- In their journals, “If you could be a tree, which kind of tree would you be? Where would you live? What would you grow? Draw a picture.”

Wrap up:
Share in partners.

Notes/Feedback:

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Introduction to Decomposition

STANDARDS
K.SL.6, K.LS1.1, K.ESS3.1, K.ESS2.2, K.SL.1

OBJECTIVES
- Students learn two reasons why trees lose their leaves
- Students build a leaf cage
- Students are introduced to the idea that plants become soil

MATERIALS
- A bag to collect leaves
- Gloves for students while collecting leaves
- A leaf cage, which is essentially a large crate that students will fill with leaves

Preparation:
Find a tree that has dropped all its leaves, and whose leaves are still at the base of the tree. Also find another pile of leaves that you can collect.
A leaf cage can be as simple as a milk crate, or as complex as a wooden box with chicken wire. Look online for different examples. It is important to fill the cage to the top, and to observe it every time you go to the garden.

Background Information:
Decomposition is an important concept to introduce from an early age. Though it is not necessary to provide many details about what causes decomposition, it is crucial that students begin to learn that all organic matter returns to the soil. Point this out, using examples from the garden, as often as you can.

Procedure:

- Students enter the garden and explore. Have students explore the tree that has lost its leaves. You will want them to notice the first sign of budding leaves, which usually happens sometime in February.
- Gather students, check in about the season and weather.
- Recite winter poem.
- "Who can tell me what you do when you are cold?"
- Class discussion.
- "Not only can we put on warmer clothes, but we can also move inside, or move to a place that is out of the wind, or use an umbrella to protect us from rain. As people, we do many things to keep ourselves warm. Just like us, trees that lose their leaves keep themselves warm through the winter."
- Bring students to the tree that you found which has lost all its leaves. "Where have all leaves gone? They fell and now are at the base of the tree. Do you think it is warm or cool under all those leaves?"
- "One reason the tree drops its leaves is to create itself a blanket through the winter. The leaves help keep the soil warm through the coldest part of the winter. Can a tree buy a blanket from a store?"
- "The leaves will not stay there all year. Another reason the tree drops its leaves is really quite amazing. These leaves will eventually become part of the soil. They will make the soil strong and healthy, and will provide lots of food for the roots to eat in the spring. We are going to collect leaves to see how this works."
- Give students gloves, and bring them to the place where they will collect leaves. Collect leaves in a bag and bring them back to the garden. Put the leaves into a leaf cage until it is all the way full.
- "What do you think will happen to these leaves over time?" Take responses. "This leaf cage will stay in our garden and we will observe how it changes."

Wrap up:

Have students return gloves and wash hands.

Journaling

STANDARDS
K.L5.c

MATERIALS
- Journals, pencils

Procedure:
- Students enter garden and explore.
- If you have lots of fallen leaves in and around the garden, collect them and use them to cover other plants around the base. Tell students that the leaves keep the plants warm, and will eventually turn into soil that will help feed the plants.
- In their journals: “You learned two ways that a tree takes care of itself during the winter. It drops its leaves to keep warm, and to provide itself food in the spring. What are two ways you can take care of a plant? Draw yourself taking care of plants in the garden.”

Wrap up:
Share in partners.

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Compost

STANDARDS
K.L5.a, K.ESS2.1, K.ESS2.2

OBJECTIVES
- Students are introduced to the idea that plant matter becomes soil
- Students explore the contents of a compost bin or worm bin

MATERIALS
- Material from a compost bin
- Magnifying glasses (optional)

Preparation:
Students will be exploring your compost bin, or worm bin. You can pull out a shoe box's worth of decomposing material to bring to your circle if there is not enough space for students to gather around your compost bin or pile.

Background Information:
Decomposition is the process by which organic matter is broken down into smaller parts. In later grades, students will learn about the fungus, bacteria and invertebrates that are in charge of decomposing. Here, it is important that students begin to explore what can and can't decompose, and how it relates to have a compost bin at school.

Procedure:
- Students enter the garden and explore. Explore the tree and the leaf cage.
- Gather students and check in about the season, weather, the tree, and the leaf cage.
- Recite winter poem.

- “Last week we talked about how the leaves that a tree drops can turn into soil. This is called the Nutrient Cycle, which is a big way of saying that everything that was once alive becomes the soil after it has died. All plants and all leaves in our garden will one day be soil again. Why is this important? It is important because all plants need soil to live! In nature, plants are either growing in soil, or becoming soil. In the garden, we make something called compost, which turns our old, dying plants into soil for new plants to grow.”
- Allow students to explore your compost bin, or the contents of your compost bin. They can use magnifying glasses, if you have them. Ask them to describe what they are seeing and feeling. Have them use their senses, except taste of course. Allow plenty of time for this. Show them whole pieces of fruit or plants, and show them small pieces of compost. Be clear about what can go into a compost bin, and what cannot go inside.
- Perhaps students are finding worms. Let them hold them gently, and teach them how to guard them from the sun. You can tell them that worms help turn old plants into new soil.

Wrap up:
Have students wash their hands.

Notes/Feedback:

Journaling Prompt: Compost

STANDARDS
K.SL.1

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter and explore.
- Encourage students to notice how leaves that are under trees are becoming softer and smaller and are starting to break down.
- In their journals, “One way nature takes care of herself is by constantly making new soil from old plants. What is one way you can take care of nature? Draw a picture.”

Assessment:
Class discussion: What is compost? Do leaves under a tree stay there forever? What makes to old and dying plants?

Wrap up:
Take volunteers to show their pictures in front of the class.

Notes/Feedback:

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Material: What is it made of?

STANDARDS
K.W.8, K.SL.6, K.L.5.a, K.L.5.c, K.LS.1.1, K.ESS2.2, K.ESS3.1

OBJECTIVES
- Students know that an object can be described by its material
- Students know that materials can be made from plants, come from the earth, or made in factories

MATERIALS
- Tools for garden work

Preparation:
On your whiteboard, have three columns ready: Plants, Earth, and Factory.
Prepare garden work for students to do.

Background Information:
This lesson is relatively simplistic, but it is important to set the stage for the coming weeks when students learn about recycling.

Procedure:
- Students enter the garden and explore. Explore the tree, the bulbs, and the leaf cage.
- Gather students and check in about the season, weather, the tree, the bulbs, and the leaf cage.
- Recite winter poem.
- "Today we are going to learn the word 'Material'. Does anyone know what this means? Turn to your partner and try to use the word material in a sentence."

- “When we describe an object, and say what it is made out of, we are talking about the material.” Point to a watering can, “For example, you can ask ‘What material is this?’ and I would say, ‘This watering can is made from plastic.’”
- “Most materials come from the earth, and we are going to explore different materials in our garden. Can you think of some common materials we use every day?” (Metal, plastic, wood).
- Have students explore the garden, and see how many materials they can name. You may want to get them get started: “The garden beds are made out of wood. The trowels are made from metal. This bucket is from plastic.”
- Gather students. Ask them to find 10 things in the garden made from wood. Ask if they know where wood comes from. Find 5 metal objects, and 5 plastic objects.
- Gather students in the classroom area. Have them list what they found. Sort their responses into the columns : Plants, Earth, and Factory. Explain that everything wooden or paper come from a tree. Everything metal comes from the earth, and everything plastic is made in a factory. See if they can think of more examples from the garden, or classroom of things that are made from plastic, wood or metal.
- Do the garden work you prepared.

Wrap up:
Have students wash hands and return tools.

Notes/Feedback:

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Making Tiny Homes

STANDARDS
K.W.8, K.SL.6, K.L.5.a, K.L.5.c, K.LS.1.1, K.ESS2.2, K.ESS3.1

MATERIALS
- Examples of cotton and wool and a straw hat

Procedure:
- Students enter the garden, and explore.
- Continue asking about materials in the garden. See if they can find things made from multiple materials.
- Ask if plants are made of a material, or if they are just plants. Can you use plants to make other things? See if they know of anything made from plants, other than wood or paper. Show them a cotton shirt, and explain that it is made from the cotton plant. Show them something from wool, and explain that it was made from a sheep's fur. Show a straw hat, and explain how it was made from a type of grass.
- Let students collect different materials from the garden (grasses, rocks, woodchips, etc) and instruct them to build a little house for a little creature. Ask if they can think of any animals that build their homes from such materials.

Wrap up:
Go on a tour, as a class, and look at every student's little home.

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Recycling Paper

STANDARDS
K.ESS3.3, K.ESS2.2

OBJECTIVES
- Students learn about recycling paper
- Students learn the difference between reusing and recycling
- Students do a project to reuse paper

MATERIALS
- Stacks of old catalogs, magazines, brochures, scrap paper, wrapping paper, etc
- One per child: Pencils, scissors, glue, necklace-length string
- "The Giving Tree" by Shel Silverstein

Preparation:
You will need to collect your stacks of paper beforehand. You may want to do the necklace making indoors. In which case, have all of the materials organized before you go outside to make the transition easier. You may also want to have examples of finished beads to show them before they get started.

Background Information:
This lesson explores recycling paper products, and the next lesson explores recycling food by composting. If students bring up recycling bottles and cans, be sure to explain to them the basic process, but we are not going to go into depth in these lessons.

Procedure:

- Students enter the garden and explore. Explore the tree, the bulbs, and the leaf cage.
- Gather students and check in about the season, weather, the tree, the bulbs, and the leaf cage. Are there any big changes?
- Recite winter poem.
- "Last week we explored the different materials in our garden. Today we are going to focus on things made from trees. Can you name any?" See how many types of paper students can name, and see if they can list different products made from wood, from pencils to houses.
- Read "The Giving Tree" and facilitate a discussion about what the boy asked for, and what the tree gave. Ask if the tree had anything left to give at the end. "How can we take from the earth, but make sure we give back? How can be sure to not waste things we take?"
- Class discussion.
- "Have you ever heard the word Recycle? Does anyone know what it means, or heard someone use it before? What do you do when you recycle? What do you recycle at lunch? What have you seen go into a recycle bin?"
- "When we finish using paper products, we can put them in a recycle bin. It goes to a factory where it is broken down and remade into something else. This is called recycling, and it is important to recycle instead of cutting down more trees."
- "There is something else we can do when we finish using something made from paper. It is called Re-Using. Reusing means to use it again. It is a lot of work to bring things to a recycling center, and for factories to recycling paper materials, when we can really reuse many paper materials at home or in the garden. Can you think of anything examples?" (Drawing on both sides of a piece of paper, turning milk cartons into bird feeders, putting newspaper in a worm bin). There are lots of ways to reuse paper, and today we are going to make jewelry out of old paper products."
- Transition kids inside, if they are going to do the project indoors.
- Each child gets several pieces of paper. They cut the sheets into long skinny triangles, about an inch at the bottom, and 5 inches tall. Show plenty of examples. Then they put a pencil at the bottom of the triangle, and roll the paper around until it is tightly wrapped. Glue the triangle tip down. Remove the pencil and let it dry. Let students make about 10 beads.
- When their beads are dry, they can string the beads and make a necklace!

Wrap up:

Organize the materials, wash hands, recycle paper scraps.

Journaling Prompt: Recycling

STANDARDS
K.ESS3.3, K.ESS2.2

MATERIALS
- Journals, pencils

Preparation:
If students need to work on their beading projects, have the materials available inside.

Procedure:
- Students enter the garden and explore. Perhaps there are changes to notice on the tree. Perhaps they are noticing birds and insects. Explore these changes, they will become more pronounced as spring approaches.
- Provide students with newspaper to feed to the worms in the worm bin. Explain that they are nature's recyclers; they are constantly turning dead plant material into compost.
- In their journals, "Can you think of two ways that mother nature recycles? Draw a picture."
- If many students have not yet finished, you can go inside to work on the beading project.
- Be sure to have a recycling bin in your classroom, and reinforce that paper products, which come from trees, need to be recycled.

Wrap up:
Return all materials.

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Recycling Food

STANDARDS
K.W.8, K.SL.1, K.L.5.a, K.LS.1.1, K.ESS.2.2, K.ESS.3.3

OBJECTIVES
- Students learn that plants and food can be recycled into compost
- Students see that compost becomes part of soil
- Students see that nature makes compost naturally, and that we copy that model small scale (in a compost pile) and large scale (in the school cafeteria)

MATERIALS
- Samples of finished compost
- Materials that can go into a compost bin (food, newspaper, tea bags) and things that cannot (plastic wrappers, cans, etc)

Preparation:
Collect samples of things that can and cannot go into a compost bin. Have finished compost available. Be prepared to amaze students that old food and plants can turn into compost!

Procedure:
- Students enter the garden and explore. Explore the tree, the bulbs, and the leaf cage.
- Gather students and check in about the season, weather, the tree, the bulbs, and the leaf cage. Are there any big changes?
- Recite winter poem.
- "Last week we talked about recycling and reusing paper products. Can anyone tell me different places at school we can recycle paper? How can we reuse paper at school? How about at home?"

- Bring students to the tree that you've been observing. Look at the leaves underneath. Give kids time to explore these leaves, and notice how they are breaking down. This can also be done in the leaf cage. Show students how the leaves at the bottom are breaking down, or already broken down and turning into compost, which becomes part of the soil.
- Explain "Mother Nature is very wise, and figured out how to reuse all of her plants. When they die, they become part of the soil again. Plants need healthy soil to survive, and it becomes healthy when it gets compost, or decomposed plants. People, especially gardeners and farmers, copy Mother Nature when we create a compost pile. We use compost piles (or worm bins) to turn our dead or dying plants into compost, which we put into the soil to feed the growing plants. We can only put certain things in our garden compost bin, only things that are plant material."
- To teach students about plant and animal material, hold up the different items you collected and ask if it can go into a compost bin or not. Students should be learning that the food we eat is plant material, and that if it grows from the earth, it can return to the compost.
- Let them hold finished compost. Ask them to smell it, feel it, describe it. Ask what kinds of things they are holding in their hands. (Leaves, old apples, whatever they can think of that is plant material!)
- If you have a compost and recycling program in your school cafeteria, bring students to the cafeteria and show them the recycling and compost bins. Ask what kinds of things from their lunch can go into the compost bin. Show them that they can put anything that comes from a plant OR an animal in the cafeteria compost. Explain that we do not put animal products in our garden compost because we do not want to attract animals. (Hopefully this is a review).
- Then take students to your school's dumpster, and show how the compost and recycling from the cafeteria and classrooms are sorted into even bigger bins. Explain how the compost and recycling are taking to a huge processing center, and what happens there.

Wrap up:
Have students gather any material in the garden that can go in the compost bin, and place it inside the bin.

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Compost Quiz

STANDARDS
K.W.8, K.SL.1, K.L.5.a, K.LS.1.1, K.ESS.2.2, K.ESS.3.3

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- You can have them explore the leaf cage in depth, and see if any insects are in there.
- You can ask student collect items to be put in the compost, or to explore the compost bin. Teach them that if they are not sure if something can go into the compost, ask themselves if a worm would eat it. If the answer is yes, then it can go inside.
- In their journals, "In a forest, leaves and branches and trees are falling all the time and becoming part of the soil. New plants grow from these old plants. Draw a forest. What animals are there? What plants?"
- If students have extra time, they can draw 5 things they can put in the compost bin, and 5 things they cannot. Challenge them to name the materials of the items that cannot go in the compost bin.

Wrap up:
Return journals, wash hands.

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Garden Creatures

STANDARDS
K.SL.6, K.W.8, K.ESS2.2, K.ESS2.1, K.ESS3.3, K.ESS3.1

OBJECTIVES
- Students recognize the different types of animals (including insects) that spend time in the garden
- Students can find evidence that an animal has been in the garden, even if they can't see it
- Students know that animals can change the garden

MATERIALS
- "The Snail's Spell" by Lynne Cherry (or another book about animals in the garden)

Background Information:
Our Oakland climate includes a mild, rainy winter and an early onset of spring. It is possible that you are seeing signs of spring in your garden already. It is important to start discussing these with your students, as well as explaining that in some parts of the world, it does not begin to get warm until much later in the year. Explain that even though it is not spring on the calendar yet, the plants and animals respond to warmer weather and longer days, which is why you may already have leaves budding on trees, or more insect visitors.

Procedure:
- Students enter garden and explore, taking notice of the tree, bulbs, and leaf cage.
- Gather students in opening circle, check in about the season, weather, tree, bulbs and leaf cage.
- Recite winter poem.
- Discuss signs of spring, if there are any.

- “We have been talking extensively about the plants in our garden. Today we are going to focus a little more on the animals we see here.”
- Read “The Snail’s Spell” or another book you have chosen. Have students name all the animals they can see.
- Ask students “Why do animals come to a garden?” See how many responses they can come up with.
- Ask students how different animals in the story can change the garden, while looking for a home, or while looking for something to eat. See how many they can come up with. (For example, snails eat plants, birds eat seeds and other insects, mice dig holes, squirrels hide seeds).
- Ask, “Are people animals?” and discuss.
- “How do people change our garden? What kinds of things we do in the garden to help our plants grow?” Discuss. “How do we change the earth outside of the garden? How can we try to change less?” Discuss.
- Send students into the garden to find at least five animals.
- Extra challenge: Find 5 examples of “animal evidence” (Spider webs, holes in a leaf, bird droppings, etc).

Wrap up:
Find a worm and thank it for making our soil strong and healthy.

Notes/Feedback:

Journaling Prompt: Animals

STANDARDS
K.SL.6, K.W.8, K.ESS2.2, K.ESS2.1, K.ESS3.3, K.ESS3.1

MATERIALS
- Class set of magnifying glasses
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Have students pretend to be a bird. Where would you go in the garden? What would you look for? Repeat, becoming a bee, butterfly, or a snail.
- Give students magnifying glasses, and encourage them to look for insects underneath leaves, under rocks and logs.
- In their journals, “Find an animal. It can be as big as a bird, or small as an ant. Draw its home, and what it eats. Then draw yourself. Draw your home, and things you eat.”

Wrap up:
Share in partners.

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Animals Change Our Garden

STANDARDS
K.SL.6, K.W.8, K.ESS2.2, K.ESS2.1, K.ESS3.3, K.ESS3.1

OBJECTIVES
- Students learn the basics of garden helpers and garden pests
- Students understand that while a caterpillar is a pest, a butterfly is a helper!

MATERIALS
- "The Very Hungry Caterpillar" by Eric Carle
- Magnifying Glasses, class set

Preparation:
Identify some areas in your garden that may have aphids or caterpillars.

Background Information:
Common garden helpers:
Worms: Turn plant matter into nutrient rich soil and build tunnels underground which aerates the soil.
Ladybugs: Eat aphids.
Birds: Eat insects that cause damage.
Bees & Butterflies: Pollinate flowers providing us with food to eat.

Common Garden Pests:
Caterpillars, slugs, snails: Eat leaves of plants
Aphids: Suck nutrients from leaves, making plants weak and eventually killing them.
Birds: Sometimes eat plant seedlings

Procedure:
- Students enter garden and explore, taking notice of the tree, bulbs, and leaf cage.

- Gather students in opening circle, check in about the season, weather, tree, bulbs and leaf cage.
- Recite winter poem.
- Discuss signs of spring, if there are any.
- “Last week we tried to find animals in our garden, and we even found evidence that animals had been here. What are two main reasons animals come in and out of our garden?” (Looking for food and shelter).
- Read “The Very Hungry Caterpillar”. Ask students which of the foods the caterpillar ate is the one he is supposed to eat. Ask students what caterpillars become.
- “Sometimes animals and insects really help our garden, we call them helpers, and sometimes they can really hurt it, we call them pests. Can anyone think of garden helpers? Garden pests?” List student responses. “You listed caterpillars as a pest because they eat our leaves. But you listed butterflies as helpers! Aren’t they the same animal?”
- Bring students to the plants you found with many aphids or caterpillars. Let the students describe the damage they see.
- Sending students to explore on their own, or in partners, with magnifying glasses. Remind them not to touch insects. Challenge them to find three helpers, and three pests. They don’t need to see the animal itself, they can use evidence as well.
- Gather students, and have them share out their findings.

Wrap up:
Return magnifying glasses.

Notes/Feedback:

Journaling Prompt: Birds

STANDARDS
K.SL.6, K.W.8, K.ESS2.2, K.ESS2.1, K.ESS3.3, K.ESS3.1

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Encourage them to continue looking for garden helpers and pests.
- Have birds returned to your garden? If so, have your students do a quiet sit, and listen to birds for at least one whole minute. “Imagine what the birds are talking about.”
- In their journals, “Pretend you are a bird. Where do you live? Where would you fly to? Draw.”

Wrap up:
Share in partners.

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Planting Trees

STANDARDS
K.ESS3.3, K.LS1.1

OBJECTIVES
- Students plant a tree
- Students know what a tree needs to live
- Objective 3

MATERIALS
- A tree
- Shovels, watering cans
- A camera

Preparation:
Organize a tree planting with a local organization, or buy a tree to plant on campus. Make sure you have all necessary paperwork in order before planting.
On the day of the planting, have watering cans full, gloves and shovels at the ready.

Background Information:
There are many Oakland organizations that may be able to help you coordinate a tree planting, for example Urban Releaf or the Sierra Club. You can also coordinate the

planting yourself by buying a tree from a local nursery. Be sure to ask which varieties do well in your region. It is also important to coordinate with those who maintain your school; you may need written permission to plant a tree on campus.
The rule of thumb, in our area, is that a newly planted tree needs 5 gallons of water, March-November, for two years. Perhaps your students can give each tree half a gallon of water every two or three weeks. Be sure to find someone who can care for the trees over the summer.

Procedure:

- Bring students to the area of the tree planting.
- Show them the tree(s) in its little pot. Ask where the roots are, and if they have enough space.
- Ask what a tree needs to live. Show them where you are planting. Ask if there is enough space, enough soil, enough air, and access to sun.
- As a class, take turns digging the hole(s) for the tree(s). Remove the tree from its pot. Have students identify the different parts of the tree. Allow them to feel the roots.
- Plant the tree, and cover it with soil. Let students water the tree.
- Ask students what trees provides us. (Air to breathe, fruit to eat, wood for homes and building and paper, shade, beauty, etc).
- Make a circle around your tree(s) and let each student thank the tree for something it provides.
- Take a picture of your students by their tree!

Wrap up:

Have students help gather materials and clean the area.

Notes/Feedback:

Journaling Prompt: Imagine the Future

STANDARDS
K.ESS3.3, K.LS1.1

MATERIALS
- Journals, pencils
- Material 2
- Material 3

Procedure:
- Students were not in the garden earlier this week, so give them extended explore time.
- Check in about the season, weather, the leaf cage, the bulbs, and the tree.
- Have a discussion about the seasonal changes they are witnessing in the garden.
- Let them visit their newly planted tree, if it is on campus, and let them sit by it.
- In their journals, "Imagine you stepped in a time machine and came back to this exact spot in 100 years. What would you see? Draw the tree, and all of its animal visitors."

Wrap up:
Share in partners.

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Spring!

STANDARDS
K.W.3, K.W.8, K.SL.6, K.ESS2.1

OBJECTIVES
- Students learn that the season has changed to spring
- Students observe and can articulate how the garden changes in the spring
- Students learn how to draw a butterfly

MATERIALS
- My Spring Robin by Anne Rockwell (or another book about spring)
- Class set: clipboards, paper, crayons

Preparation:
With the return of spring comes the return of the bees and butterflies. While bees tend to keep to their own business, a started student may startle a bee making it more likely to sting. Teach students about how to control their bodies around bees, and they may even learn to be comfortable around bees to be able to observe their movement from flower to flower!
Also, find a spot for students to sink their hands into the soil.

Procedure:
- Students enter the garden and explore.
- Check in about the season and weather –it is spring!
- What are signs of spring? If the students have been tracking their bulbs, and the trees in your garden, they will know that these are signs of spring. Other signs they may mention are warmer weather, rain showers, longer days, flowers blooming, and the return of some birds and insects.

- Teach your students their spring poem, which can be sung to the tune of “Twinkle, Twinkle, Little Star”:

  Spring, spring is coming soon,
  Grass is green and flowers bloom,
  Birds returning from the south,
  Bees are buzzing all about,
  Leaves are budding everywhere,
  Spring, spring is finally here!

- Read “My Spring Robin” and discuss spring changes.
- Take students to the area you found where they can sink their hands into the soil. Ask them how it feels. Does it feel warmer or cooler than in the winter?
- As a class, practice observing bees very carefully. See if you can see their side pouches full of pollen.
- Do a scavenger hunt, challenging students to find flowers of every color. Students can pretend to be bees or butterflies as they move through the garden.
- Gather students in your circle. Distribute paper and clipboards and one black crayon per student. As you draw a butterfly on your board, have them copy on their paper. Butterflies are insects and have six legs, two antennae, and two wings. Narrate as you draw.
- Once students have their outline in black, give them crayons to take anywhere in the garden to color in their butterflies.

Wrap up:
Gather students, have them show and tell their butterflies, and collect materials.

Notes/Feedback:

Journaling Prompt: Favorite Flower

STANDARDS
K.SL.6

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Pay extra attention to spring changes; they happen quickly!
- Ask students to find their favorite flower. Let them sit with their flower for one minute, just observing it.
- In their journals, "If you could pick your favorite flower, who would you give it to and why? How do you think they would feel? Draw a picture."

Wrap up:
Encourage students to share their journal entries in front of the class.

Notes/Feedback:

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Seeds

STANDARDS
K.W.8, K.L.5.a, K.ESS2.1

OBJECTIVES
- Students begin an exploration of seeds
- Students can articulate that seeds are living, and “wake up” when they get wet
- Students see that seeds be many sizes, colors and shapes

MATERIALS
Bags of seeds, different sizes, shapes, colors, for example:
- One bag with different types of beans
- One bag with three distinct sizes of seed
- One bag with three distinctly colored seeds

Preparation:
Organize your bags of seeds for students to explore.

Background Information:
It is important to establish from the very beginning of a child’s garden education that seeds are alive, and as diverse as people on the planet!

Procedure:
- Students enter garden and explore.
- Check in about season and weather.
- Recite the spring poem.
- “We are beginning an exploration of seeds today, what do you already know about seeds?

- The following activity is called “Seed bodies”: Have students crouch into a tiny ball on the ground and say “You are a tiny seed! You were lovingly planted in the dark, warm soil by a very friendly Kindergartener. Sshhh….it’s so silent where you are, and you are cozy in your soft, new home. You are sleeping, and enjoying the quiet. All of a sudden, you feel some water! A kindergartener has come outside and is watering you with a watering can. You feel the water soaking into your skin, you feel yourself growing a little bigger. This happens every day when the kindergartener comes out to the garden. You feel something changing inside of you, and all of a sudden, you are ready to sprout! You send a tiny little root deep into the soil to explore for food. (Show students how to start
- come out from a crouch). You also send up to little leaves to look for the sun. (Have students put their hands palm to palm, and poke up above the soil). Poke! Your first two leaves push through the soil. A kindergartener comes outside and yells to her friends that her seeds have sprouted! They water you and your roots drink it all up, and you feel the warm sun your leaves. Slowly, slowly, with more sun and water and air you start to grow big (show students how to grow slowly). You have a tall stem, deep roots, and lots of green leaves. One day you form a flower bud (have students color their face with their hands), you turn towards the sun and bloom (students open arms wide) into a beautiful flower! Bees and butterflies come visit your flower (you pretend to be a bee) and your flower turns into a seed and drops it onto the soil (students drop back down to soil)”
- Repeat this several times, but changing the type of seed they pretend to be (e.g. A squirrel buries and acorn and students grow into an oak tree, or a farmer plants a pumpkin seed, etc)
- Have students return to seated, and ask “Are seeds alive? (Yes!) What makes them wake up? (Water) Do people plant seeds? Do animals plant seeds?”
- Have students name different types of seeds they know. They may be surprised that we eat seeds in nearly every meal, including all our grains and beans.
- Let each student have a handful of seeds, and let them explore the seeds without too much guidance, letting them describe what they see and feel.

Wrap up:
Return seeds to teacher.

Notes/Feedback:

Seed sorting

STANDARDS
K.W.8, K.L.5.a, K.ESS2.1

MATERIALS
Bags of seeds, different sizes, shapes, colors, for example:
- One bag with different types of beans
- One bag with three distinct sizes of seed
- One bag with three distinctly colored seeds

Preparation:
Organize seed bags.

Procedure:
- Students enter the garden and explore.
- If they enjoyed it, go through “Seed bodies” a few more times.
- In the garden classroom, give each child a handful of the different sized seeds. Have them sort by size.
- Collect seeds, and give them a handful of different types of bean, and have them sort by type.
- Collect seeds, and give them a handful of different colored seeds, and have them sort by color.
- Ask if their seeds are alive. Ask what the one thing seeds need to wake up. (Water)
- Ask them what seeds need once they have woken up. (Warmth/sun, more water, soil, air).

Wrap up:

Return seeds.

Notes/Feedback:

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Prepare to Plant

STANDARDS
K.W.3, K.W.8, K.ESS.3.1

OBJECTIVES
- Students learn and complete the steps to prepare a bed for planting
- Students understand why they add compost to a bed before planting

MATERIALS
- Compost
- A bucket to collect pulled weeds
- "Inch by Inch: The Garden Song" by David Mallett

Preparation:
Find the area in which you'll plant next week. This week you will prepare the bed for planting. Also be sure to have compost to add to the soil.

Procedure:
- Students enter garden and explore, pay extra attention to the leaves under your tree, and to the leaf cage.
- Check in about the season and weather, the leaves under the tree, and the leaf cage.
- Recite the spring poem.
- "All over the world, farmers and gardeners prepare their garden for a big planting in the spring. Can you think about why we do a big planting in the spring?" (Longer days, more sunshine, warmer soil).
- "You saw that the leaves under the tree, and in our leaf cage, have become part of the soil. When those leaves decomposed, they added nutrients to the soil, or in other words, are providing food for the plants. Next week we will be doing our spring planting, and today we are going to prepare the garden."
- Read "Inch by Inch: The Garden Song".

- Return to the page about pulling weeds and picking stones. Bring the students to the area they are going to prepare, and show them how to pull weeds and pick out big rocks. Have them feel the soil again and notice that it is warmer. Ask, “What is making the soil warm?”
- If there are big clumps of soil, show them how to break them. Give each student a handful of compost, “This is compost. This is made from old plants. Mother Nature makes compost naturally, like we saw under the tree, but when we garden we have to add compost. Compost is food for the plants.” Have students add their compost to the bed.

Wrap up:
Students wash hands.

Notes/Feedback:

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Making Signs

STANDARDS
K.L.5.c

MATERIALS
- Wooden signs/garden stakes, outdoor paint and brushes (optional)

Preparation:
If painting, gather all materials in the place you will be painting. It would be wise to lay newspaper under the wooden garden stakes. Recruit a volunteer if you can; paint with half the class while the others are doing "Seed Bodies" and then switch.

Procedure:
- Students enter the garden and explore
- The spring garden is very sensory-rich. Do a "five senses" exploration with them.
- Gather students. "Next week we are going to plant carrots and radishes and turnips."
- Do 'Seed Bodies' where the students become one of these vegetables.
- Optional: Students paint signs that say "Just Planted" or "Sleeping Seeds" to put in their newly planted bed next week.

Wrap up:
Clean paint brushes, wash hands. Leave wooden garden stakes in a safe place to dry.

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Spring Planting

STANDARDS
K.W.3, K.W.8, K.SL.1, K.LS.1.1, K.ESS.2.1

OBJECTIVES
- Students plant their spring garden
- Students can articulate all steps of the process
- Students can be sure that their seeds are getting everything they need to grow

MATERIALS
- "The Carrot Seed" by Ruth Krauss
- Carrot, Turnip, and Radish seeds
- Hand rakes
- Row Cover, and stakes or stones to weigh down the row cover.
- Spray bottle
- Craft sticks and a permanent marker

Preparation:
In the area you prepared for planting, know where you're going to plant carrots, radishes, and turnips. Perhaps you can label the areas with craft sticks beforehand. Also cut the row cloth to fit the bed you are planting.

Background Information:
There are dozens of varieties of carrot, turnip and radish seeds. Any type can work well in the school garden. Carrots, however, take months to grow before they are ready to harvest. Try to find a baby carrot variety, which are smaller, grow faster, and are just as tasty.

Row cover, or row cloth, can be bought at any garden center, and is an important thing to have, and to use. Carrots take an exceptionally long time to sprout, and need to be kept moist throughout their two-three week germination period.

Procedure:

- Students enter garden, and explore.
- Check in about the season, and weather.
- Recite the spring poem.
- "It is planting day! We are connecting to people all over the world who do big spring plantings. Today we are going to plant carrots, radishes and turnips. Remember in the fall when we talked about how different plants prefer different weathers? Based on the season, can you guess what weather these plants prefer?" Discuss responses.
- All of these plants prefer warm, but cool weather. They all do really well in sunny areas, and need lots of warmth, but also need cool weather. They grow very well in the spring, but would not grow well in the coldest part of the winter, or the hottest part of summer. Another interesting thing is that radishes sprout very quickly, and carrots take a long time to sprout."
- Read "The Tiny Seed".
- Gather students at the area that they prepared last week. Give students hand rakes, and let them incorporate the compost into the soil. Then smooth the area with your hand. Take a craft stick and say, "I am making furrows. Furrows are little indentations, or grooves, in the soil. We will be planting our seeds in these furrows." Make a furrow for the carrot row, the radish row, and the turnip row. The seed packets can tell you about how deep each need to be.
- Divide students into a carrot group, a radish group, and a turnip group. Distribute the seeds. Give them time to look at their seeds, and describe. Show students how to carefully sprinkle their seeds into the furrows. Show them how to carefully "pinch" the furrows closed. Be sure that no one pats the seeds down; that takes the air out of the soil!
- Ask, "The seeds have space, and air, and are in a warm spot. But if we leave them here like this, they'll never wake up! What else do they need?" (Water!) Distribute the spray bottles, and allow each student 10 sprays before passing the bottle on. (You may need to come back after class and water the area gently).
- Ask the students what makes the soil warm. (The sun). "The sun warms the soil, which the seeds need, but it also dries out the water. Just as the sun dries out a puddle after a rainy day, it also dries the water out of garden. One way to keep the soil moist is to cover it with something called row cover." Show students the cloth, and have them help you cover the newly planted area, and weigh it down. "The row cover does many things, it keeps the soil moist while still letting the sun through. It also protects our seeds from hungry birds and insects. It can also keep our little seeds warm."
- If you made "Just Planted" signs, put them in the garden as well.

Wrap up:

Have students help return materials to where they belong, and wash hands.

Notes/Feedback:

Journaling Prompt: Planting

STANDARDS
K.W.8

MATERIALS
- Spray bottles
- Journals, pencils

Procedure:
- Students enter garden and explore—it is quite possible that your radish seeds may have sprouted. You can remove the row cloth to check, just be sure to replace it.
- Students can water their seeds with the spray bottles. They can water right through the cloth.
- In their journals, "Draw a picture from planting day". With your help, students can begin to label their drawing.

Assessment: Gather students and ask them to review the steps to planting, everything from choosing a spot, to pulling stones, to adding compost, drawing a furrow, planting, watering, and covering.

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Spring Tree

STANDARDS
K.W.3, K.ESS3.1, K.SL.1, K.ESS2.1, K.ESS2.2

OBJECTIVES
- Students learn and draw the parts of the tree
- Students learn that trees change through the seasons

MATERIALS
- Clipboards, pencils and crayons
- The Tree Drawing that students started in Week 4

Preparation:
Organize your clipboards and Tree Drawings beforehand, it will make the transition into drawing much easier.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Recite the spring poem.
- Ask students to become trees: Have them point to their roots, their trunk, and branches. It is spring, “Do you have leaves? Do you have flowers?”
- Go visit the tree you planted several weeks ago. Are there any changes?
- Go visit the tree that you have been observing all year. Ask students to point to the trunk, the roots, the branches and leaves. Are the leaves large? Or are they still small? If it’s a fruit tree, is it blooming? “What color are the flowers? Which insects do you see visiting the flowers?”
- Ask students to turn to a partner and explain what roots do for the tree. Repeat with trunk, and branches. They may not know all the answers, but see how much they can articulate.

- Tell them, “In fall and winter we saw this tree lose its leaves. We learned that the winter is a time when it is colder, and with less sunlight. The tree rests, and stores all its energy underground. Its leaves become part of the soil, giving the tree plenty of energy for the spring. Now we can see the tree bursting back to life. How do you feel after taking a nap, or waking up from a long sleep?”
- “What changes has the tree gone through since spring began? Study the tree well, because we are about to draw it.”
- Similar to the procedures in Weeks 4 and 12, gather students in their garden classroom with their clipboards and drawings. Have them find the box that says Spring. As you draw the tree on the whiteboard, have them follow along in their box. They can draw an underground scene and a bright spring sky. They can also draw bees and butterflies.
- “We do not have school in the summer, but our tree will undergo some more changes as summer approaches. Can anyone think of what these changes may be?”
- Have students draw the Summer tree. The leaves should be bigger, and if it is a fruit tree, the blossoms will have changed to fruit. Have them do the best that they can.

Wrap up:
Students help collect materials.

Notes/Feedback:

Journaling: Seasonal Tree Drawing

STANDARDS
K.W.3, K.ESS3.1, K.SL.1, K.ESS2.1, K.ESS2.2

MATERIALS
- Watering cans
- Journals, pencils, crayons
- Tree drawings, clipboards, pencils, crayons

Preparation:
Fill watering cans.

Procedure:
- Students enter the garden and explore.
- Students water their seeds, and check for changes.
- If they have not finished any part of their Seasonal Tree drawing, have them work on it.
- Students that have finished can sit in a part of the garden that they enjoy and draw something that they see.

Wrap up:
Return materials.

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Radish Harvest

STANDARDS
K.W.3, K.L.5, K.SL.6

OBJECTIVES
- Students harvest their radishes
- Students observe the difference between areas under the row cloth, and next to the row cloth

MATERIALS
- Cutting board and knife for the radishes
- Soap to wash hands

Preparation:
Be sure the radishes are ready to harvest. If they are not, postpone this lesson and do another one in the meantime.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Recite the spring poem.
- Ask, “Several weeks ago we planted carrots, radishes and turnips. Only one is ready to eat today. Can someone tell me all the steps we took, starting from preparing the bed to watering the seeds?”
- After students are clear on the order of events, tell them that the next step is to harvest it. “To harvest means to pick or pull a plant that is ready to eat. Today we are ready to harvest the radishes.” Have students turn to a partner and use the word harvest in a sentence.
- Have students wash their hands before harvesting.

- Bring students to the area they planted, and lift the row cloth. Compare the size of the radish leaves to the carrot leaves and turnip leaves. Explain that some plants grow faster than others. Compare the moistness of the soil under the row cloth, and next to the row cloth. Reiterate that the row cloth keeps the soil moist by protecting the soil from the sun. Show students how to harvest radishes from the area where the leaves meet the root. Once all students have harvested, bring them to a station to wash their radishes.
- You may want to do a second rinse of the radishes. Have the students seated while you cut off the radish tops and bottoms. Explain, “Like all plants, radishes have roots, stems and leaves. We do not eat the radish leaves, or the radish stem. We eat the root.”
- Cut the radishes into quarters and distribute to students. Acknowledge the soil, sun, and water that turned the seeds into food for us to eat.
- Taste your radishes!
- Thank students for trying something new. If they do not like it, practice saying “It’s not for me” and then putting the radish into the compost.
- Ask them to describe what they taste, as well as the sensations in their mouth (crunchy, juicy, etc).

Wrap up:
Wash hands.

Notes/Feedback:

Watering and Journaling

STANDARDS
K.W.3, K.L.5, K.SL.6

MATERIALS
- Watering cans
- Journals, pencils

Preparation:
Fill watering cans.

Procedure:
- They should water their seeds, and check for changes.
- Do “Seed Bodies” with your students, and have them go from radish seeds to radishes that are ready to be harvested. The second time, pretend to not harvest the radishes, and narrate “Your kindergarteners forgot about you and did not harvest you! Your roots continue to grow and grow, and your leaves grow taller towards the sun. You grow many flowers, bees and butterflies visit your flowers, and turn your flowers into seeds. These seeds dry and fall to the soil (students drop and become seeds again).” Repeat at least one more time.
- In their journals “Draw a picture of how you felt harvesting your radish. Label as much as you can.”

Wrap up:
Share drawings.

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Farms

STANDARDS
K.LS.1.1, K.ESS.2.2

OBJECTIVES
- Students learn that most fruits and vegetables grow on farms, grown by farmers
- Students can articulate the difference between a garden and farm
- Students understand that there are many steps between a seed and the grocery store

MATERIALS
- "The Vegetables We Eat" by Gail Gibbons, or a similar book about farms

Preparation:
This lesson teaches students a very simplified schema of what happens on a farm. However, the suggested book is quite detailed for kindergarteners, so look through it before the lesson. You can include as many or as few details as you see fit. Students will enjoy naming the tools and tractors. You can also add that many farmers don't need to buy fertilizer from the store, because they recycle their old plants in compost, which is food for the plants.
Lastly, identify what part of the garden you want to work on at the end of class.

Procedure:
- Students enter garden and explore.
- Gather students in classroom, check in about season and weather.
- Recite spring poem.
- "Today we are going to talk about the different fruits and vegetables that we eat. If you're hungry, where is someplace that you can get food to eat?"

- Take responses (Grocery store, restaurant, cafeteria, my parents, the kitchen, from a tree, etc).
- “Some people grow most of their own food in their gardens. However, most people buy food from a grocery store or from a farmer’s market. How does the food get to a grocery store? Where does it come from?”
- Take responses.
- “Many of you are mentioning that food comes from farms. Someone who works on a farm is a called a farmer, his or her job is call farming! Farms can be out in the country, or in the city. Farms come in all shapes and sizes, and can grow different things. Today we are going to read a story about vegetable farms and gardens. We will learn about different types of vegetables, and the difference between a garden and a farm.”
- Read “The Vegetables We Eat” or the other book you have chosen.
- Discuss, seeing if students can name the difference between a garden and a farm.
- Have students name the different tools needed in a garden.
- Have students name some of the steps from seed to grocery store, and the number of people (and jobs) involved.
- Mention, and show, the farm workers. This will be important information for next week’s lesson on Cesar Chavez.
- Have students go into the garden, pretending to be farmers, and look for two garden jobs that need to be completed.
- Do garden work!

Wrap up:
Wash hands.

Notes/Feedback:

Role Playing: Farmer

STANDARDS
K.LS.1.1, K.W.8, K.SL.6

MATERIALS
- Journals, pencils
- Tools for garden work

Procedure:
- Students enter garden and explore.
- If students enjoyed pretending to be farmers, you can continue with this and give them different tasks. Or you can ask them to try to find the different jobs that need to be done. You can guide them to pretend that they are starting a new farm, and have to hire farm workers, buy equipment and seeds. See where their imagination goes!
- In their journals, "You are a farmer! Draw your farm. Is it big or small? Is it in the country or the city? What are you growing? Include many details!"

Wrap up:
Take volunteers to show their drawings to the class.

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Cesar Chavez

STANDARDS
K.W.3, K.L.5, K.SL.6

OBJECTIVES
- Students learn about the life and work of Cesar Chavez through storytelling and drama

MATERIALS
- A Picture Book of Cesar Chavez by David A. Adler
- A second adult

Preparation:
Bring the story of Cesar Chavez come to life by acting out a scene from a farm. You can play the role of Cesar Chavez, and have the second adult play the role of a farm owner who keeps the kids working hard, without access to water or the restroom. Find a place in the garden where work needs to be done.

Background Information:
Adapted from the California Department of Education:
As a boy growing up in Arizona and California, César Estrada Chávez knew the difficult life of a migrant farm worker. Most of the families, like his own grandfather, were immigrants from Mexico and Central America. They had to move frequently to be where the crops were when they were ready for harvest. The farm owners housed them in miserable migrant camps, paid very low wages, and treated them unfairly.

Chávez devoted his life to improving the conditions of the farm workers, the poor, and the disenfranchised. He formed a union, the United Farm Workers of America (UFW). In 1968, he led a nationwide boycott against California grape owners, urging people not to buy grapes as a protest against unfair treatment of workers. Chávez also led strikes and

peaceful marches to demand laws to protect the farm workers. His nonviolent methods and skill at organizing captured nationwide attention. The grape growers agreed to settle with the union and growers of other crops slowly followed. Through 30 years of dedicated work, César E. Chávez helped to improve wages and living conditions for farm workers and fought for the civil rights of citizens everywhere.
For kindergarteners, it is important to discuss why Chavez was a hero—he stood up for what was right AND he was nonviolent. Did not use physical force, or call names. Even though the story of Chavez's work may be complicated, his methods can easily be explained to children. Furthermore, since students are starting to see how much work goes into growing food, they can image the plight of overworked, unpaid farm workers.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Recite the spring poem.
- "Today we are learning about a very special person, named Cesar Chavez. Like Martin Luther King Jr., there is a holiday named after him, and many schools and businesses are closed in his honor. Can anyone tell me something they know about Cesar Chavez?"
- Read "A Picture Book of Cesar Chavez", or whichever book you choose, and check for comprehension. What was the problem that Chavez saw? What did he do about it? How did he treat the people around him?
- Prepare students for acting out a scene from the book. Bring them to the place where the garden work needs to be done, and have the "farm owner" tell them to get to work! Have them imagine they've been working for hours and hours in the hot sun. Tell them they can't stop for water or to rest.
- You enter, as Cesar Chavez and tell the students "My name is Cesar Chavez. I understand what you are going through. I used to work on a farm, too. I am going to help you. I am going to talk to the farm owner."
- You can act out talking to the farm owner, who is very mean in return. After continually being nice, but firm, eventually the farm owner agrees to let the workers rest and have water.
- Repeat several scenes—including a politician writing a law to protect the workers.
- Explain to the students that it was a very slow process, what Cesar Chavez did, but he never gave up.

Wrap up:

Harvest a snack from the garden.

Journaling Prompt: Helping

STANDARDS
K.SL.6

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- As a class, have students name a fruit or vegetable they really love. Ask them to think about how many people help bring them that fruit: from the person who planted the seed to the person who harvested it, to the person who brought it to the store.
- In their journals, “Draw a scene in which someone needs help and you are helping them. How do you help someone? What kinds of words do you use?”

Wrap up:
Share in partners.

Garden Blankets

STANDARDS
K.ESS2.1, K.ESS2.2

OBJECTIVES
- Students re-learn the function of row cloth.
- Students see that soil exposed to the sun dries out
- Students build a little structure from plant material

Preparation:
Be able to guide students to different places in the garden where the soil has been covered, or exposed.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Recite spring poem.
- "We have learned a lot this year in Kindergarten gardening. Can you tell me some of the things you've learned?"
- Take responses.
- "Something we have learned is that when a tree loses its leaves, the leaves cover the soil and keep it warm. We also learned that we can do something similar, as

gardeners, when we use row cloth. We used row cloth to cover our carrot, turnip and radish seeds. It makes sure the soil stays wet, by not letting the sun dry the soil. In a garden, it can be very important to keep things covered."

- Send students back into the garden to find examples of leaves covering the soil or plants growing big and shading the soil. Have them compare and contrast the soil under a large plant with the soil that receives direct sunlight.
- Bring students to the row cloth covering your carrots and turnips. Remove the cloth. Have them compare and contrast the soil that stays under the row with soil that is in direct sunlight.
- Gather students in the classroom and take a few observations about the effects of covering the soil.
- "Even though plants need sun to grow, the very hot sun can dry out the soil. The plant also needs water, so we often keep the soil covered."
- To reinforce the concept, have students build tiny houses for an insect. They can use twigs, leaves, flowers. Encourage them to use plant material that has already fallen off plants. Be clear that the house needs to include a shade structure, to protect them from the hot sun.
- Gather students and their bug houses, have them do show and tell.

Wrap up:
Place bug houses in the garden.

Notes/Feedback:

Journaling Prompt: Carrot Harvest

STANDARDS
K.ESS2.1, K.ESS2.2, K.W.3

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore. Have any bugs come to visit the little houses?
- Encourage students to reflect on the weather, and notice how it affects the garden.
- In their journal, "Next week you will harvest carrots! Draw a picture of yourself harvesting. What helped grow these carrots? Include these things in your picture. Label all parts."

Wrap up:
Share in partners.

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Harvest and Celebrate!

STANDARDS
K.SL.6, K.L5.c

OBJECTIVES
- Students harvest and taste their vegetables
- Students recognize and thank the parts of the earth that brings food to life!

MATERIALS
- A basket to collect produce
- Cutting board and knife
- Soap for hand-washing
- "The Great Big Enormous Turnip" by Alexei Tolstoy

Preparation:
Know where students will wash hands, and how you will have them seated while you wash and cut vegetables.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Spring poem.
- "Today is our last week of gardening for this year!" Perhaps summarize some of the highlights of the year and big concepts introduced.
- "Today we are going to harvest our carrots and turnips. Can you all describe how we have carrots and turnips in our garden? What where the steps that brought us from seed to plant?"
- Take student responses, be sure they include : Finding a sunny spot, preparing the bed, adding compost, smoothing the soil, making furrows, planting seeds, watering, thinning, weeding, and finally harvesting.

- Read “The Great Big Enormous Turnip” and discuss.
- Bring students to the carrot and turnip patch, and teach students how to harvest from the place where the leaves meet the root.
- Gather students in the classroom, and show them their bounty! Show the root, stems and leaves of the vegetables. Ask “Which we are eating today?” (The root).
- Wash and cut the carrots. Have students wash their hands. Give each student a piece of each, and do a “taste test”. Compare and contrast flavors, and encourage them to describe the tastes. Thank the sun and the soil and the water for growing food for them to eat.
- Congratulate students on a successful year of gardening!

Wrap up:
Wash hands, put vegetable scraps in the compost.

Notes/Feedback:

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Last Day Reflection

STANDARDS
K.SL.6

Procedure:
- Students enter garden, and explore.
- Gather students, "This is your last gardening time for the year. The next time you will have gardening, you'll be in first grade! Spend a little extra time exploring today."
- What have been the students' favorite poems, songs, stories or activities this year? Do a students' choice lesson, allowing them to choose a few of these activities to do for the duration of class.

Wrap up:
Students say goodbye to the garden!

First Grade

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First grade gardening begins in the abstract with discussions and observations around the sun, light, and shadows. Throughout the year, students will explore the way that sunlight's seasonal changes affect their garden.

Students will study plant parts and their functions in depth, and will focus on watering plants in the garden to help reinforce their learnings. In the spring, students will build a trellis, create and maintain a worm bin, and learn about habitats, life cycles, and treating living things with respect.

The cumulative project—harvesting and preparing wheat—is a great capstone for the year, and includes discussions about life cycles, tending plants, working together, and treating the earth with care.

The Numi Foundation is deeply grateful to the writers of open-source materials for their contributions and inspirations to this curriculum.

Table of Contents

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Rules and Agreements

Week 1.1
STANDARDS
1.SL.1

OBJECTIVES
- Students make observations after an extended break from the garden
- Students review and practice garden rules
- Students make class agreements.

MATERIALS
- Poster board and pens
- Garden tools

Preparation:
Be clear about the difference between garden rules and classroom agreements. Perhaps your garden has rules posted that are school-wide, otherwise know beforehand what the rules are (For example: Always walk, Ask before harvesting, etc.). It is more effective to have fewer rules, but be sure that they are clear.

Procedure:

- Students enter the garden and gather in opening circle.
- Welcome students back to their outdoor classroom.
- “We need to review the rules of the garden and decide on some classroom agreements.”
- Call on students to name garden rules, and have students act them out.
- “We have garden rules to make sure everyone stays safe, and we need to decide on our class agreements for this year. These are so that everyone feels safe and welcome here, and that all of our voices are here. How do we want to agree to treat each other in this space?”
- Record student responses on the poster board, discussing and clarifying where needed. Have students sign the bottom. Keep this in your classroom and review as necessary.
- Give students an extended explore time. Practice garden rules and class agreements. Guide students in looking for different things: Colors, something taller than you, a plant that looks healthy, a weed, something you don’t recognize, evidence of an insect.
- Practice your gathering signal. Gather students in the classroom.
- Share out observations from the garden explore time.
- Review names of tools and their proper use.

Wrap up:

If there is time, continue exploring.

Notes/Feedback:

Journals

Week 1.2
MATERIALS
- Journals, pencils, crayons

Preparation:
Think about the procedures you wish to share with your students for journal-writing days. Will you share the prompt beforehand? Will it be written on a board somewhere? What are the parameters of where students can sit?

Procedure:
- Students enter the garden and explore.
- Distribute journals. “These will be your garden journals for the year. We will be writing and drawing in here this school year.”
- “Today we are going to do our first journal prompt to practice how we use our journals, and how we sit in the garden to write and to draw.”
- Go over procedures for journal-writing days.
- Students sit somewhere they enjoy. In their journals, “Draw your dream garden.”

Wrap up:
Collect journals.

Teamwork

Week2.1
STANDARDS
1.SL.1

OBJECTIVES

- Students learn the meaning of teamwork, and practice teambuilding
- Students understand that teamwork is required for success in the garden
- Students find an example of nature working together in the garden

Procedure:

- Students enter the garden and explore.
- Gather students in opening circle.
- "Before we start gardening this year, we are going to practice teambuilding skills. What does teamwork mean? Why do you think it's important that we know how to work together as a class?"
- Take responses.
- "I am going to give you a task. When I say go, you need to line up as a class by height. The only trick is that you can't speak. You may not touch your classmates. If I hear speaking, or see someone touching another person, I will have you sit down and start over. You may begin."
- Observe your class carefully, because their successes and failure will guide your debriefing session.
- Debrief. Ask questions like "What was difficult? What worked well? How did it feel not to speak? Was it frustrating when one person spoke and you needed to start over? What happened when too many people tried to be in charge?" Relate your

observations back to the importance of teamwork in the garden, and the importance of listening to others during class discussions.

- "Now we are going to do the same game, except you need to line up alphabetically. You may talk this time, but you may not touch anyone else."
- Observe your class, and formulate your debriefing questions.
- Debrief, for example, "What happened when everyone was talking at once? What did you learn about taking turns? How did you feel when someone helped you?"
- Ask students what kinds of opportunities for teamwork they foresee as they begin to do garden work again. Choose one scenario (for example, 3 students are asked to water the garden but have only one watering can) and choose students to act it out in front of the class. Guide students to say things like "May I have a turn when you're done?"
- Have students explore the garden. Ask them to find three examples of plants or animals working together in the garden. (For example, birds building a nest together, roots drink from the soil, worms live in the soil and help the plants)

Wrap up:

Ask students to share what they found in the garden.

Notes/Feedback:

Journal Prompt: Ants

Week 2.2
STANDARDS
1.L.5.c

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Have students find 3-5 insects in the garden and watch them for a short time.
- In their journal, “Ants are famous for their teamwork skills. They work hard all day, building their home, taking care of their young, and finding food for the nest. Draw a picture from a day in the life of an ant. What job does it have?”

Wrap up:
Gather students and ask them to share in partners.

The Sun

Week 3.1
STANDARDS
1.ESS1.1, 1.ESS1.2, 1.PS4.4

OBJECTIVES

- Students are introduced to the concept that the sun appears to move across the sky
- Students are introduced to the concept that the hours of sunlight changes throughout the seasons
- Students can describe what causes a shade in the garden

MATERIALS

- Craft sticks to mark spots in the garden.

Preparation:

Mark three spaces in the garden: A sunny spot, a shady spot, and a spot shaded by a tree. For the remainder of the year, as students come in explore, they should check on these spots, referred to from now on as "light spots". These observations will guide students in their yearlong exploration of light!

Background Information:

Every class will begin with a check in about the season, weather and your marked light spots. First grade standard 1.ESS1.2 states "Make observations at different times of year to relate the amount of daylight to the time of year." When discussing the season and weather with your students, be sure to note the location of the sun in the sky. Notice and discuss patterns of how high, or low, the sun appears to be, and how this affects shadows, and ultimately the plants. This lesson is just an introduction to the idea that

the position of the sun in the sky changes by season, and the hope is that it becomes clear through a yearlong observation of sun and shadows in the garden.

Procedure:

- Students enter the garden and explore.
- Gather students. Check in about the season and the weather.
- Teach students this poem:

The sun is in my heart
(Make a sun above your head)
It warms me with its power
(Hug yourself)
It wakens light
(Bring hands above your head, and open arms wide)
And life
(Repeat above)
In every bird
(Make a bird by looking at palms, crossing wrists and locking thumbs)
And beast
(Make claws with your hands)
And flower!
(Make a circle with your left thumb and forefinger, and pass your right hand through this circle, like a blooming flower)

- What is this poem about? (The sun!). Who needs the sun? (Plants and animals).
- "The sun gives us warmth and light. Where is the sun in the sky now? The sun does not actually move, but it appears to move across the sky. Does anyone know where it will be in the sky when it sets tonight? Has anyone noticed where it is first thing in the morning? The sun appears to move across the sky during the day. And we see it more during certain seasons, and lesson during others. Can anyone tell me the season with the most sunlight? This season has the most hours of daylight, and it's usually the hottest, and many plants love to grow this time of year."
- "Can anyone tell me the season which is the darkest? This season has the least hours of daylight, it's usually the coldest, and not too many plants grow this time of year."
- "Right now we are in the fall, and in a few months it will be winter. The days are becoming shorter, and cooler. We will notice this as we check in about the weather."
- Split the class into three. Each group will go to a station that you have already set up, and will make observations about how much sunlight reaches each spot. In the shady spot, encourage students to name everything that is blocking the sun to make shade. In the area shaded by the tree, ask students to notice the shadow and ask if they think it will change over the year. Send each group to a station, and rotate them through all three.
- Gather students, and share out observations from each station.
- Allow students to explore, direct them to finding the sunniest spot in the garden, and the darkest. Tell them that next week you will be planting wheat, and wheat needs a sunny place to grow. See if they can help choose a sunny place in the garden.

Wrap up:

Have students share the spot they think is sunniest in the garden.

Notes/Feedback:

Journal Prompt: Drawing

Week 3.2
STANDARDS
1.L.5.c

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Recite the sun poem (The sun is in my heart…)
- Guide students to find sunny and shady spots in the garden.
- In partners, find 5 shadows and name what is causing the shadow.
- In journals, "Find a sunny spot in the garden and have a seat. Draw what you see. Use lots of detail, and label your drawing."

Wrap up:
Share drawings.

Planting

Week 4.1
STANDARDS
1.ESS1.2

OBJECTIVES

- Students how to prepare a bed for planting, and plant
- Students connect what a plant needs to live with the steps in bed preparation
- Students connect wheat to bread and other wheat products they eat

MATERIALS

- Hand rakes
- Watering cans with a rose (the cap that goes on top of the spout with many holes that breaks up a stream of water)
- Wheat Seed (A Winter Wheat Variety, like Hard Red)
- Compost
- A copy of "The Little Red Hen" (Folktale, many authors)
- Craft stick, sharpie
- Row cover, cut to the size of the bed you're planting. Stakes or stone to weigh down the row cover.

Preparation:

Planting days require heavy preparation! To ensure that your planting goes smoothly, have all of the above materials read at your planting site. Have the compost in a bucket, the watering cans full, and the hand rakes handy. You'll never your row cover, and its weights.

Background Information:

Row cover, or row cloth, can be bought at any garden center, and is an important thing to have, and to use. It will keep the soil moist throughout germination, and protect the seeds and sprouts from hungry birds. You can water through the cloth. Once plants are about 2 inches tall, you can remove the cloth.

Wheat is a relatively easy plant to grow. Just be sure that you buy a winter variety!

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season, weather, and the three marked spots.
- "Today we are planting wheat! Wheat is a plant that most of us eat every day. We are growing a type of wheat called Winter Wheat. It is planted in the fall, grows all winter long, and we harvest in the spring. Does anyone know what we can make from wheat?"
- Take responses, and discuss.
- Read "The Little Red Hen". Discuss the steps from seed to bread. Show your wheat seed, and ask "Who will help me plant this wheat?"
- Bring students to the sunny area you have chosen to plant. Ask students, what do plants need to survive? Does this area have sun? Soil? Air? Can we water it?
- First step: show students how to sift through the soil and pull out any stones they see, and break large clumps of soil.
- Have students help add compost. "Compost is made from old plants. It is broken down into compost, and this is food for the plants."
- Use a hand rake to make the area smooth.
- Show students how to broadcast seeds. Take a handful of seeds, open fingers slightly, and shake seeds onto the soil. Show students how to spread out their seeds, to be sure that students are not dropping all of their seeds right on top of other seeds. Explain that seeds won't have space to grow if they are too close together.
- Once everyone has planted, use hand rakes to gently "shake" the seeds shallowly into the soil.
- "When we plant, we try to not push down the soil. Pushing the soil makes it hard, and pushes the air out. However, wheat is one of the few seeds that actually need to be a little bit squished to sprout." Show students how to gently tap down on their seeds. Perhaps 10 pats and then it is someone else's turn.
- Water with watering cans, showing students how to water as gentle rain.
- Mark the area with a craft stick, including date and variety planted.
- Have students help you cover the area with row cloth, and weigh it down. Ask for their ideas of why it's important to cover the seeds.

- Gather students in your classroom. Ask, are seeds alive? What makes them wake up? (Water). Ask again what plants need to grow. Make sure students see that the seeds will sprout because of the water, and will then need the sunlight, soil, and air to grow.

Wrap up:

Gather tools and wash hands.

Notes/Feedback:

Journal Prompt: Wheat

Week 4.2
STANDARDS
1.W.3, 1.SL.6

MATERIALS
- Journals, pencils, crayons
- Watering cans

Preparation:
Fill watering cans.

Procedure:
- Students enter garden and explore.
- Water the wheat, only if the soil is dry. You can water through the row cloth.
- Have students find a sunny spot in the garden to sit. In their journals, “Write about your experience planting wheat. Draw a picture. Label your picture.”

Wrap up:
In partners, share pictures and stories.

Plant Anatomy

Week 5.1
STANDARDS
1.ESS1.2, LS1.A

OBJECTIVES
- Students recognize that their body parts have jobs
- Students can name the different parts of a plant

MATERIALS
- Watering can

Preparation:
Fill cans. You can choose to uncover the wheat before class, or you can let the students carefully help you.

Procedure:
- Students enter the garden and explore—including the marked light spots.
- Gather class, check in about season, weather, and the marked light spots.
- Have the wheat seeds sprouted?
- "Does everyone here have a body? Yes? Well let's stand up and check it out. Everyone touch your head. Your knees. Elbows. Nose. Thumbs. Can you feel your heart?..."
- "We have so many different parts of our body, and they each have a different job to keep us moving. What part of my body is in charge of keep me standing tall? Which part of my body can hold onto things? Which part of my body can kick a ball?"
- "So, while is it true that my mouth eats, and my feet walk, and my nose smells, usually my body part parts are working together to do different jobs. We are going to

see how this works in a plant, too. We are going to explore plants and their different body parts over the next several weeks. Can anyone name a part of a plant that you know? (If students are struggling, it may be helpful to pull a plant and point to different parts to guide them).

- Students should name roots, stems, leaves, seeds, flowers, fruit.
- Have students stand up and pretend to be a plant, and have them point to their different “parts”.
- Ask questions like, which part of your body is underground? Which part keeps you standing tall? Which part smells nice and invites bees and butterflies?
- Students explore the garden. Have them find 5 stems, then 5 different leaves, then challenge them to find flowers, seeds, and fruit. (If they find fruit, but not seeds, you can give a hint by asking “What is inside a fruit?”
- Gather students, and water the wheat.

Wrap up:

Return materials.

Notes/Feedback:

Plant Anatomy part 2

Week 5.2
STANDARDS
1.L.5.C

MATERIALS

- Journals, pencils, crayons
- Watering cans (if necessary)
- "Inch by Inch: The Garden Song" by David Mallett

Preparation:

Check the moistness of the soil where the wheat is growing. Decide before class if the wheat needs to be watered or not, and if so, fill watering cans.
If your classroom or library does not have a copy of the book, you can print the lyrics to the garden song and read it to your class instead.

Procedure:

- Students enter the garden and explore.
- If wheat needs watering, water.
- Gather students, and read "Inch by Inch: The Garden Song".
- Ask which of the steps look familiar from planting wheat. (pulling weeds, picking stones)
- Go the page, or lyric, that says "Old crow watching hungrily, from his perch in yonder tree. In my garden I'm as free as that feathered thief up there."
- Discuss. Also ask how you protected your wheat from birds.
- In their journals, "Find a place in the garden that makes you feel free. Draw what you see."

Wrap up:
As a class, share drawings.

Notes/Feedback:

Seeds part one

Week 6.1
STANDARDS
L.S1.A, 1.ESS1.2, 1.LS3.1

OBJECTIVES
- Students know that seeds are alive and grow into new plants
- Students know that there is a baby plant inside of a seed
- Students have a tactile exploration of seeds

MATERIALS
- Large seeds, like lima beans, that have been soaked for at least one full day
- Dry lima beans (or whichever seed you chose)
- A mix of different types of seeds that students can sort through and explore

Preparation:
You will need to have prepared the soaked lima beans. Soak one per child in plenty of cold water.

Background Information:
The next six weeks are going to focus on one part plant in depth, from seeds to fruit. During explore time, ask students name plant parts when making observations in the garden. If there are trees losing their leaves in the garden, this can be a topic of discussion as well. Continue exploring the sunny spots marked from several weeks ago.

Procedure:
- Students enter the garden and explore, including the marked light spots, and the wheat.

- Gather class, check in about the season, weather, the light spots, and wheat progress.
- “Last week we talked about how we have different body parts, which each have different jobs. We then named 6 parts of the plant. For the next six weeks, we are going to study a different plant part in depth. At the end, we will put it all together.”
- “Today we are going to focus on seeds. Are seeds alive? What wakes them up? What is inside a seed?”
- Give students a dry lima bean. “This is a seed. It is called a lima bean, and if we planted it, it would grow into a tall bean plant. Can you describe the seed to me?”
- “Like you mentioned, water will wake up a seed. Here are the same seeds that have been soaked in water. How has the seed changed?”
- Discuss.
- “These changes usually happen underground where we can see it. Now we are going to answer the question, what is inside a seed?”
- Have students follow you as you peel off the seed coat. “The seed coat protects the seed, but allows water to get in”. Open your seed, you should have two halves. Students should be able to see a small root and two leaves. “Who can see what is inside the seed?”
- Have a student come to the middle of the classroom and shrink into a seed. “Water” the student and have him or her “remove” his or her coat. Show how the little leaves push through the soil, and the little root pushes down. Now say “Stop! This is as far as the seed can go with just water. What else does the little plant need to grow big and strong?” (Sun, soil, air).
- “What is the job of the seed?” (To grow into a new plant)
- “Seeds can come in many shapes and colors. They all are alive, and grow into plants that produce more seeds.” Pass out different seeds and allow students to explore. You can have them find the largest, the smallest, different colors, etc.

Wrap up:

Return materials to teacher. Put the soaked and opened lima beans in the compost.

Notes/Feedback:

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Seeds part two

Week 6.2
MATERIALS
- Watering cans

Preparation:
Fill the watering cans.

Procedure:
- Students enter the garden and explore.
- The following activity is called “Seed bodies”: Have students crouch into a tiny ball on the ground and say “You are a tiny seed! You were lovingly planted in the dark, warm soil by a very friendly first grader. Sshhh….it’s so silent where you are, and you are cozy in your soft, new home. You are sleeping, and enjoying the quiet. All of a sudden, you feel some water! A first grader has come outside and is watering you with a watering can. You feel the water soaking into your skin, you feel yourself growing a little bigger. This happens every day when the first grader comes out to the garden. You feel something changing inside of you, and all of a sudden, you are ready to sprout! You send a tiny little root deep into the soil to explore for food. (Show students how to start to come out from a crouch). You also send up to little leaves to look for the sun. (Have students put their hands palm to palm, and poke up above the soil). Poke! Your first two leaves push through the soil. A first grader comes outside and yells to her friends that her seeds have sprouted! They water you and your roots drink it all up, and you feel the warm sun on your leaves. Slowly, slowly, with more sun and water and air you start to grow big (show students how to grow slowly). You have a tall stem,

deep roots, and lots of green leaves. One day you form a flower bud (have students color their face with their hands), you turn towards the sun and bloom (students open arms wide) into a beautiful flower! Bees and butterflies come visit your flower (you pretend to be a bee) and your flower turns into a seed and drops it onto the soil (students drop back down to soil)"

- Repeat this several times, changing the type of seed the students become.
- Water the wheat.

Wrap up:

Return watering cans.

Notes/Feedback:

Roots

Week 7.1
STANDARDS
1.ESS1.2, LS1.A, MP.5, W.1.8

OBJECTIVES
- Students learn two jobs of roots
- Students learn how to properly water the soil

MATERIALS
- Rulers
- Watering cans
- Multiple plants pulled from the garden
- A tall stick (like bamboo) placed upright into the soil

Preparation:
Fill the watering cans. Pull at least 5 different plants out of the garden (weeds are fine) that includes at least the roots, stem and leaves. The purpose of having many examples is to show how different roots can look. Ideally you can find a plant with a taproot to show as well. Identify a large tree in or near the garden that the students will try to push over, and push a large stick into the soil, but not too deeply. Lastly, find a watering project for the students beyond just their wheat.

Background Information:
For our purposes, it is sufficient to teach that roots serve two main functions for the plant. One is to pull water and nutrients out of the soil. The other is to hold the plant in place in the ground. Plants are constantly growing new roots. New roots generally pull water and nutrients, while older roots are holding the plant in place.

A taproot is a long, deep root like that of a carrot, dandelion, or California Poppy.

Procedure:

- Students enter the garden and explore, including the light spots.
- Check on the wheat. Which is the tallest? Shortest? Use rulers to measure.
- Gather students, check in about the season, weather, the light spots, and changes in the wheat.
- "What plant part did we talk about last week? What is the job of the seed?"
- "Today we are talking about the plant part we don't usually see, because it works underground. Which part is that? Does anyone know the job of the root?"
- "One job of the root is that it pulls water and nutrients out of the soil. It is responsible for drinking out of the soil. Why is this such an important job?" (Plants need water and nutrients to live). "Water gets into the soil when we water it, or in nature, from the rain. The nutrients come from the compost in the soil, and the worms help keep the soil nutritious for the plants."
- Pass out the plants, allowing students to look at the different roots. See if they can see the small, fuzzy parts of the root that suck up water.
- "Roots have another important job. Can anyone guess?"
- Bring students to the tree you have chosen. Take volunteers to try to push the tree over. Ask students what is holding the tree in place.
- Then bring students to the stick you placed in the soil, and let other students push it down. When they are successful, ask if the stick had any roots to keep it in the soil.
- Gather students and ask, "What are the jobs of the roots?"
- Bring students to the wheat to water. Ask, "Which part of the wheat drinks water? The roots, stems, or leaves? If the roots are drinking, and the roots are in the soil, it is important that we water the soil."
- Find another watering project for the students, being sure that they water the soil, not the leaves.

Wrap up:

Return materials.

Notes/Feedback:

Roots part two

Week 7.2
STANDARDS
LS1.A, W.1.8

MATERIALS

- Journals, pencils, crayons
- Tools for garden work

Procedure:

- Students enter the garden and explore.
- Have students blow on different plants, pretending to be wind, to see if they can knock plants over. What is keeping the plants up?
- In their journals, "A plant needs its root to stay strong in the ground. What keeps you strong and connected to the earth? Draw a picture, and label."

Wrap up:

In partners, share.

Notes/Feedback:

Stems

Week 8.1
STANDARDS
1.ESS1.2, LS1.A, MP.5, W.1.8

OBJECTIVES
- Students set up an experiment
- Students learn the function of stems

MATERIALS
- 3-4" pieces of celery; one per student
- 6-7 long stalks of celery, with leaves, in a large jar of water
- A whole celery plant, including roots, stems, leaves.
- Blue food coloring
- Tools for garden work
- Soap to wash hands (optional)

Preparation:
Cut the celery into pieces for each student. The uncut celery stalks are to set up an experiment that will be explored next lesson.

Background Information:

The structures inside the stem, xylem and phloem, are responsible for transporting water and nutrients between the roots and the leaves/flowers. For our purposes, it is important that students see the “straws” inside a stem that pull water up from the roots.

Procedure:

- Students enter the garden and explore, including the light spots.
- Check on the wheat. Which is the tallest? Shortest? Use rulers to measure.
- Gather students, check in about the season, weather, the light spots, and changes in the wheat.
- “What plant part did we talk about last week? What are the roots jobs?”
- “One job of the roots is to pull water and nutrients up from the soil. The rest of the plant needs the water and nutrients as well. A different plant part has the job of sucking up the water from the roots all the way to the top of the plant—which part is that?”
- “The stem meets the root and sucks the water all the way up to the leaves and flower. Go into the garden, find 5 stems, and come back.”
- “What else did you notice about stems?” (They are green, some are skinny, they grow up). “Another thing the stem does it hold the plant up straight and tall. Touch your spine, in your back. Your spine keeps you up tall so you don’t fall over. The stem has a similar job for the plant.”
- Wash hands (optional), pass out the pieces of celery, and show the students a whole celery plant. “When we eat celery, we are eating the stem. I want you to take your celery piece and open it up. You should find something inside that pulls the water up through the plant.”
- Let students explore their celery, and guide them in finding the tubes inside. If they have found it, have them help their neighbor.
- Show the whole celery plant, and explain how the root pulls the water from the soil, and the stem pulls it through those tubes through the rest of the plant.
- Bring the long stalks of celery in their jar. Have a volunteer add the blue food coloring. Explain that you will leave the celery in the jar until next class, and see how the blue water travels through the plant.
- Bring students to a tree. Ask them to find the stem of the tree. See if they can figure it that a tree’s stem is called a trunk.
- Bring students to do garden work.

Wrap up:

Return tools. Compost celery (unless you had kids wash hands before handling it, in which case they can eat it).

Notes/Feedback:

Stems part two

Week 8.2
STANDARDS
LS1.A

MATERIALS

- Journals, pencils, crayons
- The celery in its blue jar of water
- A knife to cut celery into pieces

Procedure:

- Students enter the garden and explore.
- Find the smallest stem, the tallest stem, the skinniest stem, etc.
- Gather students, and let them pass around the celery in its jar of water. What do they observe? Has the stem changed color? Have the leaves? How did the leaves get blue water in them?
- Discuss
- Carefully cut the stalks into 3-4" pieces for the students to explore. Let them open up the celery, like last time, and look for the tubes. They should notice that only the tubes changed color. Guide them to understand that the water only travels up the tubes, and that the tubes bring water to the leaves.
- In their journals, have them draw what they see, labeling all parts.

Wrap up:
Share, as a class.

Notes/Feedback:

Leaves part one

Week 9
STANDARDS
1.ESS1.2, LS1.A, W.1.8, 1.PS4.3

OBJECTIVES
- Students set up an experiment to block light on a leaf
- Students are introduced to the idea that leaves make food from the sun

MATERIALS
- Cork discs and pins
- Leaf samples (and save them for the next lesson)
- Paper and pencil to record student hypotheses
- Tools for garden work

Preparation:
Collect corks and cut them into discs, about ½ centimeter thick. Each group of 3 students will need two discs, and 2-3 pins (though you will handle the pins).For the leave samples, collect leaves from around the garden, one per student. Have a variety of shapes, sizes, and colors.

Background Information:

Leaves make food (sugars) from the sun in a process called photosynthesis. The pigment responsible for making leaves green, chlorophyll, is critical in the process of photosynthesis. In this experiment, students block part of a leaf from receiving any sun, and as result, chlorophyll is not produced in that spot, and the leaf turns yellow. This concept will be explored in more detail in later grades. For first graders, they need to know that leaves are responsible for making food from the sun, and that green "stuff" inside leaves is responsible for making the food. If a leave does not get sun, no food can be made.

Procedure:

- Students enter the garden and explore, especially the wheat and the light spots.
- Gather students, check in about the season, the weather (especially as winter is approaching), the wheat and the light spots.
- "Who remembers what we talked about last week? What is the job of the stem?"
- Have students stand in a circle, and hand each a leaf that you collected. Allow them to explore it with their eyes and hands and when you say "Switch", have students pass to the right.
- Repeat, until students have seen at least 10-15 different leaves.
- "Based on your observations, what did you notice about the leaves?" (Different sizes, shapes, colors, green).
- Discuss.
- Ask, "What do you do when you're hungry? Where do you go?" (To the cafeteria, to a parent, to the store, to the garden).
- "When a plant is hungry, can it jump out of the ground, get a snack and then return to the earth? No? So then what does it do?" (Drinks food and water from the soil).
- "One way plants feed themselves is by drinking food and water from the soil. Plants also can do something else that is very special, not even animals can do it. Plants take sunlight and turn it into sugar, which is food for them to eat!"
- "This process is pretty complicated. It is called photosynthesis. I just want you to know that the job of the leaf is to make food for the plant from the sunshine, and I want you to see what happens to a leaf that does not get any sun. We are going to set up an experiment."
- Show students the cork discs, and ask if a cork disc can block sunlight. With one of the sample leaves, show the students how to put a cork disc on either side of the leaf, so they are aligned. In groups of three, send students into the garden to find a leaf to cover with their discs. When they are ready, they can raise a hand and you will pin the discs in place. Be sure to put discs on leaves that are not going to fall off over the next few weeks.
- Gather students "The cork disc is going to block only part of the leaf from getting any sun. We will see how the leaf changes. In a few weeks we will take the discs off and observe. What do you think will happen?"
- Record responses.
- Do garden work, and/or water the wheat if necessary.

- Gather students. “Which season has the most light? Which season has the least light? If you were a tree, would you want to lose your leaves during the summer when there is a lot of light, or in the winter, when there is little light? Why?”

Wrap up:

Return tools.

Notes/Feedback:

Leaves part two

Week 9.2
MATERIALS

- Journals, crayons
- Leaves collected from the last lesson

Preparation:
Students will be doing leaf rubbings. Have an example to show, and be prepared to demonstrate to students how to rub the crayon firmly, but not too hard.

Procedure:

- Students enter the garden and explore.
- Have students find 20 different leaves growing in the garden. Compare and contrast the types of greens you find.
- Distribute the leaves from last lesson. In their journals, show students how to do a leaf rubbing. They can do a spring and summer page with green leaves, and an autumn/winter page with reds, oranges, and yellows. Let them explore with different colors and types of leaves.

Wrap up:
Return materials, and share out leaf rubbings with class.

Notes/Feedback:

Flower Power

Week 10
STANDARDS
1.ESS1.2, LS1.A, W.1.8

OBJECTIVES
- Students learn about the function of flowers
- Students draw and label flowers

MATERIALS
- Flower collage (optional)
- Journals, pencils, crayons
- Magnifying glasses (optional)
- "The Reason for a Flower" by Ruth Heller

Preparation:
If you have the time and means, make a collage of different types of colorful flowers on a word document and print it out (in color!). You are trying to guide students to deduce that flowers are colorful in order to attract pollinators. You can bring them to this conclusion in other ways, so do not fret if you cannot make the collage.
"The Reason for a Flower" is a gem of a book, and highly suggested. Read it beforehand. The second half may be too long for your first-grade students, so perhaps you'll only read the first part about flowers and seeds. You can decide before class, or you can gauge your students' interest.

Background Information:
Flowers are responsible for reproduction in plants. Flowers have evolved to attract pollinators which they need for seed production. Some seeds grow in pods, and others in fruit. (And, of course, in hundreds of other ways).

Procedure:

- Students enter the garden and explore, especially the wheat and the light spots.
- Gather students, check in about the season, the weather, the wheat, and the light spots.
- “What plant part did we talk about last week? What is the job of the leaf?”
- “Today we are going to talk about the plant part that smells great and has beautiful colors. Any guesses?” Show students your collage once they’ve guessed.
- I’m going to read a story that tells you the job of the flower, listen and see if you can find it. Read “The Reason for a Flower”.
- Go back and repeat the part that says “The reason for a flower, even weeds, is to manufacture seeds.” Ask, “What is the job of the flower?” (To make seeds!)
- Discuss why it’s important for a plant to be able to make more seeds.
- Ask if flowers can make seeds alone. Show them the page in the beginning with pollinators. See how many they can name. “Flowers usually need a pollinator, like a bee or butterfly, to move the pollen grains before it can change into a seed.”
- “Flowers attract pollinators by being brightly colored (have you ever seen a black flower??), smelling nice, and by opening up wide. Bees and butterflies see the flowers, collect nectar and pollen, which helps the flower because now it can make seeds!”
- Show the page with the different types of seeds. “All of these seeds started as a flower. Even fruit comes from a flower.” See which seeds students recognize from home or the garden.
- With their journals and magnifying glasses (optional), students should find a flower and draw it slowly, in great detail. Pay attention to the number of petals, their colors, the color of the pollen and the flower’s size. Help students label these parts, as well as the name of the flower. Color in the flower. Add pollinators.

Wrap up:

Return materials.

Notes/Feedback:

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Flowers part two

Week 10.2
MATERIALS
- Journals, pencils, crayons
- Tools for garden work

Preparation:
Know what garden work needs to be done.

Procedure:
- Students enter the garden and explore.
- Count how many different types of flowers there are. How many different colors? Which is the largest? The smallest?
- In their journals, have students find a flower they think is beautiful, and draw it.
- Do garden work.

Wrap up:
Wash hands, and share flower drawings with a partner.

Notes/Feedback:

Fruit

Week 11
STANDARDS
1.ESS1.2, LS1.A, W.1.8, MP.5, L.S3.B

OBJECTIVES
- Students discuss the changes from fall to winter
- Students learn the role of fruit and pods

MATERIALS
- "A Fruit is a Suitcase for Seeds" by Jean Richards

Background Information:
Botanically speaking, a fruit is a structure that holds seeds. In the garden, a pumpkin, tomato, zucchini, cucumber and eggplant are all fruit. In the kitchen, these are considered vegetables. Be clear with this distinction with your students.

Procedure:
- Students enter the garden and explore.
- Bring students to the three places in the garden where you are tracking sun and shadows. Have a conversation at each spot, noticing changes. Have the shady spots become shadier? Has the tree shadow changed? Reinforce that in the winter, the sun appears lower in the sky, and we see it for fewer hours. Notice which trees have lost their leaves. Are there many birds singing? Many butterflies buzzing?
- Gather students at the wheat and discuss changes. Have the seeds developed? Is the wheat still growing fast, or has it slowed down? Why do you think? Measure the tallest wheat and shortest. Even though you planted all at the same time, do they all look the same?

- Gather students in classroom, and check in about the season and weather. Have students name other changes we notice in the winter. Where do the animals go? How do we dress differently? Has it begun to rain? Guide students towards recognizing a change in behavior as seasons change.
- “Does anyone remember which plant part we talked about last week? What is the job of the flower?”
- “Flower make seeds! And seeds are very precious. They contain new life. When you have something precious, how do you take care of it?” Take responses.
- “Nature does the same thing. Seeds are very precious, and plants spend a lot of energy making them. Most plants protect their seeds in something called a fruit! Have you heard of a fruit? Have you eaten a fruit? What is inside a fruit?”
- Read “A Fruit is a Suitcase for Seeds” and discuss.
- “A fruit is a part of a plant that is usually colorful and tasty, and has seeds inside. Can you name some fruits we saw in the book? Is a tomato a fruit? A pumpkin?”
- “Plants actually want their fruits to get eaten, so they make them tasty and bright so animals find them. The fruits are only tasty to eat when the seeds inside are ready. Have you ever tasted a fruit that is not ripe? What does it taste like?”
- Show the page with the animals pooping, “The seed passes through the animal unharmed, and can find a new place to grow.”
- “What are some jobs of the fruit?”
- Do seed bodies, having the kids start as apple seeds that grow into an apple tree, that blooms and produces apples (with seeds inside). Ask, “Even though you came from the same seed, do all you apples look the same?”

Wrap up:

Have students find garden work that needs to be done for next lesson.

Notes/Feedback:

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Fruit part two

Week 11.2
MATERIALS
- Tools for garden work
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Look for different pods and fruit in the garden.
- See if there are seeds without protection (wheat).
- Do “Seed Bodies” if your students enjoy it.
- Do the garden work that they identified from last lesson.
- In their journals, “Draw your favorite fruit. Draw what it looks like when you cut it open. Label all parts.”

Wrap up:
Return materials, share journal drawings in partners.

Notes/Feedback:

Leaves part three

Week 12
STANDARDS
1.ESS1.2, LS1.A, W.1.8, 1.PS4.3

OBJECTIVES
- Students discuss results from leaf experiment
- Students understand that no sunshine means no food production

MATERIALS
- Recorded hypotheses from Week 9
- Tools for garden work.

Preparation:
Check to see that the leaves have, in fact, changed color! If not, postpone this lesson by a week or two. Know what garden work needs to be done.

Background Information:
The area under the cork discs should have changed to yellow. The chlorophyll (or the green "stuff") is gone, and the leaf in unable to make food in this area.

Procedure:
- Students enter the garden and explore.
- Explore the wheat and the light spots.
- Gather students, and check in about the season, weather, changes in light, and the wheat.

- “Does anyone remember what tasty plant part we learned about last week? Who can tell the class what the fruit or pod does for the plant?”
- “Today we are going to check on the experiment we did on the leaves. Can someone explain the procedure we followed?”
- Read students their hypotheses.
- In their groups from Week 9, have students find their leaf. Go from group to group and unpin their corks. Give students a few minutes to observe. Record their findings.
- Gather class and ask for observations. “Does anyone have a guess why it is no longer green under the cork disc?”
- Explain to students that the “green stuff” is what makes the food from the sun. Without sunlight, the food cannot make food and the “green stuff” goes away.”
- “When else have you seen leaves change color? How is this connected to a change in sunlight?”
- Discuss.
- Do the garden work you have prepared.
- Have students find several examples of edible leaves in the garden. Allow them to harvest one green leaf to eat. Gather them and say “When you eat green leaves, you are eating food from the sun. You are eating sun food! Enjoy!”

Wrap up:

Return tools, and wash hands if necessary.

Notes/Feedback:

Journal Prompt: Tree

Week 12.2
STANDARDS
1.SL.1

MATERIALS
- Journals, pencils, crayons
- "The Busy Tree" by Jennifer Ward

Preparation:
Find a place on campus with several trees. Class will be under a tree today.

Procedure:
- Bring students to the area with trees that you found.
- Give students time to explore the trees: touching it, smelling it, measuring its size with their arms. Do the trees have leaves? Are they changing colors, or have they fallen? Or is it a tree that keeps its leaves?
- Have students sit in a circle, and read "The Busy Tree" and discuss. What animals do you see in the tree?
- In their journals, "Draw a tree and all the animals you may find living in or near the tree."

Wrap up:
Share, in partners.

Notes/Feedback:

Assessment: Putting It All Together

Week 13
STANDARDS
1.ESS1.2, LS1.A, W.1.8

OBJECTIVES
- Students can name the six main plant parts and name their functions
- Students build a plant

MATERIALS
- Construction paper
- Glue
- Pencils and clipboards

Preparation:
Prepare each clipboard with a piece of paper and pencil clipped in.

Procedure:
- Students enter the garden and explore, including the wheat and light spots.
- Gather students, check in about their explorations, the season, and the weather.
- "Over the last six weeks we learned about the six major plant parts! Who think they can name them all?"
- Put students into 6 groups, and assign them a plant part. Tell them that they need to be able to explain to the rest of the class their job.
- Rotate through the different groups, hearing each job.
- Tell students that they are going to "build" a new plant using materials from the garden. They need to include roots, stems, leaves, and flowers. They can add fruits and seeds if they have time. They can find plant parts on the ground, or in the

garden. They can use stems to make roots, or parts of roots to make stems. Anything is ok, as long as they build a plant.

- Pass out clipboards and pencils. Have them draw a line across the page to represent the soil. Keep the glue in a central place, and let them explore the garden and collect materials. When they have collected everything, they make glue. After gluing, label all plant parts.
- Have students name their new plants, and ask which weather it prefers to grow in.

Wrap up:

Return materials and share plants!

Notes/Feedback:

Insect Houses

Week 13.2
STANDARDS
1.SL.6, 1.SL.1

Procedure:

- Students enter the garden and explore.
- In small groups, students collect leaves and twigs, and anything that they can find that can decompose. Build small structures for insects to find.
- As a class, go and "tour" each group's structure. Students should explain their creations to the class.

Wrap up:

Wash hands.

Notes/Feedback:

The Parts We Eat

Week 14
STANDARDS
1.ESS1.2, LS1.A, W.1.8, 1.L5.C

OBJECTIVES
- Students begin to identify the plant parts of the foods they eat
- Students taste different plants

MATERIALS
- Fruits and vegetables to eat, one per plant group. For example: Nuts (seeds), carrots (roots), celery (stem), lettuce (leaf), orange (fruit), broccoli (flower)
- Soap to wash hands
- Printed pictures of foods you choose, in their whole form. For example: An almond tree, a carrot growing with leaves and stems, a picture of a whole celery plant, an orange tree, a whole lettuce plant, and a whole broccoli plant.
- Compost bin
- Tools for garden work

Preparation:
Know of any allergies in your class. Prepare foods so that each student can have a bite of each.

Procedure:
- Students enter the garden and explore.
- Students explore the light spots, and the wheat.
- Gather class, and check in about the season, weather, and explorations.
- "We just spent nearly two months learning about the different parts of the plant. We studied each in depth, we talked about how they work together, and we even built a

new plant. Today we are going to taste each plant part! Every time you eat a plant, you are eating one of the plant parts. I want you to start thinking about that when you eat."

- Put students into six groups, and give each group a printed picture. They need to figure out what the plant is, and which part they eat. (For example: We have an orange tree, we eat the fruit). You may need to go from group to group and assist them.
- Wash hands.
- Share out one at a time. After each group, taste that fruit or vegetable. Encourage students to describe the tastes. (If a student does not like something, teach them to say "It's not for me" instead of "This is gross!" Acknowledge them for trying something new, and direct them to the compost bin.)
- After all groups have shared out, vote on favorites.
- Have students help clean up, and wash hands.
- Do garden work.

Wrap up:

Return tools, and wash hands again, if necessary.

Notes/Feedback:

Journaling

Week 14.2
MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Students find 10 objects in the garden that will eventually decompose, and 5 items that will not.
- Students find a quiet place to sit. In their journals, “If you could change into a different animal, or plant, what would you become? Draw a scene from your life.”

Wrap up:
Share, in small groups.

Notes/Feedback:

Seeds have Needs

Week 15
STANDARDS
1.LS1.1, 1.LS3.1, 1.SL.1

OBJECTIVES
- Students help set up an experiment
- Students articulate the difference the needs for germination versus plant growth
- Students hypothesize about how their seeds will change in a week

MATERIALS
- 12 Lima bean seeds, or another large bean (Fava bean, Butter bean, etc)
- Four Ziploc bags
- Paper towel
- Permanent marker
- Tape
- Journals/pencils
- Two black pieces of paper

Preparation:
Have all your materials handy in the garden as you set up your experiment. Decide which window you will tape your bags to. After you set up your experiment today, you are going to need to monitor the moistness of the paper towels throughout the week. Keep the towel moist but not soaking. You can poke a hole at the bottom of the bag to allow excess water to escape.

Background Information:
We teach that seeds need only water to germinate, but it is only accurate within a certain temperature range. You are also essentially drowning the seeds in Bag 1,

which is a great lesson in not over watering plants, as well as the effect of a flood on crops. All of these ideas will be built on in next week's lesson.

Procedure:

- Students enter the garden and explore.
- Students explore the light spots and the wheat.
- Gather students and check in about the season, the weather, the light spots, and any other interesting observations.
- Do "Seed bodies" with your students. Tell them they are lima beans (or whichever seed you chose), and go through the life cycle.
- Back at their seats, ask students what makes a seed "wake up" and sprout. (Water)
- Ask what a plant needs to grow and make more seeds. (Soil, air, water, sun, space)
- Probe their thinking, and ask what it the seed had too much water, or the right amount of water but no light, or if it were very cold. Go through different scenarios and see what they think.
- "The special word for sprout is 'germinate', and we all agree that a seed can germinate when it gets wet. We are going to set up an experiment to see what else seeds need."
- Fill up a Ziploc bag halfway with water. Have students put three seeds inside. Label it: Lots of water and sun.
- Put 2-3 wet/moist paper towels in the second bag, and have students put three beans inside. Label : Wet paper towel and sun.
- Put 2-3 wet/moist paper towels in the third bag, and have students put three beans inside. Label : Wet paper towel and refrigerator
- Put 2/3 wet/moist paper towels in the fourth bag, and have students put three beans inside. Label : Wet paper towel and closet.
- Bring students to your indoor classroom. Tape Bag 1 to a sunny window. Cover with black paper. Tape Bag 2 to the same sunny window. Cover with black paper (so students can't see it). Put Bag 3 in a refrigerator (if you don't have one in your classroom, you will do this later) and put Bag 4 in a closet inside your classroom.
- Students open their journals and draw Bag 1. Remind them that Bag 1 is getting sunshine, warmth and lots of water. Have them draw what they think they will find in one week. Repeat for Bags 2, 3 and 4.

Wrap up:

Return journals and pencils.

Notes/Feedback:

Explore

Week 15.2
STANDARDS
LS1.A

Procedure:

- Students enter the garden and explore.
- Have students look for an example of each plant part.
- Are there ladybugs and aphids on your wheat? Check it out.
- What have the other grades planted? Practice naming different plants in the garden.
- Do a scavenger hunt sending students to different plants. (Find the carrots, where is the kale? And so forth).

Wrap up:

If there is something leafy to harvest, taste it!

Notes/Feedback:

Seed Needs continued

Week 16
STANDARDS
1.LS1.1, 1.LS3.1, 1.SL.1

OBJECTIVES
- Students describe how seeds respond to different environments
- Students develop a theory about what a seed really needs to germinate (water and warmth)

MATERIALS
- Journals/pencils
- Bags from the week before

Preparation:
Collect the bags from the window, the refrigerator, and the closet and bring them with you to the garden. Students will journal outside.

Procedure:
- Students enter the garden and explore.
- Students explore the light spots and the wheat.
- Gather students and check in about the season, the weather, the light spots, and any other interesting observations.
- "Today we are going to explore our four seed bags and find out what seeds really need to germinate. Last week we were sure that all seeds need is water, but let's see if there is more to the story."
- "Bag 1 stayed in a sunny place all week, and was given lots and lots of water. What do you think it's going to look like?" Take responses, and then show students.

- In theory, it should not have sprouted. Explain to students that too much water can drown a seed because it does not have any air. Ask, “How is this connected to when we plant? How much should we water a seed when we plant it? What if we planted seeds and then it rained for one whole week straight? What could happen?”
- In their journals, students draw Bag 1, next to their hypothesized Bag 1 from last week.
- “Bag 2 had some water, and stayed wet all week and was in a sunny place. What do you think it will look like?” Take responses, and then show the students.
- The seeds should have sprouted. Ask “What did the seeds have here?” (Water and light and warmth).
- In their journals, students draw Bag 1, next to their hypothesized Bag 2 from last week. They should be able to name the plant parts they see.
- “Bag 3 stayed wet all week, and was in a very cold place—the refrigerator. What do you think it will look like?” Take responses, and then show the students.
- The seeds should not have sprouted. Ask students “What did the seeds have here?” (Water, darkness, and coldness).
- “What does this have to go with gardening? If you planted seeds in the frozen ground, would you expect them to sprout? We do not often have frosts in Oakland, but when the ground does freeze, many plants die.”
- In their journals, students draw Bag 3, next to their hypothesized Bag 3 from last week.
- “Bag 4 stayed wet all week, was warm but had no light from the sun. It was in a very dark place—the closet.” Take responses, and then show the students.
- The seeds should have sprouted. Ask students “What did the seeds have here?” (Water, warmth).
- In their journals, students draw Bag 4 next to their hypothesized Bag 4 from last week. Again, notice the different parts of the plant parts.
- Show students Bags 1 and 3. “What are two things that prevent a seed from germinating?” (Very cold temperatures, and too much water).
- Show students Bags 1 and 4. “What do seeds really need to sprout?” Have a discussion. If students say that plants need the sun to sprout, show them that the seeds in the closet sprouted, too. Teach them that there is a different between warmth and light. Even if there were a light on in the refrigerator, a seed would still not sprout.
- Have students articulate that seeds need warmth and water to sprout.

Wrap up:

Find something edible in the garden, and eat it.

Notes/Feedback:

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Journaling

Week 16.2
MATERIALS

- Journals, pencils, crayons

Procedure:

- Students enter the garden and explore.
- Have students look all the plant parts.
- Have students look for the colors of the rainbow.
- In their journals, “Find the most beautiful thing in the garden. It can be anything. Look at it for one whole minute, and then draw it in your journal. Draw first with pencil, and then color it in.” (Teacher will help with the timing part.)

Wrap up:

Return materials.

Notes/Feedback:

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Habitats

Week 17
STANDARDS
1.SL.1, 1.SL.6, 1.ESS1.2

OBJECTIVES
- Students can define habitat
- Students understand that an animal or plant must meet its need in its habitat
- Students discuss changes in weather and light as the seasons change

MATERIALS
- Large sheets of paper, one per group of 4 students
- Markers
- Pictures of different habitats

Preparation:
At the top of each paper, write a different habitat. For example: Forest, Jungle, Ocean, Desert, Tundra, Wetlands. Print pictures of different habitats to help students start their drawings later.

Background Information:
Students are learning a simplistic definition of habitat, which is okay. As long as students understand that habitats have different features, and that animals meet their needs in their habitat, the concept can be built on in later years. You may need to help students with less common habitats, such as Tundra (Cold, dark, largely treeless, often frozen. Students will probably have heard of polar bears, whales, wolves, etc) and Wetlands (Land areas saturated with water, and host aquatic plants, frogs, fish, alligators, crocodiles, etc).

Procedure:

- Students enter the garden and explore.
- Students spend time noticing changes in the light spots, and observing the wheat.
- Gather students, check in about the season, weather, the light spots, and the wheat.
- As winter is closing and spring is beginning, ask students if they notice any signs of spring. Have certain insects returned? Are flowers and trees blossoming? Are there notable changes in how much light is coming to the marked spots?
- "Over the last few weeks we have been learning about what seeds need to germinate, and then what a plant needs to grow. What do YOU need to grow and be healthy and safe?"
- Take responses, leading students towards 'Shelter' and 'Warm clothes' if they do not get there by themselves.
- "Yes, we need food and water, we need to be able to stay warm, and a safe shelter as well. We also need to be around other people; humans usually live in communities for safety and for companionship. What are some places that humans live?" Take responses.
- "Now, how about a bear? What does a bear need to grow and survive?" Take responses.
- "Like us, bears also need food and water. They don't need warm clothes because they have fur. They live in shelters that they build, and usually with other bears. Where do bears live? Could they manage in a city?"
- Students should have said that bears live in the forest. Write 'Forest' on your whiteboard. Ask, "What other animals and plants live in the forest?" List responses.
- After students have listed everything they can think of, ask "Can a bear find food in the forest? Water? Does it have materials to make a shelter? You listed that a bird lives in the forest. Does the bird have everything it needs to live in the forest? What if I picked up all the bears and put them in the desert. Would that work?"
- "You have described a Habitat. The place where an animal or plant lives is its habitat, and it includes everything that the animal or plant needs to survive."
- Put students in groups, and pass out the sheets of paper with the different habitat written on top. Distribute markers and let students draw all the plants and animals that belong in that habitat.
- Have each group present their poster. Students should focus on one animal in each habitat, and explain its needs. For example, "Our group drew a jungle habitat. One animal that lives in the jungle is a monkey. Monkeys live in trees and there are lots of trees in the jungle. They eat fruit, and there are fruit trees in the jungle as well."

Wrap up:

Have students help collect materials.

Notes/Feedback:

Habitats part two

Week 17.2

MATERIALS

- Journals, pencils, crayons

Procedure:

- Students enter the garden and explore.
- Try to find five animals in the garden, and name one of their food sources. (Butterflies eat nectar from flowers).
- See if students can figure out that almost all insect and animal visitors come to the garden to eat.
- Find five animals and say where they live. (Worms live in the soil).
- In their journals, "The garden is a habitat, too. Pretend you live in the garden. What would you eat? Where would you sleep?"

Wrap up:

Harvest something to taste.

Notes/Feedback:

Worms!

Week 19
STANDARDS
1.ESS1.2, LS1.A, LS1.D

OBJECTIVES
- Students know what a worm requires in its habitat
- Students set up a worm bin
- Students learn how to safely hold worms

MATERIALS
- "Wonderful Worms" by Linda Glaser (or something similar)
- A worm box
- Newspaper
- Spray bottles, full of water
- ½ pound Red Wiggler Worms (Available from bait shops, or can be ordered online)
- 3-4 apples (or other non-citrus fruit), cut up

Preparation:
Beyond buying the worms, this lesson does not require too much preparation. Students generally love worms, so be sure to spend time discussing how to hold worms gently.

Background Information:
There are hundreds of resources showing how to make worm bins, of different complexities. You can ask a parent or a volunteer to make one, or you can purchase one relatively inexpensively. More importantly, feed your worms weekly and make sure the bin stays moist. For your discussion with the students, these are the things worms need:

Moisture (keep the worm bin moist but not sopping), Warmth (60-70F is ideal, so think about where you will place your worm bin), Food (food scraps, but keep it vegan as to not attract pests), Darkness (keep your worm bin shut), and Air (Lots of bedding like shredded newspaper and leaves will prevent the contents of the bin from becoming matted). You also may need to find a family to adopt the worm bin for the summer, or an urban farm who can acquire your bin.

Procedure:

- Students enter the garden and explore.
- Students check on the light spots and the wheat.
- Gather students, check in about the season and weather, as well as the light spots and other interesting observations.
- "Last week we learned about different habitats, or about where animals and plants live. We learned that a habitat provides everything a plant or animal need to survive. What is a worm habitat? Where do worms live?" (Underground).
- Read "Wonderful Worms", pointing out where worms live, what they need to live, what they eat, what time of day they eat, and so forth. Also ask how worms sense their surroundings without eyes (they feel with their bodies).
- "If we were to create a habitat for worms, what would we need to include?" Take responses.
- "You're right, worms need soil, darkness, food, and water. They also need to be warm, to be safe from animals that might eat them, and air. We are going to build a worm bin today, making sure we provide the worms everything they need in their habitat."
- Have students go into the garden and scoop up some soil and bring it back to the worm bin. "Worms also like something we call bedding. Bedding it made from ripped up newspaper or cardboard. The worms like to eat it, and it keeps their home clean and airy."
- Pass out newspaper, and show them home to rip it into long strips. Place the strips into the worm bin.
- "We have soil and newspaper. What else do they need? Food? What do worms eat?"
- "Worms eat dead plants, mostly. What dead plants do you see in the garden?"
- Have students collect fallen leaves, or pulled weeds and add to worm bin.
- "We also have some apples for the worms to eat", let students add apples to the worm bin, placing them all in one corner.
- Let students spray the worm bin until it is as wet as a wrung out sponge.
- Place all the worms into the same corner as the apples.
- "The worms are home! We are going to check on them when we come outside to make sure they have enough water, air, and food. We will see how leaves, bedding and food changes. Now we can each hold a worm. How do we keep it safe?" Take responses.

- Students should be seated and have their hands cupped. Worms do not want to be in direct sunlight, nor do they want to be poked.
- Let students have plenty of time to explore the worms they are holding.

Wrap up:

Gently return worms to their home, and wash hands.

Notes/Feedback:

Worms part two

Week 19.2
STANDARDS
LS1.A

MATERIALS
- Hand shovels

Preparation:
Find a place in the garden, or near the garden, where students can dig and look for worms.

Procedure:
- Students enter the garden and explore.
- Gather students, "We are going to look for worms in their natural habitat. Where would we look? In a tree? On a plant?"
- "Right, we would look underground." Bring students to the place where they can dig and look for worms. Lay down ground rules about how to hold worms, how to not throw soil with shovels, and so forth.
- Once students find earthworms, bring Red Wigglers from the worm bin. Let students compare and contrast Red Wigglers and Earthworms---be sure to keep them separate and return them to their original homes.
- Most students can do this all day, let them take their time.

Wrap up:

Return worms to their home, smooth out the place where students were digging, and wash hands.

Notes/Feedback:

Would a Worm Eat it?

Week 19
STANDARDS
1.LS1.2, LS1.A, 1.ESS1.2

OBJECTIVES
- Students can separate items that a worm can eat from items that a worm cannot eat
- Students learn that worms add castings, or nutrients, to the soil

MATERIALS
- 5-7 items worms can eat
- 5-7 items worms cannot eat
- Tools for garden work, if necessary

Preparation:
When collecting items that either a worm can or cannot eat, think about using objects that students see daily, and especially objects from the cafeteria or their lunch (Plastic wrappers, paper towels, food scraps, a can).
List on the board items that make worms sick: Oily foods, Dairy, Spicy foods, Sour foods (citrus), Eggs, Meat.
Know what garden work needs to be done.

Procedure:
- Students enter the garden and explore, checking on light spots and wheat.
- Gather students, check in about the season and weather and other observations.

- “We set up the worm bin last week. Every week in the garden, we need to add a little bit of food for the worms. We need to learn about what worms can and cannot eat in order to keep them healthy.”
- Here on the board I listed foods that a worm can eat, but would make it sick. Read list.
- Show students collected items one at time and ask “Can a worm eat it?”
- After you have separated items into two piles, ask “Do you notice any patterns? What kinds of materials can a worm eat?”
- You may need to remind students that paper comes from trees, which is a plant and that worms can eat plants.
- “When worms eat, the food passes through them and comes out the other end. The word for this is “Castings”. We can call it worm poop. Worm poop is full of nutrients, and plants need it to grow. Plants are able to grow big and strong only if there are nutrients in the soil. Without worms, we would not have food to eat!”
- As an extension, show students the items worms cannot eat. Ask if they go in the trash, or in the recycling.
- Put some food, that a worm can eat, in the worm bin.
- Let students hold a worm. Students often enjoy looking at the worm and naming the letter or number it looks like.
- Return worms to the worm bin.
- Do garden work.

Wrap up:

Return tools, wash hands.

Notes/Feedback:

Journaling: Worms

Week 19.2
MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Ask students to find a spot in the garden where they can sit and observe for one minute.
- After a minute, pass out journals, students are still in their spots.
- In their journals, “Write a thank you letter to a worm. Draw a picture.”
- If students finish early, they can hold worms.

Wrap up:
Collect materials, wash hands.

Notes/Feedback:

Getting Ready for Spring

Week 20
STANDARDS
1.ESS1.2, LS1.A

OBJECTIVES
- Students learn how to plant seeds in pots
- Students understand some advantages to planting in pots
- Students recognize that planting again means the onset of spring

MATERIALS
- Pea Seeds
- Potting Soil, in a plastic tub
- 6-pack planting containers
- Craft sticks, permanent marker
- Watering cans, full of water

Preparation:
There are many varieties of pea seeds available, and most will do fine. You can do a mix and see which variety does better in your area, just be sure to keep track of where you planted each variety. You can soak the pea seeds for a few hours before you plant. Know where you will keep

Background Information:
There are several advantages to starting seeds and then transplanting them later. You can protect them from extreme weather and pests. You can monitor moisture as well.

When potting plants, you moisten the soil first, then put the moistened soil in the potting plants. Only then do you plant. The seed packet will tell you how deep to plant, but as a rule of thumb, the depth you plant is double the height of the seed.
Students should spray the pots with water every day, unless it rains or otherwise the soil is still moist. Over the weekend, the plants will do fine if you place the pots in a shallow tray with water.

Procedure:

- Students enter the garden and explore.
- Students check on the light spots, the wheat, and feed the worms.
- Gather students, and check in about the season, and the weather. Spend time discussing the signs of spring, and the changes in temperature.
- "As gardeners, we always keep track of the season and weather patterns. One big job in the spring is to start planting again. There is more daylight, and the soil has warmed. We are going to plant peas today. We are not planting them directly into the soil, but rather in these little pots? Anyone have any ideas why?"
- "Yes, we can protect our little plants as they germinate and grow a little. We can make sure they have enough water and warmth, and we can protect them from animals like slugs, snails and birds that love to eat little plants. Once we plant them in the garden in a few weeks, they will be bigger and strong. Also, the soil will have warmed up a little more."
- "Does anyone know what kind of weather peas prefer?" (Warm, but not hot. Cool, but not freezing). "In the Bay Area, this means that we can grow peas in the fall and spring. We are starting them now, before the hot summer days."
- Bring students to the area in which you'll plant. Pour water onto the soil, and have them help mix. It should be wet, but not sopping. If you squeeze a handful of soil and water is escaping, it's probably too wet. Add soil. In small groups, give students a 6-pack cell. Have them fill the cells to the top, but do not squish the soil down. Demonstrate how deep to poke a hole. Ask what would happen if they pushed the seed too far down, or let it sitting on top of the soil.
- Distribute seeds, and let students plant one seed per cell. Place the pots in a sunny, protected place. Write the date and variety on a craft stick (one per pot) and place them in the pots.
- Ask students if the seeds have water to sprout. Ask if the little sprouted plants have food (yes, in the soil), air (also in the soil), and sun (yes, the plants are in a sunny place).
- Have students wash hands.
- Do "Seed Bodies". Have students become pea seeds that are being planted in little pots, and eventually transplanted into a big garden. Go through the life cycle of the pea plant.

Wrap up:

Return tools, wash hands.

Journaling Prompt: Spring

Week 20.2

MATERIALS

- Journals, pencils, crayons
- Spray bottles

Procedure:

- Students enter the garden and explore.
- Students can spray the pea starts, if the soil is dry.
- Give students their journals, and have them find a quiet spot to sit.
- In their journals, "Winter is a time of rest, and spring is a time of growing and changing. What are you hopeful for? What do you wish for? Draw a picture."

Wrap up:

Return materials.

Notes/Feedback:

And Then It's Spring

Week 21
STANDARDS
1.ESS1.2

OBJECTIVES
- Students articulate changes in light, weather, and animal behavior associated with spring

MATERIALS
- "And Then It's Spring" by Julie Fogliano

Procedure:
- Students enter the garden and explore. Check on light spots and wheat.
- Check in about season and weather.
- "It is spring! What are signs of springs? What changes have we noticed leading up to the first day of spring? The plants and animals aren't watching the calendar, they sense the change in light and weather and begin to change themselves. What are some big changes we can see and feel?"
- Talk about bulbs coming up, leaves growing back on trees, flowers blooming, the return of bees and butterflies, more birds, and whatever specific changes you see in your garden and school.

- Read "And Then It's Spring" and discuss.

- Return to each of the three light spots that you marked from the beginning of the year. Do an in-depth check in at each, noticing shadows and light.
- Water the pea starts if they are dry. Have they sprouted? Have students describe what they see.
- Check on the worms. Do they have enough water? Add food, if necessary and let students hold worms.

Wrap up:

Wash hands.

Notes/Feedback:

Spring Poem

Week 21.2
Procedure:

- Students enter the garden and explore.
- Teach students a spring poem

The sun is in my heart
(Hands are overhead in a circle)
It warms me with its power
(Embrace yourself and warm yourself by rubbing your arms with your hands)
It wakens light
(Bring hands above head, and extend arms, bringing them down to sides)
And Life
(Repeat movement above)
In every bird
(Look at palms, cross wrists, link thumbs, and flap hands)
And beast
(Make “claws” with hands, and make a scary face)
And flower!
(Touch your left forefinger and thumb, pass right fist through this circle and open fingers to “bloom”)

- Do poem “repeat after me” until students know it.
- Do variations on the poem: With the movements but silently, or a tiny version using just your fingers and a quiet voice.
- Have students find a sunny spot in the garden. Let them sit and relax with nothing to do but enjoy the quiet.
- Once they become restless, check on the worms and hold them. Students that enjoy relaxing in the sunshine can stay.

Wrap up:

Return worms, wash hands.

Notes/Feedback:

Tendrils need Trellises

Week 22
STANDARDS
1.LS1.1, LS1.A

OBJECTIVES
- Students learn about the role and function of tendrils
- Students build a trellis

MATERIALS
- Pictures of different types of tendrils, if not available in your garden
- Bamboo poles
- Twine
- Scissors

Preparation:
Find examples of tendrils in your garden; vines have tendrils. If you can't find any, print pictures to show. (Pumpkins, cucumbers, grapes, and morning glories all have tendrils.)

Background Information:
Tendrils are specialized stems. They grow out from the stem, and curve around until they touch something, and when they do, they attach. Plants with tendrils use them for support and for climbing.

Procedure:
- Students enter the garden and explore. Check on the wheat and the light spots.
- Gather students, check in about the season, weather, and other observations.
- Bring the pea starts. Show the students, and have students describe what they see.

- “When we planted these peas in their pots, we discussed what type of weather they prefer. Does anyone remember?”
- “Next week, we are going to take the peas out of their homes, and plant them in the garden. You said that peas like to be warm but not hot. Let’s find a sunny place for the peas that gets some shade during the day.”
- Look for a place to with your students to plant the peas next week. Look at the objects around the garden that will cause shade (fences, tall plants, trees).
- Once you have chosen a place, return students to your circle.
- Have students list the 6 plant parts they have studied this year, and list them on the board.
- “Today we are going to learn about a new plant part called a “tendril”. It is a special part of the stem that only certain plants have. Plants called vines have tendrils. Does anyone know what makes a plant a vine? What do vines do?”
- “Vines grow up fences, or in nature, they grow up other plants. To help them climb up, they have tendrils. Tendrils grow out of the stem, and are very curly. They twist and twist until they find something to grab onto.”
- If you have vines with tendrils in your garden, show your students. If not, show pictures of different types.
- “Peas grow as a vine. They have tendrils, and are much healthier when they grow up. We need to build them a structure to grow onto, and this structure is called a trellis.”
- Bring students to the area that you will plant.
- Before you build your trellis, prepare the area for planting. Pull any weeds, break any big clumps of soil, and add compost. Rake the area smooth. Narrate the steps as you do them with your students. Ask questions along the way. “Why are we pulling weeds? Why are we adding compost? Why are we smoothing the soil?”
- Place your bamboo poles or stakes at either end of the row, and every 2-3 feet along the row. Tie a knot with the twine on the bottom of the first pole. Show students how to wrap the twin around each pole, and pull the twine taut. (Keeping the twine taut is very important). Have students take turns. You will need to help, and you will probably need to finish the trellis as the students cannot reach any higher.
- When you have finished, tie off your trellis.
- Stand back and enjoy your work!
- Water the peas.
- Feed the worms.

Wrap up:

Return materials.

Notes/Feedback:

Jack and the Beanstalk

Week 22.2
STANDARDS
1.LS1.1

MATERIALS
- "Jack and the Beanstalk" (folktale, many authors)
- Watering can

Procedure:
- Students enter the garden and explore.
- Are there bees and butterflies in the garden? Watch them go from flower to flower.
- Read "Jack and the Beanstalk" and talk about the amazing tendrils on the bean plant!
- Water the peas, if they are dry.

Wrap up:
Return materials.

Notes/Feedback:

Planting Day!

Week 23
STANDARDS
LS1.A

OBJECTIVES
- Students handle pea seedlings gently
- Students learn how to transplant seedlings

MATERIALS
- Pea seedlings
- Mulch (store bought, or woodchips)
- Watering cans
- Hand trowels

Preparation:
Mark spots for planting.

Procedure:
- Students enter the garden and explore. Check on the light spots, and the wheat.
- Gather students, check in about the season, the weather and other observations.
- "It is planting day! We are going to transplant our peas from their cozy little homes into the garden. I want you to imagine that you are the pea. All you have known is your tiny little home. It's safe and warm. Then someone pulls you out of your home and puts you into a huge space. You'd be a little frightened, yes? It's almost like your first day of school. All you've known is your house and your family, and then you go into a huge school with lots of people! Well, what we are about to do the peas is hard for them too. We can make it easier by being very, very careful with them."

- Gather students at the area that they chose last week.
- Show students how to dig a hole at each marked spot.
- Give each student a pea seedling; show them how to hold it very, very gently—without touching the roots. Have them identify the roots, stem, and leaves. Have the tendrils started to appear?
- Organize students into a line so that planters have space.
- Show students how to carefully lower the start into the hole. The hole should be slightly deeper than the height of the roots. Gently fill in the soil, and make a shallow "moat" around each plant.
- When all the students have finished, let them gently water into their transplants. Remind them that only roots drink, and that they should only water inside the moats.
- Distribute a handful of mulch to each student, and have them spread the mulch over the moat.
- Ask, "Why are we covering the soil?" (The mulch prevents evaporation).
- Stand back and appreciate your hard work!

Wrap up:

Return materials and wash hands.

Notes/Feedback:

Journaling

Week 23.2
STANDARDS
1.SL.1, 1.SL.6, LS1.A

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- The wheat will not be in the garden much longer, reflect on its changes throughout the year.
- In their journals, students should draw the wheat. Include the roots underground, and worms living in the soil. Include the aphids and ladybugs that are likely living on your wheat.

Wrap up:
Share work, in partners.

Notes/Feedback:

Circles and Cycles

Week 24
STANDARDS
LS1.A, LS1.B, 1.ESS1.2

OBJECTIVES
- Students understand the connection between circles and cycles
- Students know that all living things have a life cycle
- Students learn examples of life cycles

MATERIALS
- "Are You a Ladybug" by Judy Allen
- Watering cans

Preparation:
Do the peas need watering?

Background Information:
- The life cycle is simple and complex at the same time. Do not worry if students do not grasp it right away, they certainly will over time.
- Be clear that reproducing does not cause a plant, or animal to die. You can make the distinction that some plants and animals can reproduce several times in their lifetime, and some can only reproduce once. Or, you can wait until these questions arise naturally.

Procedure:
- Students enter the garden and explore.
- Students check on the light spots, the wheat, the peas.
- Gather students, check in about the season and weather and other observations.

- On your board, draw a large circle. Write “Circle”
- “What is this shape?” (Circle) “Can you describe it to me?”
- Erase the “IR” in Circle, and replace it with a “Y”.
- “What is this word?” (Cycle)
- “What is a cycle?” (Something that goes around and around). Push students to make the connection between a circle and a cycle. For example, “Does it matter where you start? Can it go on forever? What cycles have you heard of?” (Seasonal cycles, moon cycles, etc).
- Do “Seed Bodies” where the students are peas.
- Return students to their seats. Ask, “What did you start as in this activity?” (A seed). “What did you become?” (A seed). “Does that sound like a cycle?”
- “This is called a life cycle. Everything that is alive goes through a life cycle. All plants and all animals have life cycles. Some last for hundreds of years, and some for only weeks. Animals start as babies, and as they grow, can produce a new baby. Plants start as seeds, and as they grow, can produce new seeds. We are going to explore the life cycle of plants and animals in the garden.”
- Pretend to be a seed, and go through the motions as you narrate. “I am a pea seed. I am living underground. Water wakes me up and I sprout. Once my roots find nutrients in the soil, I grow bigger and I push my leaves out to the sun. I am a baby plant. As I eat and drink more, and make food from the sun, I grow bigger and taller. I am a young pea plant. Eventually, I will grow flowers. Now I am an adult pea plant, because only now can I make more seeds. Once a bee or butterfly pollinates my flowers, my flowers change into seeds. I have completed my life cycle, and I will die soon. Before I die, my pea pods will dry out and drop to the soil. (Become a seed). If my seeds find what they need, they will start the cycle all over again (Demonstrate one more time)”
- Check for understanding. “What does a pea plant begin as? What does it make? Can a baby plant with no flowers produce seeds? What kind of seeds does a pea plant make?”
- Bring students to your pea plants. “What stage are they in their lifecycle? Do all the plants look the same? But are they identical?”
- Return students to the circle.
- Read “Are You a Ladybug”.
- Discuss the life cycle of a ladybug.
- Explore your garden for ladybugs, look for ladybugs with and without spots. Look for ladybug larvae, and for ladybug eggs.
- Water the peas, if they need it.

Wrap up:

Return materials.

Notes/Feedback:

Journaling

Week 24.2
MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Look for circles in and around the garden.
- In their journals, “Draw a big circle. Fill your circle with drawings of things that keep you happy and strong. You can draw places in nature, people you love, or anything else that you can think of.”

Wrap up:
Share, in partners.

Notes/Feedback:

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Worm Cycles

Week 25
STANDARDS
LS1.A, LS1.B, 1.ESS1.2

OBJECTIVES
- Students can articulate the concept of a life cycle
- Students learn about the life cycle of a worm

MATERIALS
- "The Life Cycle of an Earthworm" by Bobbie Kalman (or something similar)
- Mulch and watering cans, if needed
- Twine, scissors

Preparation:
How are the peas doing? Are there weeds to pull? Are the tendrils attaching themselves to the trellis? If so, great! If not, this a job that students can do. Cut foot long pieces of twine. After the lesson, you'll show them how to gently tie wayward peas to the trellis. You also may want to explore the worm bin before class, and familiarize yourself with what worm cocoons, as well as baby worms, look like.

Procedure:
- Students enter the garden and explore.
- Check on the light spots, the wheat, and the peas.
- Gather students, and check in about the season, weather and other observations.
- "Last week we learned about the Life Cycle. Can anyone describe what the life cycle is?"
- "The life cycle describes how plants and animals grow and reproduce—which is a big word for making new plants or animals."

- “Over the next few weeks we will learn about the different cycles of animals in our garden. Today we are going to talk about earthworms.”
- Read “The Life Cycle of an Earthworm”
- Check for understanding, and go through the life cycle of a worm, starting with the cocoon, and ending with the cocoon. “Can worm babies reproduce?”
- Split class into halves. One group should explore the worm bin and look for cocoons and baby worms. The other half should help connect the peas to the trellis. After 5-6 minutes, switch.
- Ask the students to check the soil moisture around the peas. If it’s dry, water. Add more mulch.

Wrap up:

Wash hands.

Notes/Feedback:

Journaling

Week 25.2
STANDARDS
1.SL.6

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Allow students to gently hold worms. Discuss the importance of worms in the creation of soil.
- Wash hands.
- Find a quiet place to sit in the garden. In their journals, "Worms are always working, and they make soil healthy for plants to grow. Without worms, plants would not be healthy, and without plants, we would not be able to eat! Write a 'Thank You' letter to a worm."

Wrap up:
Ask for volunteers to read letters in front of the class.

Notes/Feedback:

Butterflies

Week 26
STANDARDS
LS1.A, LS1.B, 1.ESS1.2

OBJECTIVES
- Students learn that some animals change significantly during the course of their life cycle
- Students discuss two examples of animals that change

MATERIALS
- "The Caterpillar and the Polliwog" by Jack Kent
- Materials for garden work

Preparation:
Is there garden work to be done? If so, gather the materials you may need.

Procedure:
- Students enter the garden and explore.
- Check on the light spots, the wheat, and the peas.
- Gather students, and check in about the season, weather and other observations.
- "We are continuing to explore life cycles this week. When we found baby worms last week, we saw that they look the same as grown worms, only smaller. Some animals look the same as babies and as adults, just smaller. Can anyone think of any examples?" (Cats, dogs, bears, people).
- "Some animals change altogether. We are going to learn about two examples today."
- Read "The Caterpillar and the Polliwog"
- "How did the polliwog change? How did the caterpillar change?"

- Choose a volunteer to act out the life cycle of a frog, from egg to polliwog, to a frog that lays egg.
- Choose another volunteer to act out the life cycle of a butterfly, from egg to caterpillar to a butterfly that lays egg.
- "Let's go into the garden and find butterflies in all their cycles. Where would we look for eggs? (Under leaves, because when the caterpillar hatches, it needs a food source right away) Where would we look for caterpillars? Even if we couldn't find a caterpillar, what kind of evidence would show you that a caterpillar has been on a plant? (Holey leaves). Where should we look for butterflies? (Drinking in flowers)."
- Spend substantial time exploring these different things.
- Bring students to a flowering plant, ideally the peas, but any flowering plant will do. "This plant is now an adult, because it has flowers. What will the flowers change into? (Seeds). Most plants cannot change their flowers into seeds by themselves. They need a bee or butterfly to pollinate the flower, first. Only then can the plant continue in its lifecycle. Often the life cycles of plants and animals are connected."
- Have students continue looking for butterflies, and for seed pods (that are evidence that a pollinator was there), and for holey leaves.
- Do the garden work you have prepared.

Wrap up:

If there are peas to harvest, have a snack!

Notes/Feedback:

Journaling

Week 26.2
MATERIALS

- "The Very Hungry Caterpillar" by Eric Carle
- Journals, pencils, crayons

Procedure:

- Students enter the garden and explore.
- Gather students, and read "The Very Hungry Caterpillar".
- Search the garden for evidence that a caterpillar has been eating leaves.
- Distribute journals, and on your board, guide students in drawing a full-page outline of a butterfly. Draw the long, thin body, six legs, and two antennae. Draw the two large wings.
- With their outlines, students can take their journals to their favorite spot in the garden and color in their butterflies.

Wrap up:

Share butterflies, in partners.

Notes/Feedback:

Pea Harvest

Week 27
STANDARDS
1.ESS1.2, LS1.A, LS1.B

OBJECTIVES
- Students can articulate the concept of a life cycle, and know specifically the cycle of the pea plant
- Students recall the steps necessary for growing peas
- Students learn to harvest peas

MATERIALS
- Scissors

Preparation:
Ideally your peas are ready to harvest when you do this lesson! If not, you can switch it around, as necessary. Decide if you will let students harvest their own peas, and if so, they will need scissors. If you want to harvest for your students, only you will need scissors.

Background Information:
The more you harvest from your pea plant, the more pea pods the plant will produce. Though you do not want to harvest tiny peas, do not be shy about doing a heavy harvest.

Procedure:
- Students enter the garden and explore. Check in on the light spots, and the wheat.
- Gather students, check in about the season and weather and other observations.

- “We have been talking these past weeks about life cycles. What is one life cycle that we have discussed? Can someone go through the cycle for the class?”
- “Can anyone name an animal that we have not talked about yet and describe its life cycle?”
- Repeat several times.
- “Our peas have nearly completed their life cycle. Pea plants do not live very long at all. They are nearing the end of their cycle, and have made their seeds. Lucky for us, they are delicious!”
- As a class, go to the peas. Have each student find and harvest (but not yet eat) a pea pod. It does not generally work well to pull the pods off the vine. You can either cut them with scissors, or pull very gently.
- Return students to the circle with their pea pod.
- Ask “What were the steps that we took to grow these plants?” Go over the steps you took as a class, from planting peas in pots, to preparing the bed, to building a trellis, to transplanting, to weeding, watering and finally harvesting.
- Show students how to open the pods down their seam. “What will you find inside?”
- Give students time to explore the seeds in their pods. Have each student count how many seeds they have, and share out with the class. “Are all the pods exactly the same?”
- Enjoy munching on your pods, and harvest more, if they are available.

Wrap up:

Harvest peas to share with other teachers or staff.

Notes/Feedback:

Assessment: Life Cycle

Week 27.2
STANDARDS
LS1.A, LS1.B

OBJECTIVES
- Students can articulate the concept of a life cycle
- Students can provide an example of a life cycle

MATERIALS
- Journals, pencils, crayons
- Materials for a second activity (for example, garden-themed books that you can bring outside)

Preparation:
If you think it will take a long time to check in with each student, have another task that students can perform without heavy supervision for when they finish drawing. Such activities could be drawing something else, exploring, or reading.

Procedure:
- Students enter the garden and explore.
- Distribute journals and pencils, and instruct students to draw something of their choosing.
- While students are drawing, visit students one by one. Ask, “What is the life cycle? Can you name a plant, and describe its life cycle? Can you name an animal and describe its life cycle?”

Wrap up:

Harvest and eat peas.

Notes/Feedback:

Cutting the Wheat

Week 28
STANDARDS
1.ESS1.2, LS1.A

OBJECTIVES
- Students can articulate the life cycle of wheat
- Students learn how to harvest wheat

MATERIALS
- Scissors, one pair per student
- Wheat grinder
- Twine or string to bundle wheat
- A bin in which to collect the cut wheat
- A full watering can, if necessary

Preparation:
A meat grinder will grind wheat—just be sure to wash it very thoroughly before using it.

Background Information:
Wheat needs to dry for about a week before it can be ground into flour. The exact moisture content of wheat before grinding seems a bit complicated, and I believe it suffices to let the wheat dry for a week or two and become hard.

Procedure:
- Students enter the garden and explore.
- Check on the light spots. Spend time here as a class, discussing changes as summer is approaching.
- Gather students and check in about the season and weather.

- “Can you tell me about the life cycle of the wheat plant? How does it go from seed to seed?”
- Read, again, “The Little Red Hen”
- “Today we are going to harvest our wheat. Next week we will process our wheat, that is, turn the wheat seeds, also called wheat berries, into flour. For now, we will cut the plants, and will let the seeds spend a week drying. If we tried to grind the seeds today, they would be too mushy and it would not work.”
- Bring students to the wheat crop. Distribute scissors, and show them how to cut the wheat stem towards the soil, and place it in the bin. If they cut a stalk that is invested with aphids, or is otherwise not good, they will put it in the compost bin instead.”
- Let students work until the crop is mostly harvested. You may need to finish by yourself later.
- Back at your circle, bundle the wheat into sheaves. If you are forecasted for a week of sun, you can leave the sheaves outside in a safe place. Otherwise, they will dry fine in your classroom.
- Show students a wheat grinder, so they are familiar with the process for next week.
- Check on the peas, and water if necessary.

Wrap up:

Harvest and eat peas.

Notes/Feedback:

Tortilla Factory

Week 28.2
STANDARDS
1.W.3

MATERIALS

- "The Tortilla Factory" by Gary Paulsen
- Journals, pencils, crayons

Procedure:

- Students enter the garden and explore.
- Gather students, and read "The Tortilla Factory". Discuss the cycle of the corn plant.
- Compare and contrast corn and wheat (they are related plants!). What other things can you make from corn?
- Think of something you ate today. In your journal, "Write a Thank You letter to the person who planted and took care of the plant or animal that you ate today."

Wrap up:

Ask for volunteers to share their letters.

Notes/Feedback:

Little Red Hen's Wheat Party

Week 29
STANDARDS
LS1.A

OBJECTIVES
- Students recall the experience of the wheat: from seed to seed
- Students experience turning wheat seeds into food
- Students celebrate their hard work!

MATERIALS
- The dried wheat
- Small cups to collect wheat seeds, and a large bin to collect the chaff and the straw
- Wheat grinder, and a large bowl to collect the flour
- Tortilla ingredients: Whole wheat flour, oil, salt, water and materials: Bowls, measuring cups, spoons
- For cooking tortillas: An electric stove, or hot plate, frying pans, spatula, a plate to collect cooked tortillas
- Plates, napkins, toppings for the tortillas

Preparation:
This requires serious preparation, and it is very worth it. Try to enlist parent volunteers, weeks in advance, to be in charge of making tortillas from the flour. Find and print a whole wheat tortilla recipe to give to your tortilla-makers.

You can use your ground wheat for the tortillas, or you can give the tortilla-makers whole wheat flour from the store. Freshly ground wheat is perishable, keep it in the refrigerator.

Procedure:

- "Today is the day! We are having a wheat party!"
- Narrate the following, having students help fill in the details: "Many, many months ago we planted our wheat. (In which season did we plant?) It was fall, and our seeds germinate quickly. They grew straight and tall and (what color where the plants at first?) very green. Eventually they produced seed helps. And then the plants changed color (what color did they turn?), and turned yellow. Many insects visited our wheat (which insects?), such as ladybugs, aphids, and ants. Just last week we harvest the wheat and let it dry out. Today we are going to turn this plant into something we can eat! Like the Little Red Hen likes to ask, 'Who will help me?!'"
- In your classroom, have students wash their hands thoroughly.
- At their seats, give students several stalks of wheat. Show them how to pull the seeds from the chaff. Show them to place the seeds in a collecting container, and to put the chaff and wheat stalks (straw!) into a separate container.
- This will take a while, give the students plenty of time to enjoy this tactile experience.
- Collect all of the seeds into a larger bowl. Bring the students to where you have the wheat mill set up. There should be a bowl to collect the "flour". Pour the wheat berries into the mill and give each student a turn to grind the wheat. Ideally, in the meantime, parents are busy frying up the tortillas.
- Back in their seats, show the students their finished product.
- Have students help clean up the classroom.
- Have parents explain to students the process of turning flour, water, and oil into a tortilla.
- Choose students to pass out plates, napkins, and whichever toppings you have.
- Once each student has a tortilla, with toppings, and is seated ask students to reflect on the process from seed to seed, and from flour to tortilla. Think about all the people who helped, and the sun, soil, air and water as well.
- Ask, "Who will help me eat these tortillas?" Enjoy!

Wrap up:

Compost plates, clean classroom.

Notes/Feedback:

Journaling

Week 29.2
STANDARDS
W.1.8

MATERIALS

- Journals, pencils, crayons

Procedure:

- Students enter the garden and explore, for an extended time.
- Harvest peas, if there are any to eat.
- Have students find a spot that they enjoy in the garden. In their journals, "Write about the Wheat Party. What was your favorite part? What was special to you? Draw a picture."

Wrap up:

Share, in partners.

Notes/Feedback:

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Preparing for Summer

STANDARDS
1.ESS1.2, LS1.A

OBJECTIVES
- Students reflect on their year of gardening
- Students participate in the process of shutting the garden down for summer

MATERIALS
- Materials for garden work: A bucket to collect weeds and wheat roots, compost, shovels, cardboard and bricks.

Preparation:
If it is the last week of school, do the same process with the peas as you will do with the wheat: pulling them out, adding compost to the bed, and covering. If you have a few more weeks left of school, wait until the last week to pull out the plant, and continuing harvesting from the plant for as long as possible.

Procedure:
- Students enter the garden and explore.
- Gather students. “It is our last week in the garden for this school year! What have been your favorite parts? What have you learned?”
- Class discussion.
- “We are going to put the garden to sleep for the summer. We need to clean the garden, pull weeds, and cover the soil. First, we are going to finish pulling out the rest of the wheat.”
- Dig out the roots of the wheat.

- Add plenty of compost to the garden bed, and dig it in.
- Cover the area with cardboard, weighed down, to keep the soil moist and cool over the summer.
- Pull weeds, organize the garden.

Wrap up:

Wash hands.

Notes/Feedback:

Journaling

Week 30.2
STANDARDS
W.1.8

MATERIALS

- Journals, pencils, crayons

Procedure:

- Students enter the garden and explore.
- If there are peas to harvest, harvest and eat them.
- Gather as a class, and discuss the ways that Nature has taken care of us this year. (This can be anything from providing beauty, to giving us shade and breeze, to providing food to eat).
- Students find and sit in their favorite spot in the garden. In their journals, “Nature takes care of us. How will you take care of nature this summer?”

Wrap up:

Share as a class.

Notes/Feedback:

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Second grade gardening touches on a wide range of topics, including erosion, cover crops, and symmetry in nature. Students will plant wildflowers to attract pollinators, radishes to eat, and cover crops to help maintain the soil.
The main garden task that second graders will focus on is identifying and pulling weeds. Pulling weeds captures topics such as the effect of space (or limited space) on plants, the ways that seeds move, and competition for resources. Second graders begin to discuss the nature of an ecosystem, and the ways that a system changes throughout the seasons. Many lessons include tactile activities designed in order to encourage learning through the senses.

Though a field trip is not written into the second grade curriculum, students might enjoy the Botanical Gardens and could accompany their third grade classmates on their outing.

The Numi Foundation is deeply grateful to the writers of open-source materials for their contributions and inspiration to this curriculum.

Table of Contents

Welcome Back!

Week 1
STANDARDS
2.SL.1

OBJECTIVES
- Students make observations after an extended break from the garden
- Students review and practice garden rules
- Students make class agreements

MATERIALS
- Poster board and pens
- Garden tools

Preparation:
Be clear about the difference between garden rules and classroom agreements. Perhaps your garden has rules posted that are school-wide, otherwise know beforehand what the rules are. (For example: Always walk, Ask before harvesting, etc). It is more effective to have fewer rules, but be sure that they are clear.

Procedure:

- Students enter the garden and gather in opening circle.
- Welcome students back to their outdoor classroom.
- “We need to review the rules of the garden and decide on some classroom agreements.”
- Call on students to name garden rules, and have students act them out.
- “We have garden rules to make sure everyone stays safe, and we need to decide on our class agreements for this year. These are so that everyone feels safe and welcome here, and that all of our voices are here. How do we want to agree to treat each other in this space?”
- Record student responses on the poster board, discussing and clarifying where needed. Have students sign the bottom. Keep this in your classroom and review as necessary.
- Give students an extended explore time. Practice garden rules and class agreements. Guide students in looking for different things: Colors, something taller than you, a plant that looks healthy, a weed, a plant at the end of its lifecycle, a seed pod, something you don’t recognize, evidence of an insect.
- Practice your gathering signal. Gather students in the classroom.
- Share out observations from the garden explore time.
- “You are second graders now, and already have three years of experience in the garden. You will have the opportunity for more responsibilities this year, and I will give them to you as you earn my trust. What are ways that you can show me that you’re ready for bigger jobs?”
- Review names of tools, tool safety, and their proper use.

Wrap up:

If there is extra time, continue exploring.

Notes/Feedback:

Scavenger Hunt

Week 1.2
STANDARDS
2.SL.1

Preparation:

Send students on a scavenger hunt. Know beforehand what kinds of things you'll ask them to find. For example: Something orange, a bug, aphids, a healthy plant, a shady spot, something soft, something spiky, a plant you have never seen.

Procedure:

- Students enter the garden and explore.
- Gather students. "I am going to send you on a scavenger hunt. I want to see that you are able to explore the garden while practicing our garden rules."
- Begin the scavenger hunt; have students find each item, and gather all students before you announce the next item to find.
- If there is time, let students help suggest items to find in the garden.

Notes/Feedback:

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Teamwork

Week 2
STANDARDS
2.SL.1, 2.SL.3

OBJECTIVES
- Students learn the meaning of teamwork, and practice teambuilding
- Students understand that teamwork is required for success in the garden
- Students find an example of nature working together in the garden

MATERIALS
- Four Bandanas

Preparation:
The first few gardening classes really set the tone for the year. A lack of cooperation amongst students can become very destructive. Take time with team building exercises, and practice them as necessary. Be sure to debrief thoroughly at the end.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about season and weather.
- Review your class agreements. Ask a student to read the garden rules.
- "Today we are going to work on team building. Why do you think we start the year with team building? What are some jobs in the garden that we need to do cooperatively?" (All of them!)
- "I am going to give you a task. The job is to line up by birthday, January 1 is here, and December 31 is there. You may not touch another person, and you may not talk! If someone talks, the class has to sit down and start over."
- Be clear with where the class should line up, and have them begin.

- After your students are lined up, have them say their birthday to check if they are in the correct order. Have students return to sitting.
- Debrief with questions like “Was that difficult? What was difficult? Was it frustrating when one person talked and you had to start over? What ways did you figure out to communicate without your voices?”
- “We are going to another task. This one is harder. You need to line up height. You may not talk. Shortest is here, and tallest over there.”
- Choose four students to blindfold, and be sure that you are in a place without obstacles. “If you can see, you may gently help those who are blindfolded, but otherwise, you should not be touching anyone else.”
- After students are in height order, have them seated. Remove blindfolds.
- Ask the students who had been blindfolded, “How did it feel that you didn’t know what was happening? How did it feel to be helped? When in the garden may you need help? How do you want to be helped?”
- To the students who could see, “How did it feel to help someone else?”
- Have the students line up one more time, by number of siblings. Tell them they can talk.
- After students have lined up, and have been seated again, ask “How was it to be able to talk? What was easier? What was difficult? What was it like when everyone spoke at once? How did you take turns?” Ask questions based on your own observations.
- “When we are having a class discussion and everyone is talking at once, what happens? If one student keeps talking out, and I keep asking them to stop talking, how does it feel for the rest of the class? If three students are supposed to water the garden with one watering can, how can they cooperate?”
- Have students act out scenarios for the class, for example: 3 students are to share one watering can, 5 students are trying to look at the same insect and there is not enough space, or someone needs helping pulling out a weed.
- Put students in groups, give students each group a task, and have them practice working together cooperatively.

Wrap up:

Have students look for examples of animals and plants working together in the garden.

Notes/Feedback:

Teamwork part 2

Week 2.2
STANDARDS
2.SL.1

MATERIALS

- "Pumpkin Soup" by Helen Cooper (or another book about teamwork)

Preparation:

Think of some scenarios that might happen in your garden that would require teamwork, and communication.

Procedure:

- Students enter the garden and explore.
- Gather students, read "Pumpkin Soup".
- Discuss. What does sharing responsibilities mean? Why do we help another? How can we use our words? What does this have to do with the garden?
- Continue to have students act out different scenarios that require teamwork in the garden.
- If there is time, continue to explore.

Notes/Feedback:

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Fall

Week 3
STANDARDS
W.2.8, 2.PS1.1

OBJECTIVES

- Students recall what they know about the season of fall
- Students learn that there are predictable weather patterns and changes associated with the seasons
- Students make observations related to the season

MATERIALS

- A large poster board, prepared as explained below.
- Enough index cards for all your students
- Pencils, crayons
- Permanent marker

Preparation:

On the poster, write FALL in large letters at the top. Also have sections that say: Weather, We Harvest, We Plant, Garden Jobs, Special Fall Changes. Each section should be big enough to fit at least 5 index cards. Students will be drawing on their index cards, and you

will assemble them on the poster board and glue them down. Find a spot in your classroom to hang your Fall poster.
Outside, have the cards, pencils, and crayons ready so that the first students can begin drawing as you distribute cards.

Background Information:

You may need to help your students with this activity. It will be easier when you make the Winter poster and the Spring poster later in the year.

For your information:
Fall Weather: Sunny, Partly Cloudy, Rainy, Windy
Food we harvest: Pumpkins, Apples, Pears, Corn, Winter Squash, Potatoes, Figs, Grapes (There are more, of course. You can also use examples from your own garden)
Foods we plant: Greens, lettuce, radish, carrot, beets, fava beans, peas, wheat (Again, there are more examples, and you can use examples from your garden)
Garden jobs: Planting, weeding, watering (when it is not raining), mulching, planting cover crops, preparing the garden for winter (And any others you can think of)
Special Changes: Animals migrate, leaves change color and fall, days get shorter, first rains.

Procedure:

- Start class by taking students on a walk through your campus, looking for signs of fall. Before you even go outside, ask students what kinds of things they may be looking for.
- After your exploration, come into the garden and explore, also looking for signs of fall.
- Gather students, check in about the season and weather.
- “What signs of fall did you see around school? What did you see in the garden?”
- “Though we think of fall as a pretty chilly time of year, sometimes in Oakland the beginning of fall can be quite warm. We have a temperate climate which means that it does not usually get extremely hot or extremely cold. We have to look harder for signs of seasons here, but we can see them if we pay attention. Another change from summer to fall is that we have less and less hours of daylight. Many animals know that when the days start getting shorter, it is time for them to start migrating. Can anyone think of an animal that migrates? What are insects that we see less of in the fall, and many of in the spring?”
- “We are going to make a fall poster together, which will list the season, the weather, the foods that we harvest, the foods we plant, the fall garden jobs, and special fall changes. We are going to go category by category, and when you have an idea, raise your hand and I’ll call on you. I’ll write it in marker on the bottom of this card, and you will draw a detailed picture. For example, if I ask ‘What is the weather like in the

fall?' If I call on someone who says 'Sunny', I'll write 'Sunny' on the bottom of this card and hand it to them, and they will draw a picture of a sunny day and then color it in. Of course, there is more than kind of weather in the fall, so multiple students can answer."

- Go through the sections, handing out cards. Students who already have cards should be able to work independently. If students finish early, they can do multiple cards, if there are enough.
- Assemble the poster and glue cards down, allowing students to admire their work.

Wrap up:

Collect and return materials.

Notes/Feedback:

Garden Journals

Week 3.2
STANDARDS
2.SL.1, 2.W.7

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Have students find, again, examples of plants and animals working together in the garden.
- Distribute journals. “These will be your garden journals for the year. We will be writing and drawing in here this school year.”
- “Today we are going to do our first journal prompt to practice how we use our journals, and how we sit in the garden to write.”
- Go over procedures for journal-writing days.
- Students sit somewhere they enjoy and write in their journals, “What are you excited about learning and doing this year in the garden? Write, and draw a picture.”

Wrap up:
Share, in partners.

Notes/Feedback:

Wildflowers

Week 4
STANDARDS
2.LS4.1, 2.SL.6, 2.LS2.2

OBJECTIVES
- Students learn that to attract pollinators, one must provide food
- Students understand that pollinators play an important role in the garden
- Students understand that a fall sowing of seeds ensures a spring blooming

MATERIALS
- Wildflower Seeds
- Soil to mix with the seeds

Preparation:
One risk of sprinkling wildflower seeds throughout the garden is that they can be confused for weeds, and may be pulled. You can choose to designate a section solely for the pollinator garden, or you can disperse such a copious amount of seed that even if a few plants get pulled here and there, there will still be plenty of plants blooming in the spring.

Background Information:
Most garden stores sell wildflower seed mixes. You may want to choose a mix with flowers native to your area—they are adapted to your climate. There usually are further specifications on seed mixes, such as seeds for a sunny garden, or a shady garden.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- “Can someone tell me what pollen is? Where is pollen found? What does pollination mean? Which insects are pollinators?”
- “Two of the most common pollinators in a garden are bees and butterflies. Why is it so important to have pollinators in our garden?”
- “Can you name 10 things that we eat that depend on insect pollination?” (Fruit, some nuts, “vegetables” that are really fruits like cucumbers, tomatoes, and pumpkins).
- “Well, if we want bees and butterflies to visit our garden, we need to invite them!”
- Look at the sky and shout, “Bees!!! Butterflies!! Please come to our garden!!” Look around theatrically, trying to see if any have come.
- “Do you think that will work? If we want to invite, or attract, pollinators, how should we do it?” (Planting flowers—which provide food).
- “We are going to plant wildflowers! Do most flowers bloom in the fall and winter, or spring and summer?”
- Draw this as you explain, “Fall is an excellent time to plant wildflower seed. What happens is that we sprinkle them into the soil now, and we let the rain water them—just like in nature. They spend all of fall and winter developing strong roots. As winter ends and the world warms up again, the plants are all ready to start blooming. We will have many pollinating visitors as our flowers begin to bloom.”
- Pass out a pinch of wildflower mix to each student. Let them look at the different sizes, shapes and textures of the seeds. Have them cup their hand with the seeds in it, and add a small handful of soil. Have them mix the seeds and soil together. Show them how to sprinkle this soil/seed mix into the garden. Great places are next to established plants, in corners, around the edge of the garden, near the garden entrance, or wherever inspires your class.
- Allow students to plant; encourage them to take their time.
- Discuss.
- Are there any pollinators in the garden at the moment? If so, have students observe them. Challenge students to notice as the number of bees or butterflies decrease as winter approaches.

Wrap up:

Wash hands, if necessary.

Notes/Feedback:

Journaling: Wildflowers

Week 4.2
STANDARDS
2.LS2.2

MATERIALS

- Journals, pencils, crayons

Procedure:

- Students enter the garden and explore.
- Students look for bees and butterflies.
- In their journals, “Draw your dream garden. Include lots of detail, and plenty of color. Label the parts of your garden.”

Wrap up:

Share, in small groups.

Notes/Feedback:

Plant Part Review

Week 5
STANDARDS
2.SL.1, 2.SL.3, W.2.8

OBJECTIVES
- Students recall plant parts and their functions
- Students can identify different plant parts in the garden
- Students build their own plant

Preparation:
Know which plants you will bring students to as you discuss each plant part and their function.

Background Information:
Plant Parts and Their Jobs
Roots—Keep plants stable (rooted!) in the ground and absorb water and nutrients from the soil.
Stem—To hold the plant upright, and to bring water and nutrients from the roots up to the rest of the plant. (The stem also brings sugars down from the leaves to the roots, but for second grade purposes it's ok to teach that the stem pulls water and nutrients up)

Leaves—Make food from the sun.
Flowers—Reproduction; to make new seeds.
Fruit—To protect seeds, to attract animals who spread the seeds

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.

- Ask students, “Can you touch your head? Your ears? Your stomach? Your knees? Etc.”
- “You have many body parts. Your body parts work together to make your body go, and each part has a special job. Can someone tell what your eyes are responsible for? Your knees? Your feet? If you wanted to eat an apple, would you bring it to your ear or to your mouth?”
- “Just like you, plants have body parts too. Before we go any further into the year, we are going to review all the important plant parts and their functions. I am going to put you to the test today. First, what are the six main plant plants?”
- As students answer, list on the board: Roots, Stems, Leaves, Flowers, Seed, Fruit.
- Do you know any other plant parts? (Bulbs, tendrils, tubers—all modified stems).
- Return to the original six plant parts. “We are going to find all of the plant parts in the garden and review their jobs.”
- Bring students to a tree. Ask one student, or maybe two to try to push it over. “Why can’t they push it over? What part of the plant is keeping the plant strong and stable in the ground?”
- “Right, the roots. What other job do the roots have?” (To absorb/drink water and nutrients from the soil.)
- “Remember when I asked if you wanted to eat an apple, would you bring it to your ear or mouth? If I water a plant and pour the water on its leaves, it’s kind of like sticking an apple in my ear…I can’t eat it through my ear! It’s important to always remember that the roots drink, and to water the soil when watering.”
- Continue looking for plant parts in the garden, and discussing each purpose.
- Once you have finished your tour, test students: “Go find three stems. Find two flowers. Find evidence of roots. Find five different shaped leaves.”
- Gather students. “Find pieces of plants on the ground and leaves that have fallen. ‘Build’ your own plant. You can use any material you find, but be sure to show roots, stems, leaves, and a flower.”
- When students have finished, let them show each other their “plants”.
- Is there anything ready to harvest? Harvest with your kids, and ask which plant part they are eating.

Wrap up:

Wash hands.

Notes/Feedback:

Plants part 2

Week 5.2
STANDARDS
2.SL.1

MATERIALS

- Journals, pencils, crayons

Procedure:

- Students enter the garden and explore.
- Students find an example of each plant part in the garden.
- Student choice: The students who loved “building” their own plant can build another, using different materials. The rest of the students can sit with their journals and draw something beautiful they find in the garden, labeling the plant parts.

Wrap up:

Students who drew in their journals can share in partners; students that “built” plants can show the other groups their plants.

Notes/Feedback:

Erosion

Week 6
STANDARDS
2.ESS1.1, 2.ESS2.1, W.2.8, 2.SL.1

OBJECTIVES
- Students discuss the ways to add nutrients into soil
- Students learn the word erosion; students learn that erosion is caused by wind and water
- Students learn that plants can help prevent erosion

MATERIALS
- A shoebox, or smaller, full of soil
- 4-5 spray bottles, full of water

Preparation:
Bring your shoebox of soil and spray bottles to the garden classroom.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Show students your little model garden. “This is my little garden. I don’t have anything planted in here right now. Last year I planted corn in my little garden, and the corn grew for months and months and pulled nutrients out of the soil. Which part of the corn plant pulled the nutrients out of the soil?”
- “The soil in my little garden is tired, and hungry. So I want to take care of it this fall. What do you do when you are tired? What can you do when you are hungry?” (Rest; eat)
- “We are going to feed the soil! One way you can feed soil is by adding compost, which is full of nutrients. Another way is to plant a special kind of plant that actually

puts nutrients back into the soil. The “Legume” plant family is a group of plants that include beans, peas, and peanuts. These important plants put something called Nitrogen into the soil! Nitrogen is important because it’s a plant’s favorite food. It’s important for you to know that because the soil is hungry, we are going to feed it, and one way of feeding is by planting a special plant that puts food into the soil. The bean we are going to plant this fall is called a Fava Bean.”

- “So that’s one way we are going to take care of the soil, and these plants also help in another way.”
- Show your little garden again. Blow hard on the soil so that some of it flies away. Do it a couple of times for effect.
- “What is happening here?” (The wind is blowing the soil away!)
- Spray your little garden forcefully with a spray bottle, making sure to push the soil around.
- “What is happening with the water?” (The rain is pushing the soil away).
- “The wind and rain can really hurt our soil if we do not protect it. The wind can blow it away, and we need our soil to stay in our garden! The rain can push the soil down and make it very hard. The way that wind and water affects the soil is called Erosion. When scientists talk about erosion, they are usually talking about what happens in nature as the wind and rain move soil and rocks. Have you ever heard of a landslide or a mudslide? That is an example of how heavy rains can cause a lot of soil to move! Can you think of any other examples?”
- “Farmers also worry about erosion. Many farmers and gardeners take very good care of their soil, and do not want it to erode! They do not want their soil moving around in the rain and from the wind. Though this may happen slowly, over time they can lose a lot of soil.”
- Explain that when you cover an area with plants, the plants cover the soil and protect it from the effects of the wind and rain. Explain that sometimes grass is grown on hills to prevent landslides—the roots hold onto the soil and prevent it from moving.
- “Back to the fava beans. We are going to plant fava beans next week. They are going to take care of our soil in two ways, can you name them?” (Adding nutrients to the soil, and protecting from erosion)
- Allow students to work in groups to test out erosion. They should make piles of soil and blow them down. They can rebuild piles and spray them, watching the effect that water has on the soil. Let them experiment with different shapes and sizes of piles, and ask which seem to “erode” faster.

Wrap up:

Wash hands.

Notes/Feedback:

Erosion part 2

Week 6.2
Preparation:
Prepare an area that students can dig soil from.

Procedure:

- Students enter the garden and explore.
- Can students find evidence of soil being moved from the wind or water?
- Put students into groups. Let them dig a certain amount of soil and give them time to "build" a small home from the soil. They can collect sticks, woodchips, and rocks to help.
- Gather students, and go on a "tour", visiting each group's house.

Wrap up:

Wash hands.

Notes/Feedback:

Planting Day!

Week 7
STANDARDS
2.ESS2.1, W.2.8, 2.SL.1

OBJECTIVES
- Students review the concepts of nutrient cycling and erosion prevention
- Students prepare a bed for planting, and plant

MATERIALS
- Fava beans
- Buckets to collect weeds
- Compost
- Full watering cans
- Craft stick and permanent marker
- Row cloth, if necessary

Preparation:
Know where you are planting! Have all the materials you need (buckets to collect weeds, compost, hand rakes, full watering cans, etc) ready at the planting site. Fava beans should be planted about 1.5 inches deep, and 4 inches apart (or the width of a child's palm). Roughly estimate how many fava beans you'll need to plant your bed, divide that by the number of students, and then you'll know how many seeds to give each student.

Background Information:
You will be cutting the fava bean plants down before they produce bean pods, but the leaves are edible (and delicious). There is a rare genetic condition, Favism, that causes

certain people to get sick from eating fresh fava beans. It tends to affect people from the southern Mediterranean region.
Row cloth can be purchased from any gardening store. It is a thin cloth that slows evaporation while still letting light through. You can water right through it, and remove it once plants are a few inches high. It will need to be weighed down.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- "Today is planting day! Who can tell me the type of bean we are planting today? Knowing that we are in the fall and moving towards winter, what kind of weather did you think fava beans prefer?" (Favas are a cool season crop).
- "Who can tell me two ways that the fava bean plant helps take care of the soil?"
- Review the concepts that certain plants can add nutrients back into the soil, and that plant roots hold onto soil and prevent erosion by wind and rain.
- "Normally in a garden, we plant plants that we want to eat, like potatoes or lettuce or strawberries. Some gardeners plant fava beans to eat, but many plant it for the same reason that we are, to take care of the soil. When you plant a plant not because you want to eat it, but because you want to take care of the soil, the plant is called a cover crop"
- "We are going to plant these fava beans and take care of them until they are big and tall. Once they make flowers, we are actually going to cut the plants down and let the stems and leaves turn into soil. After the plants have decomposed, we will be able to plant new plants on top, and the soil will be rested, healthy and strong!"
- Bring students to the planting site. Pull weeds, if necessary. Add a little bit of compost. "Why do we add compost to the soil?" and make the area smooth with hand rakes. Students can crush big clumps of soil if there are any, and pull stones if there are big ones.
- Distribute seeds to your students. Allow them a minute to explore these big seeds.
- Show students how to lay one seed down at a time, placing a flat hand down as a spacer before laying down the next. There should be about one hand's width in between all seeds. Be careful not to compact the soil while putting hands on the bed. Instruct students that everyone should lay their seeds down first, otherwise students may accidentally plant on top of each other's seeds.
- Once all seeds have been laid down, ask "If we push small seeds in only a little bit, how far do we push big seeds?"
- "Fava beans need to be pushed down about an inch and a half, which is about the height of your thumb." Show students how to push seeds down with your thumb, pushing until your thumb is all the way in the soil.
- Students push the seeds down.
- "How do we wake up our seeds?"
- Water the soil.
- Label a craft stick "Fava Beans", and the date, and place in the soil.
- If it is very sunny, or has been very sunny, cover the soil with row cloth to keep the soil moist. You can remove the row cloth when plants are 3-4 inches tall.

- Recap all the steps that you just took, from weeding all the way to watering.
- Have students help return all the materials back to where they belong.

Wrap up:

Wash hands.

Notes/Feedback:

Watering and Journaling

Week 7.2
STANDARDS
2.W.7, W.2.8, 2.ESS2.1

MATERIALS
- Watering cans, full
- Journals, pencils, crayons

Preparation:
Fill watering cans.

Procedure:
- Students enter the garden and explore.
- Gather students where you planted the favas. Show students how to poke the soil to see if it's wet. If it is wet, then leave the soil. If it has dried, water the plants. "Why wouldn't we water the soil if it were already wet?"
- In their journals, "In nature, plants get water from the rain. Draw a forest during a rain storm. Label everything you draw."

Wrap up:
Collect all materials.

Notes/Feedback:

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The Insect Club

Week 8
STANDARDS
W.2.8, 2.SL.1, 2.PS1.1

OBJECTIVES
- Students can articulate what makes an animal an insect
- Students learn the difference between an (endo)skeleton and an exoskeleton
- Students search for insects in the garden

MATERIALS
- Insect outline, one per student
- Clipboards, one per student
- Full watering cans, if necessary.

Preparation:
Find an outline of an insect; a grasshopper works well. Print it, and make enough copies for each student. Check to see if the fava beans need watering.

Procedure:
- Students enter the garden and explore.
- Gather students and check in about the season, weather, and the favas.
- "Who can name 10 of your body parts?"
- "Can you name the 6 main parts of the plant?"
- "There are many crawling visitors in our garden. Usually we call them bugs, and there are special types of bugs that scientists call 'Insects'. Can you name all the insects that you've heard of?"
- List responses on the board as students respond. List all responses, even those that are not insects (like worms or spiders).

- Distribute clipboards with the insect outline clipped in. Allow students a minute or two to look at the drawings.
- “There are certain requirements to be in the insect club, not every bug can make it. We are going to learn the five main requirements to be an insect.”
- “Take out your finger. Point to the head of the insect. Point to the middle part of its body—this is called the thorax. Say thorax. Point to the bottom part, this is called the abdomen. Say abdomen. Insects are kind of like snowmen, they are split into three sections. Head, thorax, abdomen. Point to the thorax, head, abdomen, head, thorax…(until they get the idea!)”
- Look at your list on the board. “I see worm on this list. Is a worm split into three parts? No? Can the worm be in the insect club then? No?” Erase worm, and anything else listed that is not split into three segments. (Like a slug, or a snail, or a roly poly.)
- “Ok so we got the three body parts. How many legs do you count on your insect?” (Six!)
- “All insects have six legs.” Look at your list, “How many legs on a spider? Eight legs? Can a spider be in the insect club then?” Erase spider.
- What else do you see on your insect. (Antennae, and wings)
- “Insects have antennae and wings. I see caterpillar on this list. Do caterpillars have antennae or wings? No? But caterpillars are baby butterflies or moths, and butterflies and moths are insects, so yes, caterpillars can be in the insect club. These requirements refer to grown up bugs!”
- “Insects have one more thing, but you can’t see it from the picture. You actually have something similar in your body. Put your clipboard down and I’ll help you find it.”
- “Knock on your head. Hear that? That’s your skull. Feel your jaw bones, your chin and your collar bones. Feel your shoulders, your elbows, and your spine. Feel your wrists, and your fingers. Feel your ribs, hips, your knees, and your shins. Feel the bones in your ankles. I just had you feel many of the bones in your body. They are all connected, what is that structure called?” (Skeleton).
- “You have a skeleton! Is it inside or outside of your body? Why do you need a skeleton?” Discuss.
- “Skeletons help you move, and they protect you! Your skull protects your brain. It’s like a helmet. Your ribs protect some of the most important parts of your body, like your heart and your lungs. It’s like having armor inside your body.”
- Write Skeleton on the board. “Insects have something similar. They don’t have a skeleton, they have an exoskeleton.” (Write ‘exo’ in front of skeleton.)
- “What do you think is the difference between a skeleton and an exoskeleton?”
- “For one, skeletons are inside the body, and exoskeletons are on the outside. It is hard outer shell that protects an insect from harm.”
- “Do you go and get a new skeleton when you grow? No? Do you have the same skeleton from when you were born?”
- “Another difference between a skeleton like ours, which grows with us, and an exoskeleton is that an exoskeleton does not grow. When an insect gets too big for its exoskeleton, it sheds it (molts) and there is a new, larger one underneath.”
- “I am a ladybug. I am walking into this class, and say ‘I want to be in the insect club!’ What questions are you going to ask me?”

- Let students ask you if you have three body parts, 6 legs, antennae, wings, and an exoskeleton. The answer to all is yes!
- “Alright insect detectives, I challenge you to find 5 different insects in the garden. Every time you see something creepy and crawly, look and see if you can see the three body parts, 6 legs, antennae and wings.”
- Let students explore, looking for insects. Common garden insects are ladybugs, other beetles, ants, bees, butterflies, wasps and flies.
- Water the favas, if necessary.

Wrap up:

Return watering cans.

Notes/Feedback:

Insects part 2

Week 8.2STANDARDS
W.2.8, 2.SL.1, 2.PS1.1

MATERIALS
- Journals, pencils, crayons
- Watering cans, full

Preparation:
Fill the watering cans.

Procedure:
- Students enter the garden and explore.
- Water the favas, if necessary. Have they sprouted?
- Go on another insect hunt. Challenge students to move silently through the garden.
- Distribute journals and pencils. Have students find and draw one insect, and one non-insect (like a snail or spider).

Wrap up:
Share, in partners.

Notes/Feedback:

Where Do Insects Go?

Week 9
STANDARDS
2.PS1.1. 2.SL.1, 2.SL.3, W.2.8, 2.W.7, 2.LS4.1

OBJECTIVES
- Students further their understanding of insects and their habits
- Students investigate the garden, tallying insects

MATERIALS
- "Not a Buzz to Be Found: Insects in the Winter" by Linda Glaser
- Materials for garden work
- Clipboards, paper, pencils; one per student

Preparation:
Plan a garden work project; weeding, watering, or cleaning.

Procedure:
- Students enter the garden and explore.
- Check in about the season, weather, and the favas.
- "Who had a hard time last week finding insects? Why do you think that is?"

- Read “Not a Buzz to Be Found: Insects in Winter”
- Discuss the different insects, noticing their body parts, and how they survive through the winter.
- “What other animals do you know of that migrate during the winter? What animals that you know of hibernate during the winter?”
- “You are going to explore the garden today, and you are going to try to count how many insects you see. For example, if you see a bee, write “Bee” and draw one tally. Every time you see another bee, add a tally. It may be difficult to know if you’re counting the same bee twice, or not, but do you best.”
- Send students in the garden with their clipboards and pencils.
- Gather students, and share out data. Collect papers, and keep these until spring.
- “We are going to do this again in the spring. What differences do you think you will see between now and the spring in terms of how many insects are about?”
- Bring students to the fava area. Do the work you have planned—watering or weeding (or both).

Wrap up:

Return materials, wash hands.

Notes/Feedback:

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ASSESSMENT

Week 9.2
STANDARDS
2.PS1.1. 2.SL.1, 2.SL.3, W.2.8, 2.LS4.1

MATERIALS

- Printed pictures of garden bugs, one set per pair of students

Preparation:

Print pictures of common garden bugs: snails, slugs, ladybugs, aphids, cutworms (not actually worms!), earthworms, spiders, etc.

Procedure:

- Students enter the garden and explore.
- Gather students. In partners, give them pictures of garden bugs. Have them separate the pictures into two groups: insects and non-insects. Check in with different groups as they work. If there are common misconceptions, stop the class and discuss.
- Ask students to hold up an insect that helps the garden. Discuss.
- Ask students to hold up an insect that hurts the garden. Discuss.
- Explore the garden for insects.

Wrap up:

Collect all materials.

Notes/Feedback:

The Weeds Must Go!

Week 10
STANDARDS
2.LS4.1, 2.L5.a

OBJECTIVES

- Students understand the definition of weeds
- Students understand the effects of weeds on a garden
- Students weed the garden

MATERIALS

- Buckets to collect weeds

Preparation:

Know beforehand areas in the garden that need weeding.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season, weather and the favas.
- "Who can name the six main plant parts?" (After each plant part is named, ask "What is the job of that part?")
- "What are the requirements for joining the insect club? Can you name 5 insects?"
- If it has been raining, "When it rains, the plants are happy! The soil gets soaked and the roots have plenty of water to drink. There are plants in the garden that we did not plant, that we usually called weeds. Weeds are not bad plants, they just are growing where we do not want them. Their roots also absorb water and nutrients from the soil, but we want the water and nutrients going to our plants. When it rains, weeds also grow big and tall. It is important to pull weeds before

they complete their lifecycle, that is, before they produce seeds and drop them into the soil."

- If it has not been raining, "Our plants are thirsty! It has not been raining much this fall, and the plants are relying on us to water them. Sometimes plants that we did not plant, called weeds, start growing too. They are not bad plants, but we do not want them in our garden. They take nutrients and water from the soil, but we need to save all the water for our plants. It is important to pull weeds before they complete their lifecycle, that is, before they produce seeds and drop them into the soil."
- "One of the main garden jobs in the fall is to pull weeds! We want to save the water for our plants. I am going to put you into groups to do a weeding project today."
- Take students to an example area. Show them how to pull plants up from the roots, otherwise the plants can grow back. Teach students how to identify weeds, and that they should not pull anything that they are not sure about.
- Send students in groups to different areas in the garden to weed, with a bucket to collect their plants. Inevitably students will find bugs and insects, spend the time looking at them as a class.
- Spend time describing different weeds, comparing their leaves, roots, shapes, colors.
- Bring the weeds to the compost.
- Admire your work.

Wrap up:

Wash hands.

Notes/Feedback:

Are You An Ant?

Week 10.2
STANDARDS
W.2.8

MATERIALS
- "Are You an Ant?" by Judy Allen
- Hand lenses, one per student (optional)
- Watering can, full

Preparation:
Fill the watering can.

Procedure:
- Students enter the garden and explore.
- Water the favas, if necessary.
- Gather students, read "Are You an Ant?" and discuss.
- "Are ants insects? How do they help the garden? How do they hurt the garden? How do they work together?"
- Send students in the garden with hand lenses (optional) to find ants. See if they can follow an ant and find its nest.

Wrap up:
Collect hand lenses.

Notes/Feedback:

Winter

Week 11
STANDARDS
W.2.8, 2.PS1.1

OBJECTIVES

- Students recall what they know about the season of winter
- Students learn that there are predictable weather patterns and changes associated with the seasons
- Students make observations related to the season

MATERIALS

- A large poster board, prepared as explained below.
- Enough index cards for all your students
- Pencils, crayons
- Permanent marker
- "When Winter Comes" by Nancy Van Laan (or something similar)

Preparation:

On the poster, write WINTER in large letters at the top. Also have sections that say: Weather, We Harvest, We Plant, Garden Jobs, Special Winter Changes. Each section should be big enough to fit at least 5 index cards. Students will be drawing on their index cards, and you will assemble them on the poster board and glue them down. Find a spot in your classroom to hang your Winter poster.
Outside, have the cards, pencils, and crayons ready so that the first students can begin drawing as you finish distributing cards to the rest.

Background Information:

Having made the fall poster already will help with this activity. For your information, some basics are listed below. Add or edit based on the specifics of your garden.
Winter Weather: Sunny but cool, Windy, Rainy, Cold, Cloudy
Foods we harvest: Lettuce, radish, fava leaves, peas (There are more, of course. You can also use examples from your own garden)
Foods we plant: (Though there are a few plants that be sown in cold soil, most cannot. For the sake of the lesson, you can leave this 'planting' section blank to reinforce that winter is not the time for planting).
Garden jobs: Weeding, watering (when it is not raining), mulching to keep the soil warm, cutting cover crops.
Special Changes: Many animals are hibernating, trees are bare, the shortest day of the year is the first day of winter, sometimes there is a frost, many warm weather plants die in the winter.

Procedure:

- Start class by taking students on a walk through your campus, looking for signs of winter. Before you even go outside, ask students what kinds of things they may be looking for. Signs of winter can even be a lack of insect activity, no blooming flowers, or barren trees.
- After your exploration, come into the garden and explore, also looking for signs of winter.
- After students have explored the garden, but before you gather in your outdoor classroom, bring students to a place with exposed soil. Have students sink their hands in the soil. "What does it feel like? Warm? Cold? Dry? Wet? If you were a seed, would you want to be planted in cold soil?"
- Gather students, check in about the season and weather and the favas.
- "What signs of winter did you see around school? What did you see in the garden?"
- "Though we think of winter as the coldest time of year, sometimes in Oakland there are warm winter days. Like we talked about in the fall, we have a temperate climate which means that it does not usually get extremely hot or extremely cold. We have to look harder for signs of seasons here, but we can see them if we pay attention."
- "Compared to the fall, does the winter have more or less daylight? (Are days longer or shorter?) Do you think plants grow faster or slower?"
- Read "When Winter Comes", and discuss. Compare winter in Oakland with the winter depicted in the book.
- "Just like we did in the fall, we are going to make a winter poster together, which will list the season, the weather, the foods that we harvest, the foods we plant, the winter garden jobs, and special winter changes. We are going to go category by category, and when you have an idea, raise your hand and I'll call on you. I'll write it in marker on the bottom of this card, and you will draw a detailed picture. For example, if I ask 'What is the weather like in the winter?' If I call on someone who says 'Some days are sunny and cool', I'll write 'Sunny and cool' on the bottom of this card and hand it to them, would will draw a picture of a sunny, but chilly, day and then color it in. Of course, there is more than kind of weather in the winter, so multiple students can answer."

- Go through the sections, handing out cards. Students who already have cards should be able to work independently. If students finish early, they can do multiple cards, if there are enough.
- Do the favas need watering? Send students to water the rest are finishing.
- Assemble the poster and glue cards down, allowing students to admire their work. Replace the fall poster with the winter poster.

Wrap up:

Return materials.

Notes/Feedback:

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Winter part two

Week 11.2
STANDARDS
2.W.7, W.2.8

MATERIALS
- Journals, pencils
- Materials for garden work

Preparation:
What work needs to be done in the garden?

Procedure:
- Students enter the garden and explore.
- Do the garden work prepared.
- In their journals, "Trees are resting for the winter, many animals are resting, the earth is resting. Write a lullaby to the earth as it prepares for sleep for the winter."

Wrap up:
Share, in partners.

Notes/Feedback:

Soil Types

Week 12
STANDARDS
2.LS4.1, 2.SL.1, 2.SL.6, 2.L5.a

OBJECTIVES
- Students use all senses to describe soils
- Students set up an experiment with different soil types

MATERIALS
- Three pots
- Three soil samples
- Radish seeds (or any seed that you have—the faster sprouting the better)
- Full spray bottle
- Craft sticks and permanent marker
- Tools for garden work

Preparation:
Prepare the soil experiment by collecting really nice, rich, dark garden soil and very poor soil from somewhere on your campus. In one pot you should have just nice garden soil, one pot should have just poor soil, and one should be a mix of the two.
Look at your fava beans. Are there weeds to be pulled? Is the soil dry and need water? Are there aphids on the tops of the plants? Aphids can be cut off, or sprayed off with a hose. Decide which project you will do after setting up the soil experiment.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather and favas.
- “Think about your body. What does your body need to grow?”

- “Many of you mentioned food, water and air. Those are all true. But think about the food that you eat. What kinds of foods do you think will help you grow, so that you feel healthy and strong and have energy? What kinds of foods might help you grow, and make you feel tired and less strong?” Discuss.
- “Well, what do plants need to grow?” Take responses.
- “Again you mentioned, air, water, sun and soil. What is in inside the soil that plants need?”
- “Plants use their roots to pull nutrients out of the soil. It’s the same with people, when I eat an apple, it’s the nutrients inside the apple that my body uses. We said that fruits and vegetables make us feel healthy and strong, but that junk foods often make us feel tired. Is it the same for plants? Do they care what kind of soil they are growing in?”
- “We are going to set up an experiment with three different soils. I am going to let you feel each of them.”
- Pass out the poor soil from your campus. Have students feel it, smell it, describe its texture and color. Collect soil in its pot. Label: Outside soil.
- Pass out the mix of poor soil and garden soil: Have students feel it, smell it, describe its texture and color. Collect soil in its pot. Label: Mix.
- Pass out the really nice garden soil: Have students feel it, smell it, describe its texture and color. Collect the soil in its pot. Label: Garden soil.
- “We are going to plant radish seeds in each pot. All the pots are going to get the same amount of soil, the same amount of water, and all with stay in the same sunny place. The only difference is the type of soil that are planted in.”
- Have students help: Plant 3 seeds in each pot. Radish seeds are small and do not need to be pushed down far. Water each pot the same amount with the spray bottle. When you return to your classroom, put all the pots in a sunny place so that students can observe the plants’ progress.
- Return to the favas. Do the garden work you have prepared.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

NUMI FOUNDATION
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Soils part two

Week 12.2
STANDARDS
2.W.7, W.2.8

MATERIALS
- Journals, pencils

Preparation:
Find a place in the garden that students can feel the soil.

Procedure:
- Students enter the garden and explore.
- Gather students, bring them to a place in the garden they can sink their fingers into. Let them feel soil, gently, for a little while. Encourage descriptions of the soil.
- Clean hands, and distribute journals.
- In their journals, "What do you think of when you smell the soil? What memories do you have? Write a story."

Wrap up:
Share in small groups.

Notes/Feedback:

The Garden Ecosystem

Week 13
STANDARDS
2.SL.1, 2.SL.3, 2.LS4.1

OBJECTIVES
- Students are introduced to the concept of ecosystem
- Students know that an ecosystem includes living and nonliving elements

MATERIALS
- Materials for garden work

Preparation:
Prepare garden work, whether it be weeding, watering, or removing aphids from the favas.

Background Information:
An **ecosystem** is a community of living and non-living things that work together. Ecosystems have no particular size. An ecosystem can be as large as a forest or as small as a tree. The concept of an ecosystem is extremely important, but it should be expected that your students' understanding will develop through the following years.

Let this lesson be an introduction to the concept of an ecosystem, and keep use the word ecosystem when possible. This lesson is a foundation for the concept of interdependent relationships within an ecosystem: the ways that plants depend on the sun and on animals, and how animals depend on plants and so forth. Bring this alive in your garden discussions after seeing animals eating seeds, or bees pollinating flowers, or plants growing after a heavy rain.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season, the weather, and the favas.
- "Let's look around our garden. Can you name what you see?"
- List student responses on whiteboard. If students aren't listing nonliving things, some prompting may be necessary. Nonliving things should include soil, water, air and sun.
- "You just described our garden ecosystem here in Oakland. Many of the things you listed are alive. Which of these are alive? Which of these are nonliving? Can the living keep on living it if weren't for the sun? Or the air?"
- Erase the board. "What would you find in the desert?"
- List responses, again being sure to include the nonliving.
- "Both the garden and the desert have the sun, air water, and soil. Are the soils the same? Is there plenty of water in the desert? Are the animals you'd find the same?"
- Encourage students to compare and contrast the desert ecosystem to the garden ecosystem.
- "I have been using the word Ecosystem, but I have not told you what it means. Do you have any ideas?"
- "An ecosystem is simply a community of living and nonliving things. The living and nonliving work together. The air and sun and water feed our plants, which in turn feeds animals. We will continue finding these connections throughout the year."
- "Next week we will be drawing a map of the garden ecosystem. We are going to include all the details we can. Let's start today by exploring the garden, and counting and naming all the plants we can find." Students explore, and may need help naming different plants.
- When students have finished, gather and explain that they need to find nonliving elements. This can include tools, the garden boxes, water, sun, and air.
- Do the garden work that you prepared.

Wrap up:

Return tools, wash hands.

Notes/Feedback:

Ecosystem part two

Week 13.2
STANDARDS
2.W.7, W.2.8

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Again, guide students in finding 10 living things, and 5-10 nonliving things. Are there any animals in the garden today that weren't there last time?
- In their journals, "Draw yourself standing in front of your home, or wherever you live. Include all the nature that is around you, trees, birds, anything you can think of. Label your drawing, and color it in."

Wrap up:
Share, in partners.

Notes/Feedback:

Garden Map

Week 14
STANDARDS
2.ESS2.2

OBJECTIVES
- Students experience working with a map
- Students make thorough observations of the garden

MATERIALS
- Map outline, clipboard and pencil; one per student
- An example garden map
- A plan from a landscape architect, several copies.

Preparation:
Draw a basic outline of the garden for your students to fill in, and make a copy for each student.
Fill in a garden map yourself to show as an example.
Find and print a drawing/plan from a professional landscape architect, which can easily be found online.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season, the weather and the favas.
- “Today we are going to continue our conversation about the garden ecosystem. Can someone remind the class what ‘ecosystem’ means?”
- “We are going to draw a map of the garden, and label everything we can. I want you to pretend that you are going to give the map to someone who has never been in a garden before, so you need to provide plenty of detail. You will draw and label what you see inside every garden bed (or garden row), all the paths, all the animals and all the trees.”
- “This is a lot of work! We are going to spend two class times on this project, so take your time. We are going to go together from bed to bed to work on this.”
- Start at the entrance to the garden. Have students mark the entrance on their map, and draw the plants in their immediate vicinity, and any insects or bugs that they see.
- Move to the next area, which may be the first bed, or row. “What plants are here? Draw what you see, and label.”
- Move with the students from bed to bed. Ideally, after being guided through the first few areas, the students get in a rhythm and can work independently.
- Hopefully students are noticing animals and insects, and can describe their relationships to the plants that they are eating or living in.
- When class time is almost over, gather students and collect the maps.
- Show students the drawing that a landscape architect drew. “What you were just working on is drawing the map of our garden. A landscape architect has a similar job. He or she also draws outdoor spaces, and helps design what they look can look like. Look at all the detail in the drawing, all the buildings, trees, paths, and other plants.”
- Pass out the copies of the drawings for students to look at.

Wrap up:

Collect all materials.

Notes/Feedback:

Garden Map part two

Week 14.2
STANDARDS
2.ESS2.2

MATERIALS

- Student work from previous lesson
- Clipboard and pencil; one per student

Procedure:

- Students enter the garden and explore.
- Distribute clipboards, pencils, and students' maps from previous lesson.
- Students continue to work on their maps, guide them where necessary.
- Gather students in your seating area, place the maps in a circle on the benches and let students walk in a circle, looking at other students' maps.
- Class discussion, "What was difficult? What was easy? Why are maps useful? Do you think a stranger could pick up one of your maps and find the fava beans quickly?"

Wrap up:

Collect all materials.

Notes/Feedback:

Compost Saves the Day!

Week 15
STANDARDS
W.2.8, 2.SL.1

OBJECTIVES
- Students observe and articulate the effect soil quality has on plant growth
- Students learn that there are several ways to increase the health of the soil
- Students experience cutting cover crops

MATERIALS
- Radish pots from the classroom
- Scissors, one pair per student

Preparation:
Bring the radishes from your classroom out into the garden.

Background Information:
How and when to cut favas:
Today is the day you are cutting down the fava beans. Ideally the flowers are budding, and only beginning to bloom. If the favas have not flowered at all, postpone the cutting.
If you do postpone, be sure to discuss (again) why you are cutting the fava beans, and why it is important to add nutrients to the soil. When you cut the cover crops, pull the plant completely out of the soil. Cut the plant into pieces, and push the roots back into the soil so that the nitrogen is released into the soil. (If you do not pull the roots out completely, the plant will re-sprout.) The plant body will decompose, also releasing nutrients into the soil.
You can choose to leave 5-6 plants to continue growing. They will attract bees, and the flowers will produce long green pods—a great lifecycle discussion.

Nitrogen fixation:
The nodules on the fava roots that you will show your students are amazing. Favas, like other legumes, have a bacteria called Rhizobia on their roots. The rhizobia "eats" the sugar from the plant's roots, and converts air into nitrogen, which it "fixes" onto the roots. This relationship is symbiotic. The nitrogen helps the plant grow. When the plant dies, much of the nitrogen remains in the soil which nourishes the next crop.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season, weather and the favas.
- Show the three pots with radishes, facing the label away from the students. Ask students to describe the differences amongst the plants in the pots. "Which looks the healthiest? The weakest?"
- Ask students to guess which pot has which soil, solely based on the appearance of the radish tops.
- Show students the labels. Separate the pots, and pour out the soil and pull out the radishes. Allow students to compare and contrast the health, vigor and size of the radishes from different pots.
- "So, what do you think about it all? All the plants had soil, sun, water and air. Why did some plants grow so much better than others?"
- Discuss responses.
- "Just like we talked about healthy foods that make our body grow strong, most plants grow better in healthy soil as well. Healthy soils have more nutrients. What are some ways we can add nutrients into the soil?" Discuss.
- "Many of you mentioned adding compost to the soil. This is true, compost is made from dead plants that decompose and become part of the soil again. Plants find many of the nutrients they need in the compost."
- "Does anyone remember another way we can add nutrients to the soil? Was there a special plant that we grew, not to eat, but to help the soil?"
- "The fava beans! Today is the day we are going to cut them down and turn them into the soil. Once they have decomposed, the soil will be fed and healthy and ready for a new set of plants."
- Bring students to the fava bed. Pull out several plants from the roots, and pass them around, asking students if they see anything interesting on the roots.
- "These balls, or nodules, on the roots are full of nitrogen. Nitrogen is a nutrient found in the soil, and it's a plants favorite food. This special plant makes nitrogen and puts it into the soil for the next set of plants to use. The rest of the plant, the stem and the leaves, are going to decompose, just like compost, and add even more nutrients into the soil. Why is it important that the soil has nutrients in it?"
- Show students how to pull the favas, cut them into 5 inch sections, and push the roots back into the soil. This will probably take quite a while.
- Once the favas have been cut, dig the stems into the soil a little bit, and then water the bed gently. Plants decompose faster when wet, and when in smaller pieces.

Wrap up:
Return materials, and wash hands.

Notes/Feedback:

Garden Work

Week 15.2
MATERIALS

- Watering cans
- Tools necessary for garden work.

Preparation:

What garden work needs to be done? Prepare a garden work project.

Procedure:

- Students enter the garden and explore.
- Check on the favas, water them. Pull weeds if necessary.
- Bring students to the area you prepared for garden work.
- What can be harvested in the garden? Have a tasty snack.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

What Else Do Plants Need?

Week 16
STANDARDS
2.SL.1

OBJECTIVES
- Students discuss a plant's needs
- Students hypothesize about the effect of crowding on a plants' growth
- Students set up an experiment

MATERIALS
- Three pots, all full of healthy garden soil
- Radish seeds
- Spray bottle, full
- Craft sticks and permanent marker

Preparation:
Prepare the three pots, and have all of your materials handy in your garden classroom.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season, weather, and on the state of the cut favas.
- "What was the big lesson that we learned after looking through the radishes that we planted, and looked at last week?" Take student responses.

- “We knew that plants need soil to grow, but that not all soils are the same. Even though a plant can grow in poor soils, a plant can grow bigger and stronger in soils that are healthy.”
- “We talked about how plants need (healthy) soil, air, water and sun. There is anything you think a plant needs to grow?”
- “Remember when we planted the fava beans and we measured one hand in between all of the seeds? Why did we do that?”
- “Right! Plants also need space. Why do plants need space?”
- Choose 4-5 students and have them stand, very close to each other, in the center of the class. “Pretend you are trees. Your arms are your branches, and your legs are your trunks, and your roots are underground.”
- Ask the rest of the students questions like “Are the branches too close? Can they all reach sunlight, or are they blocking each other? What about the roots? Can they reach the nutrients and water that they need?”
- Students return to their seats. “When plants are too close together, they end up competing for sun, soil, and water. Each plant gets less of what it needs, and does not grow to be strong and healthy.”
- “Here are three pots with exactly the same type of soil. How could we set up an experiment to see the effects of space on plants?” Take responses, and guide students towards planting different numbers of seeds in each pot.
- Have students help. In the first pot, plant one only seed. Label it “One seed”.
- In the second pot, plant 4 seeds. Label it “Four seeds”.
- In the third pot, plant 15 seeds. Label it “Fifteen seeds”.
- “What do you think the seeds will look like in each pot when we pull the radishes out next week?” Discuss.
- Water all pots gently with the spray bottle. When you return inside, place all pots in the same sunny spot. Water consistently.

Wrap up:

Wash hands.

Notes/Feedback:

Garden Work Continued

Week 16.2
MATERIALS

- Watering cans
- Tools necessary for garden work.

Preparation:

What garden work needs to be done? Prepare a garden work project.

Procedure:

- Students enter the garden and explore.
- Check on the favas, water them. Pull weeds if necessary.
- Bring students to the area you prepared for garden work.
- What can be harvested in the garden? Have a tasty snack.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

ASSESSMENT: Give Me Space!

Week 17
STANDARDS
2.SL.6, 2.LS2.1, W.2.8

OBJECTIVES
- Students observe the effects of crowding on young plants
- Students navigate a seed packet
- Students connect spacing plants with the garden job of weeding

MATERIALS
- Seed packets, either one per student, or one per pair of students
- Radish pots from the classroom
- Journals, pencils

Preparation:
Find a weeding project in the garden. Bring the radish pots from the classroom to the garden.
Furthermore, in this lesson you are assessing your students' understanding of why plants need space to grow, the effects of crowding on plants (including having access to nutrients), and how space is connected to weeding the garden.

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season, the weather, and the state of the favas.
- If you left some fava bean plants to continue growing, have the flowers bloomed? Are they being pollinated? Have pods begun to develop?
- "Last week we set up an experiment to look at how well plants would grow with different amounts of space."

- Bring the pots to the middle of the class. Spill out the soil to reveal the plants growing within. Compare and contrast the sizes of the sprouts from each of the pots.
- In their journals, have students draw the three different pots and the radishes inside.
- “Why is it important to think about giving plants space when we garden?”
- “Why do we pull weeds in the garden?” (Weeds often grow quickly and can out-compete food crops for water and nutrients. Weeds can also shade smaller plants).
- Weed the garden with students, giving your plants room to breathe and grow!
- Gather students again. Pass out seed packets.
- “Different plants need different amounts of space. For example, tomato plants grow much bigger than radish plants, and need more space between plants. Luckily, most seed packets tell us how much space a plant needs.
- Give students time to look at their seed packets. Find the section which says “Planting spacing” or “Thinning”. This tells how far apart plants need to grow. Compare and contrast different plants spacing needs. Which needs the most space? The least?

Wrap up:

Collect seed packets.

Notes/Feedback:

Journaling

Week 17.2
STANDARDS
2.W.7

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Find two plants that are growing too close together, and two plants that are well spaced.
- Before you send students on their drawing project, encourage them to think about drawing their object with so much detail that you could give their drawing to a stranger who would be able to find the object in the garden.
- In their journals, “Find something beautiful in the garden. Look at it for a long time. Draw it and label it. Color it in.”
- Gather students, have them trade journals with a partner. Students need to find their partners’ object in the garden.

Wrap up:
Collect all materials.

Notes/Feedback:

How'd You Get Here Anyway?

Week 18
STANDARDS
2.PS1.1, W.2.8

OBJECTIVES
- Students are introduced to the idea that seeds travel
- Students recall that plants, even weeds, go through a life cycle producing seeds

MATERIALS
- Examples of weeds producing seeds
- Buckets to collect weeds

Preparation:
Find a place on campus with lots of weeds. Try to find weeds that are producing seeds. Another place you may find this is on grass; if any sections of grass have not been cut in a while, you may seed longer stalks with grass seeds. Bring examples with you to the garden.

Background Information:
Later in the spring, students will study the mechanisms by which seeds travel in more depth. For now, the lesson is simply that plants produce seeds, and seeds can move to new places. If the seed finds what it needs: air, water, soil, sun and space, it can grow quite happily.

Procedure:
- Bring students to a weedy part of campus.

- “Who planted these weeds? No one? Well how did they get here? What did these plants start from?”
- Let student mull over this as you return to the garden, allowing them to explore.
- Gather students, check in about the season, the weather, and the state of the cut favas.
- “Who saw weeds in the garden? Who planted those weeds? Do you think I come at night and plant weeds so that we can have jobs to do in the garden? No?”
- Show examples of the weeds that you pulled that are producing seeds. Pass them around.
- “Weeds are plants, right? And plants go through a lifecycle? How do plants complete their cycle?” (By producing seeds).
- “These seeds drop into the soil, or come in by wind, or in the beak of a bird. If the seeds find what they need—what do plants need to grow?—they can grow into new plants. Again, they produce seeds and continue to spread. Weeds tend to grow quickly, and are usually big and strong. This is why we keep up with pulling weeds, otherwise they can take water, nutrients, sunlight and space away from our plants.”
- Send students into the garden to find more examples of weeds that are producing seeds.
- Do a weed pulling project in the garden, especially within the fava bed if weeds have begun to grow there.

Wrap up:

Return materials.

Notes/Feedback:

Bug Houses

Week 18.2

Procedure:

- Students enter the garden and explore.
- Look at the fava beans, are they producing long pods?
- Put students in pairs or small groups. “Build a house for a bug. You can use sticks, woodchips, or any plant material that you find on the ground. Take your time! Put your “house” somewhere in the garden”
- Give students plenty of time to enjoy this activity.

Wrap up:

Go on a “tour” of each group’s house.

Notes/Feedback:

Ladybug Symmetry

Week 19
STANDARDS
MA.2.G.1, 2.PS1.1, 2.L5.a

OBJECTIVES
- Students are introduced to symmetry
- Students learn that symmetry is often found in nature
- Students create a symmetrical art project

MATERIALS
- One piece of red construction paper (8.5x11") per student, cut into an oval.
- One piece of white construction paper (12x18") per student.
- Paintbrushes, black markers (One per 2-3 students)
- Black paint in cups
- "Are You a Ladybug?" by Judy Allen

Preparation:
Though this project is heavy on preparation, it is worth it. Have all of your supplies organized outside before class. If you are running short on time towards the end of the class, save the drawing of the antennae, legs, and writing the fact for the next lesson.

Background Information:
There are many, many types of symmetry. Here, we are exploring "mirror" or reflectional symmetry.

Procedure:
- Students enter the garden and explore.

- Gather students, check in about the season, the weather, the cut favas.
- On the board draw many shapes, some symmetrical, some not. Write Symmetry on the top.
- “Look at these shapes on the board. Some of them I can draw a line through (demonstrate) and the shape is exactly the same on both sides.” Demonstrate several more shapes (triangles, squares, rectangles).
- “Pretend these shapes are paper, and the line is a fold. I can fold these shapes in half, and they match. They are the same on both sides. They are symmetrical.”
- Point to your nonsymmetrical shapes. “There is no line I can draw through these shapes that would make them equal on both sides. They are asymmetrical.” Demonstrate by drawing lines, and showing how the remaining shapes are different.
- “The amazing thing about symmetry, is that many living things are symmetrical. Look at my body. I can draw a line from the top of my head down through my body, and I am the same on both sides. One each side I have an eye, and ear, an arm, and so forth.”
- Ask clarifying questions to your students, check for their understanding, and continuing drawing examples until they seem comfortable with the concept.
- Draw two circles. Draw a line through each circle. In one circle, draw 9 dots randomly. In the other circle, draw 10 dots symmetrical.
- “All insects are symmetrical. This is the back of a ladybug. Even a ladybug’s spots are symmetrical. For each spot, there is a matching one on the other side.”
- Students go into the garden looking for ladybugs, and noticing their spots.
- Read, “Are You a Ladybug?”
- Give each student their red oval paper. Show them how to fold it in half, length-wise.
- With their markers, let them draw a line down the fold. With the black paint and paint brush, show them how to make 4-5 spots, but only on one side.
- Students paint dots on one side of the fold.
- When they are finished, fold the paper in half so that the wet paint “paints” the spots symmetrically on the other side.
- When they open their red papers, ask students to describe what happened.
- Glue red papers onto the larger, white paper.
- Students can draw or paint the black head, two antennae, and six legs.
- If students have time, they can write one fact they learned about ladybugs on the bottom of their paper.

Wrap up:

Collect materials, wash paintbrushes, wash hands.

Notes/Feedback:

Ladybugs part two

Week 19.2
STANDARDS
MA.2.G.1, 2.PS1.1, 2.L5.a

MATERIALS

- Ladybugs from the previous lesson
- Black markers
- Journals, pencils, crayons
- "Are You a Ladybug?"

Preparation:

Bring student work out to the classroom.

Procedure:

- Students enter the garden and explore.
- Distribute student work from the previous lesson.
- Allow students the time to finish drawing their ladybugs' antennae, legs, and one fact at the bottom of the page.
- Students can use crayons to draw grass and a background on the white mounting paper.
- As students finish, send them into the garden to find more examples of symmetry in nature. They should draw an example in their journal.

Wrap up:

Collect all materials.

Notes/Feedback:

ASSESSMENT: Planting

Week 20
STANDARDS
2.SL.6, W.2.8, 2.ESS1.1

OBJECTIVES
- Students reflect on their knowledge of a plants' needs to knowledgeably plant a garden
- Students observe and describe the decomposing fava beans

MATERIALS
- Radish seeds
- Row cloth
- Craft sticks, permanent marker
- Spray bottles, full of water

Preparation:
- Have the planting materials ready next to the planting site. Students will water with the spray bottle. You will need to water with a hose or watering can very gently for a couple of days, until the radishes sprout. Then students can water gently with a watering can.
- In this lesson, you are assessing that students can articulate the steps to planting successfully, keeping in mind the importance of healthy soil, planting at the right time of year, spacing plants effectively, etc.

Background Information:
- Row cover, or row cloth, can be bought at any garden center, and is an important thing to have, and to use. Row cloth keeps the soil moist, and you can water right

through it. Once the radishes are about two inches tall, their leaves will begin to shade the soil and you can remove the cloth.

Procedure:

- Students enter the garden and explore.
- Check in about the season and weather. Are there any signs of spring?
- "We have spent many classes discussing the importance of giving plants what they need. We know that plants need sunlight and water, soil, air and space."
- "What happens to a plant that does not get enough space?" Discuss. "How do we make sure that plants get enough space in our garden?"
- "What happens to a plant that grows in unhealthy soil?" Discuss. "How we keep the soil healthy in our garden?"
- Pass around a handful of soil from the bed where the favas were. Have students feel it, smell it, describe it.
- "This is some nice soil! Our favas decomposed, adding nutrients into the soil. The nitrogen is there, too. Let's plant a radish crop, and let's give the plants plenty of space and water, too!"
- Bring students to the planting bed. If there are tough fava stems that have not decomposed entirely, you can set them aside and compost them later. Ask students where the plant material from the fava beans went. (It decomposed/became part of the soil). Have students, gently, smooth the soil with their hands. Read from your seed packet, about how much space radishes need. It should be about two inches. Show students how you can measure two inches with your fingers (about 3 adult fingers, perhaps 4 child fingers).
- Take a craft stick and say, "I am making furrows. Furrows are little indentations, or grooves, in the soil. We will be planting our seeds in these furrows." Make several furrows, the seed pack can also tell you how deep they should be.
- Students plant one at a time, placing a seed in the furrow, measuring with their fingers about two inches, and then placing the next seed.
- Explain that planting is a special time that requires concentration, challenge students to be quiet while waiting their turn, perhaps noticing is any birds are signing in, or near, the garden.
- Label the area with a craft stick, noting the date and radish variety.
- Water with the spray bottles. Cover with row cloth.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Journaling

Week 20.2
STANDARDS
2.W.7

MATERIALS

- Watering cans, full
- Journals, pencils

Procedure:

- Students enter the garden and explore.
- Water the radishes. Have they sprouted yet?
- Explore what other classes are planting.
- In their journals, "If you could be any plant in the garden, which would you be, and why? Write a story."

Wrap up:

Gather students, take volunteers to read stories.

Notes/Feedback:

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Spring has Begun!

Week 21
STANDARDS
W.2.8, 2.PS1.1

OBJECTIVES
- Students recall what they know about the season of spring
- Students learn that there are predictable weather patterns and changes associated with the seasons
- Students make observations related to the season

MATERIALS
- A large poster board, prepared as explained below.
- Enough index cards for all your students
- Pencils, crayons
- Permanent marker
- "And Then It's Spring" by Julie Fogliano (or something similar)

Preparation:
On the poster, write Spring in large letters at the top. Also have sections that say: Weather, We Harvest, We Plant, Garden Jobs, Special Spring Changes. Each section should be big enough to fit at least 5 index cards. Students will be drawing on their index cards, and you will assemble them on the poster board and glue them down. Find a spot in your classroom to hang your Spring poster.
Outside, have the cards, pencils, and crayons ready so that the first students can begin drawing as you finish distributing cards to the rest.

Background Information:

For your information, some basics are listed below. Add or edit based on the specifics of your garden.
Spring Weather: Sunny and warm, Sunny and chilly, Rain showers
Food we harvest: Lettuce, radish, fava leaves, peas (There are more, of course. You can also use examples from your own garden)
Foods we plant: Greens, lettuce, radish, carrot, peas, and warm weather crops such as tomatoes, sunflowers, cucumbers, melons and so forth. (You may or may not plant warm weather crops in your school garden, just be sure to explain to your students that spring is the time when you can begin to plant heat-loving plants).
Garden jobs: Weeding, watering (when it is not raining), planting a spring garden, pulling old plants, protect plants from heat.
Special Changes: Flowers bloom, bulbs sprouts, leaves grow back on trees, days become longer and warmer, insects return, birds return from migration, and so forth.

Procedure:

- Start class by taking students on a walk through your campus, looking for signs of spring. Before you even go outside, ask students what kinds of things they may be looking for.
- After your exploration, come into the garden and explore, also looking for signs of spring.
- After students have explored the garden, but before you gather in your outdoor classroom, bring students to a place with exposed soil. Have students sink their hands in the soil. “Remember how cold the soil was in the winter? How does it feel now?”
- Gather students, check in about the season and weather and the radishes—have they sprouted?
- “What signs of spring did you see around school? What did you see in the garden?”
- “Often spring seems short in Oakland. All at once, days seem warmer and longer, trees are blossoming, flowers are blooming, and before we know it, it is hot and summery. We will have to pay attention to the kind of spring we have this year.”
- “Compared to the winter, does the spring have more or less daylight? (Are days longer or shorter?) Do you think plants grow faster or slower?”
- Read “And Then It’s Spring”, and discuss. Compare spring in Oakland with the spring depicted in the book.
- “Just like we did in the fall and winter, we are going to make a spring poster together, which will list the season, the weather, the foods that we harvest, the foods we plant, the spring garden jobs, and special spring changes. We are going to go category by category, and when you have an idea, raise your hand and I’ll call on you. I’ll write it in marker on the bottom of this card, and you will draw a detailed picture. For example, if I ask ‘What is the weather like in the spring?’ If I call on someone who says ‘Some days are sunny and warm, I’ll write ‘Sunny and warm’ on the bottom of this card and hand it to them, would will draw a picture of a warm, sunny day and then color it in. Of course, there is more than kind of weather in the spring, so multiple students can answer.”

- Go through the sections, handing out cards. Students who already have cards should be able to work independently. If students finish early, they can do multiple cards, if there are enough.
- Do the radishes need watering? Send students to water the rest are finishing.
- Assemble the poster and glue cards down, allowing students to admire their work. Replace the winter poster with the spring poster.

Wrap up:

Return materials.

Notes/Feedback:

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Spring part two

Week 21.2
STANDARDS
2.W.7, W.2.8

MATERIALS

- Journal, pencil, crayons
- Watering cans, full

Procedure:

- Students enter the garden and explore.
- Water the radishes
- Students find five signs of spring in the garden.
- In their journals, "Spring is about the earth waking up! The earth is turning towards the sun again, and days become longer and warmer. What makes you wake up? What makes you feel excited and strong? Draw a picture.

Wrap up:

Share, in partners.

Notes/Feedback:

Seeds on the Go

Week 22
STANDARDS
2.SL.1, 2.PS1.1

OBJECTIVES
- Students are introduced to ways that seed travels
- Students understand why a plant needs its seeds to travel

MATERIALS
- "A Fruit is a Suitcase for Seeds" by Jean Richards
- Materials for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season, the weather and the radishes.
- "What signs of spring are you noticing today?"
- "Remember when we talked about how weeds got into our garden? We talked plant lifecycles, and that plants make seeds, and that sometimes weed seeds come into our garden. Actually, many plants have seeds that move. Can anyone think of other ways that seeds travel?" Take responses.
- Hold your arms up like you are a tree. "I am a cherry tree. It is the spring, and I am full of red, ripe cherries. There are seeds inside my cherries. If all of my cherries fall to the soil, some of them are going to find enough soil, water, and air to sprout. Wait…do I want a bunch of new cherry trees growing underneath me? Why not?"

- Discuss that the new cherry trees with compete with the mother tree for space, and for sunshine.
- “We spent time discussing how seeds need space! Without space, plants can’t get all the sun, soil, water and air that they need. Nature is amazing, and many plants have figured out ways to make sure their seeds travel. Let’s learn about some of the ways.”
- Read “A Fruit is a Suitcase for Seeds”. Take questions, and discuss.
- Return to the pages that discuss the different ways seeds move: by wind, by hitching and by being eaten. Seeds can also travel by water. Some plants even launch their seeds!
- Discuss some of the different ways that students have seeds moving. (Animals eating fruit in a tree, dandelion seeds blowing in the wind, pulling burrs out of a dog or cat’s fur, etc).
- Do the garden work that you have prepared.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Journaling: Seeds

Week 22.2
STANDARDS
2.W.7, W.2.8, 2.SL.1, 2.LS2.2

MATERIALS
- Journals, pencils, crayons
- Watering cans, if necessary

Procedure:
- Students enter the garden and explore.
- Water radishes, if necessary.
- Pull weeds around radishes, if necessary.
- Find a quiet spot in the garden. Sit and listen for two minutes.
- In their journals, “Seeds travel in the air, with animals, or by water. If you were a seed, how would you travel? Draw a new seed, include what it needs to float, fly, or hitch.”

Wrap up:
Gather students, share in front of class.

Notes/Feedback:

Seed Collections

Week 23
STANDARDS
2.PS1.1, W.2.8, 2.SL.1, 2.L5.a

OBJECTIVES
- Students solidify their knowledge around the ways seeds move
- Students categorize seeds by their observable properties

MATERIALS
- Seed collection papers, prepared as explained below
- Masking tape
- Clipboards, one per group of four students
- "A Fruit is a Suitcase for Seeds" by Jean Richards

Preparation:
Fold a paper into four, and label each section: Flier, Pooper, Hitcher, and Unsure. Roll a piece of tape into a loop and place one loop in each section. Students will place their collected seeds on the sticky side that is facing up.

Background Information:
Four main ways seeds travel:
- By wind (fliers), for example: Dandelion seeds, birch tree seeds. They tend to be light, and some have little parachutes.

- By water (floaters), for example: Coconuts. They tend to be hollow, and come from plants that grow by water.
- By animals (poopers), for example: All fruit. Fruit are bright and taste good, attracting animals to eat it.
- By animal fur (hitchers), for example: Grass, wheat, weeds with burrs. These seeds are sticky and spiky.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season, the weather and the radishes.
- "Last week we talked about WHY seeds need to move. Can anyone explain to the class?" Discuss.
- "This week, and for the next few weeks, we are going to talk about HOW seeds move. Normally we don't see plants tossing their seeds around, so how do they do it? Does anyone remember some examples from the book?"
- Show the book, and go through each way that seeds move, and discuss examples of each. Discuss characteristics of a seed that travels by air, versus by water.
- On the section about seeds passing through animals (poopers), ask which animals are present in the garden ecosystem. Ask, "When a bird eats fruit in our garden, does the bird get what it needs? (Yes, food). Does the plant get what it needs? (Yes, its seeds are moving). This is an example of plants and animals depending on each other in an ecosystem. The same thing happens in tropical jungle, when a monkey eats a banana and spread the banana's seeds."
- Split students into groups of four, and hand each a clipboard with their collection paper on it.
- Bring students to the heavily weeded area, in the garden or outside. Let them harvest seeds and sort them into the section they believe it belongs.
- Gather students, let them explore each other's collections, and discuss any of the seeds that they were unsure about.

Wrap up:

Collect materials.

Notes/Feedback:

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Garden Poem

Week 23.2
Procedure:

- Students enter the garden and explore.
- Gather students, and teach them the following poem (words in parenthesis represent movements):

The sun is in my heart
(Make an arch overhead with arms)
It warms me with its power
(Embrace oneself, 'warming' oneself)
It wakens life
(Make an arch overhead with arms, open arms out to sides)
And life
(Repeat movement above)
In every bird
(Look at palms, cross wrists, hook thumbs, and flap "wings")
And beast
(Make claws with hands and fingers)
And flower.
(Touch thumb and forefinger of left hand to make a hole, and pass the right fist through the "hole" and make your hand "bloom")

- Repeat until students know the poem. You can do a quiet "tiny" version, or a loud version, or a silent version with just the movements.
- Have students sit in a sunny place, silently, for three minutes.

- Gather students, ask them to share all the things they heard and saw while sitting quietly in the sun.

Wrap up:

Continue to explore, if there is time.

Notes/Feedback:

Build a Seed, Part I

Week 24
STANDARDS
2.LS2.2, 2.PS1.1, W.2.8, 2.SL.1, 2.L5.a

OBJECTIVES
- Students use their knowledge of seed movements to build a seed model
- Students work collaboratively

MATERIALS
- A large boxful of "junk" materials: string, paper, cloth scraps, paper clips, tape, glue, cotton bolls, corks, pipe cleaners, ribbon…
- A shoebox sized box, one per group, to keep their materials in
- A bucket of water for testing "floaters"
- Knife and cutting board, for the radishes
- Soap, for hand washing

Preparation:
You will need to collect all of the materials to make this project possible. It would be best to start ahead of time. Your front office may be a good place to collect "junk" materials.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and the weather.
- "Last week we explored plants, collected seeds, and tried to figure out how the different seeds we saw traveled. We knew that sticky seeds are hitchers, and seeds with little parachutes were fliers. Aren't plants amazing?"

- “Today, you are going to try to build a seed. You will be in a group, and I will give you plenty of different types of materials. As a team, the first thing you will do is try to decide if you’re going to make a flier, hitcher or floater. (No poopers!). You will have two weeks to work on your project. Next week we will test our seeds. Also, you will need to come up with a name for your new plant, and tell us the life cycle.”
- Split class into groups, and distribute materials. Before students start, “Remember! First look through your materials, and decide on which seed you’ll make. You can test out your first drafts, but the final test will be at the end of next week’s class.”
- Allow students to work for at least 30 uninterrupted minutes. Have a tub of water available for students to test if certain materials float or sink.
- Have students collect their materials in their container and wash hands.
- Bring students to the radish patch, and allow each student to harvest one. If there are extra, they can be harvested as well. Ask students what they think they should do with the extra. Who could they give them to?
- Leave at least 3 or 4 radishes in the ground to complete their lifecycle. (They will grow substantially and produce long stalks of flowers, and eventually seed pods).
- Wash the radishes and collect them. Cut off the tops, and put them into the compost. In the meantime, students wash hands.
- Give each student a washed radish.
- “Who planted these radishes? Who watered them? Weeded them? Who made sure the soil was healthy for these radishes, and spaced the seeds evenly?” Hopefully students feel proud of their hard work!
- Eat, and enjoy.

Wrap up:

Collect materials to bring inside.

Notes/Feedback:

Worms

Week 24.2
MATERIALS
- Watering cans

Preparation:
Fill the watering cans.

Procedure:
- Students enter the garden and explore.
- Water the radishes.
- First graders set up a worm bin. Allow your students to hold worms. Review how to keep worms safe while holding them. (Keep them out of the sun, don't poke them or drop them, stay seated while holding one).

Wrap up:
Return worms, wash hands.

Notes/Feedback:

ASSESSMENT: Test a Seed

Week 25
STANDARDS
2.LS2.2, 2.PS1.1, W.2.8, 2.SL.1, 2.L5.a

OBJECTIVES
- Students test their seeds
- Students understand the mechanisms by which a seed travels, and why this is necessary

MATERIALS
- Each group's shoebox of materials
- A bucket of water for testing "floaters"
- An electric fan for testing "fliers"

Preparation:
Is there an electrical outlet close enough to the garden that you can plug in a fan? If so, great! If not, you will test the "fliers" back inside your classroom.
It's possible that none of the students' seeds will "work". What a great segue into a conversation about the amazing power of nature!
This is a gentle assessment: you are looking to see that students understand HOW and WHY a seed travels, not that they are able to create a working model.

Background Information:
A suggestion on "testing" seeds:
Floaters: Seeds should float for at least 5 minutes.
Fliers: When dropped in front of a blowing fan, seeds should fly two or three feet.

Hitchers: Stick hitchers onto a students' clothing and walk 20 feet without the seed falling.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and the weather.
- In their groups from last week, distribute the boxes of materials.
- "You have thirty minutes (or however long) to finish your seeds. When we stop to clean up, you should be ready to test your seed in front of the class. Also remember to tell us the name of your seed, and a little about it's lifecycle. For example: 'Our group built a floater, and it's called the Purple Waterberry. A purple waterberry seed falls off a purple waterberry tree, which usually grows by rivers, and the seed floats until it hit lands. There, if it finds enough soil, air, water and sunlight, the purple waterberry seed sprouts, and eventually grows into a huge tree. The tree blossoms in the spring and drops new seeds every fall.'"
- Students work on their projects, testing and modifying them, until clean up.
- Clean up, collect excess material.
- Have students, ready in their groups.
- Each group presents their seed, tells its story, and tests their project in front of the class.
- After each group had a turn, debrief the experience.
- "Was this difficult? Was it easy? Which seed designs worked well? Which didn't? What did you learn from this? Isn't nature amazing?!"

Wrap up:

Make sure all materials are collected.

Notes/Feedback:

Natural Paintbrush

Week 25.2
MATERIALS

- Cups of black paint; one cup per 3-4 students
- Clipboard and paper; one per student

Preparation:

Place cups of black paint in different spots in the garden. Students will be using something that they find in the garden to use as a paintbrush. You can allow them to harvest leaf, flower, or a stem as a brush. You may choose to restrict them to only using plant material that has already fallen on the ground. Decide on your parameters before class.

Procedure:

- Students enter the garden and explore.
- Distribute clipboards and paper to students.
- "You have a clipboard, a piece of paper, and in the garden there is paint. I want you to paint a picture. What is missing?"
- "Right! A paintbrush. Your paintbrush is in the garden!" Explain your parameters about what may or may not be used as a brush. Remind students that they can use their brush as a stamp as well.
- Give students plenty of time to create their artwork. When finished, collect paintings in the classroom and give students time to appreciate each other's work.

Wrap up:

Collect all materials, wash hands.

Budding, Blooming, Pollinated

Week 26
STANDARDS
2.L5.a, 2.W.7, 2.PS1.1, 2.LS2.2

OBJECTIVES
- Students compare insect populations from the fall to the spring
- Students can distinguish between budding, blooming and pollinated flowers
- Students observe the pollinators visit blooming flowers

MATERIALS
- Insect counting papers from Week 9
- Clipboards and pencils; one per student
- Budding, blooming, pollinated paper, prepared as described below
- Colored pencils
- An example of a budding flower, a blooming flower, and a pollinated flower.
- Scissors for cutting flowers, and a vase.

Preparation:
Find the papers where students counted how many insects they saw in the late fall.
Take another piece of paper and fold it into thirds. Label the bottom of one section "Budding", one section "Blooming" and one "Pollinated". Copy enough for each student to have one.
Cut one of each type of flower to show the class.

Background Information:
This lesson rests on the assumption that the wildflower seeds that your students planted in the fall are in full bloom and attracting pollinators. This works best on a sunny day.

Budding flowers are those that have not yet opened, blooming flowers are open, and pollinated flowers are those that are changing into seeds. Pollinated flowers often look "dead", with their dropping petals, but are really just changing into seeds.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season, the weather.
- Read "The Reason for a Flower" by Ruth Heller.
- "Many of you are mentioning all the flowers in the garden. We are going to explore these flowers a little deeper today. When a plant first produces a flower, it is closed, or budding. (Show example). Do pollinators visit budding flowers? (No!)"
- "Next, a flower blooms. (Show example). Flowers are bright, colorful, and often smell good! They want pollinators to land on them and drink their nectar, and distribute their pollen from flower to flower. Flowers depend on this visit, they need to be pollinated before they can change into a seed."
- "Lastly, a flower is pollinated. (Show example). You may think it is dying, but it really is just changing into something else, the same way a caterpillar changes into a butterfly. Often, when you open pollinated flowers, you will find seeds!" (This works especially well with marigolds and poppies).
- Distribute clipboards, papers and pencils. Send students into the garden to find one of each type of flower, and draw. Instruct students to take their time.
- As students return, let them color in their flowers. Collect papers, have students keep the clipboards.
- As students are finishing ask, "Who noticed pollinators in the garden? What kinds did you see?"
- Give students their papers from when they counted insects in the fall. Attach the insect count papers to their clipboards, and send them to count insects in the garden. There may be too many to count!
- Gather students, and discuss data.
- Allow each student to cut one flower, and collect your wild bunch into a bouquet for your classroom.

Wrap up:

Return scissors.

Notes/Feedback:

Garden Exploration

Week 26.2
STANDARDS
2.LS2.2

MATERIALS
- Watering can
- Bucket to collect weeds

Preparation:
Prepare a weeding project.

Procedure:
- Students enter the garden and explore.
- Students look for budding, blooming, pollinated flowers.
- Water radishes, if necessary.
- Recite the poem “The Sun is in My Heart”
- Student choice: hold worms or pull weeds.

Wrap up:
Collect all materials, wash hands.

Notes/Feedback:

Seed Museum

Week 27
STANDARDS
2.LS2.2, 2.LS4.1, 2.SL.1, 2.L5.a

OBJECTIVES
- Students can find seeds in the garden
- Students classify seeds by their properties

Preparation:
Walk through the garden beforehand, making sure you know where different seeds are in the garden. A productive garden can have upwards of thirty types of seeds forming!

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Send students to find a red flower. Once they are all pointing to a red flower, send them to find an orange flower. Continue through the rainbow.
- Send students to find a bee pollinating. Can they see the pollen baskets on the bee's legs? (This is where the bee collects its pollen). Can they see a butterfly or moth using its long tongue to drink nectar?

- Gather students. “I wonder how many seeds there are in the garden. I think we should try to collect them, and create a seed museum.” Put students into partners. Lay out the ground rules, such as: Don’t pick something if you’re not sure that it’s a seed, do not pick flowers, and only pick one of each seed you find.”
- Send students into the garden with their partners, and give them plenty of time to harvest seeds. You may need to guide them towards some of the less obvious weed seeds, or to other seed pods you see.
- Once students have collected many seeds, let your class organize the seeds on one bench. Separate seeds by type.
- Allow students plenty of time to explore the different seeds in their “museum”. Can they identify how different ones travel? Which are the largest? The smallest? How many came in pods?

Wrap up:

Collect seeds to bring inside, if you would like.

Notes/Feedback:

Journaling

Week 27.2
STANDARDS
2.LS2.2, 2.LS4.1, 2.SL.1, 2.L5.a

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Know what garden work needs to be done.

Procedure:
- Students enter the garden and explore.
- Student choice: Create another seed museum and then choose two or three types of seeds to draw in detail OR Sit somewhere in the garden and draw an entire plant.
- In partners, share drawings.
- Garden work.

Wrap up:
Collect all materials.

Notes/Feedback:

Flower Symmetry

Week 28
STANDARDS
MA.2.G.1, 2.PS1.1, 2.L5.a

OBJECTIVES
- Students revisit the concept of symmetry
- Students see symmetry in the natural world

MATERIALS
- Journals, pencils, crayons

Procedure:
- Students enter the garden and explore.
- Check in about the season, and the weather. What are the signs that summer is near?
- "Weeks ago we talked about symmetry. We said that most animals and insects are symmetrical, and we made symmetrical ladybugs. Who can remember what symmetrical means?"
- Review symmetry, with drawings, if necessary.
- "Not only are animals often symmetrical, but so are many plants, specifically flowers."
- Instruct students to go into the garden. Each student can pick one flower to draw.
- Gather students in the sitting area. Before distributing materials, give students a minute or two to simply observe their flowers.
- Distribute journals and pencils. Give students quiet time to draw their flower in great detail.
- If students finish, they can trade flowers with other students who have finished, and draw a second flower.

- Distribute colored pencils and add color to the flower.
- Challenge students to go back into the garden and find something else symmetrical. (A fruit, a leaf)
- Collect materials.
- What is ready to harvest in the garden? Harvest a snack from the garden to enjoy.

Wrap up:

Wash hands.

Notes/Feedback:

Flower Symmetry part two

Week 28.2
STANDARDS
MA.2.G.1, 2.PS1.1, 2.L5.a

MATERIALS
- Printed pictures of symmetry in nature

Preparation:
Print different pictures of symmetry in nature.

Procedure:
- Students enter the garden and explore.
- Challenge students to find 3-4 symmetrical plants or animals in the garden.
- Gather students; pass around the pictures of symmetry in nature. Allow students time to observe and to wonder. “Isn’t nature amazing?”
- Send students in the garden to find something symmetrical: plant or animal.
- Students draw something symmetrical in their journal. It can be a pattern or something from the garden.

Assessment:
As students are drawing in their journals, walk around and look at their drawings. Observe that they understand symmetry, and if not, guide them towards something in the garden that is simple, but symmetrical.

Wrap up:
Share, in partners.

Notes/Feedback:

The Buzz on Bees

Week 29
STANDARDS
2.SL.1, 2.SL.3, 2.LS2.2

OBJECTIVES
- Students learn the basics off bees
- Students know that many plants depend on bees for pollination
- Students know that people depend on bees for food

MATERIALS
- "The Magic School Bus: Inside a Beehive" by Joanna Cole

Preparation:
"The Magic School Bus: Inside a Beehive" is quite long. Perhaps pick and choose sections to read beforehand.

Background Information:
There are hundreds of different types of bees. Here, we are exploring mostly honeybees. Two misconceptions that many kids have about bees are that 1) Bees are collecting honey from flowers and 2) Bees make honey for people to eat.

Let it be known that bees collect pollen and nectar from flowers, and from these materials they make honey in their hive. Bees make honey to feed their colony!
Scientists estimate that a third of our food supply depends on bee-pollination. It's important to learn about, and protect, bees!

Procedure:

- Students enter the garden and explore.
- Check in about the season and the weather. What changes are there as summer is approaching?
- "Today we are going to learn a little about honeybees. Bees are an extremely important part of our ecosystem. Does anyone know why? What do bees do for us?"
- "Plants depend on bees for pollination, and so do we. If plants could not make new seeds, what would happen?"
- "Which foods that we eat are dependent on pollination?" (Beans, fruits, many "vegetables" that are actually fruits (squashes, tomatoes, eggplants, cucumbers), nuts).
- Read "The Magic School Bus: Inside a Beehive". Discuss.
- "Pretend that I am the queen bee! You are my workers. I want you to leave our hive and bring me pollen!" Send students into the garden to "collect" pollen and bring it back to you.
- "Now we are going to observe bees. When observing a bee, what do we do with our body? Be sure to stay still and calm. Bees are mainly interested in flowers, and not in people. If we are careful, we can get quite close."
- "We know that bees drink nectar, and collect pollen. The nectar they store inside of themselves. The pollen they keep in little pockets on their back legs, called pollen baskets. They look like large yellow balls on their sides. See if you can find any pollen baskets."
- Send students into the garden to observe bees. Challenge them to be silent.
- If there is something to harvest, have a snack in the garden.

Wrap up:

Wash hands.

Notes/Feedback:

Bees part two

Week 29.2
STANDARDS
2.W.7, W.2.8

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Observe bees in the garden. “Are bees symmetrical?”
- Recite the poem “The Sun is in my Heart”
- In their journals, “Write a Thank-You letter to a Bee”
- Gather students, take volunteers to read their letters.

Wrap up:
Collect journals.

Notes/Feedback:

Preparing for Summer

Week 30
STANDARDS
2.SL.1

OBJECTIVES
- Students contribute to cleaning the garden for summer
- Students reflect on a year in the garden

MATERIALS
- Tools for garden work
- Sunflower seeds, one per student

Preparation:
What works needs to be done in the garden before summer?

Procedure:
- Students enter the garden and explore.
- Gather students. “It is our last week in the garden for this school year! What have been your favorite parts? What have you learned?”
- Class discussion.
- “We are going to put the garden to sleep for the summer. We need to clean the garden, pull weeds, and cover the soil. First, we are going to finish pulling out the rest of the radish plants.”
- Before digging out the radishes, give students time to explore the flowers, and seed pods. When they pull out the radish, let them marvel at the size! (The root is no longer good to eat).
- Add plenty of compost to the garden bed, and dig it in.

- Cover the area with cardboard, weighed down, to keep the soil moist and cool over the summer.
- Pull weeds, organize the garden.
- Gather students. “Even though we will not be in the garden over the summer, there are many ways you can continue exploring nature. What are some ideas?”
- “I have a gift for each of you. (Hand each student a sunflower seed). It may not look like much, like one only seed. But inside this seed, there are a million more seeds. What do I mean by that?”
- “If you plant this seed somewhere sunny, and water it every day, this seed will grow into a huge sunflower. Inside a blooming sunflower are hundreds of small flowers. Every time a flower gets pollinated, it changes into a seed. Each seed can be planted into a new sunflower, which produces more seeds, and each seed can grow a new flower….”
- Make sure students put their seeds in their pocket.
- “What were your favorite parts of this year? Which projects did you enjoy? What did you learn that you didn’t know before?”
- Congratulate students on a successful year of gardening. “Bye, Garden!”

Wrap up:

Collect materials.

Notes/Feedback:

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Summer part two

Week 30.2
MATERIALS
- Materials for garden work
- Journals, pencils

Preparation:
Is there more garden work to be done?

Procedure:
- Students enter the garden and explore.
- Continue cleaning the garden for the summer: pulling weeds, taking out the compost, whatever needs to be done.
- Distribute journals, give students time to look through their work from the year.
- In their journals, "Write a Thank You letter to something in the garden". It can be to an insect, a plant, or even to the sun.

Wrap up:
Gather students, take volunteers to read the letter.

Notes/Feedback:

Third Grade

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In third grade, the curriculum encourages students to begin to look up from the garden and into the world. With their strong understanding of nature's cycles, students are encouraged to use the garden as a tool for understanding the environment around us.

These lessons challenge students with more complex discussions, and allow them to dwell on open-ended questions. We begin to talk about the effects that humans have on the environment, and ways to mitigate those effects. A large theme is interdependence, and the ways that we are all connected.

This year, students plant a lettuce bed, and grow sunflowers. They visit Redwood Regional Park, and go on a trip to the Botanic Garden. There is a year-long focus on decomposition and composting. Prepare to field questions that you do not know how to answer, and enjoy challenging your budding naturalists.

The Numi Foundation is deeply grateful to the writers of open-source materials for their contributions and inspirations to this curriculum.

Table of Contents

NUMI FOUNDATION
Celebrating People, Planet & Possibility

Welcome Back!

Week 1
STANDARDS
3.SL.1, 3.SL3.1b

OBJECTIVES
- Students make observations after an extended break from the garden
- Students review and practice garden rules
- Students make class agreements

MATERIALS
- Poster board and pens
- Garden tools

Preparation:
Be clear about the difference between garden rules and classroom agreements. Perhaps your garden has rules posted that are school-wide; otherwise know beforehand what the rules are. (For example: Always walk, Ask before harvesting, etc). It is more effective to have fewer rules, but be sure that they are clear. This lesson assumes that students are familiar with the general garden rules.

Procedure:

- Students enter the garden and gather in opening circle.
- Welcome students back to their outdoor classroom.
- “We need to review the rules of the garden and decide on some classroom agreements.”
- Call on students to name garden rules, and have students act them out.
- “We have garden rules to make sure that people, other animals, and plants stay safe. We also need to decide on our class agreements for the year. These are so that everyone feels safe and welcome here, and that all of our voices are heard. How do we want to agree to treat each other in this space? What do we want to bring into the garden? What do we want to leave out?” Draw a large circle in the center of the poster.
- Record student responses on the poster board: inside the circle write what students want to bring into the garden, and outside the circle write what they want to leave out. Discuss and clarify where needed. Have students sign the back. Keep this in your indoor classroom and review as necessary.
- Give students an extended explore time. Practice garden rules and class agreements. Decide on a gathering signal first. Guide students in looking for different things: Colors, something taller than you, a plant that looks healthy, a weed, a plant at the end of its lifecycle, a seed pod, something you don’t recognize, evidence of an insect.
- Practice your gathering signal. Gather students in the outdoor classroom.
- Share out observations from the garden explore time.
- “You are third graders now, and already have several years of experience in the garden. Third grade gardeners have more responsibilities and more jobs than kids in lower grades. As you learn to work together, you will be given more jobs. What are ways you can show that you’re ready for more responsibility in the garden?” Discuss.
- “Third grade is also a special year in the garden because we start to talk much more about the environment and about the world around us. Our knowledge from lower grades starts to lead us to talk about the natural world outside of the garden. I am looking forward to a fun, enjoyable year of learning. What are you excited about doing this year?”
- Review names of tools, tool safety, and their proper use.

Wrap up:

Return all materials.

Notes/Feedback:

Scavenger Hunt

Week 1.2
STANDARDS
3.SL.1

Preparation:

Know what you are going to ask students to find. For example: a healthy plant, a plant that you don't recognize, evidence of a bird, three insects, a seed pod, something soft, something you do not recognize, a plant that is taller than you, a plant that you have tasted, etc.

Procedure:

- Students enter the garden and explore.
- Gather students. "I am going to send you on a scavenger hunt. I want to see that you are able to explore the garden while practicing our garden rules."
- Begin the scavenger hunt; have students find each item, and then come back to you before you say the next item to find.
- If there is time, let students help suggest items to find in the garden.

Notes/Feedback:

Teamwork Makes the Dream Work

Week 2
STANDARDS
3.SL.1, 3.SL3.1b

OBJECTIVES
- Students learn the meaning of teamwork, and practice teambuilding
- Students understand that teamwork is required for success in the garden
- Students find an example of nature working together in the garden

MATERIALS
- Four Bandanas
- Tools for cooperative garden work

Preparation:
The first few gardening classes really set the tone for the year. A lack of cooperation amongst students can be very destructive. Take time with team building exercises, and practice them as necessary. Be sure to debrief thoroughly at the end.
Also, have some tasks set up at the end for students to practice cooperatively.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about season and weather.

- Review your class agreements. Ask a student to read the garden rules.
- "Today we are going to work on team building. Why do you think we start the year with team building? What are some jobs in the garden that we need to do cooperatively?" (All of them!)

- “I am going to give you a task. The job is to line up by birthday, January 1 is here, and December 31 is there. You may not touch another person, and you may not talk! If someone talks, the class has to sit down and start over.”
- Be clear with where the class should line up, and have them begin.
- After your students are lined up, have them say their birthday to check if they are in the correct order. Have students return to sitting.
- Debrief with questions like “Was that difficult? What was difficult? Was it frustrating when one person talked and you had to start over? What ways did you figure out to communicate without your voices?”
- “We are going to another task. You need to line up height. You may not talk. Shortest is here, and tallest over there. This will be harder, because four students will be blindfolded.”
- Choose four students to blindfold, and be sure that you are in a place without obstacles. “If you can see, you may gently help those who are blindfolded, but otherwise, you should not be touching anyone else.”
- After students are in height order, remove blindfolds, and have them seated.
- Ask the students who had been blindfolded, “How did it feel that you didn’t know what was happening? How did it feel to be helped? When in the garden may you need help? How do you want to be helped?”
- To the students who could see, “How did it feel to help someone else?”
- Have the students line up one more time, by number of siblings. Tell them they can talk.
- After students have lined up, and have been seated again, ask “How was it to be able to talk? What was easier? What was difficult? What was it like when everyone spoke at once? How did you take turns?” Also ask questions based on your own observations.
- “When we are having a class discussion and everyone is talking at once, what happens? If one student keeps talking out, and I keep asking them to stop talking, how does it feel for the rest of the class? If three students are supposed to water the garden with one watering can, how can they cooperate?”
- Have students act out scenarios for the class, for example: 3 students are to share one watering can, 5 students are trying to look at the same insect and there is not enough space, or someone needs helping pulling out a weed.
- Put students in groups, give students each group a task, and have them practice working together cooperatively.

Wrap up:

Have students look for examples of animals and plants working together in the garden.

Pumpkin Soup

Week 2.2
STANDARDS
3.SL.1, 3.SL3.1b

MATERIALS

- "Pumpkin Soup" by Helen Cooper (or another book about teamwork)

Preparation:

Think of some scenarios that might happen in your garden that would require teamwork, and communication.

Procedure:

- Students enter the garden and explore.
- Gather students, read "Pumpkin Soup".
- Discuss. What does sharing responsibilities mean? Why do we help another? How can we use our words? What does this have to do with the garden?
- Continue to have students act out different scenarios that require teamwork in the garden.
- If there is time, continue to explore.

Notes/Feedback:

Weather Station

Week 3
STANDARDS
3.SL.1, 3.LS.4.1, 3.ESS2.1, 3.ESS2.2

OBJECTIVES
- Students learn the difference between weather and climate
- Students become familiar with common weather-collecting tools
- Students learn that weather and climate vary by location and by season

MATERIALS
- Thermometer
- Rain gauge
- Wind vane
- Record book—you will use this every week

Preparation:
You will need to buy (or make) these tools before class. Become familiar with them because you will teach your students how to use them, how to read them, and how to record from them. Decide if you will record weather daily, weekly, or twice a week during garden time. In this curriculum, weather-collecting will be referred to weekly, and the record book will not be mentioned in the materials list.
A record book can simply be a composition journal. Have a sample page that students will copy every time data is collected: Date, Time, Temperature, Wind Direction, Week's Rainfall. You can also leave space for notes, such as cloudy, windy, humid, etc.

Background Information:
From the NASA website: "**Weather** is basically the way the atmosphere is behaving, mainly with respect to its effects upon life and human activities. The difference

between weather and climate is that weather consists of the short-term (minutes to months) changes in the atmosphere. Most people think of weather in terms of temperature, humidity, precipitation, cloudiness, brightness, visibility, wind, and atmospheric pressure, as in high and low pressure. In most places, weather can change from minute-to-minute, hour-to-hour, day-to-day, and season-to-season. **Climate**, however, is the average of weather over time and space. An easy way to remember the difference is that climate is what you expect, like a very hot summer, and weather is what you get, like a hot day with pop-up thunderstorms."

Procedure:

- Students enter the garden and explore.
- Gather students. Check in about the season and weather.
- "It is fall! What are signs of fall in nature? What are garden jobs in the fall? What plants do we plant in the fall? Which plants do we harvest?"
- "What is the weather like, in Oakland, during the fall? What is the light like? Are the days becoming longer or shorter?"
- "What do you think the weather is like, in New York City, in the fall? What about fall in someplace warmer, like coastal Mexico?"
- "We are starting to discuss the difference between weather and climate. Weather is what we're feeling right now with respect to the sun, clouds, and humidity. Climate refers to weather patterns over a long period of time. For example, right now it is warm but chilly, and the climate in Oakland, in the fall, tends to have warm fall days, and chilly nights. The weather may change, but what we expect from the weather is the climate. Another example is that many of you said it may be snowing in New York City. New York's climate is different from ours, and we would expect cold, snowy days there. However, the weather right now in New York may actually be warm, or cloudy, or rainy."
- Probe students for understanding. "Can anyone else try to discuss the difference between weather and climate?"
- "Someone who studies weather and reports it is called a Meteorologist. Can you think of reasons why this job is so important? Why is important to be able to predict the weather? How can it help a farmer? How can it save lives?"
- "We are going to making a little weather station in our garden to keep track of changes in the weather. At the end of each season we will discuss the climate."
- Show students each weather-collecting tool, one by one. Teach names, functions, how to read and record data. Remind students to empty the rain gauge after recording. Let students practice.
- Familiarize students with the record book, and decide on a system to take turns collecting data.
- Have students predict what differences in data they may collect between the fall, winter and spring.
- Find a place in the garden to set-up your weather station.
- Explore.

Wrap up:
Is there anything to harvest? If so, have a snack.

Notes/Feedback:

Garden Journals

Week 3.2
STANDARDS
3.SL.1

MATERIALS

- Journals, pencils

Preparation:

Think about the procedures you wish to share with your students for journal-writing days. Will you share the prompt beforehand? Will it be written on a board somewhere? What are the parameters of where students can sit?

Procedure:

- Students enter the garden and explore.
- Have students find, again, examples of plants and animals working together in the garden.
- Distribute journals. “These will be your garden journals for the year. We will be writing and drawing in here this school year.”
- “Today we are going to do our first journal prompt to practice how we use our journals, and how we sit in the garden to write. Often in our journals, we will think and talk about nature. Nature is here in the garden, nature is out in the forest, and nature is even here in the city. What do you think of when you think of nature?”
- Go over procedures for journal-writing days.
- Students sit somewhere they enjoy and write in their journals, “What is nature? Where do you find it? How does it make you feel? Write, and draw a picture.”

Wrap up:

Share, in partners.

Notes/Feedback:

Decomposition

Week 4
STANDARDS
3.ESS2.1, 3.SL.1

OBJECTIVES
- Students learn the word decomposition
- Students understand that compost is the result of decomposition
- Students understand that decomposition happens in nature, and in controlled settings (compost bins)
- Students know that some items decompose, and others do not

MATERIALS
- Large garbage bag
- Soil
- 10-15 items: some compostable, some not
- Clipboard and paper for recording what goes in the compost bag
- Record book

Preparation:
Gather all materials in the outdoor classroom.

Background Information:

Decomposition is essentially rotting. Organic materials and their by-products (paper, cotton clothes, food scraps) eventually break down into smaller parts, becoming part of the soil. The agents that are responsible for decomposing will be explored more in later grades.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather
- Weather collectors share data.
- "Let's say I wanted to plant a bed of lettuce. What are the basic steps? How would I prepare the bed before planting?" Discuss.
- "Many of you mentioned that it is important to add compost to the soil before planting. You are very correct, but can you explain why it is important?" Discuss.
- "Compost adds nutrients back into the soil, and plants need nutrients to grow. My questions for you is, 'What is compost, and what is it made from?'"
- Discuss.
- Write DECOMPOSITION on the board. Underline the middle letters, from C until T. "Does anyone see a familiar word in here?"
- "Compost is the result of decomposition. What is decomposition?" If kids are stuck, hold up different items (some organic matter and some non-organic matter) and ask if they can decompose/be put in the compost/become part of the soil.
- "Decomposition, simply, is the process where organic matter (things that come from nature—plants and animals) breaks down into smaller pieces, eventually becoming part of the soil again. For example, in a forest, leaves fall off trees, and trees fall down, and eventually decompose and become part of the forest floor, providing nutrients for new plants to grow. This is called the nutrient cycle. Similarly, in our homes and gardens, we collect old plant and animal products (food scraps, paper, coffee grounds) and maintain compost bins so that we can 'make compost' to feed our plants with. Can anyone think of a garden animal that helps eat dead plants?"
- Check for understanding: "What does decomposition mean? (Rotting, breaking down). What is compost? What can go into a compost bin? What can't? How are worms involved? Do living things (like apples growing on a tree) decompose while growing? What about when the apples fall off the tree?"
- Create a "compost bag". In a large, plastic garbage bag add a shovel-full of soil. Add each of the items you have collected into the bag, having a student keep a record. After each item is added, ask "Will this decompose? Do you think we will find it when we open the bag next month?"
- After all items are inside, water the bag gently, blow plenty of air into the bag, and tie it off.
- In the garden, have students find 10 items that can decompose, and 5 items that cannot.

Wrap up:

Place bag in a warm place, but out of direct sunlight.

Notes/Feedback:

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Suggested Reading

Week 4.2
STANDARDS
3.SL.1, 3.SL.4

MATERIALS

- "The Magic School Bus Meets the Rot Squad: A Book About Decomposition" by Joanna Cole
- A leaf cage

Preparation:

This book is very detailed. Perhaps choose sections to read. Also, know where you will collect leaves. A leaf cage can be made very simply from chicken wire rolled into a cylinder and tied. Or it can be a bucket. The point is that students monitor how a full cage/bucket of leaves decomposes over the year.

Procedure:

- Students enter the garden and explore.
- Gather students, and read "The Magic School Bus Meets the Rot Squad".
- Discuss the book, and discuss the differences between decomposition in nature, and controlling decomposition into a compost bin, or a worm bin.
- Take students to the place where you are collecting leaves, and fill your leaf cage to the top with leaves. Do not collect all the leaves from under a tree! You can even have the students pack it in. Choose a place for your leaf cage to stay.
- Gather students. "What do you think will happen to the leaves in our leaf cage over the year? What kinds of changes do you think we'll see? Why is it important to leave some of the leaves under the tree?" (They will provide nutrients for the tree as they decompose).
- With extra time, continue exploring.

Wrap up:
Wash hands.

Notes/Feedback:

Seeds on the Go

Week 5
STANDARDS
3.SL.1, 3.ESS2.1, W.3.8, 3.LS4.2

OBJECTIVES
- Students solidify their knowledge around the ways seeds move
- Students categorize seeds by their observable properties

MATERIALS
- Seed collection papers, prepared as explained below
- Masking tape
- Clipboards, one per group of four students
- "A Fruit is a Suitcase for Seeds" by Jean Richards

Preparation:
Fold a paper into four, and label each section: Flier, Pooper, Hitcher, and Unsure. Roll a piece of tape into a loop and place one loop in each section. Students will place their collected seeds on the sticky side that is facing up. Find a heavily weeded area, or an area with plenty of plants for students to do their seed collection from.

Background Information:

Four main ways seeds travel:

- By wind (fliers), for example: Dandelion seeds, birch tree seeds. They tend to be light, and some have little parachutes.
- By water (floaters), for example: Coconuts. They tend to be hollow, and come from plants that grow by water.
- By animals (poopers), for example: All fruit. Fruit are bright and taste good, attracting animals to eat it.
- By animal fur (hitchers), for example: Grass, wheat, weeds with burrs. These seeds are sticky and spiky.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "We are changing topics a little bit from last week. You will remember from previous years and from your gardening knowledge that plants have adapted to move their seeds away from the mother plant. Can anyone say why many seeds must travel?"
- Read "A Fruit is a Suitcase for Seeds". Discuss the reasons seeds travel, and the different ways they travel.
- Show different pages in the book, and go through each way that seeds move, and discuss examples of each. Discuss characteristics of a seed that travels by air, versus by water.
- On the section about seeds passing through animals (poopers), ask which animals are present in the garden ecosystem. Ask, "When a bird eats fruit in our garden, does the bird get what it needs? (Yes, food). Does the plant get what it needs? (Yes, its seeds are moving). This is an example of plants and animals depending on each other in an ecosystem. The same thing happens in tropical jungle, when a monkey eats a banana and spreads the banana's seeds."
- Split students into groups of four, and hand each a clipboard with their collection paper on it.
- Bring students to the heavily weeded area, in the garden or outside the garden. "How did these plants get here?" (Traveled by wind or by animals).
- Let them harvest seeds and sort each seed into the section they believe it belongs.
- Gather students, let them explore each other's collections, and discuss any of the seeds that they were unsure about.

Wrap up:

Collect materials.

Notes/Feedback:

Journaling

Week 5.2
STANDARDS
3.SL.1

MATERIALS

- A world map
- "Garden Wizardry for Kids" by L. Patricia Kite
- Journals, pencils

Preparation:

Students will be learning about native and nonnative plants in depth later this year. Find the section in "Garden Wizardry for Kids" about lettuce. Synthesize the story to be able to explain how lettuce traveled through the Mediterranean, Europe, and eventually to the United States. If you do not have access to this (wonderful) book, there are plenty of online sources with a basic history of lettuce.

Procedure:

- Students enter the garden and explore.
- Gather students. Review the ways that seeds travel.
- "Not only have plants adapted to move their seeds, but people have been moving seeds for centuries! When people immigrate to new places, they often bring their seeds with them. Why do you think people bring seeds with them when they move?"

- Tell the story of lettuce. Discuss. "Did you learn something new?"
- "When lettuce complete its lifecycle, it makes hundreds of seeds with little parachutes at the end. How do you think lettuce seeds travel?" (By air)

- In their journals, “You are a seed. What kind of seed are you? How do you travel?”

Wrap up:
Share, in partners.

Notes/Feedback:

Planting Day

Week 6
STANDARDS
3.ESS2.1, 3.LS3.2

OBJECTIVES
- Students review the process of planting a bed
- Students hypothesize about how a close planting will affect lettuce size

MATERIALS
- Lettuce seeds (several varieties)
- Craft sticks and a permanent marker
- Row cloth, and stakes to keep it down
- Compost
- Watering can

Preparation:
Have all of your materials prepared where you will be planting. Divide the garden bed into sections, even if just mentally, to know which variety you will plant in which area. Mark each area with a labeled craft stick. This will make weeding easier, and give students an opportunity to compare different varieties. Fill watering cans.

Background Information:

Row cloth is a synthetic material that is used to cover newly planted beds. It allows lights and water in, while slowing evaporation, and keeping insects out. You can water through the row cloth, and remove it when plants are several inches tall.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "Today is a planting day! We are going to plant lettuce, which we discussed in depth last week. Who remembers something interesting about lettuce?"
- "Lettuce is a cool-season crop. It needs sunshine and warmth, but does not grow well in high temperatures. In Oakland, we usually plant lettuce in the fall and spring."
- Bring students to the garden bed. If necessary, pull weeds and stones, and add compost. Mix it in, and smooth the soil. Discuss as you go.
- "One lettuce plant can grow to be quite big, a foot tall and a foot wide. Some farmers discovered that you can actually grow lettuce very close together to keep it small. Why do you think the lettuce plant will stay small if grown close together?"
- "We are going to plant a bed full of lettuce for salad. One benefit of having the plants stay small is that it is nice to have smaller pieces of lettuce in a salad. We are going to grow different varieties and see which we like best."
- Divide students into groups, and give each group one seed type. Show students how to broadcast seeds in their section, making sure to cover the entire area with seed. Once all groups have finished, cover the seeds with a thin layer of fine compost.
- Water very gently and carefully. Heavy watering can move the seeds around.
- Cover with row cloth, and stake down. "Why do we cover the seeds? What are we protecting them from?"

Wrap up:

Return materials.

Notes/Feedback:

Journaling

Week 6.2
STANDARDS
3.SL.1

MATERIALS
- Journals, pencils
- Watering can, if necessary

Preparation:
Fill watering cans, if necessary.

Procedure:
- Students enter the garden and explore.
- If necessary, water the lettuce gently.
- Find a quiet spot to sit. Before distributing journals, encourage students to quiet quietly for several minutes, paying attention with all of their senses.
- In their journals, “Look around you. How do you feel sitting in nature? Find something beautiful and draw it.”

Wrap up:
Share, in small groups.

Notes/Feedback:

The Insect Club

Week 7
STANDARDS
3.LS1.1, 3.ESS2.1, 3.LS3.1, 3.LS4.1, 3.LS4.2, 3.SL.1

OBJECTIVES
- Students can articulate what makes an animal an insect
- Students learn the difference between an (endo)skeleton and an exoskeleton
- Students search for insects in the garden

MATERIALS
- Insect outline, one per student
- Clipboards, one per student
- Watering cans, if necessary.

Preparation:
Find an outline of an insect, a grasshopper works well. Print it, and make enough copies for each student. Check to see if the lettuce needs watering.

Background Information:
This is a variation on a second grade lesson. It is meant to set students up for the following weeks, where the difference between beneficial and harmful insects is discussed in depth.

Procedure:
- Students enter the garden and explore. Some students are recording weather data.
- Gather students; check in about the season, the weather and the leaf cage.
- Weather collectors share data.

- Has the lettuce sprouted?
- “Who can name 10 of your body parts?”
- “Can you name the 6 main parts of the plant?”
- “There are many crawling visitors in our garden. Usually we call them bugs, and there are special types of bugs that scientists call ‘Insects’. They have certain body parts, just like people and plants. Can you name all the insects that you’ve heard of?”
- List responses on the board as students respond. List all responses, even those that are not insects (like worms or spiders).
- Distribute clipboards with the insect outline clipped in. Allow students a minute or two to look at the drawings.
- “There are certain requirements to be in the insect club, not every bug can make it. We are going to learn the five main requirements to be an insect.”
- “Take out your finger. Point to the head of the insect. Point to the middle part of its body—this is called the thorax. Say thorax. Point to the bottom part, this is called the abdomen. Say abdomen. Insects are kind of like snowmen, they are split into three sections. Head, thorax, abdomen. Point to the thorax, head, abdomen, head, thorax….(until they get the idea!)”
- Look at your list on the board. “I see worm on this list. Is a worm split into three parts? No? Can the worm be in the insect club then? No?” Erase worm, and anything else listed that is not split into three segments. (Like a slug, or a snail, or a roly poly.)
- “We mentioned the three body parts. How many legs do you count on your insect?” (Six!)
- “All insects have six legs.” Look at your list, “How many legs on a spider? Eight legs? Can a spider be in the insect club then?” Erase spider.
- “What else do you see on your insect?” (Antennae, and wings)
- “Insects have antennae and wings. I see caterpillar on this list. Do caterpillars have antennae or wings? No? But caterpillars are baby butterflies or moths, and butterflies and moths are insects, so yes, caterpillars can be in the insect club. These requirements refer to grown up bugs!”
- “Insects have one more thing, but you can’t see it from the picture. You actually have something similar in your body. Put your clipboard down and I’ll help you find it.”
- “Knock on your head. Hear that? That’s your skull. Feel your jaw bones, your chin and your collar bones. Feel your shoulders, your elbows, and your spine. Feel your wrists, and your fingers. Feel your ribs, hips, your knees, and your shins. Feel the bones in your ankles. I just had you feel many of the bones in your body. They are all connected, what is that structure called?” (Skeleton).
- “You have a skeleton! Is it inside or outside of your body? Why do you need a skeleton?”
- “Skeletons help you move, and they protect you! Your skull protects your brain. It’s like a helmet. Your ribs protect some of the most important parts of your body, like your heart and your lungs. It’s like having armor inside your body.”
- Write Skeleton on the board. “Insects have something similar. They don’t have a skeleton, they have an exoskeleton.” (Write ‘exo’ in front of skeleton.)
- “What do you think is the difference between a skeleton and an exoskeleton?”

- “For one, skeletons are inside the body, and exoskeletons are on the outside. It is hard outer shell that protects an insect from harm.”
- “Do you go and get a new skeleton when you grow? No? Do you have the same skeleton from when you were born?”
- Another difference between a skeleton like ours, which grows with us, and an exoskeleton is that an exoskeleton does not grow. When an insect gets too big for its exoskeleton, it sheds it (molts) and there is a new, larger one underneath.”
- “Can someone describe the life cycle of a butterfly? What about a lady bug? How are they similar? How are they different?”
- “Alright insect detectives, I challenge you to find 5 different insects in the garden. Every time you see something creepy and crawly, look and see if you can see the three body parts, 6 legs, antennae and wings.”
- Let students explore, looking for insects. Common garden insects are ladybugs, other beetles, ants, bees, butterflies, wasps and flies.
- Water the lettuce, if necessary.

Wrap up:

Return watering cans.

Notes/Feedback:

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Suggested Reading

Week 7.2
STANDARDS
3.LS4.2, 3.SL.1

MATERIALS
- "How to Hide a Butterfly and Other Insects" by Ruth Heller
- Materials for garden work

Preparation:
Find what work needs to be done in the garden (watering, or weeding).

Procedure:
- Students enter the garden and explore.
- Gather students and read "How to Hide a Butterfly".
- "Why would an animal adapt to camouflage in its environment?"
- Explore the garden, looking for camouflaged insects.
- Do the garden work you prepared.

Wrap up:
Return materials.

Notes/Feedback:

Beneficial and Harmful Insects

Week 8
STANDARDS
3.ESS2.1, 3.PS2.1, 3.LS1.1, 3.LS3.2, 3.LS4.2, 3.SL3.1c

OBJECTIVES
- Students learn the role different bugs have in a garden
- Students categorize insects into helpful and harmful
- Students discuss the complexities of animal-plant interactions

MATERIALS
- Insect cards (see below)
- Tape
- Watering cans
- Hand shovels for digging

Preparation:
Find pictures of different insects and bugs commonly found in a garden: ants, ladybugs, beetles, cutworms, butterflies, bees, wireworms, caterpillars, aphids, snails, slugs, worms. Print pictures so they are index card-sized, and cut them out. You will want each student to have a card, and repeats are fine.
Find a place in the garden where students can dig.

Background Information:
Helpful:
Ladybugs: Eat aphids and other soft bodied insects
Butterflies: Pollinate
Bees: Pollinate

Ground beetles: eat harmful bugs, like snails and slugs
Worms: Aerate the soil by digging tunnels, decomposers that add nutrients to the soil

Harmful:
Aphids: Suck nutrients out of leaves
Wireworms: Live in the soil and cause plant damage
Cutworms: Live in the soil and cause plant damage
Slugs/snails: Eat plants/bulldoze seedlings
Caterpillars: Eat plants

Both Helpful and Harmful:
Ants: Ants help aerate the soil by digging tunnels underground. However, ants "farm" aphids, that is, they encourage aphid populations because ants eat the sweet sticky substance that aphids secrete. Ants also defend aphids from ladybugs!

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "Last week we reviewed what makes something an insect. Can anyone recall?"
- "Today we are opening the discussion to all bugs in the garden, whether or not they are insects. Some of them help our garden and some hurt our garden. Can anyone think of a bug that hurts our garden and tell us how? Who can think of a bug that helps our garden, and explain how?"
- Distribute the cards, and have students try to find the insect on their card. Its late fall, so they may not find too many pollinators like bees or butterflies. Students should look under leaves, under rocks, and may dig in the area that you have designated. If your rule is to not touch bugs, a gentle reminder may be in order.
- Have students trade cards and look for something else. In the meantime, write Helpful on one side of your board, and Harmful on the other side.
- Gather students, and have them tape their card on the side they believe their insect belongs. Some are both helpful and harmful, like ants. Some change categories

depending on where they are in their lifecycle (like butterflies and caterpillars). This is material for a rich discussion, take your time developing the conversation.

- Water the lettuce.

Wrap up:

Wash hands, return materials.

Notes/Feedback:

Insects part two

Week 8.2
STANDARDS
3.PS2.1, 3.LS1.1, 3.LS3.2, 3.LS4.2, 3.SL3.1c

MATERIALS
- Journals, pencils
- Watering cans
- Hand shovels

Preparation:
Your students probably loved searching for insects. This class is meant to give students interrupted time to search.

Procedure:
- Students enter the garden and explore.
- Give students plenty of time to dig, to search, and to find insects and bugs.
- Distribute journals, ask students to find one insect or bug and draw it. Include its surroundings. Students less engaged with bug-hunting can begin working in their journals earlier.
- Water the lettuce.

Wrap up:

Share, in partners.

Notes/Feedback:

Ladybug Symmetry

Week 9
STANDARDS
3.ESS2.1, 3.LS1.1, 3.LS3.1

OBJECTIVES
- Students are introduced to symmetry
- Students learn that symmetry is often found in nature
- Students create a symmetrical art project

MATERIALS
- One piece of red construction paper (8.5x11”) per student, cut into an oval.
- One piece of white construction paper (12x18”) per student.
- Paintbrushes, black markers (One per 2-3 students)
- Black paint in cups
- “Are You a Ladybug?” by Judy Allen

Preparation:
Though this project is heavy on preparation, it is worth it. Have all of your supplies organized outside before class. If you are running short on time towards the end of the class, save the drawing of the antennae, legs, and writing the fact for the next lesson.

Background Information:

There are many, many types of symmetry. Here, we are exploring “mirror”, or reflectional, symmetry.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- On the board draw many shapes, some symmetrical, some not. Write Symmetry on the top.
- “Look at these shapes on the board. Some of them I can draw a line through (demonstrate) and the shape is exactly the same on both sides.” Demonstrate several more shapes (triangles, squares, rectangles).
- “Pretend these shapes are paper, and the line is a fold. I can fold these shapes in half, and they match. They are the same on both sides. They are symmetrical.”
- Point to your nonsymmetrical shapes. “There is no line I can draw through these shapes that would make them equal on both sides. They are asymmetrical.” Demonstrate by drawing lines, and showing how the remaining shapes are different.
- “The amazing thing about symmetry is that many living things are symmetrical. Look at my body. I can draw a line from the top of my head down through my body, and I am the same on both sides. One each side I have an eye, and ear, an arm, and so forth.”
- Ask clarifying questions to your students, check for their understanding, and continuing drawing examples until they seem comfortable with the concept.
- Draw two circles. Draw a line through each circle. In one circle, draw 9 dots randomly. In the other circle, draw 10 dots symmetrical.
- “All insects are symmetrical. This is the back of a ladybug. Even a ladybug’s spots are symmetrical. For each spot, there is a matching one on the other side.”
- Students go into the garden looking for ladybugs, and noticing their spots.
- Read, “Are You a Ladybug?” and discuss the ladybug life cycle. “Even though a characteristic of a ladybug is its color and dots, notice the variation among the ladybugs that we find in the garden.”
- “Are ladybugs helpful or harmful in our garden? How?”
- Give each student their red oval paper. Show them how to fold it in half, length-wise.
- With their markers, let them draw a line down the fold. With the black paint and paint brush, show them how to make 4-5 spots, but only on one side.
- Students paint dots on one side of the fold.
- When they are finished, fold the paper in half so that the wet paint “paints” the spots symmetrically on the other side.

- When they open their red papers, ask students to describe what happened.
- Glue red papers onto the larger, white paper.
- Students can draw or paint the black head, two antennae, and six legs.
- If students have time, they can write one fact they learned about ladybugs on the bottom of their paper.

Wrap up:

Collect materials, wash paintbrushes, wash hands.

Notes/Feedback:

Ladybug Part 2

Week 9.2
STANDARDS
3.ESS2.1, 3.LS1.1, 3.LS3.1

MATERIALS

- Ladybugs from the previous lesson
- Black markers
- Journals, pencils, crayons
- "Are You a Ladybug?"

Preparation:

Bring student work out to the classroom.

Procedure:

Students enter the garden and explore.
Distribute student work from the previous lesson.
Allow students the time to finish drawing their ladybugs' antennae, legs, and one fact at the bottom of the page.
Students can use crayons to draw grass and a background on the white mounting paper.
As students finish, send them into the garden to find more examples of symmetry in nature. They should draw an example in their journal.

Wrap up:
Collect all materials.

Notes/Feedback:

Fall Climate

Week 10
STANDARDS
3.ESS2.1, 3.ESS2.2, 3.SL.1, 3.SL.4

OBJECTIVES
- Students discuss their fall weather data
- Students make claims about the fall climate

MATERIALS
- Record book
- Tools for garden work

Preparation:
Today you will be discussing your fall weather data, and try to guide the kids towards making a claim about the fall climate in Oakland. This may be difficult, but will hopefully become easier throughout the year. Get familiar with the record book before class, so you can synthesize the data to the students. Push them to make claims such as "In the fall in Oakland, you can expect _____ weather." Or "We experienced the first rain of the season in the month of _____."

Prepare garden work.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- Synthesize the data for the students. After each category (weather, rain, etc), call on students to make a claim about what they heard. Share examples ("Most fall days are around 60 degrees") until they are able to make claims on their own.
- "Pretend a friend is coming to visit you, and they live very far away from here. They call you to ask what kind of weather to expect, what would you say? How would you describe the fall climate in Oakland overall?"
- Do the garden work you have prepared.

Wrap up:

Return materials.

Notes/Feedback:

Compost Bag continued

Week 10.2
STANDARDS
W.3.7, W.3.8

MATERIALS

Compost bag from week 4
List of what entered compost bag, from week 4

Procedure:

Students enter the garden and explore.
Gather students, "Today we are going to open the compost bag and see what we can find. Can someone read the list of items that went into the bag?"
Student reads list.
"Before we pour the bag out and look through it, does anyone want to hypothesize about the apple slice (for example)? Or the plastic spoon (for example)?"
Class discussion.
Pour the bag out and sift through the contents. Go through each item on the list and see if you can find it.
"What is the pattern? Which types of materials decomposed and became part of the soil? Which types didn't?" Discuss.
If you have a compost program in the cafeteria, ask "How is this connected to composting in the cafeteria?"

Wrap up:

Wash hands.

Notes/Feedback:

Let Us Eat Lettuce

Week 11
STANDARDS
3.ESS2.1, 3.ESS2.2, W.3.7, W.3.8

OBJECTIVES
- Students reflect on the fall climate, and describe the winter climate
- Students evaluate their lettuce crop
- Students share their findings

MATERIALS
- Journals, pencils
- One leaf of each type of lettuce, as an example
- Compost bucket

Preparation:
Write on the board:
Lettuce Variety:
Healthy?
Tasty?
Replant?

Background Information:

In several weeks, your class will harvest from the lettuce to make a salad. In the meantime, allow students to "graze". It is important to teach them how to harvest without damaging the plant. Students should only harvest outside leaves, careful to not pull out the entire plant. Students will self-harvest during the evaluation, demonstrate several times how to take leaves properly.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "It is winter! What changes do you notice? What changes do you expect that you will begin to notice? Before we begin collecting data, how would you describe the Oakland winter climate? How is it similar, or different to the fall climate?"
- "Today we are going to evaluate the progress of our lettuce plants. A large part of gardening is learning by experimenting, but the only want to learn is by noticing what works well and what does not work well. Can anyone think of any examples?"
- "We are going to evaluate our lettuce today. We are going to look at each variety and see how well it is growing. What are some signs that a plant is growing well? Not so well?"
- "You will also get to taste each lettuce variety and decide if you like it or not. You will then suggest if we should replant this variety next year, or not."
- Hand out journals and pencils. Show students what is written on the board, and have them copy it, once for each variety of lettuce that you planted. Together, write each lettuce variety into their journal. You may need to show them an example of each type to refresh their memory.
- Bring students to the lettuce. Demonstrate how to harvest. Provide a compost bucket for students who do not enjoy the taste of lettuce.
- Guide students through the evaluation of the first lettuce variety, and then let them finish on their own. Encourage students to provide detail for the "Healthy?" category.
- Gather as a class. Call on volunteers to share their findings.

Wrap up:

Students harvest several leaves of lettuce to enjoy.

Notes/Feedback:

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Suggested Reading

Week 11.2
MATERIALS
- "When Winter Comes" by Nancy Van Laan (or something similar)
- Tools for garden work
- Journals, pencils

Preparation:
Prepare garden work, such as weeding or watering.

Procedure:
- Students enter the garden and explore.
- Gather students, and read "When Winter Comes". Discuss.
- In their journals, "Plants and animals go through many changes in the winter. It is a time for rest. What do you feel changing in you as it becomes colder and darker? What do you look forward to in the spring?"
- Garden work.

Wrap up:
Return materials.

Notes/Feedback:

Ecosystems

Week 12
STANDARDS
3.ESS2.1, 3.LS3.2, 3.SL.1, 3.LS4.1

OBJECTIVES
- Students can define ecosystem to mean an environment composed of living and nonliving things
- Students know that ecosystems can vary greatly, but are consistent in being comprised of living/nonliving

MATERIALS
- Materials for garden work

Preparation:
Identify the area in the garden that students will be weeding, thinning or watering after the lesson. If the weather has been dry and the garden needs water, you can ask students about the rainfall trend in your ecosystem. If you are going to be weeding, you can ask students about competition for resources in an ecosystem. Any garden project you do can be related back to this lesson. Write ECOSYSTEM on the top of your whiteboard.

Background Information:
An **ecosystem** is a community of living and non-living things that work together. Ecosystems have no particular size. An ecosystem can be as large as a forest or as small as a tree. The concept of an ecosystem is extremely important, but it should be expected that your students' understanding will develop through the following lessons. This lesson is the foundation for students learning about how organisms

adapt to different environments, about native, nonnative and invasive species, about interactions within environments and interdependence among species. Take your time with this lesson, and revisit if necessary.

Additionally, after the class discussion where students have to figure out why you separated their responses into two columns, ask them if they consider soil to be living or nonliving. While the elements of compost are nonliving, soil is very much living. There are more microorganisms in a handful of healthy soil than people on the planet. Let your students dwell on this, and let them discuss where soil should be placed on the chart.

Procedure:

- Students enter the garden and explore
- Class congregates; check in about season, and weather and any interesting observations from the garden
- "Let's look around our garden. Can you name what you see?"
- Teacher lists student responses on whiteboard. Teacher should list responses into two columns, one with living organisms and one with nonliving, but should not tell students why he/she is organizing it that way. If students aren't listing nonliving things, some prompting may be necessary. Nonliving things should include soil, water, air and heat/sunlight.
- After all responses have been taken… "I have listed your answers into two columns. Can anyone see the pattern? Why did I separate your responses? How are the things in column A different from column B?
- Facilitate a class discussion
- "You just described our garden ecosystem here in Oakland. You figured out that it is made from living and nonliving elements. The living things depend on the nonliving, and the nonliving can be affected by the living. They work together. Are there bears in our garden ecosystem? No? Where do you find bears? (In a forest)."
- Teacher erases garden ecosystem and has students list what you might find in a forest, again separating into living and nonliving
- "A forest ecosystem is also compromised of living and nonliving components. You can see that there are different living things in a forest" Teacher can choose to do another example, for example a desert, if students need reinforcement.
- Teacher asks: "You listed soil as a nonliving element in an ecosystem. But soil is alive, and each handful contains billions of microorganisms. But it's made up of nonliving things like rocks, and sand and decomposed plant matter. Would you consider soil living, or nonliving?"
- Discuss.
- Students venture into garden to find 5 nonliving, and 10 living things.
- When all have finished, gather students and do the garden work that you have prepared.

Wrap up:
Return materials, taste an edible member of the garden ecosystem.

Notes/Feedback:

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Ecosystems part two

Week 12.2
STANDARDS
3.SL.1

MATERIALS
- Journals, pencils
- Watering cans, if necessary

Preparation:
Determine whether the lettuce needs watering.

Procedure:
- **Students enter garden and explore.**
- **Encourage students to notice living and nonliving components of the garden ecosystem.**
- **Ask, "Can you find any new members of the ecosystem since the last time you were in the garden?"**
- **In their journals, "Is Oakland an ecosystem? Or is it part of a larger ecosystem? Draw a scene from somewhere in Oakland you know, and label the living and nonliving elements."**
- **Water the garden, if necessary.**

Wrap up:
Share, in partners.

Notes/Feedback:

Native Plants

Week 13
STANDARDS
3.ESS2.1, 3.ESS2.2, 3.LS4.2, 3.LS4.3, 3.SL.1, 3.SL3.3

OBJECTIVES
- Students learn that plants and people are native to different places
- Students learn that plants are adapted to their native climate

MATERIALS
- Globe, or map
- Materials for garden work

Preparation:
Choose some plants that your students are interested in, and find out where they are native to. "Garden Wizardry for Kids" by L. Patricia Kite is an excellent resource. Examples are below.
Additionally, this lesson assumes that students have general background knowledge of adaptations that plants and animals have developed to survive.

Background Information:
Potatoes are native to the Andes Mountains in South America and are a warm weather crop.
Watermelons are native to South Africa, and are also a warm weather crop.
Peas are native to higher altitude parts of the Far East, and are grown around the world as a cool season crop.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students; check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- Review definition of "Ecosystem". Be sure that students know that ecosystems are comprised of living and nonliving elements.
- "I am native to Oakland. I was born in Oakland, and I still live in Oakland. Even if I move to Mexico City, I will still be native to Oakland. Can someone tell me what "Native" means?"
- Discuss.
- "Basically native has to do with where something is from. When we refer to Native Americans, we are talking about the people who have lived on this land for a long time before us. Does any one here have family native to Africa? To Asia? To South America?"
- Discuss.
- "What is the climate like in the desert? What kinds of plants do you find in the desert?"
- "I heard someone say that a cactus grows in the desert. In fact, cacti are native to the Americas, from North America to South America. They grow in very dry places, and have adapted to the dry climate. They are plants that don't have leaves, which require lots of water to grow. Instead they developed thorns, which protects a cactus as well as provide itself shade. (Draw the following:) Cacti also have shallow roots that extend very far. Cacti can react to rain immediately. Often in the desert, there is strong rain that lasts a very short time, which does not sink deep into the ground. Cacti roots can quickly 'grab' the water from a large area just as the rain hits the surface of the soil."
- Discuss.
- "How do you think a cactus would do if we pulled it out of the desert and put it in a snowy field?"
- "California Poppies are native to, you guessed it, California. They are also native to the West Coast of the United State, and parts of Mexico. What is the overall California climate like?"
- "California poppies are native to warm, sandy places on the coast. They will die completely if it gets too cold. The coast is usually warm, and does not get extremely cold. It rains on the coast, but often weeks will go between rains. (Draw the following:) California poppies have very long taproots, that actually look a lot like a carrot. How do you think a California Poppy's root has adapted to strong, infrequent rain? (The root can reach very deeply as rain water settles over time. Overall California Poppies do not require a lot of water.)
- "Plants we eat are also native to different places. The more you know about where a plant came from originally, the better you can grow it and take care of it. Let me give you some examples."
- Give examples, using the map or globe to show where plants are from.
- Check for understanding.

- “Sometimes a plant cannot grow outside of its native habitat. For example, bananas require tons and tons of water to grow, need to be warm but not hot, and never cold. Where do you think bananas might be native to?” (Tropical rainforests).
- “What is the climate like in Oakland? Do bananas grow here?” (No, bananas do not).
- Do the garden work you have prepared.

Wrap up:

Return materials.

Notes/Feedback:

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Journaling

Week 13.2
STANDARDS
3.SL.1, 3.LS4.3

MATERIALS
- Journals, pencils
- Materials for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Students taste lettuce, notice changes.
- In their journals, "Most lions are native to the sunny plains of Africa. Imagine a lion accidentally stepped into a time machine and ended up in a tropical rainforest. Write a story and draw a picture."

Wrap up:
Share stories with partners.

Notes/Feedback:

Non-Native Plants

Week 14
STANDARDS
3.ESS2.1, 3.ESS2.2, 3.PS2.1, 4.LS4.2, 3.LS4.3, 3.SL.1

OBJECTIVES
- Students understand the concept of nonnative
- Students understand that sometimes nonnative plants thrive, and sometimes they cannot
- Students recognize that much of our diet comes from nonnative plants

MATERIALS
- "Garden Wizardry for Kids" by L. Patricia Kite (optional)
- Materials for garden work

Preparation:
Draw a basic world map on your board. Refer to it, and draw lines to represent the potato's movement as you explain its fascinating history.
Prepare garden work.

Background Information:
A shortened, simplified history of the potato:
Potatoes are native to modern day Peru, and were eaten there for thousands of years. In the 1500s, Spanish Conquistadors conquered Peru, "found" potatoes and brought them back to Europe. Families of these sailors began to grow potatoes. Sir Walter
Raleigh brought the potato to Ireland in the late 1500s.Some people ate the leaves and stems, became very sick, and banned potatoes. The English sent potatoes to their colonies, now the East Coast of the U.S. Ittook many more years for the potato to spread through the rest of Europe. European traders also brought potatoes to China, and eventually to Eastern Europe and Africa.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students; check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- “Last week we talked about native plants. Can someone give an example of a plant, where it is native to, and how it has adapted to its native climate?”
- Discuss.
- “This week we are going to talk about the opposite, non-native. Plants or animals can be non-native to a region, but today we are going to focus on plants. One example we discussed last week, was the idea of moving a cactus from its native desert and moving it to the top of a snowy mountain. Would the cactus survive?”
- Discuss.
- “What if the cactus was moved a similar climate, one that was warm but not hot.” (It would probably grow reasonably well.)
- “The same goes from a plant that requires a lot of water, living in a tropical rainforest. It would probably not survive in the desert. However, plants have been moving around the world, over oceans and across continents, for hundreds of years. Can anyone think of some ways that plants have moved?” (With immigrants and explorers).
- Tell the story of how potatoes have migrated around the world.
- “In fact, many of the plants that we eat can grow here, and eat all the time, are non-native to California. Carrots are originally from Afghanistan, Lettuce from the Mediterranean, Potatoes are from Latin America, to name a few. Sometimes plants can move to new areas, with new climates, and grow just fine. Other examples of plants that we grow here, but are not native to California, include apricots, peaches, and almonds.”
- “Sometimes we see bananas plants growing in the area, but these banana plants never produce fruit. Although they can survive, they do not thrive here.”
- “Another interesting idea is that sometimes we can look at a plant and have a general idea of where it is native to. Trees that lose their leaves in the fall and winter are from very cold climates, where there is very little sunlight in the winter, and the plant must ‘sleep’ through the winter. Trees from warmer climates do not need to drop their leaves in the winter. Redwoods are native to California, do they lose their leaves? Are there trees on campus that lose their leaves? Where do you think they might be from?”

- Discuss.
- Bring students to the area you have prepared to do garden work, and allow students time to look through the plant histories in “Garden Wizardry for Kids”, if you have it.
- Taste lettuce.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Journaling

Week 14.2
STANDARDS
3.ESS2.2, 3.PS2.1, 3.LS4.3, 3.SL.1

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Have students identify different plants in the garden, and suppose if they are native or nonnative to California. What evidence is there? What adaptations are visible?
- Gather students, class discussion about immigrant communities bringing their seeds with them to new lands.
- In their journals, "Imagine you were told that you had to leave your home in Oakland, and move to the other side of the world. You have very little time to pack, but remember to bring some seeds with you. What would you bring, and why?"

Wrap up:
Share, in partners.

Notes/Feedback:

Invasive Species

Week 15
STANDARDS
3.ESS2.1, 3.ESS2.2, 3.PS2.1, 3.LS4.2, 3.LS4.3, 3.SL.1

OBJECTIVES
- Students understand that some nonnative plants become invasive
- Students learn the main characteristics of invasive species
- Students understand how invasive species can affect an ecosystem

MATERIALS
- Bermuda grass
- Tools for garden work

Preparation:
It is likely that there is Bermuda grass in your garden. Find it, and show it to your students. Compare it to another weed that you can pull and see that you've removed its entire root—almost impossible to do with Bermuda grass.

Background Information:
Refer to Teacher Supplement for additional information.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students; check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- “Last week we discussed nonnative plants. Sometimes, nonnative plants are able to adapt to their new environment, and everything works out fine. In fact, the movement of certain food crops has changed the course of history.”
- “However, sometimes nonnative plants are introduced to a new place, and like their new environment just a little too much, and end up spreading all over. These nonnative plants are called Invasive. Does anyone know what invasive means? It is related to the world Invade.”
- Discuss.
- Explain the history of Bermuda Grass and Andean Pampas Grass.
- “There are four main characteristics of invasive plants.”
- On the board, write the following:
- Fast growth.
- Rapid Reproduction.
- Seeds travel far and wide.
- Plants adapt quickly.
- Discuss each characteristic.
- “This can also happen when new animal species are introduced to an area. If the nonnative animal does not have any predators, the population can become enormous, causing all kinds of damage. Many of the pests that affect gardeners and farmers are nonnative, invasive species.”
- “There are people whose job it is to research invasive species, and try to educate the public about how to best manage these kinds of problems. As individuals, we can try to avoid planting invasive species in our gardens. You can always talk to someone at the nursery when buying plants or seeds.”
- “Who can articulate how invasive plants and animals can really change an ecosystem?”
- Discuss.
- Show Bermuda grass and compare it to a normal weed.
- Garden work.

Wrap up:

Return tools, wash hands.

Notes/Feedback:

Supplement: Invasive Species

ADDITIONAL INFORMATION

Two Common Invasive Species:

Bermuda Grass: Bermuda grass is originally from Africa. People brought it to the United States to grow as the grass used on sports fields, and for food for livestock. People liked that it was strong and hardy. It has turned out to be extremely invasive. In its native climate, it must spread and cling to dry sand dunes. When introduced to a less extreme climate with more water, it spread without limit. Bermuda grass spreads three ways, by seed, by over ground shoots (stolons), and below ground shoots (rhizomes). When trying to pull Bermuda grass, if any part of the plant is left in the ground, it can easily grow again. As a result, it is nearly impossible to get rid of completely, it does not die in the winter, and it can manage with little water. It is now found over most of California, and can out-compete native plants for space and nutrients.

Andean Pampas Grass: Someone saw this pretty plant growing in its native South America. They thought it would be a nice ornamental (decorative) plant in the United States, and brought seeds over. It has become extremely invasive: each plant produces millions of seeds per year, and travels by wind, water and when soil is moved. Andean Pampas Grass thrives in the California climate, and now is found all over the coast, and in several National and State Parks, competing with native vegetation, changing the scenery, harbors pests and rats, and its dry foliage is a fire hazard.

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Journaling

Week 15.2
STANDARDS
3.PS2.1, 3.SL.1, 3.SL3.1b

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Try to find aphids: Some populations of aphids are nonnative invasive, and some are not. It is hard to tell just from looking at the aphids, but by seeing large aphid populations, it is easy to see how invasive pests can be a huge problem.
- "Some farmers choose to get rid of invasive pests, bugs or weeds, by spraying harsh chemicals on them. Why is this also a problem?"
- Class discussion.
- In their journals, "Draw a machine, or a tool, that tries to get rid of Bermuda grass."

Wrap up:
Share, in partners.

Notes/Feedback:

Redwoods

Week 16
STANDARDS
3.ESS2.1, 3.LS4.2, 3.SL.1, 3.LS3.2

OBJECTIVES
- Students learn about redwood trees
- Students understand redwood trees' adaptations allow them to live long lives
- Students are assessed in their understanding of native, nonnative, and invasive species

MATERIALS
- "Redwoods" by Jason Chin

Preparation:
"Redwoods" by Jason Chin is an incredible book. Read through it beforehand, and be sure you can identify all the adaptations yourself.
If you have a redwood tree on campus, it would be ideal to read this story under the tree.

Procedure:
- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- If there is a Redwood tree on campus, skip the above and go straight to the tree.
- "Today we are going to learn about an incredible plant, the Redwood tree. It is native to California, and to part of the coastline north of here, and redwood trees even grow native here in Oakland. What do you already know about redwood trees?"

- “Redwood trees can grow to be very, very tall. In fact, they are the tallest plants in the world. They also can live to be thousands of years old. We are going to learn more about this majestic tree from this book we are about to read, and we are going to visit a redwood forest next week for our field trip.”
- “I am going to read this book. Every time you hear an example of how the redwood tree has adapted to its environment, raise your hand and tell me, and we will discuss as a class.”
- Read “Redwoods” and discuss.
- “Who can name some of the ways a plant can die?” (Old age/end of lifecycle, pests, lack of water, too much water, not enough space, disease, fungus, fire, etc.)
- “Do redwoods usually die of these problems?” (No, they have adapted to survive through almost everything.)
- “An invasive species that we did not talk about last week is an ornamental flower called ‘Forget-Me-Not’. It has escaped from gardens and now is found spreading through many forest ecosystems. In Redwood Regional Park in Oakland, the forget-me-not covers large parts of the forest floor. When redwood trees drop their cones with seeds, some of the seeds germinate into little seedlings. These tiny seedlings cannot compete with the carpet of forget-me-nots, and often do not survive! What would eventually happen if no new redwood trees could grow?”
- Discuss.

Assessment:

Class discussion: What does it mean is a plant is native to California? What is an example? What are nonnative plants? Do all become invasive? Which kinds become invasive? How does that affect our environment?

Notes/Feedback:

Journaling

Week 16.2
STANDARDS
3.SL.4, W.3.7, 3.SL.1

MATERIALS
- Journals, pencils
- Materials for garden work

Preparation:
Identify garden work to be done.

Procedure:
- Students enter the garden and explore.
- Do the garden work you have prepared.
- Return materials.
- In their journals, “Some redwoods live for thousands of years. Imagine you are a 2000-year-old redwood tree. What was the most interesting part of history you saw in California in the past 2000 years? Write about it.”

Wrap up:
Take volunteers to share in front of the class.

Notes/Feedback:

Fieldtrip: Redwood Regional Park

Week 17
STANDARDS
3.ESS2.1, 3.LS4.2, 3.SL.1, 3.LS3.2

OBJECTIVES
- Students explore the wonder and beauty of a Redwood forest
- Students see firsthand evidence of their learning around native and nonnative species
- Students reflect on the magnitude of nature

MATERIALS
- Forget-me-not pictures, several copies

Preparation:
Print photos of Forget-Me-Nots seedlings, and flowers to try to find them in the park.

Background Information:
Redwood Regional Park is quite large. The Canyon Meadow Staging Area is a great place to begin, but many options are available. You can also arrange to have a tour scheduled with one of the park's naturalists.

Procedure:

- Discuss expectations on a field trip, and ways to protect the natural environment.
- Split into groups with chaperones, and explore.
- Look for forget-me-nots, matching the leaves (or flowers, if they are in bloom) with the photos that you have.
- Go on a silent hike.
- Continue to explore.

Wrap up:

Debrief with group.

Notes/Feedback:

Redwoods part two

Week 17.2
STANDARDS
3.SL.1, 3.SL.4

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Gather students, debrief the fieldtrip. “Did you know there was a forest in Oakland? What impressed you the most? How did you feel inside the forest? What is the most amazing thing you learned about redwood trees?”
- “The redwood trees in Oakland are not 2000 years old. Most redwood trees were cut down in the early 1900s, especially as San Francisco was being rebuilt after the 1906 earthquake and great fire. It is important to protect redwood trees, and the thousands of species that live on and in them.”
- In their journals, “Write a letter to a friend, telling them what you learned about redwoods, and why we need to protect them.”

Wrap up:
Share, in small groups.

Notes/Feedback:

Be a Bee

Week 18
STANDARDS
3.ESS2.1, 3.LS2.1, 3.L4.2, 3.LS4.3, 3.SL.1

OBJECTIVES
- Students learn about different types of bees
- Students understand the importance of bees in our ecosystem
- Students carefully observe bee pollination

MATERIALS
- Masking tape, permanent marker
- "Ms. B and Her Wondrous Bees" by Rahman Newdles

Preparation:
- Do a bit of your own research around bees; they are dozens of different species and they are all fascinating. It will help to have some background knowledge, as students will certainly have many questions about bees.
- You are going to split your class into different types of bees. You will want more honeybees than bumblebees, and only one solitary bee. Honeybees and bumblebees will have a queen bee. For example, in a class of 20, you could make 14 honeybee labels (with the masking tape), 1 queen honeybee label, 3 bumblebee labels, one queen bumblebee label, and 1 solitary bee label.

Background Information:
- There are hundreds of different types of bees. Here, we are exploring mostly honeybees, bumblebees and solitary bees. Honeybees are nonnative (they are from Europe), there are native California Bumblebees, and native Solitary Bees.

Honeybees live in huge, complex colonies in hives in trees. Bumblebees and Solitary bees live in the ground. Solitary bees live alone. Bumblebees and solitary bee do make a sticky substance from nectar, but humans do not harvest it.

- Two misconceptions that many kids have about bees are that 1) Bees are collecting honey from flowers and 2) Bees make honey for us people to eat.
- Let it be known that bees collect pollen and nectar from flowers, and from these materials they make honey in their hive. Bees make honey to feed their colony!
- Scientists estimate that a third of our food supply depends on bee-pollination. It's important to learn about, and protect, bees!

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "Today we are going to learn a little about bees. Bees are an extremely important part of our ecosystem. Does anyone know why? How do we depend on bees?"
- "Plants depend on bees for pollination, and so do we. If plants could not make new seeds, what would happen?"
- "Which foods that we eat are dependent on pollination?" (Beans, fruits, many "vegetables" that are actually fruits (squashes, tomatoes, eggplants, cucumbers), nuts).
- Give each student their masking tape sticker to put on their shirt, and have each group sit together.
- Explain: "There are dozens of different types of bees. We are going to learn about a few today. Raise your hand if you are a honeybee. Raise your hand if you are the queen bee. Queen bee: do you leave the hive? (No). Honeybees, what kinds of work do you do? (Protect the hive, collect pollen and nectar, make honey, etc.) Honeybees, you live in huge, complex colonies called hives that are found in trees. You are not native to here. You make the honey that we find in the store. Though you are nonnative, you are not invasive. You are yellow with some black stripes, and fly pretty quickly. Sometimes when we see you in the garden, we see pollen baskets on your legs; this is where you collect pollen."
- "Raise your hand if you are a bumblebee. Raise your hand if you are the bumblebee queen. Do you leave the hive? (No). Bumblebees live in hives, but in much smaller groups. They live in hives that are underground. Bumblebees are native to North America, and some are native to California. You are much larger than honeybees, fuzzier, usually are black, and fly much slower. You also collect pollen and nectar and return it to your hive."
- "Solitary bee, where are you? You live alone! Solitary means alone. You are also native to California, and you also live in the ground."
- "Raise your hand if you collect pollen and nectar." (All students should raise their hands, except the queens)
- "If you raised your hand, go into the garden and 'collect' pollen by touching the inside of an open flower. 'Bring' the pollen back to the queen, who stays seated in our classroom."

- Let students “collect” pollen and pretend to be bees.
- Look for real bees, and observe carefully.
- Gather students. Check for understanding. Discuss.
- Read “Ms. B and Her Wondrous Bees.”

Wrap up:

If there is extra time, continue to look for bees.

Notes/Feedback:

Bees part two

Week 18.2
STANDARDS
3.SL.1, 3.LS3.2, 3.SL.4, 3.PS2.1

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Background Information:
Colony Collapse Disorder (CCD), simply, is when worker bees from a hive suddenly disappear. Though this has happened throughout the history of beekeeping, it is happening much more commonly across North America and parts of Europe. It is not certain why CCD is becoming more prevalent, and it is likely that there are combinations of factors involved. Some proposed causes are: pesticide use, habitat loss, infections caused by other insects, lack of access to food.

Procedure:
- Students enter the garden and explore.
- Do garden work.
- Discuss colony collapse disorder.
- In their journals, "Write a letter to a friend about colony collapse disorder, and how it affects more than bees. Tell him/her how he/she can protect bees."

Wrap up:
Share, in partners.

Notes/Feedback:

Salad Party

Week 19
STANDARDS
3.ESS2.1, 3.LS3.2

OBJECTIVES
- Students learn one method of harvesting lettuce
- Students enjoy the fruits of their labor

MATERIALS
- Hand soap
- Colanders
- Salad spinner, if available
- Clean scissors for harvesting
- Large salad bowl and tongs
- Salad dressing
- Bowls and forks for students
- Knife and cutting board, if necessary

Preparation:
You will need to have all your materials handy. You may want to check in with other teachers to see if you can harvest other salad fixings: carrots, snap peas, radishes, nasturtium petals, etc.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students; check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- “Today is our salad party! We are going to harvest our lettuce (and other vegetables, if available) and enjoy a large salad.”
- Students wash hands.
- Bring students to the bed of lettuce. “When we planted our lettuce, we talked about the many methods of growing and cutting lettuce. Who can explain the method we used?” (Cut and come again: growing lettuce close together to stay small, and harvesting by cutting the plant, but not pulling it out all the way.)
- Show students how to “shear” a plant, by cutting an inch or two above the soil. Do not damage the inner leaves, these are the ones to grow back. Alternatively, you can harvest without shears by simply harvesting the outside leaves.
- Harvest, and put lettuce in the colanders.
- Wash lettuce, and spin it dry (if you have salad spinners, otherwise shake out the water).
- Carefully rip the lettuce into salad sized pieces into the large bowl.
- If you have access to other vegetables for your salad, harvest and clean those as well. Only the teacher should use the knife.
- Gather students, dress the salad, and serve.
- Commemorate the moment by either recalling the steps and time it took to grow the lettuce, or by each student saying something they are grateful for.
- Eat, and enjoy!

Wrap up:

Compost leftovers, clean dishes, wash hands.

Notes/Feedback:

Journaling

Week 19.2
STANDARDS
3.SL.1

MATERIALS
- Journals, pencils
- Compost
- Watering cans

Preparation:
Bring compost and watering cans to the lettuce bed.

Background Information:
After a heavy harvest, it is important to add nutrients back to the soil. Here are you adding compost to the areas just under the lettuce plants, and watering. The water will eventually bring the nutrients down to the roots—this is called topdressing.

Procedure:
- Students enter the garden and explore.
- Do garden work: add compost to the lettuce bed and water. Discuss.
- In their journals, "We would not have lettuce, or anything else, to eat if it weren't for the sun, soil, or water. Write a thank you letter to one of the three."

Wrap up:

Share, in partners.

Notes/Feedback:

Winter Climate

Week 20
STANDARDS
3.ESS2.1, 3.ESS2.2, 3.SL.1, 3.SL.4

OBJECTIVES
- Students discuss their winter weather data
- Students make claims about the winter climate

MATERIALS
- Record book
- Tools for garden work
- Leaf cage

Preparation:
Today you will be discussing your winter weather data, and try to have the kids make a claim about the winter climate in Oakland. Ideally this will make more sense to the students as they already discussed the fall climate. Get familiar with the record book before class, so you can synthesize the data to the students. Push them to make claims such as "In the winter in Oakland, you can expect _____ weather." Or "We experienced the first frost of the season in the month of _____."

Bring the leaf cage to the classroom.

Prepare garden work.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data. “Any signs of spring?”
- Synthesize the data for the students. After each category (weather, rain, etc), call on students to make a claim about what they heard. Share examples (“Most winter days are around 55 degrees”) until they are able to make claims on their own.
- “Pretend a friend is coming to visit you, and they live very far away from here. They call you to ask what kind of weather to expect, what would you say? How would you describe the winter climate in Oakland overall?”
- “Now we are going to discuss the leaf cage. What do you notice? How have the leaves changed since we collected them in the early fall? Are they recognizable? Have they mostly decomposed? How does a tree use decomposed leaves?”
- Tip out the contents of the leaf cage, and let students touch and explore. Return the contents to the leaf cage.
- Do the garden work you have prepared.

Wrap up:

Return materials.

Notes/Feedback:

Journaling

Week 20.2
STANDARDS
3.SL.1

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Look for signs of spring.
- In their journals, “Find a sunny spot. Spring is about warmth, light and waking up. What is wonderful about you? How are you going to make your community a better place? Write, and draw a picture.”

Wrap up:
Share, in partners.

Notes/Feedback:

Spring and Sunflowers

Week 21
STANDARDS
3.ESS2.1, 3.ESS2.2, 3.LS3.2

OBJECTIVES
- Students discuss signs of spring
- Students discuss the spring climate
- Students plant sunflowers

MATERIALS
- "And Then It's Spring" by Julie Fogliano
- Sunflower seeds
- Compost
- Row cloth
- Watering cans, full
- Craft sticks, permanent marker
- Hand trowels, or something similar (optional)

Preparation:
Know where you will be planting sunflower seeds. An ideal bed will have plenty of hours of sunshine each day. Avoid planting sunflowers where they can shade other low growing plants.
Bring all the tools and materials that you will need to the planting area.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students; check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "It is spring! What changes do you notice? What changes do you expect that you will begin to notice? Before we begin collecting data, how would you describe the Oakland spring climate? How is it similar, or different to the winter climate?"
- Read "And Then It's Spring" and discuss.
- Compare and contrast Oakland's winter and spring climate to the climate depicted in the book.
- "What plants prefer cool weather? Which prefer warm weather?"
- "Spring is a special time in the garden. With the promise of longer, warmer days, gardeners have a lot of work to do! What kinds of jobs does a gardener do as the winter ends and spring begins?" (Prepares beds for a big planting).
- "Today we are going to plant sunflowers. Sunflowers require plenty of heat and sunshine to grow. They are also 'heavy feeders', meaning they also require soil with plenty of nutrients. What is something we can add to the soil to make sure it has plenty of nutrients?" (Compost)
- Bring students to the area where you are going to plant sunflowers.
- "We are going to do an experiment. We have been learning about decomposition this year, and the importance of the nutrient cycle—that is, knowing that plants absorb nutrients from the soil, but that decomposed plants that also add nutrients back in. We are going to add compost to half of the bed, and plant the other half without compost. We will measure the height of the sunflowers for the rest of the school year. What do you suspect will happen?"
- Add compost to half of the bed, and dig it in.
- Encourage students to be quiet and mindful during planting. Following the spacing directions on the seed packet, plant the sunflower seeds. Label the bed with the sunflower type, and date.
- Water the seeds, cover with row cloth.

Wrap up:

Return materials, wash hands if necessary.

Notes/Feedback:

Journaling

Week 21.2
STANDARDS
3.SL.1

MATERIALS
- Journals, pencils
- Watering cans

Preparation:
Check to see if the sunflower bed is dry.

Procedure:
- Students enter the garden and explore.
- Students continue looking for signs of spring.
- If the soil is dry, water the sunflower seeds.
- In their journals, "Sunflowers turn towards the sun; they need the sun to grow. What do you turn towards? What helps you grow?"

Wrap up:
Share, in partners.

Notes/Feedback:

Circles and Cycles

Week 22
STANDARDS
3.ESS2.1, 3.LS1.1

OBJECTIVES
- Students review the concept of the life cycle
- Students know that all living things have (unique and diverse) life cycles
- Students compare and contrast life cycles of different plants and animals

MATERIALS
- "Are You a Ladybug?" by Judy Allen
- Full watering cans, if watering.
- Rulers, class set
- Paper, pencil and clipboard

Preparation:
Do the sunflowers need watering?
You will be recording sunflower heights each class, keep this paper, and rulers, handy.

Background Information:
Be clear that reproducing does not cause a plant, or animal to die. You can make the distinction that some plants and animals can reproduce several times in their lifetime, and some can only reproduce once—this will be explored more in depth in coming weeks.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- On your board, draw a large circle. Write “Circle”
- “What is this shape?” (Circle) “Can you describe it to me?”
- Erase the “IR” in Circle, and replace it with a “Y”.
- “What is this word?” (Cycle)
- “What is a cycle?” (Something that goes around and around). Push students to make the connection between a circle and a cycle. For example, “Does it matter where you start? Can it go on forever? What cycles have you heard of?” (Seasonal cycles, moon cycles, etc).
- Read “Are You a Ladybug?”
- “How do ladybugs begin?” (An egg). “What do adult ladybugs lay?” (An egg). “What are the stages a ladybug goes through before laying an egg? Does that sound like a cycle?”
- “This is called a life cycle. Everything that is alive goes through a life cycle. All plants and all animals have life cycles. Some last for hundreds of years, and some for only weeks. Animals start as babies, and as they grow, can produce a new baby. Plants start as seeds, and as they grow, can produce new seeds. We are going to explore the life cycle of plants and animals in the garden.”
- Explore your garden for ladybugs, look for ladybugs with and without spots. Look for ladybug larvae, and for ladybug eggs.
- Gather students back in the circle.
- Pretend to be a seed, and go through the motions as you narrate. “I am a sunflower seed. I am living underground. Water wakes me up and I sprout. Once my roots find nutrients in the soil, I grow bigger and I push my leaves out to the sun. I am a baby plant. As I eat and drink more, and make food from the sun, I grow bigger and taller. I am a young sunflower plant. Eventually, I will grow flowers. Now I am an adult sunflower plant, because only now can I make more seeds. Once a bee or butterfly pollinates my flowers, my flowers change into seeds. I have completed my life cycle, and I will die soon. Before I die, my seeds will dry out and drop to the soil. (Become a seed). If my seeds find what they need, they will start the cycle all over again (Demonstrate one more time)”
- Check for understanding. “What does a sunflower plant begin as? What does it make? Can a baby plant with no flowers produce seeds? What kind of seeds does a sunflower plant make?”
- Bring students to different plants in the garden. Find young plants, mature plants (with flowers) and plants that are producing seeds. Find dying plants—do they have seeds?

- Return students to the circle.
- Ask students to describe different lifecycles: Dog, butterfly, frog, etc. Compare and contrast. “What stages do they all have in common?”
- Bring students to the sunflower bed. Measure the sunflower sprouts. Record the following: 1) Tallest sprout in the compost bed 2) Shortest sprout in the compost bed

3) Tallest sprout in the no-compost bed and 4) Shortest sprout in the no-compost bed.

- Discuss findings.
- Water the sunflowers, if they need it.

Wrap up:

Return materials.

Notes/Feedback:

Garden Work and Journaling

Week 22.2
STANDARDS
3.LS1.1

MATERIALS
- Tools for garden work
- Journals, pencils

Preparation:
Decide what garden work needs to be done.

Procedure:
- Students enter the garden and explore.
- Garden work—weeding or watering.
- In their journals, "Explore the garden. Find a plant or animal that interests you, and draw its lifecycle."

Wrap up:
Share, in small groups.

Notes/Feedback:

Annual Life Cycle

Week 23
STANDARDS
3.ESS2.1, 3.LS1.1, 3.LS4.1, W.3.8

OBJECTIVES
- Students can define and find annual plants
- Students understand the lifecycle of an annual plant
- Students understand the relationship between seed movements and plant types

MATERIALS
- Craft sticks, one or two per student
- Paper, clipboard, pencil, rulers
- Watering can, if necessary

Preparation:
Know which plants in your school garden are annuals.

Background Information:
Annual plants are those that complete their lifecycle in a year, or less. Perennial plants, discussed next week, live more than a year. There is a third category, biennial, which are plants that complete their lifecycle in two years. You can choose whether or not you want to include biennial plants in your discussion.
Examples of annual plants include radishes, lettuce, collard greens, rainbow chard, wheat, peas, nasturtium, and sunflowers.

Procedure:
- Students enter the garden and explore. Some students are recording weather data.

- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "This year we have been doing a lot of classifying: describing our elements in our garden and world as living or nonliving, helpful or harmful, native and nonnative. Today we are going to learn about two new categories of plants: annual and perennial. This week we are going to focus on the life cycle of annual plants, and next week we'll explore perennial plants."
- "Who has heard the world annual? What is something that happens annually?"
- "Annual has to do with the word 'year', and refers to events that happen once a year. An annual plant is one that goes through its lifecycle in one year or less. For example: if I plant a lettuce seed today and take care of it, the lettuce plant will grow, eventually produce long stalks with flowers, the pollinated flowers will produce seeds, and the plant will die. All of this will happen in less than a year. Lettuce is an annual plant."
- "Once an apple tree becomes mature and can produce flowers and apples—it can produce seeds every year for about 100 years, until they die. Are apple trees annual plants?"
- Continue to check for understanding, describing different plant life cycles.
- Distribute one or two craft sticks per student. Send them into the garden, marking plants that they think they are annual plants. Gather students, and walk through the garden checking for accuracy. Point out plants that are currently producing seeds. Collect craft sticks.
- Gather students in the circle.
- "In the fall we discussed some of the ways that seeds travel. Can anyone name some of the ways?" (Pooper, hitcher, floater, flier)
- "While it is important for seeds to move away from the mother plant, it is little less urgent for annual plants. Can anyone think of why?" (Annual plants die after producing seeds—so the new plants won't compete with the mother plant)
- Look again in the garden for examples of annual plants that simply "drop" their seeds. Marigolds are an excellent example, if they are any in the garden.
- Measure and record sunflower heights.
- Water the plants, if necessary.

Wrap up:

Return materials.

Notes/Feedback:

Classifying Seeds

Week 23.2
STANDARDS
3.LS1.1

MATERIALS
- Materials for garden work

Preparation:
Decide what garden work needs to be done.
Scout out some annual plants whose flowers are setting seeds. It could be ornamental flowers, California poppies, or even vegetables like peas or mustard greens which produce seed pods. It may not be necessary to find that many plants; a single poppy pod contains dozens of seeds!

Procedure:
- Students enter the garden and explore.
- Do garden work.
- Explore the garden for annual plants setting seeds. Count, collect, explore seeds.
- On a bench, classify seeds by type.
- Describe and appreciate nature's abundance!

Wrap up:
Leave seeds for other classes to find, or bring seed collection to the indoor classroom.

Notes/Feedback:

Perennial Life Cycles

Week 24
STANDARDS
3.ESS2.1, 3.LS1.1, 3.LS4.1, W.3.8

OBJECTIVES
- Students can define and find perennial plants
- Students understand the lifecycle of a perennial plant
- Students understand the relationship between seed movements and plant types

MATERIALS
- Craft sticks, one or two per student
- Paper, clipboard, pencil, rulers
- "A Fruit is a Suitcase for Seeds" by Jean Richards
- Watering can, if necessary

Preparation:
Know which plants in your garden are perennial.

Procedure:
- Students enter the garden and explore. Some students are recording weather data.
- Gather students; check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "Can someone name an annual plant in our garden, and describe its life cycle?"
- "Last week we briefly mentioned that plants that live for more than a year are called perennials. All of the trees, bushes, and herbs in our garden are perennial. Before we go any further, who can think of any perennial plants that they know?"

- “Some perennial plants can live for a very long time (Redwood Trees—2000 years, Pear Trees—300 years, Apple Trees—100 years) and some for not quite as long. What they have in common is that they produce seeds multiple times in their life cycle. Redwood trees produce cones with seeds every year, as do pear trees. Almost all fruit trees flower and produce seed yearly.”
- “A perennial plants’ lifecycle is much different than an annual’s. Annual plants produce seeds then die, and perennial plants produce seeds for dozens of years. What are other differences?”
- “How are annual and perennial plants’ life cycles similar? What stages do they have in common?” (Seed, growth, maturity, reproduction, death)
- Distribute craft sticks. Students find and mark perennial plants. Go on a tour and check for accuracy. Collect sticks.
- Gather students in the circle. “In the fall we discussed seed movements. If an apple tree, for example, produces seeds every year, how important is it that the seeds move away from the mother plant?” (Very important).
- Review “A Fruit is a Suitcase for Seeds” and discuss.
- Measure and record sunflower heights. Discuss.
- Water, if necessary.

Wrap up:

Return materials.

Notes/Feedback:

Journaling

Week 24.2
STANDARDS
3.SL.1

MATERIALS
- Materials for garden work
- Journals, pencils

Preparation:
Decide what garden work needs to be done.

Procedure:
- Students enter the garden and explore.
- Do garden work.
- In their journals, "What is perennial in your life? That is, who, or what, is always there for you? Write about it, and draw a picture."

Assessment:
Check in with students as they are journaling. What is an annual plant? Describe the life cycle. What is a perennial plant? Describe the life cycle. Similarities? Differences?

Wrap up:
Share, in partners.

Notes/Feedback:

Field Trip: Botanic Garden

Week 25
STANDARDS
3.ESS2.1, 3.LS1.1, 3.LS4.1, 3.SL.1

OBJECTIVES
- Students explore their local botanic garden
- Students find annual and perennial plants
- Students discover new plants and learn about their native environment

Preparation:
The Tilden Regional Park Botanic Garden is amazing, free and open to the public. Coordinate with their staff at least a month in advance if you would like to schedule a tour.

Background Information:
The botanic garden field trip is an especially rich excursion for third graders. The botanic garden is divided into California regions and include plants native to reach region. It is also full of annual and perennial plants, native species, insects, and more. Plan on having time to explore, as well as time to search for specific plants and habitats. This trip can truly reinforce the years' learning.

Procedure:
- Explore!

Journaling

STANDARDS
3.SL.1

MATERIALS
- Record book
- Journals, pencils
- Clipboard, paper, pencil, rulers
- Watering can

Preparation:
Begin this class the same way you would for a “first lesson” of the week.

Procedure:
- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- Measure and record sunflower height, watering if necessary.
- Debrief the field trip.
- In their journals, “What did you enjoy about the fieldtrip? What did you learn?”

Wrap up:
Take volunteers to read responses in front of the class.

Notes/Feedback:

Interactions

Week 26
STANDARDS
3.ESS2.1, 3.PS2.1, 3.SL.1

OBJECTIVES
- Students can define the word 'interaction'
- Students describe and find interactions in the garden
- Students discuss a variety of types of interactions

MATERIALS
- Rulers, pencil, clipboard, paper
- Watering cans, if necessary

Preparation:
Scout the garden beforehand, have some examples of interactions up your sleeve. A fascinating example for students is that aphids suck nutrients from plants, ladybugs eat aphids, ants eat the sticky stuff that aphids secrete, and ants defend aphids from the ladybugs. See if you can find all three insects on a plant.

Background Information:
There are, literally, hundreds of interactions occurring in the garden. From the effects

that insects have on plants, to the plants competing for resources, to plants being eaten by animals, to the animals responsible for pollination and seed dispersal. An interaction is simply the way that things affect and influence each other.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- Ask students to name different components of the garden ecosystem.
- "A plant pulls nutrients out of the soil. A bird eats a seedling. A bee pollinates a flower. A leaf produces sugars from the sun. Nothing exists by itself; everything is changed and influenced by the thing around it. The word to describe this is 'interaction'. A bee interacts with a flower when it sucks nectar, but not when it just flies by. Ants interact by touching antennae, but are not interacting when they simply pass each other by. What are some more examples of interactions?"
- Explore the garden for interactions. As a group, move through some areas of the garden together, and then let students explore alone. Take plenty of time with this.
- Group students into threes. In a group, have students show and teach other an interaction that they see in the garden.
- Measure and record sunflower heights. Water, if necessary.

Wrap up:

Return materials.

Notes/Feedback:

Journaling

Week 26.2
STANDARDS
3.ESS2.1, 3.PS2.1, 3.SL.1

MATERIALS
- Journals, pencils

Background Information:
Evidence of an interaction could be a seed pod (you know that a pollinator has been there), a volunteer plant (animals or wind dispersed seeds), underdeveloped plants (competing with other plants/lacking nutrients), holes in a leaf (insects are eating plants).

Procedure:
- Students enter the garden and explore.
- Students find and describe two to three interactions in the garden.
- Students find "evidence" of an interaction.
- In their journals, "We interact with people all the time, every day. Describe an interaction that you've had that left you feeling happy. Where were you? Who were you with?"

Wrap up:
Share, in partners.

Notes/Feedback:

The Human Effect

Week 27
STANDARDS
3.ESS2.1, 3.PS2.1, 3.SL.1, 3.SL3.1b, 3.SL3.1c

OBJECTIVES
- Students continue an exploration of interactions in the garden
- Students discuss interactions in nature
- Students discuss the human effect on the natural world

MATERIALS
- Rulers, pencils, clipboard, paper
- Materials for garden work

Preparation:
Prepare garden work.

Background Information:
This lesson broaches the concept of pesticides, as it is an accessible example for students to discuss regarding the ways that humans affect the environment. Do not let them despair, discuss some other ways gardeners and farmers manage pests: having

smaller farms, planting a variety of crops, maintaining soil health, covering plants, attracting predators, accepting some crop damage and so forth.

Procedure:

- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "Can someone name and describe an interaction they just saw during their explore time?"
- "In our discussion of the garden ecosystem and the different interactions that we have been finding, there is one animal that we have yet to discuss. Any thoughts?" (It may take a while for students to guess 'Humans' because they often don't consider people to be animals—this is an interesting, and worthy, digression).
- "Humans! Who built this garden? Who planted most of these plants? Who removes the snails and slugs that eat our plants? In our discussion of nonnative invasive species, who is responsible for introducing nonnative species to new habitats? Who is responsible for the forget-me-nots that are preventing redwood sprouts from growing?"
- "Humans have an enormous role in the garden and in nature. What other examples can you think of?"
- Discuss.
- "What are some ways that humans help the environment? What are ways that we harm the environment?"
- "Imagine this scenario. A farmer has a crop of lettuce growing on a farm larger than this school. In fact, imagine it is the size of three of our schools. After a rainy day, the farmer notices snails eating her lettuce. If she doesn't do anything, the snails could likely eat, or damage, her entire farm. She won't have any lettuce to sell, and the snails will continue to reproduce. Now, when we find snails on our lettuce patch, we can easily find them and remove them. There is no way the farmer could find all the snails on her farm. What should she do?"
- Discuss. (There is clearly no correct answer).
- "If she chose to spray the lettuce with chemicals that kill snails, what other effects might you expect?"
- "Using pesticides, chemicals that kill pests, are one way that humans interact very negatively with the environment. The chemical kill other animals, and get in the soil, the water, and inside animals that eat the targeted pests."
- Discuss.
- Measure and record sunflower heights.
- Garden work. While doing garden work, ask students to articulate the ways they are interacting with the garden ecosystem.

Wrap up:

Return materials.

Notes/Feedback:

Natural Paintbrush

Week 27.2
MATERIALS
- Cups of black paint; one cup per 3-4 students
- Clipboard and paper; one per student

Preparation:
Place cups of black paint in different spots in the garden. Students will be using something that they find in the garden to use as a paintbrush. You can allow them to harvest a plant, or a leave, or a flower as a brush. You may choose to restrict them to only using plant material that has already fallen on the ground. Decide on your parameters before class.

Procedure:
- Students enter the garden and explore.
- Distribute clipboards and paper to students.
- "You have a clipboard, a piece of paper, and in the garden there is paint. I want you to paint a picture. What is missing?"
- "Right! A paintbrush. Your paintbrush is in the garden!" Explain your parameters about what may or may not be used as a brush. Remind students that they can use their brush also as a stamp!
- Give students plenty of time on their artwork. When finished, collect paintings in the classroom and give students time to appreciate each others' work.

Wrap up:

Collect all materials, wash hands.

Notes/Feedback:

Interdependence

Week 28
STANDARDS
3.ESS2.1, 3.PS2.1, 3.SL.1

OBJECTIVES
- Students learn the concept of interdependence
- Students discuss the less obvious interactions in the garden

MATERIALS
- "Dear Children of the Earth" by SchimSchimmel
- Rulers, clipboard, pencil, paper
- Watering cans

Procedure:
- Students enter the garden and explore. Some students are recording weather data.
- Gather students; check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- "We have been spending weeks discussing the ways that different plants and animals and members of the garden ecosystem interact with each other. Some of these interactions are obvious, like a caterpillar eating a leaf, and some are less obvious. Do you think a bird is connected to a mushroom?"
- Discuss.
- "Well, a mushroom helps turn dead plants into soil. Without soil, plants would not grow, and without plants, birds would not eat."
- "Can anyone else think of another example of two things that may not seem connected, but really are?"

- “This is called interdependence. Everything is an ecosystem is connected, from the bacteria in the soil to the sun in the sky. We can talk about the interdependence within a garden, a forest, or in the whole world.”
- Discuss.
- Go into the garden and explore less obvious connections.
- Go to the sunflowers. Water, if necessary. Where are they in their life cycle? Measure and record heights. Discuss any significant findings.
- Gather students in the circle. “The sunflowers (that are growing taller from the extra compost) are connected to the nutrients in the soil, the bacteria, bugs, and fungus that turn dead plants into soil. They are connected to those dead plants as well. They are connected to the insects that pollinate it, the sun in the sky, the ants in the soil and the plants nearby. Nothing works by itself.”
- Read “Dear Children of the Earth” and discuss.

Notes/Feedback:

Mindfulness Exercise

Week 28.2
STANDARDS
3.SL.1

MATERIALS

- Journals, pencils

Procedure:

- Students enter the garden and explore.
- Spend time observing the pollinators that are likely frequenting the garden this time of year.
- Have students sit quietly, alone, for 3 minutes and with the instructions to notice as many interactions as possible.
- In their journals, “How are you connected to the redwood trees in the forest?”

Wrap up:

Share, in partners.

Notes/Feedback:

Helping the Earth

Week 29
STANDARDS
3.ESS2.1, 3.ESS2.2, 3.LS3.1, 3.LS3.2,

OBJECTIVES
- Students discuss spring weather data, and make claims about the spring climate
- Students discuss the results of the sunflower experiment
- Students engage in discussion about their agency to help the world

MATERIALS
- Clipboard, pencil, paper, rulers
- Tools for garden work.

Preparation:
Today you will be discussing your spring weather data, and try to have the kids make a claim about the spring climate in Oakland. Get familiar with the record book before class, so you can synthesize the data to the students. Push them to make claims about the spring climate in Oakland based on what they observed.
Prepare garden work.

Procedure:
- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.

- Weather collectors share data.

- Synthesize the spring weather data.
- “How would you describe the spring climate in Oakland? What changes did you notice from the winter? What similarities?”
- “Are there signs of summer approaching? What is summer like in Oakland? What is summer in other places that you have been?”
- Go to the sunflowers. Measure and record sunflower heights.
- “We have learned so many new concepts this year in third grade gardening. Perhaps the most important is this idea of interdependence: we are all connected. We are connected to each other, and we are all connected to the earth.”
- “What are some ways that you, personally, can help the earth? They can be big or small.” (Write responses on the board)
- “This is a long list! There are hundreds of ways you can help, from talking to people about the importance of bees, to picking up trash on the street. Do not forget how much power you have!”
- Discuss.
- Do garden work.

Assessment:

Class discussion: What were the results of the experiment with the sunflower plants? What caused the height differences? Is every sunflower going to grow to the same height? Discuss.

Wrap up:

Return materials.

Notes/Feedback:

Journaling

Week 29.2
STANDARDS
3.SL.1

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Do garden work.
- In their journals, “Last week we read a book written from the earth to the children. Write a letter from you, to the earth.”

Wrap up:
Take volunteers to share.

Notes/Feedback:

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Suggested Reading

Week 30
STANDARDS
3.ESS2.1, 3.LS1.1

OBJECTIVES
- Students meditate on the power of a seed
- Students feel encouraged to play a role in taking care of the earth

MATERIALS
- "Miss Rumphius" by Barbara Cooney
- Sunflower seeds, at least one per student (or another summer-loving seed of your choice)

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season, the weather and the leaf cage.
- Discuss the leaf cage for the last time.
- "Last week we discussed ways we can help the earth. Here is a story about the same thing." Read "Miss Rumphius" and discuss the many lessons within the book.
- Hand each student a seed, and instruct them to hold it tight and close their eyes.
-

- “You may be thinking, ‘One seed?!’ but think about this. Inside your hand is one seed. It is a sunflower seed, and if you plant it and take care of it, it will grow in a tall, beautiful sunflower plant. The flowers are pollinated, and turn into seeds. One plant can produce 1000 seeds. So now you have 1000 seeds. Imagine you plant 1000 sunflower seeds, and then have 1000 sunflower plants. If each sunflower grows, and produces 1000 seeds, you will have one million seeds. Can you even imagine one million seeds? If you harvested the seeds from one million plants, you’d have one trillion seeds. Can you even imagine that? And this can go on forever, and in fact, it has been going on forever. Open your eyes, and look at your seed. Your one seed.”
- “One way you can help our community is by planting this seed, and taking good care of it. Think about how much beauty you can bring to the world with a single flower. Think about how much joy you can bring the world with one kind word.”
- Students put seeds in their pockets.
- Explore the garden, enjoying and noticing the flowers, plants, birds and bugs that make it all happen.

Notes/Feedback:

Journaling

Week 30.2
MATERIALS
- Materials for garden work
- Journals, pencils

Preparation:
Is there more garden work to be done?

Procedure:
- Students enter the garden and explore.
- Gather students, reflect on the year.
- Continue cleaning the garden for the summer: pulling weeds, taking out the compost, whatever needs to be done. Leave the sunflower plants in place for as long as possible.
- Distribute journals, give students time to look through their work from the year.
- In their journals, "Write a Thank You letter to something in the garden". It can be to an insect, a plant, or even to the sun.

Wrap up:
Gather students; take volunteers to read the letter.

Notes/Feedback:

Fourth Grade

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John Muir wrote, "When we try to pick out anything by itself, we find it hitched to everything else in the Universe." Fourth grade gardening is designed to show students that everything in nature – and in our community – is connected in an intricate web of life.

The main themes of fourth grade gardening are community, plant adaptations, and soil health and production. Students will plant greens, potatoes, and cover crops to reinforce these themes.

In the garden, fourth grade students will be responsible for building and maintaining the compost pile. This work affords real responsibility, promotes learning, and can have a meaningful impact on the garden. Additionally, students will enjoy field trips to Muir Woods and to the Presidio in San Francisco. The Numi Foundation would like to thank all the writers of open-source material for contributions and inspiration to this curriculum.

Table of Contents

Welcome Back!

Week 1.1
STANDARDS
4.SL.1

OBJECTIVES
- Students make observations after an extended break from the garden
- Students review and practice garden rules
- Students make class agreements

MATERIALS
- Poster board and pens
- Garden tools

Preparation:
Be clear about the difference between garden rules and classroom agreements. Perhaps your garden has rules posted that are school-wide, otherwise know beforehand what the rules are. (For example: Always walk, Ask before harvesting, etc). It is more effective to have fewer rules, but be sure that they are clear. This lesson assumes that students are familiar with the garden rules.

Procedure:

- Students enter the garden and gather in opening circle.
- Welcome students back to their outdoor classroom.
- “We need to review the rules of the garden and decide on some classroom agreements.”
- Call on students to name garden rules, and have students act them out.
- “We have garden rules to make sure that the animals, people and plants in our garden stay safe. We also need to decide on our class agreements for this year. These are so that everyone feels safe and welcome here, and that all of our voices are heard. How do we want to agree to treat each other in this space? What do we want to bring into the garden? What do we want to leave out?” Draw a large circle in the center of the poster.
- Record student responses on the poster board: inside the circle write what students want to bring into the garden, and outside the circle write what they want to leave out. Discuss and clarify where needed. Have students sign the back. Keep this in your indoor classroom and review as necessary.
- Give students an extended explore time. Practice garden rules and class agreements. Decide on a gathering signal first. Guide students in looking for different things: Colors, something taller than you, a plant that looks healthy, a weed, a plant at the end of its lifecycle, a seed pod, something you don’t recognize, evidence of an insect.
- Practice your gathering signal. Gather students in the classroom.
- Share out observations from the garden explore time.
- “You are fourth graders now, and already have several years of experience in the garden. Fourth grade gardeners have more responsibilities and more jobs than kids in lower grades. As you learn to work together, you will be given more jobs. What are ways you can show that you’re ready for more responsibility in the garden?” Discuss.
- “Fourth grade is also a special year in the garden because we start to talk much more about the environment and about the world around us. Our knowledge from lower grades starts to lead us to talk about the natural world outside of the garden. We are going to be talking a lot about soil health, soil creation, the nutrient cycle and decomposition. We are also going to start talking about what our role in the community is. I am looking forward to a fun, enjoyable year of learning. What are you excited about doing this year?”
- Review names of tools, tool safety, and their proper use.

Wrap up:

Return all materials.

Notes/Feedback:

Scavenger Hunt

Week 1.2
STANDARDS
4.SL.1

Preparation:

Know what you are going to ask students to find. For example: a healthy plant, a plantthat you don't recognize, evidence of a bird, three insects, a seed pod, something soft, something you do not recognize, a plant that is taller than you, a plant that you have tasted, etc.

Procedure:

- Students enter the garden and explore.
- Gather students. "I am going to send you on a scavenger hunt. I want to see that you are able to explore the garden while practicing our garden rules."
- Begin the scavenger hunt; have students find each item, and then come back to you before you say the next item to find.
- If there is time, let students help suggest items to find in the garden.

Notes/Feedback:

Teamwork makes the Dream Work

Week 2.1
STANDARDS
4.SL.1

OBJECTIVES
- Students learn the meaning of teamwork, and practice teambuilding.
- Students understand that teamwork is required for success in the garden.
- Students find an example of nature working together in the garden.

MATERIALS
- 4 bandanas
- Materials for practicing cooperative garden work

Preparation:
The first few gardening classes really set the tone for the year. A lack of cooperation amongst students can be very destructive. Take time with team building exercises, and practice them as necessary. Be sure to debrief thoroughly at the end.
Also, have some tasks set up at the end for students to practice cooperatively.

Procedure:
- Students enter the garden and explore.

- Gather students; check in about season and weather.
- Review your class agreements. Ask a student to read the garden rules.
- “Today we are going to work on team building. Why do you think we start the year with team building? What are some jobs in the garden that we need to do cooperatively?” (All of them!)
- “I am going to give you a task. The job is to line up by birthday, January 1 is here, and December 31 is there. You may not touch another person, and you may not talk! If someone talks, the class has to sit down and start over.”
- Be clear with where the class should line up, and have them begin.
- After your students are lined up, have them say their birthday to check if they are in the correct order. Have students return to sitting.
- Debrief with questions like “Was that difficult? What was difficult? Was it frustrating when one person talked and you had to start over? What ways did you figure out to communicate without your voices?”
- “We are going to another task. You need to line up height. You may not talk. Shortest is here, and tallest over there. This will be harder, because four students will be blindfolded.”
- Choose four students to blindfold, and be sure that you are in a place without obstacles. “If you can see, you may gently help those who are blindfolded, but otherwise, you should not be touching anyone else.”
- After students are in height order, remove blindfolds, and have them seated.
- Ask the students who had been blindfolded, “How did it feel that you didn’t know what was happening? How did it feel to be helped? When in the garden may you need help? How do you want to be helped?”
- To the students who could see, “How did it feel to help someone else?”
- Have the students line up one more time, by number of siblings. Tell them they can talk.
- After students have lined up, and have been seated again, ask “How was it to be able to talk? What was easier? What was difficult? What was it like when everyone spoke at once? How did you take turns?” Also ask questions based on your own observations.
- “When we are having a class discussion and everyone is talking at once, what happens? If one student keeps talking out, and I keep asking them to stop talking, how does it feel for the rest of the class? If three students are supposed to water the garden with one watering can, how can they cooperate?”
- Have students act out scenarios for the class, for example: 3 students are to share one watering can, 5 students are trying to look at the same insect and there is not enough space, or someone needs helping pulling out a weed.
- Put students in groups, give students each group a task, and have them practice working together cooperatively.

Wrap up:

Have students look for examples of animals and plants working together in the garden.

Notes/Feedback:

Pumpkin Soup

Week 2.2
STANDARDS
4.SL.1

MATERIALS
- "Pumpkin Soup" by Helen Cooper (or another book about teamwork)

Preparation:
Think of some scenarios that might happen in your garden that would require teamwork, and communication.

Procedure:
- Students enter the garden and explore.
- Gather students, read "Pumpkin Soup".
- Discuss. What does sharing responsibilities mean? Why do we help another? How can we use our words? What does this have to do with the garden?
- Continue to have students act out different scenarios that require teamwork in the garden.
- If there is time, continue to explore.

Notes/Feedback:

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Community

Week 3.1
STANDARDS
4.SL.1

OBJECTIVES
- Students discuss the concept of community
- Students discuss their role in a community

MATERIALS
- 6 pack cells
- Potting soil in a large tub
- A full watering can
- Craft sticks
- Permanent marker
- Seeds—Collard greens, mustard greens, kale
- Poster board and markers

Preparation:
Collect all the materials in the place where you will be sowing seeds. Know how many cells you want to plant. You may choose to grow an abundance of seedlings to give away, or just enough for your garden.

Many types of greens grow well in the fall, choose any combination of seeds, just be sure to label them.
Find an organization nearby that you could donate produce to. Examples could be a senior center, a women's center, a homeless shelter, or a food kitchen.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- "We have lots of beautiful plants growing in our garden. Though we plant many of them, and take care of our garden, other factors are responsible for maintaining our garden. Who can think of some of these parts of nature that help our garden work?" (Insects, birds, wind, soil, sun, water).
- "If we take care of the earth, the earth takes care of us. Yes, we are working in our garden, but really we would have nothing if it were not for the sun, soil and water. When we are given so much, it is also important to share."
- Discuss, solicit thoughts from the students. How do we share? With whom do we share? Why should we share?
- Write "Community" in the middle of the poster board.
- "What is our community? Who is in our community?" Write responses on one side of the poster.
- "How do we take care of our community? How does it take care of us?" Write responses on the other side of the poster.
- Review responses, and discuss. "We can talk about the world community, or even our classroom community. Let's focus on the community in our neighborhood."
- "Some people in our community may not have enough to eat. Should we care about that? Are we obligated to address the needs in our community?"
- "We are going to be planting greens today. Greens are eaten by many people in our community. We are going to take care of the plants, but the earth is going to most of the work. We are going to be given so much food from the earth, how can we share it?"
- Discuss, leading students to grow greens for giving away.
- Bring students to the area where you are sowing seeds.
- "We are going to be planting greens today. We are going to plant them in pots, and later transplant them to the garden. Most greens prefer the cool weather, and can grow through a cold winter. We are starting them in pots to protect them from pests. We are sowing seeds for other people. We are planting food to make our community stronger. Let's think about this as we work quietly."
- Pour water into the tub with the potting soil. The soil should be wet but not sopping. If you squeeze the soil and water pours out, there is too much water.
- Students fill cells with potting soil; do not compact soil.
- Plant two seeds in each cell. Label each pot with the type of seeds being grown.
- Place all pots in a sunny place. Water them gently every couple of days—do not let the soil dry out.

Wrap up:

Wash hands, return materials.

Notes/Feedback:

Garden Journals

Week 3.2
STANDARDS
4.SL.1

MATERIALS
- Journals, pencils

Preparation:
Think about the procedures you wish to share with your students for journal-writing days. Will you share the prompt beforehand? Will it be written on a board somewhere? What are the parameters of where students can sit?

Procedure:
- Students enter the garden and explore.
- Have students find, again, examples of plants and animals working together in the garden.
- Distribute journals. "These will be your garden journals for the year. We will be writing and drawing in here this school year."
- "Today we are going to do our first journal prompt to practice how we use our journals, and how we sit in the garden to write. Often in our journals, we will think and talk about nature. Today we are going to write about our discussion about community."
- Go over procedures for journal-writing days.
- Students sit somewhere they enjoy and write in their journals, "Who is in your family community? How do take care of them? How do they take care of you?"

Wrap up:
Share, in partners.

Notes/Feedback:

Decomposition

Week 4.1
STANDARDS
4.ESS1.1, 4.PS3.4

OBJECTIVES
- Students review the word decomposition
- Students understand that compost is the result of decomposition
- Students understand that decomposition happens in nature, and in controlled settings (compost bins)
- Students know that some items decompose, and others do not

MATERIALS
- 10-15 items: some compostable, some not
- Watering can

Preparation:
Gather all materials in the outdoor classroom.

Background Information:

Decomposition is essentially rotting. Organic materials and their by-products (paper, cotton clothes, food scraps) eventually break down into smaller parts, becoming part of the soil. The agents that are responsible for decomposing will be explored in the following lessons.
Compost bins mimic the nutrient cycle in nature.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season, the weather
- "Let's say I wanted to plant a bed of lettuce. What are the basic steps? How would I prepare the bed before planting?" Discuss.
- "Many of you mentioned that it is important to add compost to the soil before planting. You are very correct, but can you explain why it is important?"
- "Compost adds nutrients back into the soil, and plants need nutrients to grow. My questions for you is, 'What is compost, and what is it made from?'"
- Discuss.
- Write DECOMPOSITION on the board. Underline the middle letters, from C until T. "Does anyone see a familiar word in here?"
- "Compost is the result of decomposition. What is decomposition?" If kids are stuck, hold up different items (some organic matter and some non-organic matter) and ask if they can decompose/be put in the compost/become part of the soil.
- "Decomposition, simply, is the process where organic matter (things that come from nature—plants and animals) breaks down into smaller pieces, eventually becoming part of the soil again. For example, in a forest, leaves fall off trees, and trees fall down, and eventually decompose and become part of the forest floor, providing nutrients for new plants to grow. This is called the nutrient cycle. Similarly, in our homes and gardens, we collect old plant and animal products (food scraps, paper, coffee grounds) and maintain compost bins so that we can 'make compost' to feed our plants with. Can anyone think of a garden animal that helps eat dead plants?"
- Check for understanding: "What does decomposition mean? (Rotting, breaking down). What is compost? What can go into a compost bin? What can't? How are worms involved? Do living things (like apples growing on a tree) decompose while growing? What about when the apples fall off the tree?"
- Hold up each of the items, one by one. Ask students if they will decompose. Discuss.
- "In the coming weeks, we are going to talk about how this actually happens. And then we are going to set up a compost bin for the school."
- In the garden, have students find 10 items that can decompose, and 5 items that cannot.
- Water the greens, if necessary.

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: What is Nature?

Week 4.2
STANDARDS
4.SL.1

MATERIALS

- Journals, pencils
- Watering cans

Procedure:

- Students enter the garden and explore.
- Check on the greens—are they sprouting?
- Gather students. “What is nature? Where do you find nature? Is there nature in the city? In this garden?”
- In their journals, “What does nature mean to you? How do you feel in nature? Write and draw a picture.”

Wrap up:

Share, in small groups.

Notes/Feedback:

Soil is Alive!

Week 5.1
STANDARDS
4.SL.1, 4.ESS2.1

OBJECTIVES
- Students feel and smell different types of soil
- Students list what they find in soil
- Students recognize that soil is formed by natural processes

MATERIALS
- Different soil samples: From the garden, potting soil, rocky soil, poor soil
- Clipboards with paper and pencil; one per group of 4 students
- Rocks, sticks, apple (or another food item)
- Watering can

Preparation:
Explore your campus, you will likely find different types of soils to pull from. Set up the soil samples in different stations in your outdoor classroom. Students will rotate through the stations touching, feeling and smelling the different types.

Background Information:

Soil is essentially made of organic (living) and inorganic (nonliving) matter. The living includes decomposed organic matter: plants, animals, woodchips, etc. The nonliving is silt, clay, and sand. Water is an essential part of soil, as well as billions of microorganisms. It takes hundreds of years for an inch of topsoil to be formed.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "There is something in this garden that we do not talk about all that much…but without it, we would not have food to eat. It is found all over the world, it can be different colors and textures. It doesn't move on its own, but it is alive. Any guesses?"
- "Soil! Soil is alive. (Show a handful of soil). In this handful, there are more living things than people on the planet!"
- "What is this stuff anyway? What do you know about soil?"
- Discuss.
- Rotate students through the soil samples in your outdoor seating area. Encourage students to hold the soil, smell it, squish it.
- Gather students, share out observations.
- Compare and contrast the "nice" garden soil and the poor soil. What do students notice in the texture and color?
- "I want you to pretend that I am from another planet and have never heard of this 'soil' stuff before. I'm going to put you into groups of four. You are going to go into the garden, and collect a soil sample. You are going to look through it, and write down all the things you see in the soil. You'll need to become familiar with this 'soil' stuff, because I'll want you to explain it to me."
- Send groups into the garden with a clipboard, paper and pencil to record everything they find in a handful of soil.
- Gather students and share out lists. Write responses on the board, separating items into living and nonliving. If students say "dirt" or "brown stuff" ask them to better define what they see. Ask, "Can anyone tell why I listed your responses into two columns?"
- If anything is missing from their list, add them to the board (water, microorganisms, decomposed matter may be missing).
- "Soil is made of living and nonliving. You listed things like rocks, woodchips, sand." Hand someone sticks, rocks, and the apple. "Can you make me soil from these things?"
- Discuss.
- "It takes hundreds of years for the earth to form an inch of topsoil. Topsoil contains many nutrients and is vital for plants to grow. We will discuss this more later in the year, but it is very important to take care of soil. Soil is alive!"
- "Soil is formed by two main processes: weathering and decomposition. We will discuss weathering more later in the year, and next week we will begin talking more about decomposition. All the 'brown stuff' you see in the soil is dead plants and

animals, broken down into tiny pieces. That's decomposition. But how does it get so small? We will be exploring that next week."

- Water the collards, if necessary.

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: The Smell of Soil

Week 5.2
STANDARDS
4.SL.1

MATERIALS
- Journals, pencils
- Watering cans

Procedure:
- Students enter the garden and explore.
- Students look for insects and bugs living in the soil.
- Water the collards, if necessary.
- In their journals, “Find a handful of soil. Smell it. What does it smell like to you? What does it remind you of?”

Wrap up:
Share, in small groups.

Notes/Feedback:

The Garden FBI

Week 6.1
STANDARDS
4.SL.1, 4.ESS2.1

OBJECTIVES
- Students learn about the garden FBI
- Students can name an example of Fungus, Bacteria and Invertebrates
- Students understand the importance of decomposition

MATERIALS
- Hand lenses, class set
- Watering can

Background Information:
The FBI (Fungus, Bacteria, Invertebrates) are decomposers; they are responsible for breaking down organic matter. Fungus includes mold and mushrooms. Bacteria already lives on organic matter, but does not start to break down organic matter right away. Invertebrates that decompose include worms, roly polys (pill bugs) and slugs.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "What is decomposition? Name 5 things that can decompose. Why is decomposition important?" Discuss.
- "Close your eyes. Imagine a forest. Leaves fall, trees fall, and animals die. Imagine that none of these things decomposed. Imagine, after 100 years, how messy the forest would be! Imagine after thousands of years…"
- "Now imagine that trees and plants are pulling nutrients out of the soil, but that no nutrients are going back to the soil. Eventually there will be no nutrients left for the roots to find. Then what?"
- "Again, why is decomposition important?"
- "Decomposition is the basis for the nutrient cycle –that is the recycling of nutrients back into the earth. Plants pull nutrients from the earth and contain these nutrients (which animals eat!). When plants die, they decompose and the nutrients go back into the soil for the next plants to use. It's a cycle that has always existed. The nutrients that exist now are the same nutrients that have always been on the planet, just in different forms!"
- "But the question remains—what turns dead plants into soil? What breaks it down?"
- "There are three main categories, and we lovingly call them the garden FBI." On your board, write Fungus, Bacteria, Invertebrates.
- "Before we start. Have you ever left food out too long in your house? What does it start to look like as it gets older and older?" (Mushy, moldy, slimy.)
- "Many of you mentioned mold! Mold is a type of fungus. Mushrooms are also fungus. If you have ever seen a tree that has fallen down, you probably have seen mushrooms growing on it. The mushrooms are decomposing the tree." (Write mushrooms and mold under Fungus).
- "B stands for Bacteria. What do you know about bacteria?" Discuss.
- "Bacteria cannot be seen without a microscope. Bacteria are all over our bodies, and inside our bodies. Most bacteria help our bodies, only some kinds make us sick. Bacteria is in the soil, and on our plants. When a plant dies, only then do bacteria start to decompose."
- "I stands for invertebrate. Vertebrate means with a spine. Invertebrate means without. Are you a vertebrate or invertebrate? Can you think of which invertebrates in the garden eat dead plants?" (Slugs, worms, roly polys).
- "When a plant dies, the garden FBI shows up and takes care of business. Are they interested in an apple growing on a tree? What about when the apple falls?"
- Distribute hand lenses; students explore the garden, looking for the FBI, or evidence of the FBI. Look under trees, in woodchips, under logs, and for fallen fruit. Remind students that if they find mushrooms, be sure to not touch them!
- Water greens, if necessary.

Wrap up:

Return materials.

Notes/Feedback:

Reading: The Rot Squad

Week 6.2
STANDARDS
4.SL.1, 4.ESS2.1

MATERIALS
- "The Magic School Bus Meets the Rot Squad: A Book About Decomposition" by Joanna Cole
- One banana
- Watering can

Preparation:
This book is very detailed. Perhaps choose sections to read.

Procedure:
- Students enter the garden and explore.
- Gather students, and read "The Magic School Bus Meets the Rot Squad".
- Make note of the FBI.
- Discuss the book, and discuss the differences between decomposition in nature, and controlling decomposition into a compost bin, or a worm bin.
- Have students choose a place to put the banana. "We are going to watch this banana decompose. How do you think it will change over time, based on what you may have seen with old produce in your house?"

- Water the greens, if necessary.
- With extra time, continue exploring.

Wrap up:

Return materials.

Notes/Feedback:

ASSESSMENT: Building a Compost Pile

Week 7.1
STANDARDS
4.ESS2.1

OBJECTIVES
- Students learn about different types of compost piles
- Students learn about components of a compost pile
- Students build a compost pile

MATERIALS
- Brown, carbonaceous materials
- Green, nitrogenous materials
- Hose, or full watering cans
- Compost bin, if using one

Preparation:
Do your research about building compost piles.
Gather all materials needed at the compost building site. This is an assessment in that you are encouraging your students to use their knowledge of decomposition to help build the pile.

Background Information:
Refer to Teacher Supplement for additional information.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- “Today we are going to build a compost pile! Before we get started, can someone remind us what soil is made of?” Discuss.
- “Yes, part of soil is made from decomposed plants. What does decomposition mean? Whose job is it to break down all the dead organic matter on earth? Why is this important?”
- “When farmers and gardeners build compost piles, we are copying nature. We are looking at how she recycles her nutrients. In nature, nothing is wasted. Did you know that in the United States, landfills are full of food scraps and food waste? All of that food can be recycled back into the earth if given the chance to decompose. Let’s recycle our plant waste into something we can use to feed the new plants we grow: compost.”
- Build the compost pile, teaching students as you go. You may want to have a student or two just in charge of keeping the pile wet.
- Stand back and admire your work. Ask, “Who do you think is going to show up to take care of this pile? How do you think the pile will change over time?”
- Water the greens, if necessary.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Weeds

Week 7.2
STANDARDS
4.ESS2.1

MATERIALS
- Tools for garden work
- Journals, pencils, colored pencils/crayons

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Do garden work. If you are pulling weeds, ask “How did these weeds get here?”
- Return materials, wash hands.
- In their journals, “A sunflower plant can become a peach tree. What does that mean? Draw a picture.”

Wrap up:
Share, in partners.

Notes/Feedback:

Building a Compost Pile

TEACHER SUPPLEMENT

ADDITIONAL INFORMATION

Building a compost pile will require substantial research on your part. There are so many types of ways to build a compost pile, you will need to do some recognizance of what is available in your garden and school to see which type suits your program best. There is an abundance of information about compost piles available online, in books, and from local master gardeners. Take advantage of these resources!

Location

Find a place for the pile, not too close to a building. Piles need to be at least 3'x3'x3',or else they will not heat up properly.

Container

You can build a pile on the ground, or buy a bin to contain everything.

Ingredients

Building a compost pile is an excellent example of bio-mimicry. To build a pile, you need to add alternate layers of "greens" and "browns". Greens are the nitrogen rich materials, that include grass clippings, food scraps (avoid foods that attract animals, such as meat, dairy, and oily foods), weeds, and plant waste. Browns are the carbon rich materials: soil, dry leaves, pine needles, straw, wood chips. These two elements work together to maintain the bacteria population that breaks down the compost pile.

Building

You will need to spend time collecting all these materials so that you can build the pile all at once. Start by watering the area that you will pile the materials on. Add a layer of browns,

then greens, then soil. Water the pile as you go, but do not let the pile get soggy. If your pile is not three feet high, repeat this pattern. Within a few days, the pile should heat up! A compost thermometer is a great tool to have.

Maintenance

Turn the pile every few days. Water it, so it's damp but not soaking.

Moving Day!

Week 8.1
STANDARDS
4.LS1.1

OBJECTIVES
- Students learn about the difference between cotyledons and first true leaves
- Students transplant their greens

MATERIALS
- Seedlings
- Watering cans
- Hand trowels
- Compost

Preparation:
Bring the “greens” seedlings to your gather space. Have the trowels, compost, and watering cans ready at your planting area.
On the seedlings you should see at least one set of “true leaves”, not just the initial leaves (cotyledons) from inside the seed. If not, postpone the transplanting.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Ask students to name the different parts of the plant.
- "You all know about leaves, and that they make food from the sun. You also know that inside a seed is a tiny plant with either one or two leaves, and a little root. When a seed wakes up (what makes a seed wake up?) it pushes its root down and unfurls its leaves up. If the roots find nutrients, and the leaves find the sun, the little plant has energy to grow bigger and bigger. (Pass out the seedlings, ask students to be careful.) The first two leaves to poke out are the called 'cotyledons', they were inside the seed, but the first 'true' leaves are those that they plant makes after growing. Can you tell the difference?"
- Bring students and seedlings to the planting area. Pull weeds, pick stones. Add compost (Ask, "Why are we adding compost to the soil?") and dig it in. Smooth the soil. You, or a student helper, can dig the holes for the seedlings—spacing them properly. If you have a variety of greens, grow the same ones in the same area.
- Distribute seedlings being extraordinary careful with them. Do not hold the plants by the roots; it can damage the fine root hairs. Hold them from the stem. Give students a moment to look at their plants.
- Plant the seedlings gently, bury the first leaves. Make a little moat around each plant and water gently.
- If there is extra time, continue to explore.

Wrap up:

Wash hands, and return materials.

Notes/Feedback:

Journaling Prompt: Transplanting

Week 8.2
STANDARDS
4.SL.1

MATERIALS
- Journals, pencils
- Full watering cans

Procedure:
- Students enter the garden and explore.
- Water the greens if the soil is dry.
- In their journals, “This week we moved the seedlings from their small pots to the big garden. Have you every moved? What do you think the seedlings are feeling? Write a fictional story, draw a picture.”

Wrap up:
Share, in partners.

Notes/Feedback:

Mulching for Warmth

Week 9.1
STANDARDS
4.ESS2.1

OBJECTIVES
- Students learn several reasons why mulching is important
- Students understand that mulching is a form of bio-mimicry
- Students mulch the greens

MATERIALS
- Bags to collect leaves
- Full watering cans

Preparation:
Are there many fallen leaves in the garden? If so, great! If not, find a place on campus where you and your students can collect fallen leaves.

Background Information:
Mulching is simply putting something under a plant, covering the soil under the leaves and above the roots. Common mulches are woodchips, leaves, straw or even compost. Mulching is done for a variety of reasons: to slow evaporation and thereby save water, to prevent weed growth, and to keep a plant warm. Mulching can often prevent soil from freezing. Most greens are frost tolerant, but still appreciate the extra warmth.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- “What do animals do to prepare for the winter? What do plants do?” Discuss.
- “Many trees do drop their leaves to prepare for the winter. With less sun, the trees essentially ‘hibernate’ and focus what little energy they have on their roots underground. The fallen leaves help the tree in several ways. Can anyone think of how?”
- “For one, the leaves keep the soil under the tree warm. It is like a little blanket at the base of the tree. Secondly, the leaves eventually decompose, and all those nutrients from the leaves end up back in the soil for the tree to use in the spring. What will change the leaves into soil?” (The FBI!).
- “Gardeners and farmers have been copying nature for a long time. Just like we copy the forest when we make a compost bin, we copy the leaves that fall when we mulch. This is called bio-mimicry—copying the earth.”
- Discuss mulching—materials you can use and benefits of each.
- Either in the garden or out, collect leaves. Be sure to leave some leaves for the tree!
- Back in the garden, bring students and leaves to the greens.
- Show students how to mulch. Crush up some leaves and cover the area under the plants. Make a thick layer.
- Water the greens.

Wrap up:

Wash hands, return materials.

Notes/Feedback:

Journal Prompt: Winter is Coming

Week 9.2
STANDARDS
4.SL.1

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Look for signs of the FBI.
- Do garden work, return materials.
- In their journals, "Winter is coming. Winter is a time of rest, and of slowing down. How do you feel as winter approaches?"

Wrap up:
Share, in partners.

Field Trip: Muir Woods

Week 10.1
STANDARDS
4.LS1.1, 4.ESS2.1

OBJECTIVES
- Students explore a redwood forest
- Students find different decomposers
- Students enjoy the beauty and wonders of nature

MATERIALS
- Anything you need for a field trip.

Preparation:
This trip will need to be planned weeks in advance. There are wonderful educational programs available. You will also want to plan on having “explore” time for your students.

Procedure:

- Enjoy Muir Woods! Discover tall redwoods, rows of mushrooms, and more in this majestic forest!

Notes/Feedback:

Journal Prompt: Redwoods

Week 10.2
STANDARDS
4.SL.1

MATERIALS
- Tools for garden work
- Journals, pencils

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Do garden work.
- As a class, debrief the field trip.
- In their journals, “How did you feel in the redwood forest? Draw a picture.”

Wrap up:
Take volunteers to share with the class.

Notes/Feedback:

Plant Part Review

Week 11.1
STANDARDS
4.SL.1, 4.LS1.1

OBJECTIVES
- Students recall plant parts and their functions
- Students can identify different plant parts in the garden
- Students build their own plant

MATERIALS
- Tools for garden work
- A carrot, with stems and leaves attached

Preparation:
Know which plants you will bring students to as you discuss each plant part and their function.
This week is about basic plant parts, next week is about specialized plant parts.

Background Information:
Plant Parts and Their Jobs
Roots—Keep plants stable (rooted!) in the ground and absorb water and nutrients from the soil.
Stem—To hold the plant upright, and to bring water and nutrients from the roots up to the rest of the plant. The stem also brings sugars down from the leaves to the roots.
Leaves—Make food from the sun.

Flowers—Reproduction; to make new seeds.
Fruit—To protect seeds, to attract animals who spread the seeds

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- "It is winter! What changes do you notice in the garden? Outside the garden?"
- "This week we are reviewing the 6 main plant parts and their functions. Each plant part has a specific job that helps the plant grow and reproduce. The same way you have many body parts, and those parts work together to make your body function."
- "What are the six main plant plants?"
- As students answer, list on the board: Roots, Stems, Leaves, Flowers, Seed, Fruit.
- If students name other plant parts, list them, but mention that you will discussing those next week.
- Return to the original six plant parts. "We are going to find all of the plant parts in the garden and review their jobs."
- Bring students to a tree. Ask one student, or maybe two to try to push it over. "Why can't they push it over? What part of the plant is keeping the plant strong and stable in the ground?"
- "Right, the roots. What other job do the roots have?" (To absorb/drink water and nutrients from the soil.)
- "If I water a plant and pour the water on its leaves, it's kind of like sticking an apple in my ear…I can't eat through my ear, and a plant can't drink through its leaves! It's important to always remember that the roots drink, and to water the soil when watering."
- Continue looking for plant parts in the garden, and discussing each purpose.
- When looking for stems: tear some stems apart so students can see the tubes inside that transport materials up and down.
- When looking for flowers: ask "How are flowers attracting insects?" (Smell, bright colors, etc)
- Once you have finished your tour, test students: "Go find three stems. Find two flowers. Find evidence of roots. Find five different shaped leaves."
- Gather students, and show a carrot. "This carrot is a great example of plant parts working together. The little roots absorb nutrients and water from the soil. The stem brings the water and nutrients to the leaves. The leaves make food, sugars, from the sun and the stem brings the sugars down to the root. The plant stores this sugar in this huge taproot until the plant is ready to grow (carrots can grow more than 3 feet!) tall and produce flowers and seeds. Have you tasted carrots? They are sweet, right? You can taste the sugars that the leaves made from the sun."
- "Find pieces of plants on the ground and leaves that have fallen. 'Build' your own plant. You can use any material you find, but be sure to show roots, stems, leaves, and a flower."
- When students have finished, let them show each other their "plants".
- Do garden work.

Wrap up:
Return materials, wash hands.

Notes/Feedback:

Journal Prompt: Plant Parts

Week 11.2
STANDARDS
4.LS1.1, 4.SL.1

MATERIALS
- Journals, pencils
- Watering can

Preparation:
Write on the board:
Roots: Who or what keeps you grounded?
Trunk: Who or what keeps you standing tall?
Branches: What are you reaching for?
Leaves: What talents do you have?
Fruit: What are your big goals?

Procedure:
- Students enter the garden and explore.
- Water the greens.
- For this journal activity, students need to see the board. In their journals, "Draw a tree with roots, a trunk, branches, leaves and fruit. Pretend you are the tree. Label the different parts."

Wrap up:
Take volunteers to share in front of the class.

Notes/Feedback:

Specialized Plant Parts

Week 12.1
STANDARDS
4.SL.1, 4.LS1.1

OBJECTIVES
- Students learn about examples of specialized plant parts
- Students discuss why plants have adapted specialized parts
- Students find examples of animals adapting to their surroundings

MATERIALS
- Tools for garden work
- "How to Hide a Butterfly and Other Insects" by Ruth Heller

Preparation:
Identify some of the following plant parts in or around the garden.

Background Information:
Thorns-Thorns are modified stems and are used to deter herbivores.

Tendrils-Tendrils are modified stems that are using by plants that climb. Tendrils attach to other plants (or in the garden, on trellises or fences) and support a plant by growing up.

Tubers-Can be specialized stems or roots. For our purposes, we will refer only to stem tubers. Tubers are enlarged stems that store nutrients for the plant during dry or winter

months. The stored energy is used by the plant in the next growing season. Potatoes are an example of stem tubers.

Bulbs- A bulb is a modified stem that stores food during dormancy. Examples include onions, irises, and tulips.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- “Last week we reviewed the six main plant parts. Can someone name them?”
- “This week we are learning about some other special plant parts that some plants use to help them adapt to certain environments. For example, a cactus has adapted to not
- have leaves, but rather long spines. These spines are more water efficient for the plant, and also protect the cactus from being eaten. Can you think of any other specialized plant parts that you may have seen in the garden?”
- Discuss tendrils, thorns, bulbs, and tubers. “Why do some plants have these special adaptations? What kind of environment is a plant from if it needs to store food all winter?”
- Find examples in the garden.
- Gather students. Read “How to Hide a Butterfly” and discuss.
- “Some adaptations that plants have are to protect themselves from getting eaten. The same with animals—they try to avoid their predators as well. Can you find of camouflaged insects in the garden?”
- Search for insects.
- Do garden work.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Nature's Paintbrushes

Week 12.2
MATERIALS

- Cups of black paint; one cup per 3-4 students
- Clipboard and paper; one per student

Preparation:

Place cups of black paint in different spots in the garden. Students will be using something that they find in the garden to use as a paintbrush. You can allow them to harvest a whole plant, or a leaf, or a flower as a brush. You may choose to restrict them to only using plant material that has already fallen on the ground. Decide on your parameters before class.

Procedure:

- Students enter the garden and explore.
- Distribute clipboards and paper to students.
- "You have a clipboard, a piece of paper, and in the garden there is paint. I want you to paint a picture. What is missing?"
- "Right! A paintbrush. Your paintbrush is in the garden!" Explain your parameters about what may or may not be used as a brush. Remind students that they can use their brush also as a stamp!
- Give students plenty of time on their artwork. When finished, collect paintings in the classroom and give students time to appreciate each others' work.

Wrap up:

Collect all materials, wash hands.

Notes/Feedback:

Propagation

Week 13.1
STANDARDS
4.LS1.1

OBJECTIVES
- Students learn about propagation by stem cutting
- Students discuss advantages for a plant that can propagate vegetatively
- Students pot stem cuttings

MATERIALS
- A stem from a lettuce plant, or something similar
- A stem from a plant that can be propagated by cutting
- Shears
- A plant from which to take cuttings
- Pots and potting soil
- Craft sticks and permanent marker
- Watering can
- Rooting hormone (not completely necessary)

Preparation:
Arranging a guest lecturer from a local nursery would be ideal. Nurseries propagate many of their plants by cutting, and it is always fun to have an expert on hand.

If you do not have access to a guest lecturer, make sure you gather all your materials ahead of time. You'll need to water your cuttings frequently; make sure you have a system in place.
Do some extra cuttings, so that after 6-7 weeks, you can pull them out and check out the roots.

Background Information:

Plants that propagate easily from cutting: Fig, purple tree collards, rosemary, willow, any type of succulent.
Whichever you choose, do a little extra research for best results.
Nodes are the places on the branch where the leaves grow from. Underground, the roots will sprout from the nodes as well, so make sure you bury at least two nodes.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "We have spent the past few weeks revisiting the different plant parts. Just when you thought it was all pretty clear: leaves make food from the sun, seeds make new plants, I am going to make it a little more complicated."
- "First, I want to teach you the word propagation. It simply means the growth of a new plant. In nature, plants propagate themselves by spreading their seeds through animals, or by the wind. Gardeners propagate seeds by planting them. This is where this gets tricky, you don't always have to plant a seed to get a new plant. Can you think of any plants that we have grown in the garden, but not from seed?"
- Show the lettuce stem. "Some plants can only be propagated by seed. If I want a lettuce plant, I have to plant a lettuce seed. I ripped this lettuce stem from the plant, and this stem will now die. If I stick the stem back in the soil, it will decompose."
- Show the stem that can be propagated. "This stem is another story. It can be propagated vegetatively, that is, by part of the plant. That's just a fancy way of saying that I can actually plant this stem and it will re-grow into a new plant. Does that seem crazy to you?"
- "This is almost like saying that I could cut off my toe, and my toe would grow a whole new body. We know that can't happen, yet that's basically what happens with certain plants. I can cut a stem from a certain plant, take off the leaves, and plant it. All of a sudden, the part of the stem that's underground starts acting like a root, and the part above ground starts growing new leaves. Can we think about this for a minute?"
- Discuss. "Why do you think some plants have adapted to be able to re-grow from stems?"

- Do your cutting project, following directions for your specific plant.
- Water the greens if necessary.

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: Reproduction

Week 13.2
STANDARDS
4.SL.1, 4.LS1.1

MATERIALS
- Journals, pencils
- Watering cans

Procedure:
- Students enter the garden and explore.
- Water the greens, and cuttings, as necessary.
- In their journals, “Over the last few weeks, we have been learning about special ways that plants can grow and reproduce. If you could grow a special new limb, what would it be and why? Draw, and explain.”

Wrap up:
Share, in partners.

Notes/Feedback:

Ecosystems

Week 14.1
STANDARDS
4.LS1.1, 4.LS1.2, 4.ESS2.1, 4.SL.1

OBJECTIVES
- Students can define ecosystem to mean an environment composed of living and nonliving things
- Students know that ecosystems can vary greatly, but are consistent in being comprised of living/nonliving
- Students investigate the ecosystem within the compost pile

MATERIALS
- Materials for garden work

Preparation:
Identify the area in the garden that students will be weeding, thinning or watering after the lesson. If the weather has been dry and the garden needs water, you can ask students about the rainfall trend in your ecosystem. If you are going to be weeding, you can ask students about competition for resources in an ecosystem. Any garden project you do can be related back to this lesson, just be sure to identify some areas to work beforehand.
Also, write ECOSYSTEM on the top of your whiteboard.

Background Information:
An ecosystem is a community of living and non-living things that work together. Ecosystems have no particular size. An ecosystem can be as large as a forest or as

small as a tree. This lesson is meant as a review. In past grades, ecosystems are defined relatively simply. Here the idea is to reinforce that all elements in a system work together. This lesson will serve as a foundation for following lessons in attracting pollinators, discussing the roles pollinators have within a system, food webs, and even donating produce—what role do we have in our community?

Procedure:

- Students enter the garden and explore
- Gather students, check in about the season and weather.
- "Let's look around our garden. Can you name what you see?"
- Teacher lists student responses on whiteboard. Teacher should list responses into two columns, one with living organisms and one with nonliving, but should not tell students why he/she is organizing it that way. If students aren't listing nonliving things, some prompting may be necessary. Nonliving things should include soil, water, air and heat/sunlight.
- After all responses have been taken… "I have listed your answers into two columns. Can anyone see the pattern? Why did I separate your responses? How are the things in column A different from column B?
- Facilitate a class discussion.
- "You just described our garden ecosystem here in Oakland. You figured out that it is made from living and nonliving elements. The living things depend on the nonliving, and the nonliving can be affected by the living. They work together. The point here is consistent with what we have been discussing for the past weeks. Though each plant part has its job, its greater job is to work with the other parts to help the plant grow and reproduce. Same goes the compost pile, the FBI works together to decompose plant material."
- "A forest ecosystem is also compromised of living and nonliving components. You can imagine that there are different living things in a forest, or in the desert. Again, everything in the system works together."
- Teacher asks: "You listed soil as a nonliving element in an ecosystem. But soil is alive, and each handful contains billions of microorganisms. But it's made up of nonliving things like rocks, and sand and decomposed plant matter. Would you consider soil living, or nonliving?"
- Discuss.
- Bring students to the compost pile. Pull out a chunk, and let students dig through it. "What are you finding? How are the FBI working together in here?" (One example is that the bugs generally break the bigger pieces apart, and the fungus and bacteria work on the smaller pieces. In general, the FBI works together, not one part can decompose by itself.)
- When all have finished, return the plant material back to the compost pile. Gather students and do the garden work that you have prepared.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Garden Drawings

Week 14.2
STANDARDS
4.LS1.1

MATERIALS
- Watering cans
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Allow time to water the cuttings, the greens, and to explore the compost pile.
- In their journals, "Find something beautiful. Look at it for a little while, and then draw it. Try to be so detailed, that someone could find what you were drawing."

Wrap up:
Trade journals, in partners, and have partners try to find each other's subjects within the garden.

Notes/Feedback:

The Bees and the Flowers

Week 15.1
STANDARDS
4.LS1.1, 4.LS1.2

OBJECTIVES
- Students learn that to attract pollinators, one must provide food
- Students discuss the importance of pollinators in a garden ecosystem
- Students learn that flowers have adapted to attract specific pollinators

MATERIALS
- Pictures of different types of flowers
- Materials for garden work

Preparation:
Print some examples of different types of native flowers available in your local nursery; print a variety of colors, shapes, and sizes.
Students will be choosing which types of pollinators they want to attract by choosing flowers to plant in the next lesson.
Prepare garden work.

Background Information:

One of the most interesting examples of co-evolution is the way that pollinators and flowers have adapted to each other; which is commonly seen in the ways flowers have adapted to attract specific pollinators.

- Bees see blue/purple, yellow and UV light and are attracted to sweet smells. Bee-pollinated flowers usually fit this description, and often have "landing patterns" where the flower wants the bee to land.
- Butterflies see red, and do not smell very well. Butterfly-pollinated flowers are bright, often red, and grow in clusters to offer the butterfly a landing platform. The flowers are usually tubular and are the right shape for a butterfly tongue.
- Moths are usually night flying, and therefore moth-pollinated flowers are often open at night, and are white or pale, to be visible in the dark.
- Hummingbirds tend to be attracted to bright red flowers that do not smell. Hummingbirds feed while hovering, so petals are curved and out of the way.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "Last week we talked about ecosystems, which are a community of living and nonliving things. Together, we are taking care of our garden ecosystem. We have also talked about the community in which we live, we have talked about the community of decomposers in the compost pile, and about the ways that plant parts work together in a system. What else works in community in the garden?"
- "One really interesting example is the way that flowers and pollinators work together. Why do pollinators visit flowers? Why do flowers need pollinators?" (Flowers provide food for pollinators, and many flowers depend on insects for pollination).
- Discuss.
- "Why is it so important to have pollinators in our garden?" Discuss.
- "Can you name 10 things that we eat that depend on insect pollination?" (Fruit, some nuts, "vegetables" that are really fruits like cucumbers, tomatoes, and pumpkins).
- Show the pictures you have, and explain how each pollinator is attracted to certain things (colors, smells, or no smells) and that flowers have adapted to attract certain pollinators.
- "If we want pollinators to visit our garden, we need to invite them! Which flowers do we want to plant? Which do you want to bring to our garden?"
- Class discussion; record choices because you will purchase these plants to plant in the following lesson.
- Explore the garden; see if students can find any examples of pollination. It is mid-winter, so it may be unlikely.
- Do garden work.

Wrap up:

Return materials.

Notes/Feedback:

Seedlings

Week 15.2
STANDARDS
4.LS1.1, 4.LS1.2

MATERIALS

- Seeds or seedlings of the chosen flowers
- Watering cans
- Mulch

Preparation:

One risk of sprinkling wildflower seeds throughout the garden is that they can be confused for weeds, and may be pulled. You can choose to designate a section solely for the pollinator garden, or you can disperse such a copious amount of seed that even if a few plants get pulled here and there, there will still be plenty of plants blooming in the spring.

Procedure:

- Students enter the garden and explore.
- Gather students. If planting seeds: “Normally we do not plant mid-winter, but we can plant wildflower seeds. In nature, flower seeds sit underground all winter and wait for the warmth of spring, when they sprout.” If planting seedlings: “Normally we do not plant mid-winter, but these native flowers should be fine. We need to be sure to water them deeply, and mulch them.”
- Gather students at the planting area. If seedlings: Plant the seedlings that your students have chosen.
- Water the plants and mulch.
- If seeds: Pass out a pinch of seeds to each student. Let them look at the different sizes, shapes and textures of the seeds. Have them cup their hand with the seeds in it, and add a small handful of soil. Have them mix the seeds and soil together. Show

them how to sprinkle this soil/seed mix into the garden. Great places are next to established plants, in corners, around the edge of the garden, near the garden entrance or whatever inspires your class. As students are planting, encourage them to take their time.

Wrap up:

Return materials.

Notes/Feedback:

Food Chain

Week 16.1
STANDARDS
4.LS1.1, 4.LS1.2, 4.SL.1

OBJECTIVES
- Students understand the concept of a food chain
- Students name food chains in nature
- Students identify food chains in the garden

MATERIALS
- Tools for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- “Last week we planted flowers to attract pollinators. We know that if we provide food for bees and butterflies, they will come. Every living thing must have something

to eat in its habitat, otherwise it will starve. Can you name some animals and what they eat?"

- Discuss.
- "I heard some great examples. For example, in a forest, perhaps a fox will eat a rabbit. Let's take it one step further. (On the board write 'Fox' and draw an arrow towards 'rabbit'. What does the rabbit eat? (Once students say plants, draw an arrow from rabbit and write 'plants').
- The board should say Fox☐Rabbit☐Plants.
- "What do the plants eat? What eats a fox?" (Discuss until you have something like the following on the board: Cougar☐fox☐rabbit☐plants☐sun/soil).
- "This is called a food chain. It is actually a little more complicated than this, but we will stop here for today. I want you to find examples of the food chain in the garden."
- Students explore the garden for more examples of food chains. (Birds eat insects, insects eat other insects, insects eat plants, etc).
- Garden work.

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: Food Chains

Week 16.2
STANDARDS
4.LS1.1, 4.LS1.2, 4.SL.1

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Find 5 examples of plants or insects being eaten.
- In their journals, "Draw 3 food chains. One from the garden, one from the ocean, and one from an ecosystem of your choosing."

Wrap up:
Share, in partners.

Notes/Feedback:

Food Webs

Week 17.1
STANDARDS
4.LS1.1, 4.LS1.2, 4.SL.1

OBJECTIVES
- Students learn that the ecosystem is a web, not chain
- Students learn surprising connections among elements in a web
- Students discuss consequences of altering the web

MATERIALS
- Blank stickers (i.e. name tags)
- Permanent marker
- A ball of yarn or string

Preparation:
For this web to work properly, students must represent decomposers, plants, animals, as well as the sun, soil, and water.
Remember that decomposers can "eat" anything (and return it to the soil), plants can "eat" sun, soil, water and get eaten by animals. Animals eat plants or other animals, and get "eaten" by decomposers.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- “Last week we talked about food chains, can somebody name one?”
- “Like we have been talking about all year, nature actually works in a system, in a community, where all parts work together. I will show you how. First, as a class, name everything you see in the garden.”
- If a student says “Greens”, give him/her a sticker that says “Greens” on it. Continue until all students are labeled. Push students towards naming the less obvious (sun, soil, water) and decomposers (fungus, bacteria, invertebrates). Once all students are labeled, gather everyone in a standing circle.
- Give one student the string to start. Instruct him/her to hold on to one end. “Pass the rest of the string to someone that you eat, or get eaten by.” The next person holds onto the string, and passes the ball of string to someone they eat or get eaten by. Continue until everyone is in the web.
- (This could look something like: Greens☐soil☐Lettuce☐Caterpillar☐Bird☐Fig tree☐Fungus☐Ladybug☐Aphids☐Wheat…etc).
- “This is not a chain, this is a web! We are all connected to each other. This is a system, an ecosystem. When we looked at animals at the ‘top of the food chain’ last week, the animals that don’t get eaten, we can see now they do get eaten, by the decomposers. The decomposers return everything to the soil, where new plants grow from. It is all connected in an intricate web of life.”
- Ask the ‘fungus’ to pull on his/her part of the string. Ask “Who else feels the tug? Who is connected to the fungus?” Ask the ‘ladybug’ to pull the string. Continue, finding interesting connections between unexpected members of the ecosystem.
- “What would happen if I sprayed a chemical that killed all the ladybugs? Would that affect the rest of the ecosystem?” Discuss.
- I am going to ask the ‘ladybug’ to drop his/her part of the string. If you feel your string move when his/her drops, then you can drop yours as well, and so on. Ask the ‘ladybug’ to drop his/her part of the string.
- The whole web should collapse very quickly.
- Gather students. “What did you learn from that activity?”
- Discuss.
- Probe, “What connections surprised you? What did you learn from the part when the whole web collapsed? If someone came to you and said they wanted to kill all the aphids on their farm, what might you say to them?”
- “Some animals on our planet are going extinct. How does that affect the habitat in which it lives?”
- Continue exploring the garden.

Notes/Feedback:

Reading: Children of the Earth

Week 17.2
STANDARDS
4.SL.1

MATERIALS
- "Dear Children of the Earth" by Schim Schimmel
- Tools for garden work

Preparation:
Prepare for garden work.

Procedure:
- Students enter the garden and explore.
- Do garden work, return materials when done.
- Gather students, read "Dear Children of the Earth" and discuss. Connect the story to food webs, and interconnectedness.

Notes/Feedback:

Harvest Day

Week 18.1
STANDARDS
4.SL.1

OBJECTIVES
- Students revisit their discussion about community
- Students learn to harvest greens

MATERIALS
- Container to collect harvested greens
- Container to collect damaged greens
- String/twine and scissors OR rubber bands
- Compost
- Full watering can

Preparation:
Before class, have students decide on who will receive the greens that you are harvesting.
As the plants re-grow, continue to harvest and donate.

Background Information:

It is important to harvest properly, otherwise the plant can get damaged. With greens, harvest the outside leaves. With your thumb, follow the stem of a leaf all the way to the main stalk where it is attached. Snap the stem off so there is a clean break on the main stalk.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather. Are there any signs of spring approaching?
- "As you well know by now, we have been discussing systems and communities over the year. In the beginning of fall, we talked about our community, and what role we want to play in our community. We decided as a class to grow greens for giving. Today we are doing our first harvest. How do you feel about giving these plants away?" Discuss.
- Bring students to the greens.
- Show students how to harvest. Show students examples of damaged leaves. "Collect the greens into this container, and the damaged greens in this container—which we can later compost." Tell students how many leaves they should harvest and begin.
- Some students can make bundles of 8-10 leaves and tie them with twine/rubber bands.
- Put the greens in a safe place until they will be given away.
- "When we harvest, we need to give the plants a little extra food. Remember, their leaves make food from the sun, and we just took away many of their leaves. The compost will help."
- Add compost to the plants, under the leaves/over the roots. Water the plants.
- Gather students in your outdoor seating. "What is the chain of giving here? Include the people we are sharing the greens with."

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: Children of the Earth

Week 18.2
STANDARDS
4.SL.1

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Do garden work. Return materials.
- In their journals, “Last week we read a letter from the Earth to the children. Write a letter from you, to the Earth.”

Wrap up:
Take volunteers to share in front of the class.

Notes/Feedback:

Soil Jars

Week 19.1
STANDARDS
4.ESS2.1, 4.PS4.2, 4.SL.1

OBJECTIVES
- Students set-up soil jars
- Students learn about the types of nonliving matter in soil
- Students discuss weathering

MATERIALS
- 4-5 clean glass jars with lids—ideally the same size
- A full watering can
- Tools for garden work

Preparation:
Bring all materials to your gathering area.
Is there garden work?

Background Information:
Soil is essentially composed of decayed organic matter (plants, animals) as well as rocks,

sand, silt, and clay. Rocks are the largest particle, followed by sand, silt and lastly clay. When you make a soil jar, and let it sit, the sediments will settle in that order. Often, large pieces of organic matter will float, and the rest of the organic matter will settle with the clay. You will prepare the jars today, and observe them later this week.
Weathering is the process by which soil, rocks and minerals are broken down into smaller pieces. This activity is meant to show the different sizes of materials found within soil, and therefore open a discussion about how rocks change sizes to begin with.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "In the fall, we learned about the different components of soil. Can someone tell the class what is in soil?"
- "Soil is alive, and it is basically made of decomposed organic matter, and rocks of different sizes. We know that soil has air, water, and microorganisms in it as well. How do dead plants and animals become part of the soil?" (The FBI decomposes organic matter).
- "We also know that there is nonliving 'stuff' in the soil as well. We know there is sand, which are smaller rocks, but there are two other types of rock as well. We are going to discover what else is in our soil, and how it gets there."
- Split the class into 4-5 groups, give each group a jar. Instruct students to fill their jar one third full with soil and then return to the classroom.
- Once all students have returned, fill each group's jar with water. "What do you notice? Are there bubbles? What do bubbles mean?" (There is air in soil).
- "Cap your jars tightly, and shake them well. We are going to let the contents of the jar settle, and we will look at our jars later this week." Students bring their jars to a place in the garden where they will not be disturbed until next garden class.
- Discuss, "What are ways that people use soil? What are ways that other animals use soil? What are ways that plants use soil?"
- Do garden work.

Wrap up:

Return materials.

Notes/Feedback:

Weathering

Week 19.2
STANDARDS
4.ESS2.1, 4.PS4.2, 4.SL.1

MATERIALS
- Soil Jars from earlier in the week
- A book about weathering (if necessary)
- Watering cans

Preparation:
This lesson assumes that students have a general background of weathering, erosion and deposition from science lessons. If not, it may be helpful to find a book on this topic.

Background Information:
Weathering should not be confused with erosion, which involves movement. Weathering happens without movement of particles.

Procedure:
- Students enter the garden and explore.
- Groups from earlier in the week bring their soil jars, carefully, to the classroom.
- Give students time to observe the layers in their jars.
- "What do you see on the bottom?"
- "Sand is the bottom layer because it is the heaviest part of the soil. What is sand? What is it made from? (Rocks). How do rocks break into smaller pieces?" (Heat, water, ice and pressure).
- Discuss weathering, read a book if you have one.

- “The next layer is called silt. Silt is smaller than sand. Can you see the layer just above sand?”
- “The next layer is called clay. Have you heard of clay? What can you do with clay?”
- “Clay particles are tiny, much smaller than silt, and therefore they rest on top. There may not be very much clay in our soil, and mixed it in is all this brown stuff. What is the brown stuff?”
- Encourage students to make further observations. Did any organic material float to the top? Is your soil very sandy? Or is it heavy clay? What kind of soil would you expect to find near the ocean?
- “Although this may seem like a simple project, farmers and gardeners often do this test before planting a new area. Why do you think it would be helpful for a gardener to see the amounts of clay, silt, and sand in their soil?”
- “One benefit of sandy soil is that it is soft, and plants’ roots can easily grow and breathe. However, water and nutrients flow through sand quickly, sometimes before the plant has a change to absorb it. What do you think a solution would be, if your soil is too sandy?” (Adding compost).
- “Very clay-ey soil keeps nutrients and water readily available in the soil, because it is so hard. This is a good thing, but on the flipside, the harder, heavy clay soils can sometimes be difficult for plants to grow and breathe in. What do you think a solution could be, if your soil is too clay-ey?” (Adding compost).
- “Look at your soil jars. Which layer is the thickest, sand, silt or clay?”
- Students can pour their soil jars back into the garden.
- Water the garden.

Wrap up:

Return materials.

Notes/Feedback:

Planting Day

Week 20.1
STANDARDS
4.LS1.1, 4.LS1.2, 4.SL.1

OBJECTIVES
- Students learn about the history of the potato
- Students recall the function of tubers
- Students discuss vegetative propagation

MATERIALS
- "Garden Wizardry for Kids" by L. Patricia Kite
- Seed potatoes or Organic potatoes from the store
- Full watering cans
- Compost
- Rulers
- Craft stick, permanent marker
- Hand trowels

Preparation:
Potatoes can be grown from "seed potatoes" (not actually seeds) bought from a nursery or from small, **organic** (very important!) potatoes from the store. Find potatoes with little sprouts. There are methods where you cut the potatoes into pieces and let them dry, but it's not necessary to do it that way.
Find the area where you will be planting potatoes.
Be familiar with the section on potatoes from "Garden Wizardry for Kids".

Background Information:

Plant potatoes in trenches 6-8 inches deep and at least one foot apart. As potatoes sprout and grow, you will need to "hill" the potatoes. You cover the green stems and leaves so that only the top few inches are showing.

Procedure:

- Students enter the garden and explore.
- Before gathering students, ask them to sink their hands into the soil. Warm? Cold? Cool?
- Gather students, check in about the season and weather, and soil temperature.
- "You know from your years of gardening that, as gardeners, we follow the cycles of nature. We learn how to take care of plants by observing how they grow naturally. We know that some plants grow in cooler weather, and some in warm weather. What do you know about potatoes?"
- "Potatoes grow in the spring and summer. The soil is warm enough for us to plant, as winter is ending and spring is approaching."
- Read a little about potatoes from "Garden Wizardry for Kids".
- "The part of the potato plant that we eat is the 'tuber'. What do you remember learning about tubers earlier this year?"
- "Tubers are a specialized plant part. Potatoes store their nutrients in this tuber, underground, to have energy to use for later. Even though potatoes produce flowers, and their flowers make seeds, farmers and gardeners don't plant potato seeds. We plant the tubers, and this is another example of propagating vegetatively. Instead of planting a seed, we are basically taking part of the potato's stem and sticking it in the ground. This piece of stem can grow a whole new plant!"
- Bring students to the planting area.
- Pull weeds, pick stones. Dig in plenty of compost.
- Using rulers, have students dig trenches, 6-8" deep, one foot apart.
- Dig holes within the trenches, place the potatoes in the holes, one foot apart, and cover the potatoes. Water thoroughly.
- Label the area with the date and variety of potato.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Reading: Two Old Potatoes

Week 20.2
STANDARDS
4.SL.1

MATERIALS

- "Two Old Potatoes and Me" by John Coy
- Watering cans
- Journals, pencils

Procedure:

- Students enter the garden and explore.
- Water the potatoes, only if the soil is dry.
- Gather students. Read "Two Old Potatoes and Me".
- Discuss the steps of growing potatoes. Note that you will be harvesting your potatoes as "new potatoes", in the late spring, and not in the fall, as depicted in the story.
- In their journals, "What is a lesson that you learned from someone in your family?"

Wrap up:

Share, in small groups.

Notes/Feedback:

Spring Check In

Week 21.1
STANDARDS
4.LS1.1, 4.LS1.2, 4.SL.1

OBJECTIVES
- Students notice and discuss signs of spring
- Students investigate their plant cuttings
- Students do whatever garden work is necessary

MATERIALS
- "And Then It is Spring" by Julie Fogliano
- Any tools you may need for garden work

Preparation:
Choose a few of the plants you have propagated by cutting to pull apart.
This lesson is mostly about "checking in" with the garden. What needs watering? Have the potatoes sprouted? Are the flowers blooming? Do the greens need harvesting?

Procedure:
- Students enter the garden and explore.

- Gather students, check in about the season and weather.

- “What signs of spring have you noticed? What has changed? Are there pollinators in the garden?”
- Explore the garden again, looking for signs of spring.
- Gather students, read “And Then It is Spring” and discuss.
- Distribute the plant cuttings, one per group of students. Allow students pull the cuttings out, and spend time looking at the new roots and new leaves.
- Go to the compost pile. “How has this pile changed over the past few months? What do you notice right away? What are less obvious changes?”
- Allow students to pull apart the compost pile a little bit. Look for examples of the garden FBI.
- Distribute the rest of the cuttings. They can be taken home, or distributed as gifts. Some can stay and be transplanted into the garden.
- Harvest greens, if possible.

Wrap up:

Wash hands.

Notes/Feedback:

Soil Testing

Week 22.1
STANDARDS
4.LS1.1, 4.LS1.2, 4.SL.1, 4.ESS2.1

OBJECTIVES
- Students learn about the three main nutrients in the soil
- Students learn about the functions of nitrogen, phosphorous, and potassium
- Students complete a soil test procedure

MATERIALS
- Soil Test Kit
- Containers of different soil samples from the garden, and one sample from outside the garden
- Tools for garden work

Preparation:
Soil Test Kits are inexpensive and can be bought from a nursery. Become familiar with the instructions, and be sure to gather anything you may need before class.
Prepare garden work.

Background Information:

Basic functions of plant nutrients:

- Nitrogen helps plants with rapid growth, increases growth in seed and fruit production, improves the quality and growth of leaves. Aids in photosynthesis.
- Phosphorous encourages blooming and root growth. Also aids in photosynthesis.
- Potassium helps in the building of protein. Aids in photosynthesis, and improving fruit quality.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- "In our yearlong discuss of soil, we know the importance of having healthy soil for our plants. What are some signs of healthy soil? What does it look like, feel like, smell like? Turn to your partner and discuss."
- "I heard some of you say that healthy soil is full of nutrients. Today we are going to learn the names of those main nutrients, and we are going to test for them. Many of the nutrients get into soil from decomposed plants, and some are minerals that come from weathered rocks. Today we are going to talk about the main three: Nitrogen, Phosphorous, Potassium."
- Show students the soil test kit, and explain the procedure.
- Test the soil. Results take about 10-15 minutes, do garden work in the meantime.
- Gather students, and discuss results. Which areas of the garden are lacking nutrients? Which areas have plenty? "Any theories?"
- "Just like our bodies require different types of nutrients, so do plants. Next week we will talk more about adding nutrients back into the soil."

Wrap up:

Return materials from garden work, clean up from soil testing.

Notes/Feedback:

Journal Prompt: Smell and Memory

Week 22.2
STANDARDS
4.SL.1

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Do garden work.
- Return materials.
- Students spend time holding and smelling soil.
- In their journals, “What does the smell of soil remind you of? What memories does it bring back?”

Wrap up:
Share in small groups.

Notes/Feedback:

Plants Change the Land

Week 23.1
STANDARDS
4.ESS2.1

OBJECTIVES
- Students discuss the ways to add nutrients into soil
- Students learn that cover crops add nutrients to the cover, and protect soil from weathering
- Students plant cover crops

MATERIALS
- A shoebox, or smaller, full of soil
- 1 spray bottle, full of water
- Fava beans to plant
- Bucket to collect weeds, if necessary
- Watering cans
- Hand rakes
- Craft stick, permanent marker
- Row cloth and stakes to hold it down

Preparation:
Bring your shoebox of soil and spray bottles to the garden classroom.
Know where you are planting! Have all the materials you need (buckets to collect weeds, compost, hand rakes, full watering cans, etc) ready at the planting site. Fava beans

should be planted about 1.5 inches deep, and 4 inches apart (or the width of a child's palm). Roughly estimate how many fava beans you'll need to plant your bed, divide that by the number of students, and then you'll know how many seeds to give each student.
Row cloth can be bought from a garden store. It is a thin, light synthetic material that allows light and water in, but slow evaporation, and keeps bugs out. Water through row cloth, and remove it when plants are several inches tall.

Background Information:

You will be cutting the fava bean plants down before they produce bean pods, but the leaves are edible (and delicious). There is a rare genetic condition, Favism, that causes certain people to get sick from eating fresh fava beans. It tends to affect people from the southern Mediterranean region.

Row cloth can be purchased from any gardening store. It is a thin cloth that slows evaporation while still letting light through. You can water right through it, and remove it once plants are a few inches high. It will need to be weighed down.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- Show students your little model garden. "This is my little garden. I don't have anything planted in here right now. Last year I planted corn in my little garden, and the corn grew for months and months and pulled nutrients out of the soil."
- Blow on the soil until some flies out. "Then a storm came and blew some of my soil away." Spray the soil. "Then a rainstorm came and pushed the soil down, making it hard."
- "My soil is now lacking nutrients, it is hard and compact, and much of it has been blown away. Am I taking good care of my soil? No? What can I do to take better care of it?"
- Discuss.
- "I'm hearing lots of good ideas, like cover the soil, or add compost back to it."
- "One way of doing both of these things at the same time is by planting cover crops. Cover crops are special plants that feed the soil; they add more nutrients to the soil than they take. The 'Legume' plant family is a group of plants that include beans, peas, and peanuts. These important plants put Nitrogen into the soil, one of the nutrients we discussed last week! Nitrogen is one of the most important nutrients a plant needs to grow. The legume we are going to plant this spring is called the Fava Bean."
- "The wind and rain can really hurt our soil if we do not protect it. Though weathering is natural, we want to protect the soil that we use to grow food. When scientists talk about erosion, they are usually talking about what happens in nature as the wind and rain move soil and rocks. Have you ever heard of a landslide or a mudslide? That is an example of how heavy rains can cause a lot of soil to move! Sometimes people

plant grass on hillsides, so the roots grab the soil and prevent it from moving. Can you think of any other examples?"

- "Farmers worry about erosion. Many farmers and gardeners take very good care of their soil, and do not want it to erode! They do not want their soil moving around in the rain and from the wind. Though this may happen slowly, over time they can lose a lot of soil."
- "Back to the fava beans. We are going to plant them now, and learn more how they add food to the soil next week."
- Bring students to area where you are planting.
- "We are going to take care of the favas until they are big and tall. Once they make flowers, we are actually going to cut the plants down and let the plants decompose. After the plants have decomposed, we will be able to plant new plants on top next year, and the soil will be rested, healthy and strong!"
- Pull weeds, if necessary. Make the area smooth with hand rakes. Students can crush big clumps of soil if there are any, and pull stones if there are big ones.
- Distribute seeds to your students. Allow them a minute to explore these big seeds.
- Show students how to lay one seed down at a time, placing a flat hand down as a spacer before laying down the next. There should be about one hand's width in between all seeds. Be careful not to compact the soil while putting hands on the bed. Instruct students that everyone should lay their seeds down first, otherwise students may accidentally plant on top of each other's seeds.
- Once all seeds have been laid down, ask "If we push small seeds in only a little bit, how far do we push big seeds?"
- "Fava beans need to be pushed down about an inch and a half, which is about the height of your thumb." Show students how to push seeds down with your thumb, pushing until your thumb is all the way in the soil.
- Students push the seeds down.
- Water thoroughly.
- If it is very sunny, or has been very sunny, cover the soil with row cloth to keep the soil moist. You can remove the row cloth when plants are 3-4 inches tall.

Wrap up:

Wash hands.

Notes/Feedback:

Meal Planning

Week 23.2
STANDARDS
4.SL.1

MATERIALS
- Full watering cans

Procedure:
- Students enter the garden and explore.
- Students find and identify 4-6 plants that are ready for harvest.
- In groups, plan “meals” that they could make from the produce in the garden.
- Gather class, have groups explain the meal that they would make from the garden.
- Water the fava beans, if necessary.

Wrap up:
Return materials.

Notes/Feedback:

Nitrogen Fixation

Week 24.1
STANDARDS
4.ESS2.1, 4.LS1.1

OBJECTIVES
- Students learn about nitrogen fixation
- Students understand the mutually beneficial relationship between a special bacterium and the fava bean
- Students understand that cover crops are planted to improve soil quality

MATERIALS
- Watering cans
- Tools for garden work
- Labeled index cards
- Masking tape

Preparation:
If there are already fava beans (or any other legumes—peas, or other beans) growing in the garden, try to pull one out before class. You should be able to see the nitrogen modules on the roots.

Label index cards. Label one 'fava bean', label one 'bacteria' and label five cards 'sugars', and another five 'nitrogen'. You should have 12 cards total.
Prepare garden work.

Background Information:

Nitrogen fixation, simply, is the process by which certain legumes "fix", or put, atmospheric nitrogen into the soil. Nitrogen is an extremely important plant nutrient. Certain legumes, including fava beans, have a relationship with bacteria from the genus Rhizobium, which cause the formation of root nodules. The bacteria live in the nodules and create food (nitrogen) for the plant, and the plant supplies food in return.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- Take one volunteer; bring her to the front of the class. Tape the card that says 'fava bean' on her. Hand her the five cards that say 'sugar'.
- "This is our fava bean, a full-grown plant. Last week we talked about how cover crops protect the soil from wind and rain, and how plants in the legume family add nitrogen to the soil. What do you remember about nitrogen from our soil testing day?"
- "I am going to show you how this plant brings nitrogen into the soil. It's a special plant, it gives more to the soil than it takes." Take a volunteer, and bring him up to the fava bean. Tape the card that says 'bacteria' to him, and have the bacteria sit next to the fava bean's roots. Hand him the five cards that say 'nitrogen'.
- "This is a special bacterium, called Rhizobia. You don't need to remember his name, just know that he is a bacterium. The fava bean and the bacteria have a special deal." (Have the fava bean and bacteria shake hands.)
- "The bacteria live on the bean's roots. The plant is making sugar from the sun, and bringing it to its roots. The plant is letting the bacteria eat some of the sugar." (Fava bean hands the bacteria a 'sugar' card."
- "In exchange, the bacteria takes nitrogen out of the air in the soil, makes it solid, and puts it on the bean's roots for the bean to use." (The bacteria hands the bean a 'nitrogen' card.)
- "And so on and so forth, they get along quite nicely." (Bacteria and bean continue exchanging cards.)
- "The bacteria gets sugar to eat, and the bean gets nitrogen to grow. This process is called 'nitrogen fixation'."
- If you have a sample fava bean or pea plant, pass it around, showing students the solid nitrogen nodules on the roots. They can break them apart and open them, they should be pink on the inside. Volunteers can sit down.
- "As gardeners, this is an amazing plant to put in your garden. We can cut the fava beans down before they use up all their nitrogen to make bean pods. The favas will decompose into the soil, adding nutrients. Also, the nitrogen on the roots will stay in the soil and be available for the next plant to use."
- Discuss, take questions.
- Do garden work, including watering the fava beans.

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: Nitrogen

Week 24.2
STANDARDS
4.SL.1, 4.LS1.1

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Do garden work.
- In their journals, "Earlier this week we discussed nitrogen fixation—an absolutely amazing partnership between a plant and a certain bacterium. What else that you have learned in the garden has amazed you this year? Write, and draw."

Wrap up:
Take volunteers to read in front of the class.

Notes/Feedback:

Assessment: Pygmy Forest

Week 25
STANDARDS
4.LS1.1, 4.ESS2.1

OBJECTIVES
- Students are assessed around what plants need from soil, and what happens in cases of extreme lack of nutrients
- Students learn about pygmy forests
- Students connect their learning to the soil health in the garden

MATERIALS
- Pictures of pygmy forests
- Journals, pencils

Preparation:
Print pictures from pygmy forests. Try to find photos that show the contrast between normal trees and pygmy trees.

Background Information:
Pygmy forests exist around the world, for different geologic reasons. They are formed when a certain area of forest has extremely poor soil, and perhaps a hardpan of soil (basically a big rock) only a few feet deep. This essentially has a natural bonsai effect on the trees, keeping them extremely small. Trees 80-100 years old can have a trunk only one inch thick!

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- Distribute journals and pencils.
- "We have been learning about soil formation, the importance of decomposition in recycling nutrients, and which nutrients exist in soil. I want you to draw a picture of what you think a forest should look like with very healthy soil."
- Give students several minutes to draw.
- Show pictures of pygmy forests. Show the tiny trees in relation to normal trees growing nearby.
- "What happened here? What is causing some of these trees to be tiny?"
- Class discussion. (This is a gentle assessment. You are looking for mention of lack of nutrients.)
- "Scientists have studied pygmy forests around the world. Imagine finding 100-year-old trees that are only a few feet tall, and a few steps away, the same tree growing fifty feet tall! Scientists have tested these soils, like we have in our garden, and have found areas that are simply missing nutrients. Without nutrients, plants can't grow!"
- "Sometimes the soils have lots of natural metals in them as well. These minerals can join and essentially form a long, flat rock just under the soil surface. Imagine you are a tree, and your roots meet a huge rock just underground. Your roots would not be able to break through this rock to reach the water and nutrients it needs to grow. This is common in pygmy forests as well."
- "What does this look like in our garden? We have no sheet rock in our soil, but what happens to plants when they lack nutrients?" (Lack of growth, poor development, insect infestations—insects attack weaker plants).
- In their journals, students should draw a pygmy forest, showing a huge rock under the surface of the soil.
- As students finish, explore the compost bin. Look for signs of the garden FBI.

Wrap up:

Wash hands.

Notes/Feedback:

Approaching Summer

Week 25.2
MATERIALS
- Tools for garden work

Preparation:
What needs to be done in the garden? Harvest greens, compost maintenance, water favas?

Procedure:
- Students enter the garden and explore.
- Students look for signs of summer approaching.
- Garden work.

Wrap up:
Return tools, wash hands.

Notes/Feedback:

Field Trip: Presidio in San Francisco

Week 26.1
STANDARDS
4.SL.1, 4.ESS2.1

OBJECTIVES

- Students learn about the history of the Presidio in San Francisco
- Students explore the sandy soil by the coast
- Students enjoy their local National Park

Preparation:

Your class could go on a day trip to the Presidio, or on a one-night camping trip through the organization “Camping at the Presidio”. The trip requires planning, but is worth it. The Presidio offers fascinating social studies connections for fourth grade students. Try to contact a naturalist beforehand who may be able to take your students on a guided hike.
The Presidio has many nature walks—look at map beforehand. Students should explore the native plants in the area. Notice the sandy soil, and the windswept scenario. Notice the plants that have been modified by heavy winds, and plants that adapt that grow low to the ground. Can students find example of weathering?

Procedure:

- Students explore and enjoy the Presidio!

Notes/Feedback:

Journal Prompt: Field Trip Reflection

Week 26.2
STANDARDS
W.4.8, 4.SL.1

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Do garden work.
- Gather class. “What did you enjoy about the field trip? What did you learn?”
- In their journals, “What was interesting to you about the Presidio, and the plants that you saw growing there? Write a letter to someone you know that has not been to the Presidio, and tell them what you saw, and what you did.”

Wrap up:

Take volunteers to read letters.

Notes/Feedback:

Build A Seed

Week 27.1
STANDARDS
4.SL.1, 4.LS1.1, 4.LS1.2

OBJECTIVES
- Students revisit the ways that seeds travel
- Students work cooperatively to build a seed
- Students test their seeds (next lesson as well)

MATERIALS
- A large boxful of "junk" materials: string, paper, cloth scraps, paper clips, tape, glue, cotton bolls, corks, pipe cleaners, ribbon…
- A shoebox sized box, one per group, in which to keep their materials
- A bucket of water for testing "floaters"
- "The Reason for a Flower" by Ruth Heller
- Watering cans

Preparation:
- You will need to collect all of the materials to make this project possible. It would be best to start ahead of time. Your front office may be a good place to collect "junk" materials.
- This lesson digresses somewhat from the themes of the year, but it is a very fun project that your students will enjoy.

Background Information:

The prior knowledge necessary are the methods by which seeds travel. The four main ways are by wind (fliers), passing through animals (poopers), sticking to animals (hitchers) and by water (floaters). Review this information with your students while reading “The Reason for a Flower”.

Procedure:

- Students enter the garden and explore.
- Gather students, check in about the season and weather.
- Read “The Reason for a Flower” and review the ways that seeds move.
- “How do plants depend on animals? How do animals depend on plants?”
- “Today, you are going to try to build a seed. You will be in a group, and I will give you plenty of different types of materials. As a team, the first thing you will do is try to decide if you’re going to make a flier, hitcher or floater. (No poopers!). You will have all of this class to work on your project. During our next garden lesson, later this week, you will have time to finish your project and then test it in front of the class. Also, you will need to come up with a name for your new plant, and tell us the life cycle.”
- Split class into groups, and distribute materials. Before students start, “Remember! First look through your materials, and decide on which seed you’ll make. You can test out your first drafts, but the final test will be at the end of the next class.”
- Allow students to work for at least 30 uninterrupted minutes. Have a tub of water available for students to test if certain materials float or sink.
- Have students collect their materials in their container and wash hands.
- Water potatoes and favas, if necessary.

Wrap up:

Return materials.

Notes/Feedback:

Seed Types

Week 27.2
STANDARDS
4.SL.1, 4.LS1.1, 4.LS1.2

MATERIALS
- Each group's shoebox of materials
- A bucket of water for testing "floaters"
- An electric fan for testing "fliers"

Preparation:
Is there an electrical outlet close enough to the garden that you can plug in a fan? If so, great! If not, you will test the "fliers" back inside your classroom.
It's possible that none of the students' seeds will "work". What a great segue into a conversation about the amazing power of nature!
This is a gentle assessment: how do students work together? How are ideas heard, and discussed?

Background Information:
A suggestion on "testing" seeds:
Floaters: Seeds should float for at least 5 minutes.
Fliers: When dropped in front of a blowing fan, seeds should fly two or three feet.
Hitchers: Stick hitchers onto a students' clothing and walk 20 feet without the seed falling.

Procedure:
- Students enter the garden and explore.
- In their groups from early this week, distribute the boxes of materials.

- “You have thirty minutes (or however long) to finish your seeds. When we stop to clean up, you should be ready to test your seed in front of the class. Also remember to tell us the name of your seed, and a little about its lifecycle. For example: ‘Our group built a floater, and it’s called the Purple Waterberry. A purple waterberry seed falls off a purple waterberry tree, which usually grows by rivers, and the seed floats until it hit lands. There, if it finds enough soil, air, water and sunlight, the purple waterberry seed sprouts, and eventually grows into a huge tree. The tree blossoms in the spring and drops new seeds every fall.’”
- Students work on their projects, testing and modifying them, until clean up.
- Clean up, collect excess material.
- Have students ready in their groups.
- Each group presents their seed, tells its story, and tests their project in front of the class.
- After each group had a turn, debrief the experience.
- “Was this difficult? Was it easy? Which seed designs worked well? Which didn’t? What did you learn from this? Isn’t nature amazing?!”

Wrap up:

Make sure no junk is left in the garden.

Notes/Feedback:

Harvest Potatoes

Week 28.1
STANDARDS
4.LS1.1

OBJECTIVES
- Students learn about methods of potato harvesting
- Students harvest potatoes

MATERIALS
- Shovels
- Container to collect potatoes
- Tools for garden work

Preparation:
New potatoes are ready to harvest once the plants have already flowered, and begin to wilt a little bit. If potatoes have not flowered and been pollinated, postpone this lesson. Prepare garden work.

Procedure:
- Students enter the garden and explore.

- Gather students; check in about the season and weather. What are signs of summer approaching?
- "We are going to harvest our potatoes today. There are two ways to harvest potatoes. You can harvest 'new' potatoes, which is what we are going to do. New

potatoes are small, and are the newly formed tubers of the plant. They are formed after the flowers are pollinated—that is, it is best to eat them fresh. They are harvested in the late spring or early summer, and do not last very long. The other way to harvest potatoes is to let the plant grow all through the summer, and harvest them in the early fall. In this method, the potatoes grow much bigger, and their skin grows hard and thick. These kinds of potatoes can be stored in cool places underground, or in the grocery store, for many months without going bad. People used to grow enough potatoes to last them all year!"

- Bring students to the area with the potatoes. One at a time, or however it works for you, have students dig and pull out potatoes. This is a fun activity, take your time.
- After pulling the plants out, dig through the bed one more time to avoid leaving potatoes underground.
- Gather potatoes in the container. You will be cooking them later this week.
- Count the potatoes. Look at all the shapes, sizes and colors.
- If there is time, do garden work.

Wrap up:

Return materials. Wash hands.

Notes/Feedback:

Eating Potatoes

Week 28.2
MATERIALS

- Tools for garden work
- Electric burner
- Pots and their tops
- Colander
- Serving materials, and plates
- Salt
- Soap for hand washing
- Journals, pencils

Preparation:

Is there place where the electric burner can be plugged in, inside the garden? If so, great! If not, do the cooking in your classroom. Wash the potatoes and put them in their pots. Fill the pots with water.

Procedure:

- Students enter the garden and explore.
- Turn on the stove. New potatoes should only take 20-30 minutes to cook.
- In the meantime, students write in their journals. “Planting one potato can produce 5 or more new potatoes. If you take care of the earth, she will take care of you. How else can you take care of the earth?”
- As potatoes are finishing, drain the hot water.
- Students wash hands.
- Distribute plates, hot potatoes. Sprinkle salt on top, if you choose.
- Once all students have their snack, “We are going to go in a circle, and each person says something they are thankful for.”
- Eat, and enjoy!

Wrap up:
Compost serving materials, wash dishes.

Notes/Feedback:

Summer Shut Down

Week 29.1
STANDARDS
4.LS1.1

OBJECTIVES
- Students contribute to cleaning the garden for summer
- Students observe the nitrogen nodules on the fava bean's roots
- Students experience cutting cover crops

MATERIALS
- Scissors, one pair per student cutting down favas
- Full watering cans
- Tools needed for garden work

Preparation:
How are you shutting down the garden for summer? What work needs to be done? Perhaps you can have rotation stations. You can also add finished compost into the garden beds.

Background Information:
How to cut favas:

Today is the day you are cutting down the fava beans. Ideally the flowers are budding, and only beginning to bloom. If the favas have not flowered at all, postpone the cutting. If you do postpone, be sure to discuss (again) why you are cutting the fava beans, and why it is important to add nutrients to the soil. When you cut the cover crops, pull the plant completely out of the soil. Cut the plant into pieces, and push the roots back into the soil so that the nitrogen is released into the soil. (If you do not pull the roots out completely, the plant will re-sprout.) The plant body will decompose, also releasing nutrients into the soil.

Procedure:

- Students enter the garden and explore.
- Gather students. Check in about the season and weather.
- Bring students to the fava bed. Pull out several plants from the roots, and pass them around, asking students if they see anything interesting on the roots.
- (If your students have not yet seen the nitrogen nodules:) “These balls, or nodules, on the roots are full of nitrogen. When we cut the favas down, the nitrogen will stay in the soil. The rest of the plant, the stem and the leaves, are going to decompose, just like compost, and add even more nutrients into the soil. Why is it important that the soil has nutrients in it?”
- Show students how to pull the favas, cut them into 5 inch sections, and push the roots back into the soil. This will probably take quite a while.
- Once the favas have been cut, dig the stems into the soil a little bit, and then water the bed gently. Plants decompose faster when wet, and when in smaller pieces.
- Have garden work rotation stations, if possible.

Wrap up:

Return materials.

Notes/Feedback:

Class Discussion

Week 29.2
STANDARDS
4.SL.1

MATERIALS

- Journals, pencils
- Paper for you to record student responses

Procedure:

- Students enter the garden and explore.
- Class discussion: What have you learned this year? What surprised you? What do you want to know more about?
- In their journals, "Next year you are fifth grade gardeners. What do you want to plant in the garden? What activities do you want to do more of? What are you interested in?"
- Ask students to share out their responses, and record their responses. Keep this paper for next year, and try to incorporate their suggestions into their fifth grade year.
- With extra time, continue exploring.

Notes/Feedback:

Miss Rumphius

Week 30.1
STANDARDS
4.LS1.1

OBJECTIVES
- Students meditate on the power of a seed
- Students feel encouraged to play a role in taking care of the earth

MATERIALS
- "Miss Rumphius" by Barbara Cooney
- Sunflower seeds, at least one per student (or another summer-loving seed of your choice)

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and the weather.
- "Over this year, we talked about how we are all connected on this earth, and in this community. Here is a story about the same idea." Read "Miss Rumphius" and discuss the many lessons within the book.
-

- Hand each student a seed, and instruct them to hold it tight and close their eyes.
- "You may be thinking, 'One seed?!' but think about this. Inside your hand is one seed. It is a sunflower seed, and if you plant it and take care of it, it will grow in a tall, beautiful sunflower plant. The flowers are pollinated, and turn into seeds. One plant can produce 1000 seeds. So now you have 1000 seeds. Imagine you plant 1000 sunflower seeds, and then have 1000 sunflower plants. If each sunflower grows, and produces 1000 seeds, you will have one million seeds. Can you even imagine one million seeds? If you harvested the seeds from one million plants, you'd have one trillion seeds. Can you even imagine that? And this can go on forever, and in fact, it has been going on forever. Open your eyes, and look at your seed. Your one seed."
- "One way you can help our community is by planting this seed, and taking good care of it. Think about how much beauty you can bring to the world with a single flower. Think about how much joy you can bring the world with one kind word."
- Students put seeds in their pockets.
- Explore the garden, enjoying and noticing the flowers, plants, birds and bugs that make it all happen.

Notes/Feedback:

Thank You Letters

Week 30.2
MATERIALS
- Materials for garden work
- Journals, pencils

Preparation:
Is there more garden work to be done?

Procedure:
- Students enter the garden and explore.
- Gather students, reflect on the year.
- Continue cleaning the garden for the summer: pulling weeds, taking out the compost, whatever needs to be done.
- Distribute journals, give students time to look through their work from the year.
- In their journals, “Write a Thank You letter to something in the garden”. It can be to an insect, a plant, or even to the sun.

Wrap up:
Gather students; take volunteers to read the letter.

Notes/Feedback:

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The fifth grade curriculum is the least scripted of all class years. Students work in the garden, but on helping other students with their plants. The goal is that fifth graders are taking ownership of their nature education, helping direct the flow of conversations, and identifying the projects that need to be accomplished.

The main theme of fifth grade gardening is systems. Students spend all year learning about the ways that nature, communities, and cycles work together. Students also discuss the consequences of disrupting natural cycles and systems.

At the end of the year, fifth graders read Seedfolks, a young adult novel about a neighborhood transformed by a community garden project. This story is the foundation from which students design, plan, and carry out a community action project. With your guidance, students will become the agents of change in the garden, in class discussions, and in your community.

The Numi Foundation is deeply grateful to the writers of open-source materials for their contributions and inspiration to this curriculum.

Table of Contents

Welcome Back!

1.1
STANDARDS
5.SL.1

OBJECTIVES
- Students make observations after an extended break from the garden
- Students review and practice garden rules
- Students make class agreements

MATERIALS
- Poster board and pens
- Garden tools

Preparation:
Be clear about the difference between garden rules and classroom agreements. Perhaps your garden has rules posted that are school-wide, otherwise know beforehand what the rules are. (For example: Always walk, Ask before harvesting, etc). It is more effective to have fewer rules, but be sure that they are clear.

Procedure:
- Students enter the garden and gather in opening circle.

- Welcome students back to their outdoor classroom.
- “We need to review the rules of the garden and decide on some classroom agreements.”
- Call on students to name garden rules, and have students act them out.
- “We have garden rules to make sure everyone, including the animals and plants, stay safe in the garden. We also need to decide on our class agreements for this year. These are so that everyone feels safe and welcome here, and that all of our voices are heard. How do we want to agree to treat each other in this space? What do we want to bring into the garden? What do we want to leave out?” Draw a large circle in the center of the poster.
- Record student responses on the poster board: inside the circle write what students want to bring into the garden, and outside the circle write what they want to leave out. Discuss and clarify where needed. Have students sign the back. Keep this in your indoor classroom and review as necessary.
- Give students an extended explore time. Practice garden rules and class agreements. Decide on a gathering signal first. Guide students in looking for different things: Colors, something taller than you, a plant that looks healthy, a weed, a plant at the end of its lifecycle, a seed pod, something you don’t recognize, evidence of an insect.
- Practice your gathering signal. Gather students in the classroom.
- Share out observations from the garden explore time.
- “You are fifth graders now, and already have several years of experience in the garden. Fifth grade gardeners have more responsibilities and more jobs than kids in lower grades. As you learn to work together, you will be given more jobs. What are ways you can show that you’re ready for more responsibility in the garden?” Discuss.
- “Fifth grade is also a special year in the garden because we start to help the lower grades with their plants. As we discuss the interconnectedness of all living things, we will be able to help other grades with pest problems. We are going to learn about modern agriculture, and the effects that we have on our natural resources. At the end of the year, we are going to plan and do a project to better our community. I am looking forward to a fun, enjoyable year of learning. What are you excited about doing this year?”
- Review names of tools, tool safety, and their proper use.

Wrap up:

Return all materials.

Notes/Feedback:

Scavenger Hunt

1.2
STANDARDS
5.SL.1

Preparation:

Know what you are going to ask students to find. For example: a healthy plant, a plant that you don't recognize, evidence of a bird, three insects, a seed pod, something soft, something you do not recognize, a plant that is taller than you, a plant that you have tasted, etc.

Procedure:

- Students enter the garden and explore.
- Gather students. "I am going to send you on a scavenger hunt. I want to see that you are able to explore the garden while practicing our garden rules."
- Begin the scavenger hunt; have students find each item, and then come back to you before you say the next item to find.
- If there is time, let students help suggest items to find in the garden.

Notes/Feedback:

Teamwork makes the Dream Work

2.1
STANDARDS
5.SL.1

OBJECTIVES
- Students learn the meaning of teamwork, and practice teambuilding
- Students understand that teamwork is required for success in the garden
- Students find an example of nature working together in the garden

MATERIALS
- 4 bandanas
- Materials for cooperative garden work

Preparation:
The first few gardening classes really set the tone for the year. A lack of cooperation amongst students can be very destructive. Take time with team building exercises, and practice them as necessary. Be sure to debrief thoroughly at the end.
Also, have some tasks set up at the end for students to practice cooperatively.

Procedure:
- Students enter the garden and explore.

- Gather students; check in about season and weather.
- Review your class agreements. Ask a student to read the garden rules.
- “Today we are going to work on team building. Why do you think we start the year with team building? What are some jobs in the garden that we need to do cooperatively?” (All of them!)
- “I am going to give you a task. The job is to line up by birthday, January 1 is here, and December 31 is there. You may not touch another person, and you may not talk! If someone talks, the class has to sit down and start over.”
- Be clear with where the class should line up, and have them begin.
- After your students are lined up, have them say their birthday to check if they are in the correct order. Have students return to sitting.
- Debrief with questions like “Was that difficult? What was difficult? Was it frustrating when one person talked and you had to start over? What ways did you figure out to communicate without your voices?”
- “We are going to another task. You need to line up height. You may not talk. Shortest is here, and tallest over there. This will be harder, because four students will be blindfolded.”
- Choose four students to blindfold, and be sure that you are in a place without obstacles. “If you can see, you may gently help those who are blindfolded, but otherwise, you should not be touching anyone else.”
- After students are in height order, remove blindfolds, and have them seated.
- Ask the students who had been blindfolded, “How did it feel that you didn’t know what was happening? How did it feel to be helped? When in the garden might you need help? How do you want to be helped?”
- To the students who could see, “How did it feel to help someone else?”
- Have the students line up one more time by number of siblings. Tell them they can talk.
- After students have lined up, and have been seated again, ask “How was it to be able to talk? What was easier? What was difficult? What was it like when everyone spoke at once? How did you take turns?” Also ask questions based on your own observations.
- “When we are having a class discussion and everyone is talking at once, what happens? If one student keeps talking out, and I keep asking them to stop talking, how does it feel for the rest of the class? If three students are supposed to water the garden with one watering can, how can they cooperate?”
- Have students act out scenarios for the class, for example: 3 students are to share one watering can, 5 students are trying to look at the same insect and there is not enough space, or someone needs helping pulling out a weed.
- Put students in groups, give students each group a task, and have them practice working together cooperatively.

Wrap up:

Have students look for examples of animals and plants working together in the garden.

Notes/Feedback:

Cooperation and Systems

2.2
STANDARDS
5.SL.1, 5.LS2.1

Procedure:

- Students enter the garden and explore.
- "Earlier this week we did team building exercises. We thoroughly discussed the importance of being able to work together to achieve our goals. If you see someone not cooperating, or someone not helping the team, can we brainstorm some ways we can gently ask them to help?"
- Practice asking others to help, and/or cooperate.
- "This year we are going to learn, at length, about the ways different systems in the world work together. From the people in communities, to the water drops in the water cycle, we are going to discuss it all. What are some parts of nature that you already know work together?" Discuss.
- Students continue to explore the garden, naming examples of "systems" in the garden.

Wrap up:

In partners, show examples of systems in the garden.

Notes/Feedback:

Ecosystems

3.1
STANDARDS
5.SL.1, 5.LS2.1

OBJECTIVES
- Students can define ecosystem to mean an environment composed of living and nonliving things
- Students know that ecosystems can vary greatly, but are consistent in being comprised of living/nonliving
- Students learn that a plant or animal's must be met within its ecosystem

MATERIALS
- Tools to prepare a garden bed
- A list of what other grades are planting this fall

Preparation:
Write ECOSYSTEM on the top of your whiteboard.
Find out what other grades are planting, and have a list.
Know which area in the garden you will prepare for planting.

Background Information:

An ecosystem is a community of living and non-living things that work together. Ecosystems have no particular size. An ecosystem can be as large as a forest or as small as a tree. This lesson is meant as a review. In past grades, ecosystems are defined relatively simply. Here the idea is to reinforce that all elements in a system work together. This lesson will serve as a foundation for following lessons in interconnectedness, food webs, non-native species, and integrated pest management.

Procedure:

- Students enter the garden and explore
- Gather students; check in about the season and weather.
- "Let's look around our garden. Can you name what you see?"
- List student responses on whiteboard. List responses into two columns, one with living organisms and one with nonliving, but do not tell students why you are organizing it that way. If students aren't listing nonliving things, some prompting may be necessary. Nonliving things should include soil, water, air and heat/sunlight.
- After all responses have been taken… "I have listed your answers into two columns. Can anyone see the pattern? Why did I separate your responses? How are the things in column A different from column B?
- Facilitate a class discussion.
- "You just described our garden ecosystem here in Oakland. You figured out that it is made from living and nonliving elements. The living things depend on the nonliving, and the nonliving can be affected by the living. They work together. The point here is that all elements here are connected, and not one can be separated from the rest without there being a large effect. We are going to see how this works in the coming weeks."
- "A forest ecosystem is also compromised of living and nonliving components. Living things must find food and shelter in its ecosystem. You can imagine that plants and animals have specific needs—a whale needs different things than a bear, right?"
- "Turn to a partner and discuss the forest ecosystem, and some animals that live within it. Do the same for the ocean, compare and contrast."
- Give students time to discuss.
- "Could we call our community an ecosystem? What kinds of people and places exist within our community? What do people need to live? How do people meet their needs within their community? What if needs are not met? How can we help?"
- Discuss.
- "We are working within the garden ecosystem here in our school. (Tell the students what other grades are planting.) What do you think we should plant? What could we plant to share with other grades, and with people in our

community? Be mindful that it is the fall, and we need to plant a cool weather plant."

- Class discussion; agree on a plant or two.
- Go to the area where you will be planting, and pull weeds, pick stones, revive soil.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Seed Planting

3.2

MATERIALS

- Seeds for planting
- Materials for planting: compost, watering cans, craft sticks, marker
- Hand tools

Preparation:

Based on the plants you are planting, become familiar with the seed requirements, such as planting depth and row spacing.

Procedure:

- Students enter the garden and explore.
- Bring students to the area that they began to prepare earlier this week.
- Add compost, dig it in.
- Plant seeds that students chose earlier this week.
- Water the garden bed and label with plant name and date.

Wrap up:

Return materials.

Notes/Feedback:

Food Webs

4.1
STANDARDS
5.LS2.1, 5.SL.1

OBJECTIVES
- Students review the concept of a food web
- Students learn surprising connections among elements in a web
- Students discuss consequences of altering the web

MATERIALS
- Blank stickers (i.e. name tags)
- Permanent markers
- A ball of yarn or string
- Watering cans

Preparation:
This lesson assumes that students are already familiar with the roles of plants, animals, decomposers and the nonliving elements of the environment.
For this activity to work properly, the class must represent all categories within a system. Remember that decomposers can “eat” anything (and return it to the soil),

plants can “eat” sun, soil, water and get eaten by animals. Animals eat plants or other animals, and get eaten by other animals or decomposers.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- “Sometimes we hear people talk about the food chain. A food chain refers to the order in which things are eaten. You could say that a shark is at the top of the food chain, a shark eats other fish, those fish maybe eat other fish, and those fish eat plants, and plants get nutrients from the soil. And so on. Can someone give another example?”
- “As we will continue to explore all year, nature actually works in a system, in a community, where all parts work together. I will show you how. Just like last week, can you name everything you see in the garden?”
- If a student says “Greens”, give him/her a sticker that says “Greens” on it. Continue until all students are labeled. Push students towards naming the less obvious (sun, soil, water) and decomposers (fungus, bacteria, invertebrates). Once all students are labeled, gather everyone in a standing circle.
- Give one student the string to start. Instruct him/her to hold on to one end. “Pass the rest of the string to someone that you eat, or get eaten by.” The next person holds onto the string, and passes the ball of string to someone they eat or get eaten by. Continue until everyone is in the web.
- (This could look something like: Greens☐soil☐Lettuce☐Caterpillar☐Bird☐Fig tree☐Fungus☐Ladybug☐Aphids☐Wheat…etc).
- “This is not a chain, this is a web! We are all connected to each other. This is a system, an ecosystem. When we talk about animals at the ‘top of the food chain’ the animals that don’t get eaten, we can see now they do get eaten, by the decomposers. The decomposers return everything to the soil, where new plants grow from. It is all connected in an intricate web of life.”
- Ask the ‘fungus’ to pull on his/her part of the string. Ask “Who else feels the tug? Who is connected to the fungus?” Ask the ‘ladybug’ to pull the string. Continue, finding interesting connections between unexpected members of the ecosystem.
- “What would happen if I sprayed a chemical that killed all the ladybugs? Would that affect the rest of the ecosystem?” Discuss.
- I am going to ask the ‘ladybug’ to drop his/her part of the string. If you feel your string move when his/her drops, then you can drop yours as well, and so on. Ask the ‘ladybug’ to drop his/her part of the string.
- The whole web should collapse very quickly.
- Gather students. “What did you learn from that activity?”
- Discuss.
- Probe, “What connections surprised you? What did you learn from the part when the whole web collapsed? If a farmer came to you and said they wanted to kill all the aphids on their farm, what might you say to them?” (Aphids provide food for ladybugs, etc).
- “Some animals on our planet are going extinct. How does that affect the habitat in which it lives?”
- Discuss.
- Water your plants.

Notes/Feedback:

Journaling

4.2
STANDARDS
5.SL.1

MATERIALS
- Journals, pencils

Preparation:
Think about the procedures you wish to share with your students for journal-writing days. Will you share the prompt beforehand? Will it be written on a board somewhere? What are the parameters of where students can sit?

Procedure:
- Students enter the garden and explore.
- Students look for examples of plants and animals interacting in the garden.
- Distribute journals. “These will be your garden journals for the year. We will be writing and drawing in here this school year.”
- “Today we are going to do our first journal prompt to practice how we use our journals, and how we sit in the garden to write. Often in our journals, we will think and talk about nature. Today we are going to write about our discussion about food webs and community.”
- Go over procedures for journal-writing days.
- Students sit somewhere they enjoy and write in their journals, “What are you connected to? Write down as many as you can think of. Explain how 3 of them are connected to you. It can be people, animals, plants, or whatever inspires you.”

Wrap up:
Share, in partners.

Notes/Feedback:

Integrated Pest Management

5.1
STANDARDS
5.SL.1, 5.LS2.1, 5.ESS3.1, 3.PS2.1

OBJECTIVES
- Students hear an example of an ecosystem being damaged
- Students reflect on the many consequences of altering an ecosystem
- Students are introduced to integrated pest management

MATERIALS
- Tools for garden work

Preparation:
Know what garden work needs to be done.

Background Information:
There are varying reports on this story of parachuting cats into Borneo. Some believe it to be something of a myth, or at least slightly exaggerated. Whatever the case, it is an important story to tell, and to learn from. Introducing, or removing, something from an ecosystem can have disastrous consequences.

Procedure:
- Students enter the garden and explore.

- Gather students; check in about the season and weather.
- “Last week we discussed the interconnectedness of elements in a system. When we built our food web, we saw how changing one thing can really affect everything else, sometimes in surprising ways.”
- “I am going to read you a story. Listen carefully.”
- Read, “In the early 1950s, there was an outbreak of a serious disease called malaria amongst the Dayak people in Borneo. The World Health Organization tried to solve the problem. They sprayed large amounts of a chemical called DDT to kill the mosquitoes that carried the malaria. The mosquitoes died and there was less malaria. That was good. However, there were side effects. One of the first effects was that the roofs of people's houses began to fall down on their heads. It turned out that the DDT was also killing a parasitic wasp that ate thatch-eating caterpillars. Without the wasps to eat them, there were more and more thatch-eating caterpillars. Worse than that, the insects that died from being poisoned by DDT were eaten by gecko lizards, which were then eaten by cats. The cats started to die, the rats flourished, and the people were threatened by outbreaks of two new serious diseases carried by the rats, sylvatic plague and typhus. To cope with these problems, which it had itself created, the World Health Organization had to parachute live cats into Borneo.”
- “Can someone explain the sequence of events that happened here? What do you think about this? What surprises you?”
- “If the chemical DDT gets into the soil, then what happens?” (The plants absorb it through its roots and then people eat plants with DDT in it).
- “What does this have to do with our garden?” Discuss.
- “We do have ‘pests’ in our garden. Aphids, snails, and slugs can be a really problem. Imagine you are a farmer and your family depends on you to be able to sell your fruits and vegetables. One pest can ruin a whole crop, so a farmer must think about the way she takes care of her plants. What kinds of pest damage have you seen in our garden?”
- “One of our jobs as fifth grade gardeners is to help other grades with any pest problems that we see. This is called ‘Integrated Pest Management’, or IPM, and we are going to talk about it more in the coming weeks. Some people are experts in IPM and help farmers with their crops. We are going to help our schoolmates by taking time to look for pest damage and offer suggestions.”
- “For example, let’s say we noticed a caterpillar eating the fourth graders’ greens. What could we suggest? Should we spray a chemical to kill all the caterpillars? No? What could be other side effects of doing that? What’s a better idea?” Discuss.
- “It is helpful to think about an insect’s natural predators. What eats caterpillars?” (Birds).
- “How could we attract birds to our garden?” Discuss.

- “Right, we could build bird feeders, add bird baths, and so on.”
- “In the meantime, let’s take care of our plants.”
- Do garden work.

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: Creative Writing

5.2
STANDARDS
5.LS2.1, 5.SL.1

MATERIALS

- Journals, pencils

Procedure:

- Students enter the garden and explore.
- Students look for signs of pest damage, and try to identify which pest it may be. Caterpillars usually leave holes, aphids can cause leaf discoloration, snails leave slime, etc.
- In their journals, “Imagine someone took all the birds out of the forest. Write a story describing what happens next.”

Wrap up:

Share, in small groups.

Notes/Feedback:

Soil Made my Lunch

6.1
STANDARDS
5.PS3.1, 5.SL.1, 3.PS2.1

OBJECTIVES
- Students can trace their diet to the soil
- Students know that animals depend (some directly, some indirectly) on plants for food
- Students understand the connection between healthy soil and healthy people

MATERIALS
- Small whiteboards and pens for students

Preparation:
Know which plants are ready for harvest, if any.

Background Information:
This is a straightforward lesson that many students enjoy. The idea that our health and the health of our planet are dependent on the state of our soil is a concept that students should be introduced to from an early age. However, the standard 5.PS3.1 states, in part: “Use modelsto describe that energy in animals’ food was once energy from the sun”. It is important be clear that our food can be traced to the soil AND that all plants depend on the sun to grow. This will be addressed in the next lessons as well, but this lesson builds

a foundation for students to think about how depleted or polluted soil affects their health.

Procedure:

- Students enter garden and explore.
- Gather students; check in about the season and weather.
- "Often farmers will use dangerous chemicals on their crops to protect them from pest damage. Last we were talking about the disastrous effects that a single change to an ecosystem can cause. So not only can a chemical dramatically affect the other insects and animals in the area, but it can also end up in the soil. We are going to talk a lot more about soil health in the following weeks, but today we are going to discuss why the soil matters so much."
- "Gardeners and farmers often talk about the importance of growing healthy soil, and that our health is directly connected to eating strong plants from healthy soil. Is
    - everything we eat from the soil? Can anyone think of anything we eat that is not from the soil?"
- Ask students to think to themselves, and after a moment ask them to turn to a partner to see if they can think of a food that does not come from the soil. Listen to the discussions, and pick out a food that is named.
- For example: "I heard someone say that pizza is not from the soil. Let us discuss!"
- List all of the components of a pizza on your board: Crust, tomato sauce, cheese, mushrooms, chicken, etc. Let students "build" a pizza with their suggestions, be sure to have at least one vegetable topping, and one meat topping.
- "Let's start with crust. What is the main ingredient?" When a student responds with "wheat", write Wheat on the board, and ask where wheat grows, and then write Soil. Repeat with all ingredients. Eventually your board will look like this:

Crust ☐ Wheat ☐ Soil
Tomato sauce ☐ Tomato plant ☐ Soil
Cheese ☐ Milk ☐ Cow eats ☐ Grass ☐ Soil
Mushrooms ☐ Soil
Olives ☐ Olive tree ☐ Soil
Chicken eats ☐ Grains and worms ☐ Soil

- Split the class into groups of 5-6 students, and allow them to choose a meal and diagram it's components to return to the soil.
- When students have finished, allow them to present to their classmates.
- "Was there anything that surprised you during this lesson? What ingredients did you have a hard time retracing to soil? What can you assume about an ingredient that is many steps away from the soil? If you can't figure out what something is made from, what can you say about its wholesomeness?"
- Class discussion.
- "So, if everything we eat essentially grows from the soil, what can we say about the connection between our health and the health of the soil?" (Healthy soil grows healthy plants which grow healthy people!) Discuss.

- “What are some ways that you know of to keep soil healthy? How do you ‘grow’ healthy soil?”
- After concluding the discussion, encourage students to walk around the garden and see what kinds of meals they could make from the produce ready to harvest.

Wrap up:

Harvest something ready to eat, and acknowledge the soil from which it came.

Notes/Feedback:

Journal Prompt: Soil

6.2
STANDARDS
5.SL.1

MATERIALS
- Tools for garden work

Preparation:
Is there garden work to be done?

Procedure:
- **Students enter the garden and explore.**
- **Continue looking for evidence of pest damage.**
- **Do garden work.**
- **Return materials.**
- **Encourage students to feel and smell the soil from different places in the garden. See if they can describe what soil smells like, feels like, looks like.**
- **In their journals, "What does the soil remind you of? What memories does it bring back?"**

Wrap up:
Share, in partners.

Notes/Feedback:

It Starts from the Sun

7.1
STANDARDS
5.PS3.1

OBJECTIVES
- Students learn that energy from plants was once energy from the sun
- Students know that animals depend on plants that make energy from the sun
- Students trace living things to the sun

MATERIALS
- Tools for garden work

Preparation:
Prepare garden work.
Check to see if anything is ready to harvest and taste.

Background Information:
Photosynthesis is the process by which plants convert Carbon Dioxide, Water and Light into Sugar and Oxygen. Assuming that students have studied photosynthesis in depth outside of the garden, this lesson only touches on photosynthesis conceptually.
In this lesson, we are making a distinction between the fact that the sun is the main source of energy for all plants and animals, and the idea that healthy soil grows healthy plants while polluted soil grows polluted plants.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- “Last week we traced everything in our diet back to the soil. Why is it important to think about the health of the soil? What else is connected to the health of the soil? What are ways to build healthy soil?”
- On your board write Beef☐Cow☐Grass☐Soil.
- “When we diagrammed some meals last week, we saw that we could trace our food to the soil. However, we need to make a distinction. Scientifically, most of the mass, or substance, that makes up a plant is made from sun energy. What do you think that means?”
- Class discussion.
- “During photosynthesis, plants convert sunlight into sugar, which is energy for the plant. The plant stores this food, and uses it to grow big and strong. So even though plants need to get nutrients and water from the soil, the plant builds new cells and can grow because of the energy from the sun. One example is that the leaves of a carrot make energy from the sun, the stem of the carrot sends these sugars down to the root and stores it there for later. A carrot root grows big and strong from the sugars that the leaves produced. Have you tasted a carrot? Isn’t it sweet?”
- “Everything we eat, though it comes from the soil, is made from energy from the sun. Can animals make food from the sun? No? So what do we depend on?” Discuss.
- “Let’s go back to the example that some people eat beef, cows eat grass, grass grows from energy from the sun. Without grass, there’d be no cows! Cows cannot produce their own food, no animal can for that matter. All animals depend on energy from plants, which get their energy from the sun.”
- Class discussion.
- Students go into the garden, find 5 living (or previously living) things, and trace its origin to the sun. (i.e. The garden beds are made from wood, wood is from trees, trees grow from energy from the sun. OR Lettuce grows from energy from the sun.)
- Do garden work.
- Find something to harvest and taste. “How did this plant get energy to grow?” (The sun!). “We are eating sun food!”
- Taste, and enjoy.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Assessment

7.2
STANDARDS
5.PS3.1, 5.LS2.1

MATERIALS
- Journals, pencils

Preparation:
This week's journal prompt is long, you may want to write it on the board before class.
- Name 10 things in the garden. Write them in a circle. Make sure you have plants, animals, decomposers, and nonliving elements. Draw lines to connect them in a web.
- Write a few sentences describing what would happen if some chemicals leaked into our soil. What would be affected?
- Write a few sentences describing what would happen if we took the sun away.
- What is something in the garden that you are thankful for?

Procedure:
- Students enter the garden and explore.
- Gather students. "Over the past weeks, we have been talking about interconnectedness, ecosystems, and the sources of energy of all living things. I am interested in seeing where you are with all of this information. I am going to give you a journal prompt, and am going to come around to see what you are working on."
- Give students, plenty of time to work. Go around and check in with students and their thought processes.

- As students finish, give them time to look for plant damage in the garden.

Wrap up:

Discuss some possible responses to the prompts as a whole class.

Notes/Feedback:

Modern Agriculture

8.1
STANDARDS
5.PS2.1, 5.SL.1, 5.ESS3.1

OBJECTIVES
- Students discuss some characteristics of modern agriculture
- Students understand that a declining farmer population is required to grow more food
- Students discuss consequences of some modern agriculture practices

MATERIALS
- "The Vegetables We Eat" by Gail Gibbons
- Journals, pencils
- Tools for garden work

Preparation:
"The Vegetables We Eat", though meant for younger grades, does a good job of introducing some aspects of modern agriculture. The point here is not that modern agriculture is good or bad, just that it exists as a result of an increased demand on fewer people.
Prepare garden work.

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and weather.

- “What do you know about farms? What do you think of when I say farm, or farmer?” Discuss.
- “If you go to the store and buy an apple, where did it come from? How many people do you think it took to get you that apple?”
- “A long time ago, most people grew their own food, and otherwise traded something of theirs in exchange for crops. All over the world, people have a history in agriculture—growing food or raising animals. Even less than a hundred years ago, much of Oakland was covered in fruit trees, and eventually canning factories that preserved the fruit. The Fruitvale neighborhood of Oakland was one of these places, covered in trees and canning factories. Nowadays, many of us are very far away from the people and places that grow our food. When we talk about the system that brings that apple to the grocery store, we are talking about modern agriculture.”
- Read “The Vegetables We Eat”, and discuss the parts about food production and distribution. Challenge students to name all the jobs that they see.
- “Modern agriculture can mean all kinds of things. In this book, we see farmers, farm workers, buyers, distributors, and markets all involved in the process of bringing you food. In recent history, more and more people have moved from the country to the city, leaving less people to farm. There are less and less farmers every year, and this small amount of people have to grow more and more food. Farms have become enormous. What kinds of problems do you think could arise from big farms?”
- Class discussion. Pose some scenarios:
- “You go to the store and buy an apple. It was harvested two weeks ago, and traveled 2000 miles to get to your store. What do you think about that?”
- “Imagine you are a farmer and there is an aphid infestation on your broccoli crop. What would you do?”
- “Imagine you only grow corn, because the supermarket will not buy your other crops. What is going to happen to your soil?”
- Discuss. (The point here is that because a small population is required to grow a lot of food, sometimes shortcuts are taken, often with large consequences.)
- “What are the consequences of using pesticides? What are the consequences of not talking care of soil? What are the consequences of growing only one type of crop—what would happen to your crop during an infestation?”
- Class discussion.
- Give students time to look for pest damage in the garden. Students record their observations in their journals, and make suggestions.
- Garden work.

Wrap up:

Return materials.

Notes/Feedback:

Journaling: Pests

8.2
STANDARDS
5.ESS3.1

MATERIALS
- Journals, pencils
- Paper

Procedure:
- Students enter the garden and explore.
- Distribute journals; students continue to look for pest damage.
- Gather students, and discuss their findings. Discuss solutions for a particular pest problem.
- Have a couple of students write a letter to the classroom whose plants need help: naming the problem, and offering a solution. The rest of the class can continue exploring, or choose something to draw in their journal.

Wrap up:
Deliver the letter to the appropriate classroom.

Notes/Feedback:

Cesar Chavez

9.1
STANDARDS
5.ESS3.1

OBJECTIVES
- Students learn about the life and work of Cesar Chavez
- Students learn about the struggle of farm workers on large farms
- Students learn about organizations that encourage fair labor practices

MATERIALS
- "Harvesting Hope: The Story of Cesar Chavez" by Kathleen Krull (or something similar)
- Products labeled "Fair Trade USA" (perhaps Numi Tea)
- Watering can

Preparation:
In the beginning of class, you are pretending to be an unrelenting farm owner. Try your best to be convincing! You will be giving your students a difficult, tiresome task. Look around the garden and come up with something. (Washing the garden beds, collecting all the stones, pulling weeds…)
You will need to bring something Fair Trade USA certified.

Procedure:
- Students enter the garden and explore.

- Gather students; check in about the season and weather.
- With your best authoritative voice, put your students to work. Tell them they may not stop to rest, to talk, or to drink water. Students who disobey will be sent to the principal's office.
- After students get the point, gather students. Read "Harvesting Hope: The Story of Cesar Chavez" and discuss.
- Discuss the effects that a large farm can have on the environment: the soil and water, AND the effects it has on farm workers. The struggle of the farm worker is a terrible, and important, topic of discussion.
- Show students the products you brought labeled "Fair Trade USA". "As we learned, in some modern farms, farmers end up using chemicals that hurt the soil and end up in the water. Some farm owners have so much land that they must hire many people, yet they do not pay them enough or treat them well. Thankfully, many people, like Cesar Chavez, believe in protecting the environment and farm workers from these terrible practices. There is an organization called "Fair Trade USA" that goes to farms around the world and checks to see that the farmers take care of their employees and their land. Then the organization labels their products with this stamp, so buyers can know a little more about the product that their buying."
- Discuss, and show Fair Trade products.
- "Some foods, like bananas, chocolate, tea and coffee are grown very far away—and therefore is it hard for buyers to know anything about where they came from. It is important to have organizations and people that are dedicated to making sure that the people producing their products are healthy, safe and well taken care of."
- If there is time, and if it's dry, water the garden. Allow students to take breaks, talk and drink water!

Wrap up:

Return materials.

Notes/Feedback:

Numi Guest Speaker

9.2
STANDARDS
5.ESS3.1

Preparation:
Arrange a guest lecture with someone from Numi Tea.

Procedure:
- Students enter the garden and explore.
- Have a guest lecture with a Numi Organic Tea employee. Have him/her discuss the process that their company goes through to ensure the health and safety of the farmers and farm workers that grow their tea.
- Give students plenty of time to ask questions.
- Students take their guest on a tour of the garden.

Notes/Feedback:

Organic Farming

10.1
STANDARDS
5.ESS3.1, 5.LS2.1

OBJECTIVES
- Students learn about organic farming practices
- Students understand that organic farming is a systems approach
- Students prepare for their upcoming guest lecture

MATERIALS
- "Molly's Organic Farm" by Carol L. Malnor
- Journals, pencils
- Tools for garden work

Preparation:
Prepare garden work.

Background Information:
These days, organic farms can vary greatly in size, mission, and practice. The generally idea is that organic farmers try to use a systems approach in maintaining the health of

the land, plants and people. Some methods organic farmers use instead of noxious pesticides are:

- Practicing crop rotation (So pests and diseases do not get used to a certain crop always being in a certain place)
- Maintaining high soil fertility through composting and cover crops (Often pests attack weak plants)
- Planting a diverse set of crops (Diverse crops attract diverse insects, encouraging natural pest control)

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "We have been discussing modern agriculture for the past few weeks. Not that all modern agriculture is bad, there are plenty of large farms that do try to take care of the environment. However, you can see how easy it is for practices to become harmful when farms become huge. Last week we learned about an organization that promotes farms and farmers that take care of their workers, and their land."
- "Another type of farming is called Organic Farming. What do you know about organic farming?" Discuss.
- "Organic farmers tend to have smaller farms, with many types of crops. Why might it be easier to take care of a smaller farm?"
- Read "Molly's Organic Farm".
- Discuss different ways that organic farmers take care of their soil, and their crops. "Organic farmers try to copy nature when they take care of their garden." Discuss crop rotation, soil fertility, and biodiversity.
- "There are many ways that you can take care of your soil and plants. Some are a little more complex, like practicing crop rotation, and some are quite simple. When we cover a plant with row cloth, we are also preventing snails from eating our plants in the night. When we attract birds to our garden, we are managing the caterpillar population. There are many solutions, if we take the time to learn about them."
- Students go into the garden with their journals and pretend to be organic farmers. Students take note of all the 'organic practices' they notice in the garden. (Cover crops growing, compost pile, bird feeders, row cloth, etc).
- In their journals, students write all the questions they would like to ask an organic farmer in preparation for the guest lecture later this week.
- Garden work.

Wrap up:

Return materials.

Notes/Feedback:

Guest Speaker: Organic Farmer

10.2
STANDARDS
5.ESS3.1, 5.LS2.1, 5.SL.1

MATERIALS
- Journals (with the students' questions from last class)

Preparation:
Arrange a guest lecture with a local organic farmer. There are many urban farmers in the greater Bay Area.

Procedure:
- Students enter the garden and explore.
- Guest lecture with visiting Organic Farmer.
- Students have time to ask the questions that wrote during the last class.
- Students take their guest Farmer on a tour of the garden. Students show the farmer the ways they take care of the garden naturally.

Notes/Feedback:

Winter Check In

11.1

OBJECTIVES

- Students notice winter changes on campus and in the garden
- Students decide on what garden projects need to be done
- Students do garden work to prepare the garden for winter

MATERIALS

- Tools and materials for garden work
- Pencils and paper (if students are going to be looking for pest damage)

Preparation:

There are many garden jobs to do as winter approaches: Watering, collecting leaves for mulching, adding compost to plants, weeding. Know which jobs are in the cards for today. Spend most of the class today working in the garden.

Procedure:

- Take students on a walk throughout the campus, looking for signs of seasonal changes.
- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- 'It is winter! What changes are you noticing on campus? In the garden? In our neighborhood? How are the plants changing? How is the weather changing? What have you noticed about the light? Is your mood changing? Your energy?"

- “It is important to spend extra time taking care of our garden as winter approaches. With the colder, shorter days, our plants need some extra attention. Go into the garden and come back with one or two suggestions of work that needs to be done.”
- As students return, discuss what they found. Split the class into groups to do garden work. Some students can look for pest damage and write a letter with advice on managing those pests.

Wrap up:

Return materials, wash hands. Deliver the letter to the appropriate classroom.

Notes/Feedback:

Journal Prompt: Winter

11.2
STANDARDS
5.SL.1

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Students find someplace they really enjoy to sit. Encourage students to sit silently for three minutes, just listening and looking.
- In their journals, "Winter is a time of rest. Many animals hibernate, many trees lose their leaves and save energy until the spring. How are you feeling this time of year? Do you notice any changes in yourself?"

Wrap up:
Share, in partners.

Water

12.1
STANDARDS
5.ESS2.1, 5.ESS2.2, 5.SL.1

OBJECTIVES
- Students explore what they know about water
- Students learn some interesting water facts
- Students explore the garden for evidence of water

MATERIALS
- A see-through water bottle
- Watering cans, if the garden is dry

Background Information:
Water Facts:
- Water is made up of two elements, hydrogen and oxygen
- Every living things on Earth requires water
- Water has three states, solid, liquid and gas. All three are found naturally on Earth
- Water covers around 70% of the Earth's surface
- Most of the Earth's water is in the ocean
- Water goes through a cycle
- About 70% of an adult's body is made of water
- Water dissolves more substances than any other liquid. Traveling water carries chemicals, minerals and nutrients with it
- Much of our fresh water is underground in aquifers
- The same water that existed on Earth millions of years ago, is the same water on Earth today

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- “We are changing topics for the next few weeks and we are going to learn all about water. Before we get started, I want to know everything that you know about water.”
- As students respond, write their responses on the board. Take your time with this; let them mull and explore their subconscious for a while.
- Review responses, and discuss any questions that may come up.
- “This is a really great start. We are going to go more in depth over the next couple of weeks. You are about to explore the garden for evidence of water, but first, take a look at the water in my water bottle.” (Hold up your bottle).
- “This is the same water that has existed since the beginning of the world. Water cannot be created or destroyed by humans. It can be used, cycled, and changed, but it is always here. The same water that flowed over mountains in Greece 10,000 years ago still exists on Earth today, just in another form. The water in this bottle could be the water that someone drank 500 years ago, combined with water from the Nile River in Egypt, combined with water from the polar ice caps. Water is infinite!”
- “With this in mind, go explore the garden. Find evidence of water.”
- Evidence could include, but is not limited to: Sand (weathered by water), dew, actually seeing water, feeling moisture deep in the soil, robust plants, looking inside a plant, etc.
- Water your plants, if they need it.

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: Tree Drawing

12.2
STANDARDS
5.SL.1

MATERIALS

- Journals, pencils
- Tools for garden work

Preparation:

Write on the board:
Roots: Who or what keeps you grounded?
Trunk: Who or what keeps you standing tall?
Branches: What are you reaching for?
Leaves: What talents do you have?
Fruit: What are your big goals?

Procedure:

- Students enter the garden and explore.
- Do garden work.
- For this journal activity, students need to see the board. In their journals, “Draw a tree with roots, a trunk, branches, leaves and fruit. Pretend you are the tree. Label the different parts.”

Wrap up:

Take volunteers to share in front of the class.

Notes/Feedback:

The Water Cycle

13.1
STANDARDS
5.ESS2.1, 5.ESS2.2, 5.SL.1

OBJECTIVES
- Students learn about the basic stages of the water cycle
- Students can define evaporation, condensation, precipitation
- Students learn the difference between fresh water and salt water

MATERIALS
- Book about the Water Cycle
- Definitions of evaporation, condensation, precipitation printed

Preparation:
Find a book that you like that explains the water cycle. I do not suggest one here, and there are so many options!
Print out the definitions of evaporation, condensation and precipitation. Each definition should be on a different page.

Background Information:
The water cycle refers to the movement of water on, below and above the Earth. It is certainly a large, and complicated, topic to discuss in just a few weeks, but students should understand the basics. We often begin talking about the water cycle in the ocean. The sun warms the ocean surface, and water evaporates, changing from liquid to gas. Only fresh water evaporates (evaporation), the salt stays in the ocean. The gas

condenses (condensation) in the cooler temperatures of the atmosphere, and falls back to Earth (precipitation) as rain or snow. Water eventually flows back to the ocean.
In the discussion around water being either salty or fresh, there are actually a few other categories, including brackish (less salty than ocean water) and brine (saltier than ocean water). You may choose to explore these categories as well.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "Last week we began to talk about water. You seem to know a lot about water, and today we are going to learn more. We are going to learn about the basic water cycle.
- There are three main words that you need to know: evaporation, condensation, precipitation. Do any of them sound familiar?"
- Split the class into three groups. Each group gets a definition, and has to figure out how to act out their action to the rest of the group.
- Gather students, and let them present.
- Ask the group questions to check for understanding.
- "The water cycle is the way that evaporation, condensation and precipitation work together. (Draw on your board as you narrate): The cycle generally works like this: Most of Earth's water is in the ocean. The sun heats up the surface of the water from oceans, rivers and lakes. Even though the ocean is salty, the salt stays in the ocean. Only pure water is evaporated. Anyway, this gas goes into the atmosphere where it joins with other water molecules, and they condense into clouds and become liquid again. The cooler temperatures change the water gas into water liquid. Have you ever seen water drops on your bathroom window after a hot shower? This is condensation—the hot steam from the shower cools on the glass and goes back to liquid. Anyway, clouds become full of water and fall back to Earth—this is precipitation. If it rains, eventually the water falls down mountains and joins streams, streams join to form rivers, and rivers flow into the ocean. If it is falls as snow, snow often stays on the tops of mountains for months, or maybe all year round. When temperatures warm in the spring or summer, snow melts and eventually this water flows back to the ocean as well. Here, the process begins again!"
- "The water is in the ocean is salty, as you know. The water in clouds, streams, rivers, lakes and snow is called fresh water, that is, it does not have salt."
- Read the book you chose about the water cycle.

- Check for understanding. Ask about difference phases of the cycle. Ask if different water forms are fresh, or salty. For example, the Atlantic Ocean, Lake Merritt, the Mississippi River, a waterfall, a pond, etc.
- With extra time, check for pest damage in the garden.

Notes/Feedback:

Journal Prompt: Water

13.2
STANDARDS
5.ESS2.1, 5.ESS2.2

MATERIALS

- Pencil and paper for students doing a pest damage report
- Journals, pencils

Procedure:

- Students enter the garden and explore.
- Again, check for pest damage. If students have a recommendation for another class, choose a few students to assess the damage and write a letter to the relevant classroom.
- In their journals, "Draw the water cycle. And then, if you could be inside a drop of water, where would you go and why?"

Wrap up:

Share, in partners.

Notes/Feedback:

From the Sierra to the Pacific

14.1
STANDARDS
5.ESS2.1, 5.ESS2.2, 5.SL.1

OBJECTIVES
- Students review the water cycle
- Students learn about the water cycle in the greater Bay Area
- Students name the geological features that water passes through in the local water cycle

MATERIALS
- A copy of the map on page 3 of the Supplement page
- Tools for garden work

Preparation:
This lesson borrows from the "Save The Bay's San Francisco Bay Watershed Curriculum" simply because it is so excellent. I suggest that you use the activity where students model California's landscape with their hands and arms. Become familiar with this, so that you can teach it.

Copy the map on the third page to have available for students to look at.
In Yosemite, which is in the Sierra Nevada Mountains, precipitation is often snow. Snow stays in on the mountain tops, and melts in the spring. Water flows, or falls, off

mountains (the longest continuous waterfall in North America is Yosemite Falls) and joins rivers and streams, and winds up in the Pacific Ocean.
Prepare garden work.

Background Information:

Refer to Teacher Supplement for additional information.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- Review the water cycle.
- "When we have been talking about the water cycle, we have been discussing the general pattern of water from ocean back to the ocean. Now, we are going to give these mountains, streams, and rivers their names!"
- Do the "Watershed in Your Hands" activity.
- It is worth mentioning that as water evaporates and forms cloud, wind coming off the ocean blows the clouds East, towards the mountains. The clouds cannot blow over the mountains, so they sit there, and drop their rain and snow on the mountains.
- Review the names of the different landmarks; Sierra Nevada Mountains, San Joaquin River, Sacramento River, The Delta, The Bay, The Ocean.
- Which are fresh water? Which are salt water?
- Do the garden work you have prepared.

Wrap up:

Return materials.

Notes/Feedback:

Journal Prompt: Water Poem

14.2
STANDARDS
5.ESS2.1, 5.ESS2.2, 5.SL.1

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Gather students. Repeat the "Watershed in Your Hands" activity, except have students narrate the cycle.
- "People have always been inspired by rivers. There are thousands of poems, stories, songs and paintings about rivers. Can you think of any? What do you think rivers often represent in poetry, and in art in general?"
- In their journals, "Write a poem about a river, or draw a picture."

Wrap up:
Share, in partners.

Notes/Feedback:

Where Does Our Water Come From?

15.1
STANDARDS
5.ESS2.1, 5.ESS2.2, 5.SL.1

OBJECTIVES
- Students learn how people make drinking water from the water cycle
- Students learn about reservoirs and the water cleaning system
- Students begin drawing posters to show the water cycle

MATERIALS
- "The Magic School Bus at the Waterworks" by Joanna Cole (multiple copies, if available)
- 12 poster boards (14"x22" works well, but smaller is fine)
- 12 pieces of scratch paper
- Pencils, rulers, markers—class set

Preparation:
Read "The Magic School Bus at the Waterworks" and become familiar with it. This book was written in 1986, and so the process for treating water has changed a little bit.

Overall, though, the book does an excellent job of explaining how water is diverted from streams and rivers into reservoirs. If you want to have more facts about the Oakland reservoir system, look at the Water Education Foundation website: www.water-ed.org/watersources.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- “All this talk about water, and we haven’t really gotten to an important part.” Turn on your garden hose, or faucet, if you have one in the garden. “Where is this water coming from?! Any ideas?” Discuss.
- Read “The Magic School Bus at the Waterworks” and discuss. “What did you know already? What did you learn? What surprised you?” Supplement with facts about the Oakland reservoir system, if you so choose.
- Ask students to list the 10-12 steps that brings water from Ocean to faucet. List these steps on the board. Be sure they include evaporation, condensation, and precipitation.
- Put students into small groups, each group gets one poster, one piece of scratch paper, as well as pencils, rulers, and markers. Assign each group one step. Students write their step on the bottom. Students illustrate their step, begin by using scratch paper. When you approve their sketch, students may begin on the poster board.
- Students will finish their posters later in the week.

Wrap up:

Return materials.

Notes/Feedback:

Garden Work

15.2
STANDARDS
5.ESS2.1, 5.ESS2.2

MATERIALS
- Posters, scratch paper from earlier this week
- Pencils, markers, rulers
- Tools for garden work, if necessary

Preparation:
Is there garden work to do?

Procedure:
- Students enter the garden and explore.
- Garden work, if there is work to be done.
- Return materials, wash hands.
- Distribute group work. Give students the rest of class time to finish their posters.
- Students present their posters to the rest of class. Decide on a place on campus they want to hang their posters.

Wrap up:
Hang up posters, if there is time!

Notes/Feedback:

Assessment: Agriculture and Drought

16.1
STANDARDS
5.ESS2.1, 5.ESS2.2, 5.SL.1, 5.ESS3.1, 5.PS2.1

OBJECTIVES
- Students discuss the effects of the current California drought
- Students discuss the effects of water pollution
- Students brainstorm ways to save water, and keep water clean

Preparation:
This lesson pushes students to discuss "What are the effects of a drought?" It also introduces students to the effect of pollution on the water cycle. This lesson is an assessment because it requires students to consolidate their knowledge ranging from modern agriculture, the water cycle, and the water treatment system.

Background Information:
At the time of writing, spring 2014, California is considered to be in "severe drought". 2013 was the driest year in recorded history in many parts of California. Snow pack in the Sierras (a main water source) is dramatically smaller than it should be. This lesson is not meant to frighten students, but rather encourage them to be environmental stewards: informing others of their knowledge, taking care to save water, and to keep it clean.

Procedure:
- Students enter the garden and explore.

- Gather students; check in about the season and weather.
- “We are coming to close our unit on water. We have discussed everything from the water cycle to the way that water gets into our faucet. Today, we need to talk about some of the ways that humans have affected the water in our world, and the effects of the current drought. We will discuss the drought first. Does anyone know what drought means?”
- “A drought is a period of time when a place receives less rain that it normally does. California is in a state of drought. Tell me all the effects of a drought that you can think of.”
- Discuss, take plenty of time. (Push students to think back to the food web—what is connected to water? Also discuss the effects on plants, animals, drinking water, irrigation for farms, etc).
- “What are ways we can save water in the garden? At home? At school? As a city?” (Ways to save water in the garden include mulching, planting native plants, not watering more than necessary, growing drought tolerant plants, and checking the weather as to not water before a rain).
- “One way that people have very negatively affected our water supply is by causing water pollution. Polluted water means that it is dirty, not from soil, but from chemicals. Water can dissolve many substances, and chemicals from factories and farms easily dissolve in water, or are liquid, and spill into water. As you know, water goes through a cycle, and is constantly moving. Even if water 200 miles from here becomes polluted, it will still flow to the ocean.”
- “Tell me all the ways you can think of that polluted water affects our planet, animals, and our health.”
- Discuss, take plenty of time.
- “How does modern agriculture contribute to water pollution?” (Run-off from pesticide use ends up in our streams, rivers and oceans—the effects of which are innumerable.)
- “How can we help keep our water clean?” (Not using pesticides in our homes and gardens, keeping pollutants out of storm drains, etc)
- “Although it is true that we are in a drought, and that water pollution is a serious problem, there are many ways you can help. Every action counts!”

Notes/Feedback:

Journal Prompt: Water Conservation

16.2
STANDARDS
5.ESS3.1

MATERIALS
- Journals, pencils
- Woodchips, straw, or store-bought mulch

Preparation:
Students mulched in the winter in order to keep plants warm. Mulching is just as important in the warmer months to slow evaporation of water from the soil, thereby requiring less watering.

Procedure:
- Students enter the garden and explore.
- Students mulch garden, to slow evaporation.
- In their journals, "Write a letter to someone you know, explaining why it is important to save water, and to keep it clean."

Wrap up:
Take volunteers to read letters.

Notes/Feedback:

Field Trip to the Marin Headlands

17.1
STANDARDS
5.ESS2.1, 5.ESS2.2, 5.SL.1, 5.ESS3.1

OBJECTIVES

- Students have an outdoor learning experience on the California coast
- Students learn about watershed studies

Preparation:

Prepare for this field trip months in advance. Two excellent organizations that offer class trips to the Marin Headlands are the YMCA of San Francisco—Point Bonita, and NatureBridge.
Both offer overnight and day trips, watershed studies, and scholarships. The YMCA program offers service learning opportunities.

Procedure:

- Enjoy the beautiful California coast!

Notes/Feedback:

Journal Prompt: Field Trip Reflection

17.2
STANDARDS
5.SL.1

MATERIALS
- Tools for garden work
- Journals, pencils, colored pencils

Preparation:
Is this work to be done in the garden?

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- Garden work.
- Return materials.
- Class debrief: “What did you learn from the trip to the Marin Headlands? What was your favorite part? What surprised you? How did you feel, spending time by the ocean?”
- In their journals, “Think to your favorite moment from the field trip. Draw an illustration, be as detailed as possible.”

Wrap up:

Share, in small groups

Notes/Feedback:

Seedfolks I

18.1
STANDARDS
5.RL5.2, 5.SL.1

OBJECTIVES
- Students reflect on the changing seasons
- Students interpret a character's intentions
- Students discuss their family history

MATERIALS
- "Seedfolks" by Paul Fleischman
- Tools for garden work

Preparation:
Over the next 6 weeks, you will be reading "Seedfolks" by Paul Fleischman. Read it before you start, it is quite short.
You will read one or two sections per class, and then discuss. Students will spend the five weeks following the reading of the story planning and executing a community service project. You can choose to read the chapters to your students, or to find a class set of books. In these lessons, I assume that you are reading aloud to your students.
Lastly, there is one chapter that I skip—Maricela's story, which deals with teenage pregnancy and abortion.

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and weather.

- “It is almost spring. What signs of spring do you see in the garden?”
- “Over the next 6 weeks, we are going to be doing something a little different in the garden. We are going to read this book, ‘Seedfolks’. I will read you a chapter or two, we will spend time discussing it, and then we will continue with our garden work. ‘Seedfolks is about community, and the way things work together in a system. After we read the book, we are going to do a project for our community, so I want you to start thinking about that now.”
- Make sure students are settled, and read Kim’s chapter.
- Discuss, based on the student’s observations and reflections.
- Dig deeper, “Why is Kim planting seeds? In anyone in your family history a farmer? Who do you feel connected to when you are in the garden?”
- Ask, “What works needs to be done in the garden?” Send students to explore, and to come back and report.
- Do garden work, based on students’ observations.

Wrap up:

Return materials.

Notes/Feedback:

Seedfolks II

18.2
STANDARDS
5.RL5.2, 5.SL.1

MATERIALS
- "Seedfolks" by Paul Fleischman

Procedure:
- Students enter the garden and explore.
- Gather students, and make sure they are settled.
- Read Ana's story, and let the students share their observations.
- "Ana describes changes in her neighborhood. Do you hear people talking about how Oakland is changing? Have you noticed changes? What do you think about that?"
- Read Wendell's story, and solicit the students' thoughts.
- "How did the young girl inspire him to start his own garden?"
- Students go into the garden and make moats around all the plants.

Wrap up:
Wash hands.

Notes/Feedback:

Seedfolks III

19.1
STANDARDS
5.RL5.2, 5.SL.1

OBJECTIVES
- Students summarize key plot details from the text
- Students interpret characters' intentions
- Students relate to the characters in Seedfolks

MATERIALS
- Paper, pencil

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- Make sure students are settled.
- Read Gonzalo's chapter, and solicit students' thoughts.
- "What do you think Tío Juan was trying to tell Wendell? When have you been misunderstood?"
- "Describe what interactions have taken place so far in the story."
- Spend time in the garden looking for pest damage. As a class, discuss possible solutions to a particular problem.
- Choose one or two students to write a letter to the classroom who may need help with their plants.

Wrap up:
Deliver letter to appropriate classroom.

Notes/Feedback:

Seedfolks IV

19.2
STANDARDS
5.RL5.2, 5.SL.1

MATERIALS
- "Seedfolks" by Paul Fleischman
- Garden gloves, class set
- Trash bags

Preparation:
Students will be picking up trash around campus, or in the garden. Know where you will go to pick up trash.

Procedure:
- Students enter the garden and explore.
- Gather students, and give them time to settle.
- Read Leona's story.
- Ask students, "What do you think about Leona's chapter? Does she remind you of anybody you know?"
- "When have you had a hard time being heard? What did you do?"
- Pick up trash around the garden or on campus.

Wrap up:
Throw trash away, wash hands.

Notes/Feedback:

Seedfolks V

20.1
STANDARDS
5.RL5.2, 5.SL.1

OBJECTIVES
- Students reflect on community dynamics
- Students share their perspective on their neighborhood

MATERIALS
- "Seedfolks" by Paul Fleischman
- Tools for garden work, if necessary

Preparation:
Is there weeding, watering, or harvesting work? If not, students can explore the compost bin or the worm box.

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "It is spring! What are you noticing in the garden?"
- Make sure students are settled. Read Sam's chapter.

- Solicit students' thoughts and reflections.
- "What was Sam's job before he retired? What does he do now? Did anything surprise you about Sam's story? Why do you think people separated and starting trying to

keep others out of their plots? Do you see this happening in your own neighborhood? What do you think will happen next?"

- Class discussion.
- Garden work or compost bin/work box exploration.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Seedfolks VI

20.2
STANDARDS
5.RL5.2, 5.SL.1

MATERIALS
- "Seedfolks" by Paul Fleischman
- Poster board, markers, pens
- Seed packets, as many as possible

Preparation:
Students will be making two posters, one of warm season vegetables and one with cool season vegetables. The season a plant prefers is normally listed on the seed packet. If not, you can look at the soil temperature the seed prefers to get an idea. With some exceptions, plants that set fruit (cucumbers, melons, eggplants, tomatoes, beans) require warm temperatures, where plants that we harvest for the roots or leaves are typically cool season crops (lettuce, most greens, beets, radishes, carrots). Fava beans and peas, cool weather crops, are exceptions.

Procedure:
- Students enter the garden and explore.

- Gather students, and encourage students to settle.
- Read Virgil's story, and pause when Virgil says that their lettuce is dying. Ask, "Do you have any ideas why their lettuce is dying?"

- Finish the chapter.
- “What did you think about Virgil’s story? Why do you think he was so surprised to see his Dad making mistakes, and lying? Why did their lettuce not grow well?”
- Discuss.
- “One of the first things you have to learn as a gardener is that plants prefer certain seasons. Some grow in the warm weather and others in the cool weather. Can you think of any examples?”
- “We are going to make posters for next year’s Kindergarteners. Some of you will work on the cool season poster, and the rest of you on the warm season poster.”
- As a class, separate the seed packets into cool weather and warm weather. Split the class into two, and have each group make a poster listing, for example, cool season vegetables, with corresponding pictures.

Wrap up:

Each group presents their poster. Return materials. Give posters to the Kindergarten teachers.

Notes/Feedback:

Seedfolks VII

21.1
STANDARDS
5.RL5.2, 5.SL.1

OBJECTIVES
- Students have a class discussion based on their own thoughts and observations
- Students reflect on the formation of a community
- Students distinguish between a community and a neighborhood

MATERIALS
- "Seedfolks" by Paul Fleischman
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- Settle students. Read Sae Young's chapter.
- Solicit students' thoughts and reflections.
- "What was the winning idea to bring water to the garden? Could that work in our garden?"
- "What is the difference between a neighborhood, and a community?"
- Class discussion.
- In their journals, "What do you think of the story so far? How do you see the community forming around the garden?"

Wrap up:
Share, in partners.

Notes/Feedback:

Seedfolks VIII

21.2
STANDARDS
5.RL5.2, 5.SL.1

MATERIALS

- "Seedfolks" by Paul Fleischman
- Wooden garden stakes
- Outdoor paint
- Paintbrushes
- Newspaper

Preparation:

Wooden garden stakes are available at garden and hardware stores.
Lay out newspapers, paint, and paintbrushes in the area of the garden where students will work.

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "What do you think about the story so far? What do you think is going to happen next? How do you think the garden will evolve?"

- Read Curtis's story. Solicit students' thoughts and reflections.
- "What do you think about Curtis? Is his plan going to work?"

- Each student can choose a plant in the garden to label. Students should find a plant in the garden they want to label. Walk around the garden and distribute stakes to students when they have found their plant. Students can take their stakes to the working area, and paint their stakes. Lay them on the newspaper to dry.

Wrap up:

Gather materials, wash hands.

Notes/Feedback:

Seedfolks IX

22.1
STANDARDS
5.RL5.2, 5.SL.1

OBJECTIVES
- Students discuss character relationships and interactions
- Students reflect on another character's intentions
- Students plant flowers

MATERIALS
- "Seedfolks" by Paul Fleischman
- Several packets of warm weather flower seeds
- Tools for garden work

Preparation:
Students will be planting flower seeds. Do you want them to distribute seeds within the garden, or on campus? Decide before class. If you decide to plant on campus, find places near sprinkler systems so that the seeds will be watered regularly.
It has been a few weeks since students have done garden work. Is there weeding, watering, or harvesting to be done?

Procedure:

- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- “Like I mentioned before we started reading ‘Seedfolks’, we are going to plan and complete a community service project after we finish this story. Do you have any ideas? I want you to keep thinking about them as we continue through the story.”
- Read Nora’s story. Ask students for their thoughts and reflections.
- “What is Nora’s relationship to Mr. Myles? Why do you think Mr. Myles wanted to plant flowers? What do you think he was thinking about as he inspected his flower sprouts?”
- Distribute flower seeds. Plant in the garden, or around campus.
- Further garden work, as planned.

Wrap up:

Return materials.

Notes/Feedback:

Seedfolks X

22.2
STANDARDS
5.RL5.2, 5.RL5.3, 5.SL.1

MATERIALS
- "Seedfolks" by Paul Fleischman
- Journals, pencils

Preparation:
As mentioned before, Maricela's chapter is skipped. However, the last paragraph of her story is very powerful. If you so choose, you can read this paragraph to your students, starting with "She talked on…" and ending with "…flowers growing and changing."

Procedure:
- Students enter the garden and explore.
- Take the painted garden stakes, and place them in the garden.
- Optional: "We are skipping the next chapter, because its themes are not necessarily appropriate for a class discussion. However, I am going to read you the last paragraph of this chapter." Read the paragraph, and ask for thoughts.
- Read Amir's chapter.
- Solicit thoughts and reflections from students. Discuss stereotypes, appearances, and apologies.
- In their journals, "You are part of nature, you are connected to everything alive. Write about your place in nature." OR "Stereotypes can be difficult to overcome. What do you wish people knew about you, that they can't tell by looking at you?"

Wrap up:
Share, in partners.

Notes/Feedback:

Seedfolks XI

23.1
STANDARDS
5.RL5.2, 5.RL5.3, 5.SL.1

OBJECTIVES
- Students reflect on the story as a whole
- Students compare the characters' experiences to their own
- Students discuss the transformation that occurred over the course of the story

MATERIALS
- "Seedfolks" by Paul Fleischman
- Tools for garden work

Preparation:
What works needs to be done in the garden?

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and weather.
- "We are about to read the last story in this book. What are your thoughts? How do you expect the story to conclude?"

- Read Florence's story.
- Solicit students' thoughts and reflections.

- “Seedfolks means ancestors. Do any of the characters remind you of your ancestors?”
- “How does the garden change through the seasons? How does our garden change through the seasons?”
- “Compare the neighborhood from the beginning of the story, to the community described at the end of the story.”
- Students explore the garden, looking for garden work to be done. Gather students; have them suggest what projects there are to do today.
- Do garden work.

Wrap up:

Return materials.

Notes/Feedback:

Seedfolks XII

23.2
STANDARDS
5.RL5.2, 5.SL.1

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden and explore.
- Gather students. "This week we finished reading 'Seedfolks'. You've had a few days to think about it. Do you have any more thoughts or feelings you would like to share? Were there any characters that you connected to? Any of the events that you thought were powerful?"
- "Above all, this story is about community. What was it that brought the community together? What pulled it apart?"
- Discuss.
- "All year we have been talking about systems, and interactions, and communities. Everything in nature and in life works together. The famous naturalist John Muir once wrote, 'When we try to pick out anything by itself, we find it hitched to everything else in the Universe.' What do you think he meant by this?"

- "As a class, we can make a powerful change in our community by working together. I want you to spend the rest of class time sitting somewhere you enjoy in the garden, and writing down your ideas. Think about what project we can do as a class that will help build community."

- Students sit in the garden and write.

Wrap up:

With extra time, students can share in partners.

Notes/Feedback:

Community Project—Brainstorm

24.1
STANDARDS
5.SL.1

OBJECTIVES
- Students brainstorm ideas for a community project
- Students vote on a project to do as a class
- Students understand scope and sequence of community project

MATERIALS
- Journals, pencils

Preparation:
Write on your board:
- Explain the project.
- Who will this project help?
- What we can prepare on our own.
- What we need help with.

Background Information:
Refer to Teacher Supplement for additional information.

Procedure:
- Students enter the garden and explore.

- Gather students; check in about the season and weather.
- “Last week you wrote in your journals ideas for a community project. Who would like to share their ideas?”
- As a class, discuss different ideas. Keep students accountable to a 4-week planning, 1-week executing timeline.
- Narrow down suggestions to the 3-4 most popular ideas. Have students choose the idea they feel most interested in, and split the class into these groups.
- In their groups, students flesh out their idea a little more. One student records in their journal the prompts from the board.
- Gather class. Each group presents their idea, and after all groups have presented, vote on which project the class will undertake.
- Explain, “Now that we have chosen a project, let me tell you a little more about the timeline we are working with. Next week we will be indoors, using computers to do research about our project. We will work on writing an action plan—that is, the steps we need to take to do our project. The following week, we will continue planning our project, and contacting all the people we need help from. The week after that, we will gather our materials, and practice for our project. The final week, we will do our project. Our second lessons of the week will be devoted to either finishing our work from the first part of the week, or exploring and taking care of the garden.”

Wrap up:

With extra time, continue exploring the garden.

Notes/Feedback:

Teacher Supplement: Brainstorm

ADDITIONAL INSTRUCTIONS

Suggested timeline for the community project

- Week 24.
    - Lesson 1: Brainstorm and vote
    - Lesson 2: Garden work
- Week 25.
    - Lesson 1: Research and action plan
    - Lesson 2: Continue action plan
- Week 26.
    - Lesson 1: Planning, make phone calls
    - Lesson 2: Garden work
- Week 27.
    - Lesson 1: Gather materials, practice
    - Lesson 2: Continue practicing
- Week 28.
    - Lesson 1: Action
    - Lesson 2: Reflection

If students need help with brainstorming ideas for a community action project, some possibilities are:

- Organizing a letter writing campaign about a cause they feel passionate about
- Build a garden box for someone in the community

- Organize a block party to clean the neighborhood
- Organize a tree planting in the neighborhood
- Educate the school about ways to save water
- Organize a food drive for a local food bank

Class Discussion

24.2
STANDARDS
5.SL.1

MATERIALS
- Tools for garden work

Preparation:
Students will be in the garden less over the coming weeks. Think about what maintenance projects they will need to do to keep up with the garden.

Procedure:
- Students enter the garden and explore.
- Check in about the season and the weather.
- "Look around the garden. What needs to be done? Go back out and explore, and let's gather to discuss."
- Class discussion of work that needs to be completed. If several jobs, split the class into groups to work.
- Small group work in the garden.

Wrap up:
Return materials, wash hands.

Notes/Feedback:

Community Project—Action Plan

25.1
STANDARDS
5.SL.1

OBJECTIVES
- Students conduct research to plan for their project
- Students work as a class, or in small groups, to think through their project
- Students finish their action plan

MATERIALS
- Copies of the action plan template, pencils

Preparation:
Based on the project that your students have chosen, draft an action plan that you and your class will fill out together. You may want to fill out a sample plan so students have an idea of what is expected.
Will you need to do research on computers? Or can you work outside in the garden?

Background Information:
Refer to Teacher Supplement for additional information.

Procedure:

- Class begins, either in the garden or indoors.
- Go over action plan template. Discuss each aspect of the plan. Students can work in groups on a certain area, or you can fill out each section as a whole group.

Wrap up:

Review action plan as a group.

Notes/Feedback:

Teacher Supplement: Action Plan

ADDITIONAL INSTRUCTIONS
Example of an action plan

Type of project: Organizing a weeklong Food Drive in Our Community

Project goal: To educate our community about local food insecurity and to organize a food drive that will support our local food bank

Materials Needed	People we need to contact	Tasks	Project location	Off-campus permission slips?	Day of action plan
-Bags for each classroom to collect cans -Bags to distribute to neighbors -Fliers to distribute to	-Volunteer coordinator at local food bank -Principal; tell him/her our plan	-Call contacts -Learn about local food insecurity -Prepare assembly to tell school body what we are doing	-Assembly: on campus -Distributing fliers/bags: in the neighborhood -Collecting bags of food: on campus -Teacher brings bags of food to	-Walking permission slips in order to post fliers in the neighborhood	-9am: Collect materials -10am: Distribute bags/fliers to neighbors -11am: School-wide assembly and rally. Distribute bags to all

classrooms, neighbors		-Make fliers for campus -Make fliers for neighbors, staple fliers to bags which will be distributed to neighbors	local food bank		classrooms. -Next week: teacher will drive all bags to local food bank

Journal Prompt: Seedfolks

25.2
STANDARDS
5.SL.1

MATERIALS
- Action plan
- Journals, pencils

Preparation:
If the action plan template needs to be completed, begin indoors where you can work as a class. Otherwise, you can begin class outside in the garden.

Procedure:
- Begin class.
- Continue working on community action plan.
- Once finished, bring students to the garden to explore.
- In their journals, "Kim, from Seedfolks, started something big from just 6 seeds. Can small actions have big consequences? Write your thoughts, or draw a picture."

Wrap up:
Share, in partners.

Notes/Feedback:

Community Action—Planning

26.1
STANDARDS
5.SL.1

OBJECTIVES
- Students take their action plan and make steps toward realizing their plan
- Students engage in small group work
- Students share out progress

MATERIALS
- Action plan from last week
- Paper, pencils

Preparation:
Think about your end goals for your planning day today.
It will be helpful to have second adult to help you today; perhaps to take students to make phone calls and work on logistics.

Procedure:
- Students enter the garden and explore.

- Gather students; check in about the season and weather.

- Show students their completed action plan. Discuss the next steps, “Who did we decide that we need to call? What materials do we need? Who can we ask to help? Remember—teamwork makes the dream work!”
- Group work.
- Close with a class discussion—“What is the end goal here? How do we stay focused on the goal?” If students worked in small groups, have each group share out what they worked on.

Wrap up:

Collect materials.

Notes/Feedback:

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Nature's Paintbrush

26.2

MATERIALS

- Cups of black paint; one cup per 3-4 students
- Clipboard and paper; one per student

Preparation:

This is a very fun project, and a great break for students planning the Community Action Project.

Place cups of black paint in different spots in the garden. Students will be using something that they find in the garden to use as a paintbrush. You can allow them to harvest an entire plant, or a leaf, or a flower as a brush. You may choose to restrict them to only using plant material that has already fallen on the ground. Decide on your parameters before class.

Procedure:

- Students enter the garden and explore.
- Distribute clipboards and paper to students.
- "You have a clipboard, a piece of paper, and in the garden there is paint. I want you to paint a picture. What is missing?"
- "Right! A paintbrush. Your paintbrush is in the garden!" Explain your parameters about what may or may not be used as a brush. Remind students that they can use their brush also as a stamp!
- Give students plenty of time on their artwork. When finished, collect paintings in the classroom and give students time to appreciate each other's' work.

Wrap up:

Collect all materials, wash hands.

Notes/Feedback:

Community Action—Practice

27.1
STANDARDS
5.SL.1

OBJECTIVES
- Students gather their materials for the community action day
- Students go through a "dress rehearsal" of the community action day
- Students reflect on their project

MATERIALS
- Action plan
- Materials that you need for your project

Preparation:
What materials will students need? If students are doing their project on campus, use that space today to space. If the project is off campus, choose somewhere on campus to mimic the process.

Procedure:
- Class begins.

- "Today we will need to gather all of our materials for the community action day. We will also practice what we will be doing on the day off, so that we can be prepared."
- Gather materials.

- Rehearse community action project, discuss as you go along.
- “How are you feeling about this project? What are you looking forward to? What are you nervous about? How do you think this will affect the community?”

Wrap up:

Store materials in an accessible place for next week.

Notes/Feedback:

Rehearsal

27.2
STANDARDS
5.SL.1

MATERIALS

- Any materials you need for your project

Preparation:

Do you need to have anything ready for your students to help with their rehearsing?

Procedure:

- Practice makes perfect! Continue practicing and organizing so that next week's project goes as planned.
- With extra time, explore the garden.

Notes/Feedback:

Community Action Project

28.1
STANDARDS
5.SL.1

OBJECTIVES
- Students complete their community action project

Preparation:
You have been preparing for weeks, enjoy! Considering having someone record or photograph the students' work.

Procedure:
- Students do their project!

Notes/Feedback:

Class Discussion

28.2
STANDARDS
5.SL.1

MATERIALS
- Journals, pencils

Procedure:
- Students enter the garden, and enjoy an extended explore time.
- Gather students; check in about the season and weather.
- “Summer is near, do you notice any changes in the garden, or in the weather?”
- “We completed our action project! Let’s debrief. What are your thoughts and experiences?”
- “How did this impact our community? How did you see community forming? What was meaningful for you? What would you have done differently? What advice would you give to next year’s fifth graders?”
- Students find a quiet spot in the garden with their journals, “What are you connected to in this world? Can you name 10 things? 20? 50? What inspires you to connect to yourself, your community, and nature?”

Wrap up:
Share, in partners.

Notes/Feedback:

Cleaning the Garden for Summer

29.1

OBJECTIVES

- Students suggest projects to clean the garden for summer
- Students have agency in preparing the garden for summer
- Students work in groups to do garden work

MATERIALS

- Tools for garden work

Preparation:

What better way to unwind from a month of planning a community action project than some garden work? Look around the garden—what needs to be cleaned, harvested, composted, and rearranged before summer? Have a list of tasks ready, and know that the students may have suggestions of their own.

Procedure:

- Students enter the garden and explore.
- While exploring, ask students to notice what garden jobs need to be done.
- Gather students; check in about the season and weather.
- "What garden jobs need to be done?" Write a list on the board.
- Students break into groups based on the work they would like to do. Spend the class period cleaning the garden for summer.

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Reflection

29.2
STANDARDS
5.SL.1

MATERIALS
- Tools for garden work

Procedure:
- Students enter the garden and explore.
- Continue cleaning the garden, and doing garden work, as needed.
- “Does anyone want to share out any of their favorite memories of the year?”
- Class discussion and reflection about the year.

Wrap up:
Return tools.

Notes/Feedback:

Miss Rumphius

30.1
STANDARDS
5.RL5.2

OBJECTIVES
- Students meditate on the power of a seed
- Students feel encouraged to play a role in taking care of the earth

MATERIALS
- "Miss Rumphius" by Barbara Cooney
- Sunflower seeds, at least one per student (or another summer-loving seed of your choice)

Procedure:
- Students enter the garden and explore.
- Gather students; check in about the season and the weather.
- "Over this year, we talked about how we are all connected on this earth, and in this community. Here is a story about the same idea." Read "Miss Rumphius" and discuss the many lessons within the book.
- Hand each student a seed, and instruct them to hold it tight and close their eyes.
-

- “You may be thinking, ‘One seed?!’ but think about this. Inside your hand is one seed. It is a sunflower seed, and if you plant it and take care of it, it will grow in a tall, beautiful sunflower plant. The flowers are pollinated, and turn into seeds. One plant can produce 1000 seeds. So now you have 1000 seeds. Imagine you plant 1000 sunflower seeds, and then have 1000 sunflower plants. If each sunflower grows, and produces 1000 seeds, you will have one million seeds. Can you even imagine one million seeds? If you harvested the seeds from one million plants, you’d have one trillion seeds. Can you even imagine that? And this can go on forever, and in fact, it has been going on forever. Open your eyes, and look at your seed. Your one seed.”
- “One way you can help our community is by planting this seed, and taking good care of it. Think about how much beauty you can bring to the world with a single flower. Think about how much joy you can bring the world with one kind word.”
- Students put seeds in their pockets.
- Explore the garden, enjoying and noticing the flowers, plants, birds and bugs that make it all happen.

Notes/Feedback:

Reading from Journals

30.2

MATERIALS

- Materials for garden work
- Journals, pencils

Preparation:

Is there more garden work to be done?

Procedure:

- Students enter the garden and explore.
- Gather students, reflect on the year. “What did you learn? What surprised you? What will you never forget from the community project?”
- Help clean the garden for the summer: pulling weeds, taking out the compost, whatever needs to be done.
- Distribute journals, give students time to look through their work from the year.
- In their journals, “You are a part of nature, and it is part of you. When this year did you feel connected to nature the most?”

Wrap up:

Gather students; take volunteers to read their journal entry.

Notes/Feedback:

Sixth Grade

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The sixth grade curriculum expands the focus from the garden out into the world. Students explore concepts of health more broadly, to include spiritual and mental health, personal health, ecosystem health, and community health. The year concludes with a capstone community health project.

By the close of the school year, students will have had an opportunity to develop both as members of a team and as leaders. They'll practice using scientific principles, including developing theories, creating experiments, and gathering data. Finally, students will engage in a long-term community health project that culminates in a presentation to the public (community).

The Numi Foundation is deeply grateful to the writers of open-source materials for their contributions and inspirations to this curriculum.

Table of Contents

Garden Re-Introduction

What is expected of us when we are in the garden?

1.1
STANDARDS
6.SL.1

OBJECTIVES

- I can follow the garden rules.
- I can be an effective group member.

MATERIALS

- White board, markers, and eraser
- Large sign-size copy of garden rules if applicable
- Garden scavenger hunt worksheet (enough copies for each pair to have one)
- Clipboards and pencils
- 6th grade pacing guide

Preparation:

Since this is the first visit to the garden for the school year, make sure that everything is kid-safe and that all equipment is in its proper location. You want students to see how the garden should look when they enter and when they leave. Also, if you have a sign with the garden rules on it, make sure students can't see it at the beginning of the class. Finally, make sure that you are familiar with the 6th grade garden curriculum- you need to be able to summarize its content to the students at the end of this class. Place essential question and objectives on the white board.

Also, this would be the time to start some seedlings for WEEK 3, LESSON 1 if you do not want to buy seedlings from the store. Try starting some lettuce and greens for an easy transplant.
If you are going to be using this entire curriculum in sequence, you should bury an apple in a clearly marked area of the garden. This apple will be used to study decomposition in Unit 3

Procedure:

- Have students gather at the entrance to the garden, and before you enter the garden remind them of the method you will use to get their attention or gather them back together in the garden (i.e. call and response, "If you can hear the sound of my voice, clap once, a bell, etc.)
- Enter the garden and take seats in the classroom area. Remind students that many of them have had multiple years in the garden, and this means they have had a good deal of exposure to the garden rules and procedures. Propose that if they talk to each other,
  some of that dormant knowledge might be re-invigorated. Ask students to have a "lightening round" brainstorm session with a neighbor about the garden rules.
- Have students do one more "lightening round" brainstorm with the person on the other side of them.
- Have students share out their ideas and write them on the white board.
- Share the garden rules sign, and compare their ideas to the codified garden rules. Discussion prompts: Did they come up with all of the existing rules? Did they miss any? Did they come up with ones that should be included? Why are these our rules?
- OPTIONAL: If a high percentage of your students have not had multiple years of garden exposure, you might want to spend more time delving more deeply into the meaning of these rules. Have students act out how to follow the rules, have them engage in small group discussion about them, practice them, etc. If most of your students have been part of the garden program for multiple years, simply reviewing them and talking about them as a class should be sufficient.
- Have students get into partner pairs, and pass out clipboards, pencils, and scavenger hunt worksheets. Explain that this is activity is intended as a chance for them to get back into the rhythms of the garden, and to observe what is growing and changing. Indicate that you will also be watching and listening to ensure that everyone is following the garden rules.
- Give students approximately 20 minutes to complete the scavenger hunt. (Extension: If you have pairs who finish early, have them create addition scavenger hunt search prompts for other partner pairs.)
- Gather back in the classroom area. Have students turn in clipboards, pencils, and scavenger hunt worksheets.

- Preview what we are going to be studying in the garden this year. Write the overarching essential question on the board, introduce the main units of study, and highlight their capstone project.

Wrap up:

Have students turn to each other (and to the teacher) and welcome each other to another great year in the garden.

Assessment:

Teacher observation of conversations, partner-pair brainstorming, and scavenger hunt.

Notes/Feedback:

My Physical Health

How can I take better care of my body?

2.1
STANDARDS
CCSS: 6.SL.1, 6.W.10
Health: 5.1M

OBJECTIVES

- I can figure out how different foods fit into the food groups.
- I can try different foods and discuss my responses with others.
- I can begin to think about what it means for me to be healthy.

MATERIALS

- White board, markers, and eraser
- Chalk and What's on My Plate diagram which can be found at: http://choosemyplate.gov/kids/downloads/ColoringSheet.pdf
- Different foods that are not grown in the garden for What's on My Plate activity. (These can be pictures of the food, or the actual food such as rice, yogurt, milk cartons, cereal, etc.)
- Different fruits and veggies that are grown at this time of year- enough for all students to be able to taste a sample of each
- Labels for taste test samples and lots of toothpicks

- Food recordkeeping worksheets
- Garden journals, clipboards, and pencils

Preparation:

Wash and chop up food samples beforehand- this will save you time and headache. Create labels for each food students will be sampling- preferably on mailing labels so that they can be affixed to containers. Also, draw huge chalk outline of the What's on my Plate diagram on the blacktop.

Background Information:
The focus of this lesson is to get students to start thinking about what they put in their bodies. It is important to not be judgmental, but just to offer the information around healthy nutrition and then let students assess their own eating practices. Depending on your understanding of nutrition, you might want to spend some time doing some learning of your own! Here is a good place to begin: http://www.choosemyplate.gov/food-groups/

Procedure:

- Enter the garden and take seats in the classroom area. Have students read the essential question and the objectives for the day.
- Explain that we are starting a new unit of instruction and that this unit focuses on personal health. Ask students to spend a moment thinking about what this means and then have them share out. Discussion prompts: What do we think of when we hear the phrase, "personal health"? What makes us healthy? What sort of broad categories are there within personal health? **Push them toward thinking about physical health, emotional health, and spiritual health.**
- Explain that this week we will be focusing on physical health, and particularly what we eat. Ask for students to share out common foods that they eat. Ask them to think about what sorts of foods actually help our bodies to stay strong, grow, and fight off disease and infection.
- Begin What's on My Plate activity. Take students to large chalk drawing of My Plate. Explain that this drawing shows the proportional amounts of foods on their plates- i.e. how much of each type of food students should be eating at any given time. Ask students to list the categories and explain how they relate to each other (i.e. your vegetable portion should be the largest, fruits and veggies should take up half of your plate, dairy should take up the least portion of your plate, etc.) Show students the food cards, or non-garden food items, and invite them to arrange these items in the correct areas of the plate. OPTIONAL: Encourage students to pick small demonstration items from the garden and place these items on the plate as well.
- Give students about 5 minutes to work on this activity. OPTIONAL: Give students the names of other items and have them write their names with chalk in the correct area of the plate.
- Review My Plate: see if everyone is in agreement about where items need to go. Discuss the difficulty of categorizing some things such as prepared foods, candy, fats, etc.
- Do a quick food allergy check before beginning the next activity. Pass out clipboard, pencils, and garden journals. Have students set up a page in their garden journal with the following headers: Garden Taste Test: Food Name, Food Group, My Comments. (You should place an example of this format on the board.) Ask students

to use toothpicks to sample a type of fresh fruit or vegetable, write a review, and then move on to the next sample. At the end, they should have tried 5-8 foods given your time constraints and written one review for each food. OPTIONAL: You can include foods from other food groups if you have the time- cheese, nuts, grains, etc.- try to keep these items as whole food oriented as possible.)

- Introduce food record keeping worksheets: Pass them out and ask students to keep track of their food consumption for the rest of the week. Explain that they will write down the date, what and how much they ate, and what food group each food falls into.

Wrap up:

Make sure items from all activities are cleaned up. Gather together and have students say one type of healthy food they are going to try this week.

Assessment:

Teacher observation of My Plate activity and taste testing.

Notes/Feedback:

My Physical Health II

How can I take better care of my body?

2.2

STANDARDS

CCSS: 6.SL.1, 6.W.10, 6.W.4
Health: 5.1M
Arts: VA2.4

OBJECTIVES

- I can record my meals every day.
- I can imagine my elders and ancestors and what they might have eaten.
- I can write a letter with a "photo" from an imagined ancestor.

MATERIALS

- White board, markers, and eraser
- Garden journals, clipboards, and pencils
- Markers, crayons, and other assorted drawing supplies
- Student meal recordkeeping worksheets
- Mats, towels, or sheets for guided meditation

Preparation:

Decide how you want to lead the guided meditation- possibly create a script for yourself if you feel like you are not especially skilled at extemporaneous speaking.

Background Information:

With this lesson, we want to inspire student curiosity about elder food ways, to encourage them to question why food looks the way it does today, and to realize we didn't always feed ourselves in this manner. This lesson is meant to inspire respect and reverence for the wisdom of our collective ancestors.

Procedure:

- Enter the garden and take seats in the classroom area. Have students read the essential question and the objectives for the day.
- Have students share out some "a-ha" moments from their meal record-keeping. Discussion questions: Do you notice any patterns? How did you feel after eating certain things? Did you have well balanced meals? (Have them think back to the My Plate exercise.) Are there other foods you would like to eat more of, or foods that you would like to eat less of? Did you eat whole foods? Did you eat processed foods? What is the difference in these two types of foods?
- Have students put away their journals, and get comfortable lying on the ground. If students want, they can use towels, mats, or blankets underneath them. Ask them to prepare themselves to go on a guided meditation- this means that the teacher will be helping to breathe and visualize different things.
- Do guided meditation: prepare your own version of this. Generally it is good to do some sort of breath work at the beginning so that students can calm down their mind and body. Some sort of counted breath or sending of the breath to different areas of the body to relax is often useful. Then ask them to picture a special family meal they had recently. Imagine the table, the food, who cooked the food and where the food came from. Feel emotions, smell smells, and taste tastes. Now take them back to the next generation, and imagine the same thing for their mom/dad/aunt or uncle. Then go back to their grandma or grandpa. Next go back to their ancestors during the 1800's- what did a meal look like then? Then go back to ancient times (Africa, Asia, Mesoamerica) when we were living in small villages- what did a meal look like then? And then finally, what about before we lived permanently in one place? What did a meal look like when we were hunters and gatherers? Imagine the food ways that extend down all of these generations to you today. Set aside 10-15 minutes for this meditation.
- Give students a little bit of time to decompress with their classmates about this experience because it can be exciting, unnerving, and/or uncomfortable for some of them. **Some students might not be able to imagine their ancestor's history or might be uncomfortable doing so.**
- Have students create a letter and a "photo" of an ancestral or elder meal that describes what foods they might have eaten and what advice they might give about how to eat well. These letters and photos will be created in the garden journals.

Wrap up:

Make sure items from all activities are cleaned up. Gather together and encourage students to think about how they get the food they eat and the impact this food has on them and the planet. Are there food ways that are healthier than others? Encourage students to continue keeping track of what they eat.

Assessment:

Ancestral letter and "photo"

Notes/Feedback:

My Mental Health I

What does mindfulness look like?

3.1

STANDARDS

CCSS: 6.SL.1, 6.W.10, 6.W.4

Health: 7.2M, 6.1M, 1.4M, 1.3M

OBJECTIVES

- I can be an effective group member.
- I can talk with others about health topics.
- I can transplant seedlings.

MATERIALS

- White board, markers, and eraser
- Seedlings
- Garden tools- trowels, gloves, watering cans, plant labels and markers/pencils
- Large vase with water, colored sand in bags/containers, a stirring stick

Preparation:

Place essential question, objectives, and triad discussion questions on the board.

Triad Discussion Questions:

- What sorts of things make your mind feel stressed, busy, scattered, and unfocused (like when the sands were whirling around in the vase)?
- What sorts of activities help you feel mindful (focused, calm, purposeful)?

- What sorts of places help you feel mindful?
- Do you think being able to be mindful is a useful skill? Why or why not?
- What other sorts of observations would you like to share around the colored sands reflection or your own ability to be mindful?

Purchase seedlings (or use the ones you started at the beginning of the school year.) Decide where students will be planting seedlings.

Background Information:
Make sure that you are ready to teach students how to plant seedlings. Give some thought ahead of time to how you want the plants spaced out in the garden beds. Also, this lesson is going to ask students to have some fairly "deep" abstract conversations around what it means to be mindful. This might be challenging to some students. Encourage them to keep trying and give as many concrete examples of mindfulness as possible.

Procedure:

- Enter the garden and take seats in the classroom area. Have students read the essential question and the objectives for the day.
- Making the Connection: Remind students that we just spent a week talking about physical health. This week we will be talking about mental health- ability to focus, be resilient, calm, etc. Is there a connection between taking care of our bodies (eating well, exercising, etc) and the health of our minds? If so, what?
- Introduce the concept of mindfulness. What does it mean to be mindful? To be fully focused? To have a quiet mind? What does it feel like to be scattered, stressed, or to have a "monkey mind?"
- Colored Sands Reflection Activity: Explain to students that sometimes it is difficult to understand abstract concepts such as mindfulness, so we are going to do a little activity to help them visualize this concept. Have each student choose a small handful of colored sand that represents them. (You can let them spend a few moments thinking and talking about what different colors symbolize to them.) Then have them pour their handful of sand into the large vase full of water. Tell them that this vase represents our mind. As we think, analyze, stress, multi-task, etc., everything gets unsettled, turbulent, and messy. Stir the water and sand in the vase. Let students take turns stirring. Ask questions such as: What do you see happening? Does your brain ever feel like this to you? Does this look like a mindful mind? How do you think we can get the sands and water to represent mindfulness? Take the spoon out of the vase. Ask students to observe what is happening. What do they think will happen if we just let it be?
- Set vase in a safe place and establish the rule that is will be left alone until the next class session.
- Give students about 10 minutes to engage in structured conversation about mental health and mindfulness. Direct their attention to the questions on the board, and explain that in groups of three, they need to discuss these topics. Share out responses as a whole class.

- Demonstrate how to mindfully transplant seedlings. Point out how the body and mind are acting in unison, and the whole being is focused on giving this baby plant a new and better home. Ask students what they can do to be mindful in their planting practice. Should they do this quickly or slowly? Should they make a plan ahead of time? Should they be talking or silent? What should their senses be doing?
- Give students about 15 minutes to transplant plants.

Wrap up:

Make sure items from all activities are cleaned up. Gather together and ask them to pay attention to their own levels of mindfulness throughout the week.

Assessment:

Teacher observation of triad discussions and seedlings transplant.

Notes/Feedback:

My Mental Health II

What does mindfulness look like?

3.2

STANDARDS

CCSS: 6.SL.1, 6.W.3, 6.RP.1
Health: 7.2M, 1.3M, 1.4M

OBJECTIVES

- I can be an effective group member.
- I can work with others to make and enjoy tea.
- I can apply math to tea making.
- I can create a poem that will help me to be mindful.

MATERIALS

- White board, markers, and eraser
- Tea making supplies: dried herbs, bowls, measuring spoons and cups, tea bags, strainers, basic tea recipes
- Mindful nature poem outlines
- Garden journals, pencils, clipboards

Preparation:

Prepare for tea making. Assemble your bulk herbs, multiple sets of measuring spoons and cups, and small mixing bowls. Assume that this will be a team building activity and that you need to have one small mixing bowl, 1 recipe, 1 steeping (tea) pot, 1 strainer, and one set of measuring spoons/cups for each team. Decide how you want to heat water- do you need to use a camp stove or can you run an extension cord and heat water in an electric teapot/coffee maker? Plan how to ensure student safety around hot water and how to avoid having all of the bulk herbs end up on the ground. Also, make copies of the poem outlines so that each student can have one.

Background Information:

Making tea is an inherently mindful activity. Both the process of mixing the herbs which engages our senses and the calm moments as we sip the hot, herbal blend bring relaxation and focus. Many cultures have tea making ceremonies to venerate this process. Sharing this with the students is an important component of mindfulness education because it forces us to slow down and engage the senses in the here and now. Also, it teaches students about another way that plants help nurture and build our health.

Procedure:

- Enter the garden and take seats in the classroom area. Have students read the essential question and the objectives for the day.
- Making the Connection: Ask students to think about the following questions. After a minute of reflection, do a lightening round check-in with your neighbor. Why have we decided that the garden is a good place to learn about our own health? How does nature connect to our own well-being? How does being in nature support mindfulness? How are you doing at being mindful this week?
- Spend a few moments letting students share out their thoughts about nature, health, and mindfulness.
- Ratio's, Proportions and Tea-Making: Ask if anyone drinks tea or knows of any friends or family who drink tea. Does anyone have any favorite tea flavors? What are teas made from? (Push for plants, roots, seeds, flowers, herbs, etc.) Explain that today we are going to make some mindfulness tea, and that the acts of making and drinking tea can help to focus and quiet the mind. As part of our tea making, we are going to do a bit of math- proportions! How do proportions work? (When things are in proportion, their relative sizes are the same.) Give an example of doubling or tripling the amounts in a recipe. Explain that we are going to be working with tea recipes, and making sure that we keep the proportions even.
- Model how to make tea. Give students 10 minutes to make tea blends and let steep in hot water.
- As students finish making tea, have them gather back in the classroom area to begin the mindful nature poems.

- Explain to students that they are going to create a nature poem that will help to focus and calm their minds. Show students the structure and an example to get them thinking about what they might want their poem to be like. Emphasize that this poem is to be used with deep breathing and visualization, so as you read it aloud, you visualize yourself embodying all of the best aspects of nature.
- Give students the rest of the time to work on writing their poems in their garden journals and sharing their poems. As they are working, invite them over to the tea area in groups to get samples they can sip while they are working on their poems.

Wrap up:

Make sure items from all activities are cleaned up. Gather together and invite them to try using their mindful poetry or any other useful strategies to work on increasing their mindfulness this week.

Assessment:

Teacher observations of team tea making activity and evaluation of student poems.

Notes/Feedback:

My Spirit Health I

How can I take care of my spirit?

4.1

STANDARDS

CCSS: 6.SL.1, 6.W.7, 6.W.4
Health: 7.2M, 1.4M
Arts: VA2.4

OBJECTIVES

- I can know how I feel.
- I can be aware of what I need to feel good.
- I can analyze survey results.

MATERIALS

- White board, markers, and eraser
- Spirit surveys, clipboards, pencils
- Large bulletin board paper and tape
- Spirit seed pack instructions and template
- Sample seed packages (both for actual seeds and one demonstration spirit seed package that you have created beforehand)
- Seeds
- Markers, scissors and glue sticks

Preparation:

Prepare the classroom space and yourself to host a discussion about emotions and spirit- this can be a heavy topic for some folks. Assemble art supplies in an area where

they are accessible and organized. Purchase a low water wildflower seed mix. Create your own spirit seed package that you are willing to share with the students.

Background Information:
Conversations about the spirit or things of a spiritual nature are often shunned in classroom settings. As part of a health curriculum, this component is linked to, and just as important as physical health and mental health. It can be difficult to define, and even harder to nurture, but it is a worthwhile pursuit. Aim to raise lots of questions, and help students really think through what their spirit is and how they can take care of it.

Procedure:

- Enter the garden and take seats in the classroom area. Have students read the essential question and the objectives for the day.
- Creating a safe space: Explain that today we are going to talk about some topics that might be very personal or emotional for some students. Review the rules and ask if there are other agreements we need to make or considerations we need to hold in our hearts and heads.
- Spirit Surveys: Ask students to anonymously complete a spirit survey. **Make sure that everyone understands what "anonymous" means. These surveys are meant to give us an overall picture of our spirit health. Pass out surveys, clipboards, and pencils. Give students 5 minutes to complete and turn in surveys.
- Shuffle surveys and pass them back out so that everyone has someone else's. Use the large paper and tape to record a summary (using tallies) of people's responses to the questions. For example, if the question was, "Rate on a scale of 1-10 how you are feeling today with one being very low (tired, sad, frustrated, etc.) and 10 being great (really happy, well centered, calm, etc.)," you could tally people's responses.
- Decide how many of the questions you want to analyze, and complete this activity with the students. Spend some time discussing the aggregated data, and use it to spawn a conversation about how we take care of spirit. Discussion prompts: How do you know when you are feeling good? What sorts of activities can you engage in to move yourself from feeling sad to happy, mad to calm, frustrated to satisfied? If veggies and fruits feed your body, what feeds your spirit?
- Prepare for spirit seed package activity. Share sample seed package activities with students. Show them how the seed packets explain how to take care of the seeds so that healthy plants will grow. These can be called the care instructions or guidelines because they explain what the plants need in terms of soil, water, sun, nutrients, etc. Explain that they will be creating seed packets that contain their spirit seeds. Discussion prompts: So, if you wanted to grow a strong spirit, what sort of care instructions would you include? What needs does your spirit have? What should be avoided?
- Give students time to create their seed packets. They need to write instructions, create drawings, cut out and glue packages if they have time.
- **Most likely the seeds will need to be put in the packages at a later date so that the glue has time to dry.**

Wrap up:

Make sure items from all activities are cleaned up. Gather students into a circle and have them pair share one thing they are going to do this week to take care of their spirits.

Assessment:

Review spirit seed packs

Notes/Feedback:

My Spirit Health II

How can I take care of my spirit?

4.2

STANDARDS

CCSS: 6.SL.1, 6.RL.1, 6.Rl.2
Health: 7.2M, 1.4M
Arts: VA2.4

OBJECTIVES

- I can respond in writing to a story.
- I can respond analytically to my environment.
- I can feel my spirit respond to the beauty of nature.
- I can represent my spirit abstractly.

MATERIALS

- Clipboards, garden journals, pencils
- Native American story
- Permission slips
- Lunches and snacks
- Water
- First aid kits
- Volunteers

Preparation:

This lesson involves a field trip to a place full of natural beauty, as well as human-maintained gardens. Green Gulch Zen Farm/Muir Beach is an excellent field trip

destination. Students can relax and play on the beach, and take a tour of a working farm. Obviously, arrangements for this trip would need to be made well in advance, but the possibilities for learning about the connections between personal health and nature are incredible. Students can see healthy food being raised in awesomely fertile soil, and their spirits and minds can enjoy the wind, waves, and sand of the beach. Before leaving the classroom, students should set-up their journals for observations and reflections about their field trip experience. To do this, place the following prompts on the board:

1. What sorts of food does the Green Gulch Farm grow?
2. What parts of Green Gulch Farm made your stomach hungry?
3. What parts of our field trip made your spirit sing?
4. How might a place like Muir Beach and Green Gulch Farm improve your health?
5. Draw pictures of some of the plants and animals you saw today.

Background Information:

To learn more about the Green Gulch Farm and Zen Center, visit this link:
http://www.sfzc.org/ggf/

Procedure:

- Enter the garden and take seats in the classroom area. Have students read the essential question and the objectives for the day.
- Review classroom rules and explain field trip procedures.
- Have students prepare their garden journals for note-taking, by writing the following prompts.
- Drive to Muir Beach.
- Take a tour of the Green Gulch Farm.
- Share snack and read Native American story aloud. Ask students to respond to this story in writing. What do they think it means? What wolf do they feed frequently? What can you do to help the good wolf grow stronger?
- Walk out to Muir Beach, set ground rules and give students time to play on the beach.
- Share lunch.
- Ask students to create a spirit still life using materials they find on the beach. Discuss what a still life is, and how to use concrete objects to symbolize abstract concepts. Ask them to assemble their compositions in a compact area (no more than 2ft by 2ft) and then ask them to write their name in the sand in front of their work of art. Give students 20 minutes to create spirit still life's. Then do a gallery walk to see everyone's compositions. Close this activity by talking about what will happen to their pieces of art over time (wind, water, people, birds, etc.)

Wrap up:

Do a trash and recycling pick up on the beach. Take 15 minutes and complete their reflections for the day. Pack up, gather in a circle, and have each person express gratitude for one thing they did today.

Assessment:

Teacher observations and reading of garden journals.

Notes/Feedback:

ASSESSMENT: Personal Health

What sorts of behaviors and choices will improve my health?

5.1

STANDARDS

CCSS: 6.SL.1, 6.W.4

Health: 5.1M, 6.1M, 7.1M

OBJECTIVES

- I can summarize what we have learned in this unit.
- I can create a plan to improve my health over the course of this school year.

MATERIALS

- White board, eraser, markers
- Clipboards, garden journals, pencils
- Health pledge template and model health pledge
- Colorful page tabs (for students to use in their garden journals to mark the page of their personal health pledge)

Preparation:

Create some sort of graphic organizer for the white board that has spaces for physical, mental, and spirit health. Write essential question and objectives on the white board as well.

Procedure:

- Enter the garden and take seats in the classroom area. Have students read the essential question and the objectives for the day.
- Summarize and Review: Ask students to copy the graphic organizer from the board into their journals, and then give them about 5 minutes to reflect and take notes on what they have learned. Next, have them share their ideas with a partner and add to their personal graphic organizers if they come up with anything new. Finally, as a group, fill in the graphic organizer on the board with all of the concepts we have covered so far in this unit. Discussion Prompts: How can we take care of ourselves physically? What sorts of mindful practices can we engage in? How do we feed our spirit? What activities have we done? What are the connections between these three different elements? How can nature (gardens, forest, beaches, and farms) help us to be healthier?
- Introduce the idea of a pledge. Discussion prompts: If you make a pledge to someone what does that mean? Can you make a pledge to yourself? Why might you want to do something like that?
- Explain that they are going to be making their own personal health pledges as the final project for this unit. This means that they are going to need to promise to take steps to improve their physical, mental, and spirit health over the course of this school year. For each of the three areas of personal health, they need to create 2-3 goals. Share a model health pledge with them so that they can understand the format and the intention. Discuss what an achievable goal might look like (I will increase my vegetable portion at lunch and dinner vs. I will never eat candy again.)
- Give students the rest of class time to create rough drafts of these pledges in their garden journals.

Wrap up:

Gather in a circle and ask students to visualize a healthier version of themselves. What are they eating? What sorts of physical activities are they engaged in? What are they doing to take care of their mind and their spirit?

Summative Assessment:

Teacher observations and reading of garden journals.

Notes/Feedback:

ASSESSMENT CONTINUED

What sorts of behaviors and choices will improve my health?

5.2

STANDARDS

CCSS: 6.SL.1, 6.W.4
Health: 5.1M, 6.1M, 7.1M
Arts: VA2.4

OBJECTIVES

- I can create a plan to improve my health over the course of this school year.
- I can create a drawing that represents a healthy me.

MATERIALS

- White board, eraser, markers
- Clipboards, garden journals, pencils
- Health pledge template copies (one for each student final draft)
- Body outline for Healthy Me drawings

Preparation:

- Put the graphic organizer for the previous lesson up on the white board, in addition to the essential question and the objectives.

Procedure:

- Enter the garden and take seats in the classroom area. Have students read the essential question and the objectives for the day.
- Making Connections:Many adults are interested in the topics we have been learning about in this unit. Some adults even decide to pursue careers in the fields of physical, mental, and spiritual health. Can we think of some jobs that fit within these categories? (chef, nutritionist, coach, physical therapist, personal trainer, yoga teacher, masseuse, psychologist, life coach, priest, imam, pastor, monk, artist, teacher, etc.)
- Give directions for Healthy Me drawings. Explain that students are to begin on these drawings once they are finished with their final draft of their personal health pledges. The final draft of the health pledges need to be completed on the template form and need to be signed both by themselves and their chosen coach. The Healthy Me drawings need to symbolize their vision of personal health.
- Give students 30-35 minutes to finish up pledges and drawings.

Wrap up:

Have students attach both their drawings and their pledges to their clipboard and then leave both on their seat. Do a gallery walk so that everyone can see each other's drawings and pledges.

Summative Assessment:

Student pledges and artwork

Notes/Feedback:

Plant Survival I

What does a plant need to survive?

6.1
STANDARDS
NGSS: MS-LS1-5
CCSS: 6.SL.1, 6.W.1

OBJECTIVES

- I can create a valid, replicable experiment that will answer my question.
- I can be an effective group member.

MATERIALS

- White board, markers, eraser
- Garden journals, clipboards, pencils
- Experiment supplies (soil, pots, plants, boxes, watering cans)
- Bulletin board paper with lab write-up template

Preparation:

In this lesson, students will start planning an experiment to test the question of what a plant needs to survive. In the next lesson, students will actually begin conducting the experiment, so it would make sense to start gathering likely supplies before that class.

Consider that students will try to test variables such as air, water, soil, and sunlight and plan accordingly. Write essential question and objectives on the white board. Also, write down a few key vocabulary words: experiment, procedure, supplies/materials, variables, controls, hypothesis, etc. Create a lab write-up template on a large piece of paper.

If you are using this entire curriculum in sequence, you should bury a second apple in a well-marked area of the garden, near the apple you buried at the beginning of Unit 1. Both of these apples will be used in Unit 3 when students study decomposition. Make sure you put flags in the ground, or mark the spot exactly so that you don't lose your apples!

Background Information:

To prepare yourself for this unit, you will want to make sure that you are familiar with the scientific process, specifically how to set up an experiment. Also, you will want to have a strong grasp on plant photosynthesis, respiration, and reproduction.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Making Connections: Explain that we are starting a new unit of study, and the overarching essential question is, "How do plant and human health needs compare?" Remind them of the unit we just completed which resulted in personal health pledges and a better understanding of their own personal health. Now we are going to study what plants need to be healthy and survive.**
- **"Lightening Round" brainstorm with a neighbor: What do you think plants need to survive?**
- **Share out results of conversations, and then ask them how they would prove that a plant needs something to survive and be healthy? (Push them toward the idea that if something is truly needed for survival, if you remove that variable, the test subject should suffer, perish, etc.)**
- **Explain that we are going to conduct an experiment to test for each of the following variables: water, sunlight, air (CO2 specifically), soil (micronutrients.) Have students review the vocabulary on the board, and either give definitions for the words or use the vocabulary words in a sentence.**
- **Divide students into groups with each group focusing on one variable. Explain that they need to create an experiment that tests whether or not that variable is necessary for plant survival. Have students copy the lab write-up template into their journals. ***Optional: If you have a couple of kids who want to test another variable that is not listed here, but they make a good argument and have a solid methodology, allow them to try it out. Also, you might want to have a control group that grows a plant that uses soil, water, sun, and air.**

- **Let students plan their experiments. Emphasize that they need to complete the first portion of their lab write-up template so that you can help them gather all of their needed supplies.**
- **Check in with each group during this work time to make sure that they are creating solid experiments. Make sure that they understand the importance of isolating variables and ensuring that other factors don't impact their results. (I.e. if you are testing the important of sunlight on plant growth, not only do you need to remove sunlight as much as possible, you need to makes sure that you plant is still getting air, water, and micronutrients.)**

Wrap up:

Gather together in the classroom area, and ask for students to share out obstacles and questions. Hopefully one of the questions that will emerge is how to make sure that there is continuity between different experiments- how do we make sure that the plants that are getting water, get the same amount?

Assessment:

Teacher conversation with groups during experiment planning phase; review of lab write-up

Notes/Feedback:

Plant Survival II

What does a plant need to survive?

6.2

STANDARDS

NGSS: MS-LS1-5

CCSS: 6.SL.1, 6.W.1

OBJECTIVES

- I can create a valid, replicable experiment that will answer my question.
- I can be an effective group member.

MATERIALS

- White board, markers, eraser
- Garden journals, clipboards, pencils
- Experiment supplies (soil, pots, plants, boxes, watering cans)
- Bulletin board paper with lab write-up template

Preparation:

In this lesson, students will actually begin conducting the experiment, so make sure you have everything they need. Write essential question and objectives on the white board

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Pass out clipboards, pencils, and garden journals and give students time to view their lab write-ups. Ask them to pay special attention to the materials/supplies and procedures sections, and to update these areas as needed.**
- **Group Discussion: Take some time to ensure that students have planned solid, workable experiments. Make sure that they understand the importance of isolating variables and ensuring that other factors don't impact their results. (I.e. if you are testing the important of sunlight on plant growth, not only do you need to remove sunlight as much as possible, you need to makes sure that you plant is still getting air, water, and micronutrients.) Clarify how much water all of the groups (except the group testing water) are going to give their plants. Also touch on the fact that everyone will start with the same plant and the same soil (except for the group testing soil.)**
- **Experiment Set-Up: Give students time to set up their experiment and to continue working on their lab write-up, being sure to include any questions or concerns they might have.**

Wrap up:

Gather together in the classroom area, and ask for students to share out concerns and questions. Establish a maintenance routine for the plants according to experiment protocols (frequency of water, etc.)

Notes/Feedback:

Flourishing Plants I

What does a plant need to thrive?

7.1

STANDARDS

NGSS: MS-LS1-5
CCSS: 6.SL.1, 6.W.1, 6.L.6
Health 1.4M

OBJECTIVES

- I can create a valid, replicable experiment that will answer my question.
- I can discuss new concepts with a partner.
- I can gather data by observing natural phenomena.

MATERIALS

- White board, markers, eraser
- Garden journals, clipboards, pencils
- Small flags, signs or other means of marking healthy plant communities
- Structured observation template on large paper

Preparation:

Before class, mark thriving plant communities with a flag. If possible, mark areas of natives, vegetables, trees, and shrubs both within the garden and within the larger school grounds. Write essential question and objectives on the board. Create structured observation template on large paper, and include the following: Is this area a thriving plant community? Why or why not? If the plants are thriving, why is this the case?

Background Information:

This lesson asks students to begin thinking about the gradations of health- what does it mean to be surviving vs. flourishing? We will examine this question both within personal and plant contexts. We all have basic requirements for survival, but what is needed to live a vibrant, meaningful life? Can we imagine what plants might need to thrive?

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain that the experiment we are conducting looks at what plants need to survive- the most basic level of health. Give students time to conduct their observations and record their findings in their garden journals.**
- **Share out findings and questions about the plant experiments.**
- **Making the Connections: In small groups, ask students to think about the difference between thriving and surviving? How are they different? What moves you from one to the other? Is it the same for everyone? Does one feel better than the other? What about for plants? What do you think they might need to thrive? What does thriving look like for plants? What sorts of experiments could we set up to test this question?**
- **Structured Observations: Explain that you have marked some observation areas in the garden (and possibly beyond.) These marked spots are all areas where plants are growing. Students are to walk around to these marked areas and observe what is going on. They need to determine if the plants are thriving, and they need to explain how they reached their determination. Also, they need to develop a hypothesis as to why the plants are thriving (or not.)**
- **Give students time to wander around the garden and school yard, making their observations and recording information in their journals.**

Wrap up:

Gather together in the classroom area, and ask students to share out some of their observations.

Assessment:

Teacher observations and review of garden journals

Notes/Feedback:

Flourishing Plants II

What does a plant need to thrive?

7.2

STANDARDS

NGSS: MS-LS1-5
CCSS: 6.RI.7
Health: 1.4M

OBJECTIVES

- I can gather data by observing natural phenomena.
- I can create a plant community that helps individual plants to thrive.

MATERIALS

- White board, markers, eraser
- Seedball Directions Worksheet (copies for each student)
- Seedball materials: seeds, clay, potting soil, water, seeds, tubs for mixing, cups for seed selection, cardboard box for drying

Preparation:

Make sure you have different sorts of seeds for the seedballs. Try to get seeds of plants that are going to provide different things for the overall plant community such as shade, pollinators, nitrogen fixing, etc. Write the essential question and the objective on the board.

Background Information:

This lesson looks at how plants can actually help each other to thrive. Some plants like to grow in the shade of other plants, some plants attract beneficial insects, and some discourage garden pests. Some plants make micronutrients more available to others,

while some plant roots help break apart the soil for other plants. Start looking for these beneficial relationships between plants and encourage your students to do so also!

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Have students review their individual health pledges with their coach, and ask them to report on their progress, as well as to reflect on whether or not their goals are helping them to thrive.**
- **Explain that in the last class, we did some garden observations of different plants. They were asked to determine whether plants were thriving or not, and why. This might have been a little difficult because they didn't have a lot of background information. We didn't spend a lot of time talking about the how's and why's of this concept- so maybe it was hard to assess whether or not the plants were really healthy. Share that we did this activity because sometimes it is useful to do observations and develop our own ideas on things before we are exposed to lots of other data. Today, we get more information!**
- **Making Connections: Introduce the Three Sisters Guild and if you have the remnants of this plant community in your garden, point it out to them. Ask students to summarize how the plants help each other out in this plant community. Ask students to think of other plant communities that wind up helping individual plants survive. **It is important to highlight that the connections between the plants improve individual plant health.****
- Explain that their task today is to create a thriving plant community by creating seedballs! We are going to try and build up some native plant communities by putting seeds of different plants into a ball of clay/soil, and then putting these in places where they will get the winter rains. Pass out seedball directions and have students spend time reading over why seedballs work and how we construct them.
- Encourage students to be thoughtful in their seed selection- choose plant seeds that will ultimately benefit the whole plant community.
- Seedball construction time!

Wrap up:

Clean up hands and supplies. Gather together in the classroom area, and ask students to share some of their reasoning as to the seeds that went into their seedball. How will their combination of seeds help to create a thriving plant community? Given the ways in which plants can help each other, what are some of the items plants need to thrive? (right amount of shade, soft soil, miconutrients, mulch, fungal hyphae, etc.)

Assessment:
Teacher observations of seedball construction and related conversations

Notes/Feedback:

Photosynthesis

How does the process of photosynthesis provide energy for plant growth?

8.1
STANDARDS
NGSS: MS-LS1-6
CCSS: 6.SL.1, 6.W.1
Arts: VA2.5

OBJECTIVES

- I can create a valid replicable experiment that will answer my question.
- I can use our experiment results to make sense of the phenomenon of photosynthesis.
- I can appreciate the power of the sun.

MATERIALS

- White board, markers, eraser
- Plant experiments from earlier lessons
- Clipboards, garden journals, and pencils
- Lab write-up template on large paper
- Photosynthesis equation on large paper
- Solar printing paper, cardboard pieces of the same size, dress-making pins, buckets with water

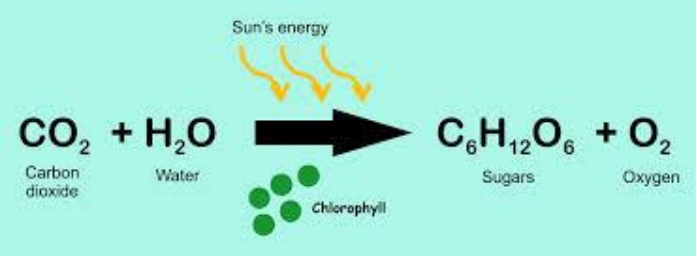
Preparation:

Create an example of solar printing using photo paper (which can be purchased from art supply stores or ordered online.) Set up solar printing area with pins,

cardboard, tubs with water, and solar paper (hidden from the sun until right before you need to use it.) Write essential question and objectives on the board.

Background Information:

There are many variants on the equation for photosynthesis, some more complex than others. Feel free to use a different one if it suits your purposes. The important point is that students begin to make the connection between the results of their experiment and the process of photosynthesis. Also, working with photo printing paper can be a little tricky, so make sure students have gathered 2-3 leaves and know the procedures before your give them the paper!



Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today we are going to finish up our experiments. We have talked about what plants need to survive, and we have also ventured into some conversations and observations around what helps plants to thrive. Let's establish what plants need to survive based on the data from our experiments and then we can look at why these things are needed.**
- **Experiment Review and Final Write-up: Put the lab write-up template on the board, in case some students haven't finished copying it into their journals. Students make final observations, reach a conclusion, and then write down their results in their garden journals (in the lab write up template they created the week before.)**
- **Analysis: Once everyone is done, have groups share out their results. Discuss the findings. Possible discussion prompts: Do you feel like these results are accurate? What might be some flaws in our experiment design? How could we design experiments that might be more accurate? What conclusions can we draw about what plants need to survive?**

- Put the equation for photosynthesis on the board. Ask students to chat with a neighbor about it. Possible discussion questions: Do you recognize anything in this equation? What do you know about equations and the opposite sides of the equal sign? How does this equation connect to our experiments?
- Emphasize the importance of the sun as the catalyst in the equation- the sun is what powers this process and ultimately allows the plant to make sugars (food) for itself.
- Prepare for solar printing. Have students each gather 2-3 small to medium sized leaves from the garden. Once students have gathered their leaves, ask what role leaves play in photosynthesis (gather light, O2/CO2 exchange.) Explain that we are going to create some artwork that captures the image of the leaves using the power of the sun. How fitting! Demonstrate the solar printing process, and then allow students to print their leaves.

Wrap up:

Clean up hands and supplies. Gather together in the classroom area, and ask students to spend some time appreciating the power of the sun this week. Prompt them to think about how crucial sunlight is to plants and therefore to us.

Assessment:

Assessment of lab write-ups and observation of in-class discussion.

Notes/Feedback:

Photosynthesis

How does the process of photosynthesisprovide energy for plant growth?

8.2

STANDARDS

NGSS: MS-LS1-6, MS-LS1-1, MS-LS1-2
Arts: VA2.4

OBJECTIVES

- I can create a microscope slide of leaf stomata.
- I can draw and label plant leaf cells.

MATERIALS

- White board, markers, eraser
- Clipboards, garden journals, and pencils
- Photosynthesis equation on large paper
- Microscopes, blank slides, slide covers, tweezers, clear nail polish
- Copies of magnified and labeled leaf drawing
- White paper, newsprint, paint, rags, paper plates, brushes, brayers (optional)
- Garden leaves (students can pick these or you can harvest a bunch from other places before class)

Preparation:
Create an example slide and an example of leaf printing. Write the essential question and the objectives on the board. Set up both slide creation area and art area. It also might be helpful to get a volunteer to help with the lesson today as there are lots of hands-on activities happening.

Background Information:
This lesson looks a little more closely at how plant leaves capture sunlight and how they take in CO2 and O2. The slide making exercise and the drawing allows students to get up close and personal with stomata. Peeling off the leaf's cuticle and essentially printing "the stomata" can be a little dicey- it really comes down to how well the students applied and peeled the nail polish. Practice a few times on your own to get the hang of it. With the leaf printing, have students do one printing that just uses the chlorophyll in the leaf. Really juicy leaves like brassicas or nasturtiums work well- place the leaf on white paper and fold the paper to cover it, and then roll the brayer over it a bunch of times.

Procedure:
- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today we are going to examine the crucial role plant leaves play in the process of photosynthesis.**
- **Place photosynthesis equation on the board and give students a couple of minutes to review it, discuss it, and make connections to plant health and survival. Have students share out their thoughts.**
- **Introduce students to the drawing of a leaf. Point out the different structures and explain their purpose. Explain while students are setting up their leaf slides, they will need to make a very detailed leaf drawing, making sure to label all of the parts.**
- **Walk students through the two different activities they will be doing today.**
    a. **Show them how to create slides of the leaf stomata. They need to pick a smallish leaf, and then carefully paint clear nail polish on part of the underside. As they wait for it to dry, they will complete their leaf drawings. Once the nail polish is dried, students will carefully try to peel it off in as large a piece as possible. Students will then get a blank slide and place the leaf peel in the center- this is called a dry mount. Slide covers are optional and may not stay in place well without some kind of solvent. Show students how to use the microscopes or viewers to look at their slide. Students will**

work in groups 3-4 to create 1 slide. Emphasize safety- slides and slide covers can break easily and microscopes are delicate pieces of equipment.

b. **Also show them how to do leaf printing starting with just the simple chlorophyll prints. Then show them how to apply paint to the leaves (using brush or brayer) and then press the leaf onto white paper, painted side down (once again just using the brayer or the force of their hand.) Have them experiment with different types of leaves.**

- **Divide the class into two parts and let them get to work. Closely monitor activities at both stations. Keep an eye on the time, and make sure to give groups time to clean up before they switch stations.**

Wrap up:

Clean up hands and supplies. Gather together in the classroom area, and ask students what they think plants do with the glucose (sugars) they make during photosynthesis. (Burn them for food, store them, use them to build cellulose.)

Assessment:

Assessment of garden journals and plant cell drawings.

Notes/Feedback:

Plant Reproduction I

What sorts of adaptations have helped plants to reproduce?

9.1

STANDARDS

9.1

NGSS: MS-LS1-4

CCSS: 6.SL.1, 6.RI.7

OBJECTIVES

- I can use informational texts to build background knowledge.
- I can design innovative solutions to real life problems.
- I can be an effective group member.

MATERIALS

- White board, markers, eraser
- Clipboards, garden journals, and pencils
- Large seeds like fava beans (enough for every group to have one)
- Adaptation props- odds and ends such as paperclips, toothpicks, glue sticks, pipe-cleaners, Velcro, paper, balloons, etc- that students can use to adapt seeds.
- Seed adaptation handouts

Preparation:

Make sure you have plenty of adaptation supplies in your box so that students have a wide range of materials when trying to adapt their seeds to overcome different obstacles. Write the essential question and the objectives on the board.

Background Information:

The adaptive technology of seeds is a fascinating field. From burrs to slingshots, plants have developed some pretty innovative means to give their offspring the best chance at survival. This brings us back to overall unit focus- plant health. Just how does preparing for future generations fit into the business of surviving and thriving? Food for thought!

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today are going to continue to study plant survival and health. In particular, we will focus on how plants try to ensure the health and survival of future generations- through seed adaptation. Write the word, "adaptation" on the board, and invite students to define it and give examples.**
- **Pass out Seed Adaptation handout and have students read silently. Discussion Prompts: Why have plants evolved different types of seeds? Why is it advantageous to spread your seeds far away rather than right next to you? What are some methods that plants use to spread their seeds?**
- **Seed Adaptation Challenge: Explain to students that they are going to have to take a regular fava bean seed and adapt it to use some natural means of dispersal. Give each group a natural means of dispersal (water-must float for at least 1 minute, wind- must glide at least 6 feet away, animal- must stick to a person/animal for at least 8 strides, animal- must attract an animal, propellant- must shoot at least 3 feet away.) Have each group write down their assignment (their means of dispersal) and then show them the box of parts they can use.**
- **Give groups time to work on their seed adaptations. Circulate to make sure that everyone understands the assignment. Groups need to discuss, draw up plans and create. If they have a plan that is not supported by the materials in the box, but is still feasible (without rockets or huge cash expenditures), let them draw up detailed plans. Explain that they will not be able to compete with in the testing portion of this assignment however.**

- **Clean up and allow groups to demonstrate and explain their inventions. Discuss the merits and drawbacks of different proposed adaptations.**

Wrap up:

Clean up hands and supplies. Gather together in the classroom area, and ask students to contemplate how long this sort of adaptation takes in nature. Does this happen in one generation or does this take hundreds and thousands of years? **Making Connections:** Does adaptation seem like a useful tool in promoting species survival and health? Does the ability to adapt, grow, and, change affect our individual ability to be healthy and thrive?

Assessment:

Teacher observations

Notes/Feedback:

Plant Reproduction II

What sorts of adaptations have helped plants to reproduce?

9.2

STANDARDS

NGSS: MS-LS1-4
CCSS: 6.SL.1
Arts: VA2.4

OBJECTIVES

- I can demonstrate my understanding of plant adaptations by drawing pollinator specific flowers.

MATERIALS

- White board, markers, eraser
- Clipboards and pencils
- Pollinator drawings and descriptions
- Drawing paper and coloring supplies (crayons, markers, colored pencils)
- As assortment of flowers (to supplement whatever you might have in the garden) for students to make mini bouquets, string or twine, and scissors

Preparation:

Pick flowers from around your neighborhood, backyard, or a local park. Make copies of pollinator drawings and descriptions- enough so that each student can have one. Put essential question and objectives on the board.

Background Information:

Flowers have co-evolved over many years along with their pollinators, so it is no surprise that they are made to order! From their color and shape, to their smell and taste- they are designed to lure in the help they need. This lesson is designed to help students celebrate the diversity of flower design and appreciate nature's adaptive abilities once again.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today are going to continue to study plant survival and health. In particular, we will focus on how plants try to ensure the health and survival of future generations- through flower adaptation. Just like seeds, flowers are designed with a particular purpose in mind- pollination.**
- **Prompt students to think about pollination. Discussion prompts: How does pollination happen? What is the goal of pollination? Who helps plants get pollinated?**
- **Introduce the cast of pollinators- have students read the species names on the different cards aloud and share the pictures. Point out that pollinators all have different needs.**
- **Flower Art Design Challenge: Students are going to randomly (and SECRETLY) be assigned different pollinators, and they need to design a flower that will attract that pollinator and facilitate pollination. Give some sort of silly example or model such as a pollinator that couldn't fly, but could only roll. What sort of flower/plant would you need to design to accommodate this sort of pollinator?**
- **Give students time to create their designs.**
- As students finish, give them time to create mini-bouquets. Push them to include a diverse array of flowers in their bouquet and to appreciate the smell and look (and to imagine what sorts of pollinators these flowers attract.)

Wrap up:

Clean up supplies. Gather together in the classroom area, and ask students to share their flower drawings and explain their designs. Have the other students guess which pollinator they had been assigned. Ask students if all plants are pollinated by insects? (No, about 10% of plants are wind pollinated, including many grasses, and pines.)

Assessment:
Flower art designs

Notes/Feedback:

ASSESSMENT: Health of Plants and People

How do plant and human health needs compare?

10.1
STANDARDS
NGSS: MS-ETS1-4
CCSS: 6.SL.1, 6.W.2, 6.W.10

OBJECTIVES

- I can reflect on my own health.
- I can talk with others about what we have learned so far.
- I can compare the health needs of plants and humans.
- I can plan an experiment.

MATERIALS

- White board, markers, eraser
- Clipboards, garden journals, and pencils
- Venn Diagram worksheets (one for each student)

Preparation:

Put essential question and objectives on the board.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Give students time to reflect on their personal health pledges and reflect in writing on their progress. Debrief quickly if students wish to share their progress with their classmates.**
- **Summarize: Tell students that it is time for us to end this unit on plant health, and so we want to try to summarize what we have talked about and done so far so that we are ready to make sense of it all. On the board, write the headings, "Human Health" and "Plant Health." Allow students to flip through their journals to review what we have covered in the last two units. Also, let them chat with each other and draw/make lists of ideas. Share out and place their responses on the board.**
- **Introduce the graphic organizer known as a Venn Diagram. Have students explain to each other how it works and where you place information on it. Explain that you want students to use this tool to organize their thoughts as they compare plant and human health needs. Encourage them to think about surviving vs. thriving, adaptation, and many of the other concepts we have covered.**
- **Give students time to finish their diagrams. If student finish early, have them write out an experiment plan to determine what plants need to thrive (example- how could you test if plants are made healthier by earthworms, compost, classical music, vitamin water, etc.?)**

Wrap up:

Gather students in the classroom area and help them to Make Connections: There are lots of neat connections between human and plant health, and during our next class we will explore some of them. If all of these experiments, research, and questions about plant health, structures, and adaptation has interested you, what sorts of careers might speak to you? (Farmer, botanist, scientist, herbalist, chemist, doctor, the field of biotechnology, etc.)

Summative Assessment:

Venn Diagrams- look for both content and arrangement

Notes/Feedback:

The Health of Plants and People

In what ways does the health of plants and people connect?

10.2
STANDARDS
CCSS: 6.SL.1

OBJECTIVES

- I can calm my mind, body, and spirit through meditation.
- I can talk with my peers about important health concepts.
- I can use plants to improve my health.

MATERIALS

- White board, markers, eraser
- Large body outline on white paper, and markers
- Eating a rainbow cue cards
- Nice smelling flowers (enough for every student to have one)
- Supplies to make a "rainbow" salad- lettuce, greens, radishes, carrots (from the garden or a store), colanders and buckets for washing produce, soap, water, and buckets for washing hands, large salad bowls, kid-friendly knives and cutting boards, oil, vinegar, salt and pepper, plates and forks
- OPTIONAL: Herbal medicine making supplies (items to make tea, cough syrup, poultice, vegetable glycerine tincture, etc.)

Preparation:

Put essential question and objectives on the board. Set up "cooking" area with supplies. Determine how you are going to divide up the salad-dividing tasks

amongst your students because everyone will want a task. You can have the harvesters, salad washers, the driers, and the leaf tearers. You can have the carrot graters, the radish choppers, and the preparers of any other veggies. Other students can make the dressing, someone can mix the whole salad, and someone else can divide it onto plates. The herbal medicine making portion is entirely optional, but it would be useful for the students to understand that beyond just eating plants for health, many of our modern drugs (e.g., aspirin, Morphium, Tamoxifen, Vincristin, etc.) were originally derived from botanical material. Also, many cultures around the world (and in our country) still use traditional herbal medicine to deal with all sorts of health issues (physical, mental, and spiritual.) It can also be fun to introduce them to spearmint, lavender, and chamomile and their various health benefits.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain that we are going to start off today by doing a little something that is good for the health of our mind, body, and spirit- meditation. We are going to take some time to lay down, close, our eyes, slow and deepen our breath, and visualize our connections with plants. Give every student a flower and instruct them to get comfortable (sitting up or laying down) and relaxed. Have them close their eyes and ask them to listen to the sound of your voice. Meditation script (feel free to alter): Close your eyes and listen to the sound of your breath as is moves in and out of your body. Is it quick or slow? Deep or shallow? Does it fill your whole body? Take your flower up to your nose and as you breathe in, appreciate its fragrance. Imagine the plant this flower grew on and picture yourself sitting next to this plant. As you breathe in, imagine the plant sending clean, clear oxygen to you- visualize it as this blue wave that enters your body and sweeps it clean. As you breathe out, see the carbon dioxide you are sending to the plant as a green wave that enters the leaves and refreshes the plant. As you keep breathing, visualize this green and blue circle of connection between you and your plant. Keep breathing slowly and deeply, feeling cleaner and clearer with each breath. (Give students 1-2 minutes to focus on breathing.) Now, start to notice your breath again and the smell of your flower. Wiggle your fingers and your toes. Blink open your eyes and sit up. Find a smile growing on your face and share it with your neighbor.**
- **Making Connections: Give students time to reflect on the essential question. Ask them to chat with their neighbor to try and come up**

with connections between human and plant health. Discussion prompts: In what ways can plants improve our physical, mental, and spirit health? In what ways can humans improve plant health? If plants are unhealthy, does it follow that we might be too?

- **Eating a Rainbow Activity: Explain that by eating certain kinds of plants we can actually improve our physical health. Discussion prompt: What do you think it means to eat a rainbow? Pass out cue cards, and ask kids (in groups of 3-4) to wander the garden and find plants that fit their assigned color. Also ask them to brainstorm foods that also match this color. (Make sure they understand things that are artificially colored like skittles, do NOT have the same health benefits, and can actually be harmful to your health.) After letting kids wander and collect information for about 8-10 minutes, gather back into the classroom area. Have each group share their color, the plants that are that color, and the health benefits of those plants. Have them color in the parts of the body that benefitted by these plants with the appropriate color. Take turns until everyone has shared and the body is full of colorful drawings.**
- **Making rainbow salad: Make sure all students wash their hands with soap in running water. Divide the tasks amongst the kids and make sure that everyone knows how to handle food and cooking tools safely. Spend time going over how to wash food and how to use knives. Monitor knife station closely.**
- **Enjoy shared salad! ***Optional: As students are eating the salad, you can share herbal information with them or you can do a demonstration.**

Wrap up:

Clean up and give thanks for the meal and what we have learned.

Assessment:

Teacher observations

Notes/Feedback:

Sensory Exploration of Soil I

What can my senses tell me about soil?

11.1
STANDARDS
CCSS: 6.SL.1, 6.W.7

OBJECTIVES

- I can use my senses to explore the content and health of soil.
- I can be an effective group member.

MATERIALS

- White board, markers, eraser
- Clipboards, journals, pencils
- 1 teaspoon
- Amazing soil facts sheet (for your reference)
- Soil samples- at least 5 different ones so that you can have small enough groups

Preparation:

Put essential questions for the lesson and the unit, as well as the objectives on the board. Gather soil samples ahead of time. You can use garden soil, and potting soil, but it is also good to try and grab other types of soil too, such as a really sandy soil, riparian soil, a clay soil, an un-amended soil, etc.- so that students can really begin to appreciate the differences between soils. Also, watch this video to see how to do a simple soil texture test: http://www.youtube.com/watch?v=GWZwbVJCNec
Bury your third apple in the ground near the two you buried during Unit 1 and 2. These apples will be used for the decomposition lessons later on in this unit.

Background Information:
Soil science is an incredibly rich field that can really hold student interest. If you feel a little shaky on some of the topics covered in this unit, do a little research. There is all sorts of great information out there about soil structure and texture as well as the soil food web. The study of soil presents us with a lovely and very accessible opportunity to begin our exploration of ecosystems.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain that we are starting a new unit today. Thus far we have studied our own personal health, and the health of plants. Now, we are going to study soil health. Have them read over the unit essential question. So, rather than just looking at the health of one unit (person or plant) we are going to be looking at the health of a whole system, and how the parts of that system can influence its overall health.**
- **Building curiosity: Invite students to have a "lightening round" conversation with a neighbor about the following topics- What makes soil healthy or not healthy? How can you tell if soil is healthy? What signs might you look for? Have students share out some of their ideas. Suggest that we often do not appreciate just how incredible the substance is beneath our feet- we talk about things as being dirty or soiled- these words have negative connotations. Hold out a teaspoon and ask them if we were to fill this with soil- what would actually be in the teaspoon? It is brimming with life. Write the statistics about soil biota on the board, one piece at a time, stopping to explain as needed.**
- Have students set up their journals so that they can conduct soil observations. They should set up a chart that has the headings: Sounds like…../Feels like…../Smells like…./Looks like…./Ribbon (Y/N)?
- Demonstrate how to use senses to study soil samples. Model how to smell it, feel it, rub it in hands, hear it, and look at it. Discuss descriptive words they might want to use: brown, moist, sandy, clayey, big pieces, small pieces, rough, smooth, etc. Finally show them how to carefully wet a small portion of the soil in their hand and then try to form an unbreakable "ribbon." Explain that this test can be used to determine if soil has clay in it.
- Break students into groups, and let them begin their soil testing and circulate to answer questions and redirect as needed.

Wrap up:

Clean hands and gather back into the classroom area. Ask student to share what they learned through their close observation of soil.

Assessment:
Student notes on soil

Notes/Feedback:

Sensory Exploration of Soil II

What can my senses tell me about (clay) soil?

11.2
STANDARDS
Arts: VA2.5

OBJECTIVES

- I can create a work of art that demonstrates my understanding of soil organisms.

MATERIALS

- White board, markers, eraser
- Images of soil profile and soil organisms (for your own reference and to share with students)
- Air dry clay, rolling pens, rulers with good edges, flat plastic, wood, or cookie sheets for clay to sit on
- Pins, sticks, and other implements for marking the clay

Preparation:

Put essential question and objectives on the board. Gather art supplies and make sure you have enough clay for everyone and enough cookies sheet, plastic, etc. for everyone. Clay tools can be shared. Assume that everyone will be making tiles that measure 6inx6in. If you have time, make a clay tile yourself ahead of time, so that you have a model and you can troubleshoot in advance.
In preparation for lesson 10 of this unit, you might want to look at getting some compost delivered to your garden site.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Draw soil profile on the board and talk about each section as you go. Discussion prompts: What do you think might be in this section (or horizon as soil scientists like to call it)? What do you notice about the size of rocks as you move toward the center of the earth? Where do you think most of the soil life lives?**
- **Share pictures of organisms that live in the soil. Discussion prompts: What do you see and what don't you see? (Insects, small mammals, reptiles, but no birds, large mammals.) What sorts of anatomical structures do you notice? (Legs, no legs, antennae, eyes, etc.) Discuss relative sizes of these organisms- from quite visible with the naked eye to invisible unless you have an electron microscope.**
- **Introduce art project. We are going to use clay (which is actually a soil type or texture) to make small tiles. We will roll out the clay on cardboard, and then we will measure and cut it so that it is the right size. On these tiles we are going to draw soil profiles. Create an example on the board. Show how to create the different horizons, and then talk about how to use different tools to draw the soil organisms. Explain that given the complexity of some of these creatures, students might want to simplify them or create symbols for them.**
- **Review rules with students and show them where supplies are and let them get started.**

Wrap up:
Clean up and gather together in the classroom area. Ask students to name one organism they placed in their piece of artwork. Explain that the next time we meet they will be studying living soil organisms.

Assessment:
Student made clay tiles that represent soil cross-section

Notes/Feedback:

Soil Biota I

What organisms (micro and macro) live in our soil?

12.1

STANDARDS

CCSS: 6.SP.1, 6.SP.2, 6.SP.4
NGSS: MS-LS2-1

OBJECTIVES

- I can use my observational skills to gather data
- I can use math to make meaning of data.

MATERIALS

- White board, markers, eraser
- Clipboards, garden journals, and pencils
- Clearly marked square foot plots of garden (or other natural) area where students can dig
- Buckets, trowels, measuring sticks
- Chart example (to copy onto the board)
- Poster paper and markers (one set for each group plus one sheet extra for whole class exercise)

Background Information:
Students are going to combine observation with math to develop a deeper understanding of what is going on under their feet. This lesson has them tallying what sorts of organisms they find as they careful remove each layer of soil. Then, once they have dug a deep enough hole, they will create dots plots to document what they have discovered.

Preparation:
Put essential question and objectives on the board. Set up digging areas and set out digging tools. Create example of a dot plot.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Square Foot Soil Observations: Explain that today we are going to be conducting research into the soil biota in our very own school yard. First, we are going to set up our system for recording information.**
- **Have students set up chart in their journals so that it looks like the one you place on the board. Explain how to use it to record data.**
- **Show students how carefully excavate the soil layers. Explain that they will follow the process of carefully observing, removing an inch or two of soil and observing again, etc. explain that they are looking for evidence of soil and plant life as well as changes in soil appearance.**
- **Let students get to work on their square foot soil observations. Give them only about 20 minutes and keep them moving through the different layers.**
- **Have students clean up and refill their holes. Give them a couple of minutes to update their notes. Then show them how to create a dot plot that shows types and quantities of soil organisms they found.**
- **Give students time to create a dot plot. Once students have finished have them share their findings with the whole class. Post dot plots around the classroom area.**
- **Calculating averages: Explain that we are now going to do a little activity that is going to allow us to calculate the average number of soil organisms in our garden soil. Lightening round share: Ask students to talk with their neighbor about how to calculate the mean of a set of numbers (one method of finding the average.) Review how to do this. Assign each group one type of soil organism to calculate the mean for based on the dot plots of each group. So, one group will go around to**

each dot plot, get each group's numbers for worms, and then find the mean. Another will follow the same process for ants, etc., etc.

- **Once all groups have calculated their average, they will add them onto a group bar graph of soil organisms. Discussion prompts: What do you notice about the organisms in our garden soil? (Largest population, smallest population, etc.) Why did you think these numbers look like this? Are these numbers accurate or was there a problem with our sampling technique? How does our collaborative graph connect or relate to the dot plots made by the groups?**

Wrap up:

Have students clean up and gather in the classroom area. Making Connections: How do you think soil organism populations relate to overall soil health?

Assessment:

Student observations, notes, and statistics

Notes/Feedback:

Soil Biota II

What organisms (micro and macro) live in our soil?

12.2
STANDARDS
CCSS: 6.W.3
NGSS: MS-LS2-1
Arts: VA2.1

OBJECTIVES

- I can write about what I observe in the natural world.
- I can use art to express what I know about soil organisms.

MATERIALS

- White board, markers, eraser
- Clipboards, garden journals, pencils
- Most Wanted Poster templates (one for each student)
- Markers, crayons, etc.
- Soil organism profiles (from week 11Powerpoint presentation)
- Insect id books

Preparation:

Put essential question and objectives on the board. Set out art supplies.

Background Information:

The last couple of lessons gave students an overview of soil biota- what sort of life is found in the soil and where it is located. This lesson provides a bit more depth. Students do a bit of research on one particular type of soil dwelling organism, pull

out the salient details and then present this information to the group. You can create your own profile cards from the PowerPoint presentation for students to use, or you can use some additional class time to allow them to do research on the internet or in books.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Give students a brief period to do some reflective writing in their journals about the life beneath their feet. Invite them to take off shoes and socks, or lay on the ground if the climate is agreeable. Tell them that they need to imagine all of what is happening below them. What does it look like? What sorts of organisms are there? What are they doing? They can write a letter, a poem, or a regular journal entry depending on their mood.**
- **Making Connections: Gather back together and explain that today we are going to a deeper study of a few soil organisms. Before we begin though, ask students to reflect on the following question: What characteristics does healthy soil have? (Push them to think about how we define healthy soil. What makes soil healthy? The amount of life it sustains? The number of plants growing in it?) Ask them to think about one thing they would look for to determine whether or not soil was healthy. Have them do an amoeba share: Find someone and say your one word answer at the same time. If you have the same word (or same general idea) link arms and move together. Find another person and repeat the process. We will do this for one minute. Have folks share out their words/ideas. Write a few key ones on the board: water, air, organic matter, humus, plants, FBI, etc. Repeat the question from an earlier lesson- I wonder how soil organisms relate to soil health?**
- **Pass out soil organism profile cards and let students look over them briefly. Ask them to pay attention to drawings, subtitles, etc. Discussion prompts: What sort of information do they expect to learn from these cards?**
- **Pass out Most Wanted templates. Have students look over what they will need to fill in. Explain that they will need to choose one organism, read its profile, and then create its wanted poster.**

- **Pick up profiles. Pass them out randomly and allow students to trade if they want. Give students time to work. Make Insect Id guides available as well.**
- **Gather profiles back up and have students clean up their materials. Have students share-out their artwork and writing.**

Wrap up:

Come together in a circle and appreciate the inventiveness of the different posters. Share that during our next two classes we will figure out the connection between these organisms and soil health.

Assessment:

Most Wanted Posters

Notes/Feedback:

Decomposition I

What role does decomposition play in the creation of soil?

13.1
STANDARDS
CCSS: 6.SL.1, 6.W.4
NGSS: MS-LS2-3, MS-LS2-2

OBJECTIVES

- I can write a meaningful response to something I have read.
- As part of a group, I can put the events of decomposition in order.

MATERIALS

- White board, markers, eraser
- Copies from Gaia's Garden, pages 73-76
- Decomposition flowchart templates (one for each students)
- Clipboards, garden journals, and pencils
- A leaf and a small amount of garden or forest humus

Preparation:

Put essential question and objectives on the board. Make copies of reading selection and templates.

Background Information:
Decomposition is actually a very complex process. Don't worry if kids disagree about how to order things or wind up a bit confused. While there is a general trajectory toward a stable, humus-y substance, this process is not entirely linear, and so will not fit neatly in uni-directional flowchart. That's okay. If students notice that the process is more idiosyncratic than that, celebrate their discovery, and ask how they can build that element into their sequence.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- Pass out reading on decomposition. Take turns reading aloud as a class. Give students time to re-read, process, and journal about what they have read.
- Once students have finished reading and writing. Pass around a leaf and ask them to consider the following, "You hold in your hand a lovely red sycamore leaf. It has a protective exterior, a stem and a number of veins running through it. It grew on a tree, and when it was alive it had the stomata and chlorophyll that we learned about in the last unit. But now it has died and fallen to the ground." Take the leaf back, pass around a small bowl or handful of good soil. Say, "You hold in your hand supremely healthy soil. It smells rich and earthy. It is dark and fluffy and just a bit moist. There is space for air and water. There is lots of organic matter- some that is still decomposing and some that is stable humus. There are also bacteria, fungi, a worm or two, maybe a beetle, and various other insects." Take the soil back and hold up both the leaf and the soil. Ask, "How do we get from an leaf to rich, healthy soil?" (Encourage students to look back at the reading of they need to.)
- **Summarize:** Have students talk through the process as a group. It should include primary, secondary and tertiary decomposers. This doesn't need to be a super in-depth conversation, but it does need to help the students understand how to sequence this process, and how to focus on the organisms that are doing the work.
- Pass out flowcharts and have students work in pairs to complete them using their reading as a reference as needed.

Wrap up:

Have students gather back in the classroom area and share how they developed their sequences. Ask what worked and what didn't for them in terms of this step-by-step, linear sequence? Did they make any modifications?

Assessment:
Decomposition sequences

Notes/Feedback:

Decomposition II

What role does decomposition play in the creation of soil?

13.2
STANDARDS
Arts: VA2.1, VA2.3

OBJECTIVES

- I can put the events of decomposition in order.
- I can create accurate drawings of the different stages of decomposition.

MATERIALS

- White board, markers, eraser
- Decomposition composition cartoon strips (one for each student)
- Clipboards, garden journals, and pencils
- A new apple, three apples in various stages of decomposition, and rich, healthy humus-y garden soil.
- Magnifying glasses

Preparation:

Put essential question and objectives on the board. Set up decomposition samples.

Background Information:
Part of the reason this lesson includes an art component is because the students need to slow down and really pay attention to changes (both subtle and overt) to the decomposing apple. Having them draw these changes is one way of engaging them in close observation. To help them draw as realistically as possible, you might want to add a bit of basic drawing instruction as well. Giving them some details about sketching in general shapes and contours and then adding value, will help them to create accurate depictions.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Making Connections: We have been learning a lot lately about soil, soil organisms, soil health, and decomposition. We have learned new terms, read some interesting texts, and conducted research. Encourage students to realize that what we are also talking about is a life and death cycle. It is about the death of some things feeding the life and health of others. Could we have life without death? Consider this in terms of soil health, the food you eat, and life cycles in general. Give students some time to ponder this question and journal about it, understanding that this could be an emotional topic for some students.**
- **Group share-out: If there is anyone who wants to share some portion of their reflections with the group, allow them to do so.**
- **Optional: Conduct brief review of drawing skills- focusing on observation, contour, value, and perspective.**
- **Show students the apples in various stages of decomposition. Let them use magnifying glasses to study them closely and let them talk about what they see (and possibly smell.)**
- **Pass out cartoon strips and let them draw what each stage of decomposition looks like starting with the bright, new apple and finishing with the decomposed organic matter.**

Wrap up:
Clean up and gather in the classroom area. Do a gallery walk of students' drawings, and take note of the details included in their illustrations.

Assessment:
Decomposition drawings

Notes/Feedback:

ASSESSMENT: Healthy Soil

How do different organisms work together to build healthy soil?

14.1

STANDARDS

CCSS: 6.SL.1, 6.W.7

NGSS: MS-LS-1

OBJECTIVES

- I can be an effective group member.
- I can judge the health of soil based on a number of characteristics.

MATERIALS

- White board, markers, eraser
- Soil samples similar to what was used in lesson 1 of this unit
- Magnifying glasses
- Mind map template for white board
- Soil judging sheets

Preparation:
Put essential question and objectives on the board. Set up soil samples as stations.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain that today we are going to demonstrate what we have learned in this unit by determining the health of different soil samples.**
- **Summarize: Group mind-mapping exercise- We have covered a lot of ground in this unit and before we try to use it to analyze soil samples, let's review the content and get it organized and accessible in our brains. Put up mind map and have students copy it into their journals. Explain that students can work on their own AND if they want to they can come up one at a time and add to the large map on the board. Remind students as needed that this should be a quiet reflection activity. At the end, ask if there are any questions.**
- **Soil judging preparation: Explain process to students. They are going to work on this project in groups of 3-4; they will travel to a station and record their observations and conclusions before they move to the next station. Discussion prompts: What are some key elements you might look for in healthy soil? What information could be gained by touching it, smelling it, and looking closely at it?**
- **Pass out soil judging forms and let students get to work.**

Wrap up:
Clean up and give students time to share out their results and ask questions of each other.

Summative Assessment:
Mind maps and soil judging sheets

Notes/Feedback:

ASSESSMENT CONTINUED

How do different organisms work together to build healthy soil?

14.2
STANDARDS
CCSS: 6.SL.1
NGSS: MS-LS-1

OBJECTIVES

- I can create healthier soil by digging in compost.
- I can explain the connections between decomposition, compost, soil organisms, and healthy soil.

MATERIALS

- White board, markers, eraser
- Garden beds that are ready to have compost dug into them.
- Trowels, shovels, gloves, and buckets
- compost

Preparation:

Have compost delivered or purchase bags of it from a local nursery. In terms of quantity, it depends on how many beds you are going to be amending. Keep in mind

though that everyone in your class will be engaged with this activity, so you need to have enough for everyone to use. Also, make sure you have a couple different beds that are ready to be prepared for new plantings. If they still have old plants in them, great! Students can remove those plants or chop and drop them depending on how you wish to proceed.

Background Information:
Preparing garden beds for spring planting is a deeply satisfying activity. If there are weeds in the beds, they need to be carefully pulled so that they don't spread their seed or leave roots behind. If there are crop plants left, consider chopping them and dropping them to add organic matter to the soil. This is quite literally what it sounds like- you cut them off at the soil surface and chop up their aerial portions. Next, you liberally add compost in an even layer (anywhere from 2-6 inches given how much space you have.) Finally, you mix it in. This involves turning the soil over onto itself, mixing in the compost, breaking up clods, and smoothing it flat again.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Making Connections: Let students know if they enjoyed what we learned about in this unit, they might be interested in the following careers: soil scientist, geologist, ecologist, biologist, chemist, park ranger, etc.**
- **Explain that today we are going to put into practice what we have learned in this unit. Discussion prompts: How can you identify healthy soil? What might you want to add to soil to make it healthier? (insects, fungi, bacteria, organic matter)**
- **Introduce compost- have students investigate it with their sense. Discussion prompts: What does it smell, touch, look like? What do you think goes into compost?**
- **Today we are going to add compost (organic matter) to our garden soil to improve its health. Compost helps soil retain water, creates pore space for air, regulates temperature, improves soil structure, and provides nutrients for plants.**
- **Demonstrate how to amend soil with compost, and remind students about how to use tools safely.**
- **Let students get to work!**

Wrap up:
Clean up and gather back in the classroom area. Congratulate them on using their knowledge to improve the health of the garden soil. Suggest that it is a noble pursuit to use ones talents and wisdom to improve the world around them. Let them know that at the end of this year they will have a culminating project that will allow them to do just that. Preview the next unit by saying that thus far we have studied personal health, plant health, and soil health. In the next unit, we will study the health of even larger ecosystems!

Summative Assessment:
Teacher observations

Notes/Feedback:

Connections I

What sorts of connections might you see in a healthy ecosystem?

15.1

STANDARDS

CCSS: 6.SL.1, 6.W.10

NGSS: MS-LS2-1, MS-LS2-2

OBJECTIVES

- I can demonstrate how different elements in an ecosystem are connected to each other.
- I can evaluate the importance of ecological connections.

MATERIALS

- White board, markers, eraser
- Clipboards, journals, pencils
- Large amount of nylon rope or yarn (for web exercise), scissors
- Peel off labels for ecosystem web activity
- Laminated vocabulary cards

Preparation:

Put essential questions for the lesson and the unit, as well as the objectives on the board. Create laminated vocabulary cards. These cards will be used in a matching game to build background vocabulary before students begin the lesson. There should be three types of cards: terms, definitions, and examples. These cards are passed out randomly and students have to create triads each with 1 term, 1 definition, and 2-3 examples.

Background Information:
This unit further strengthens student understanding of health within the context of ecosystems. The lessons in this unit are crucial to developing student awareness of the components of a healthy system (whether that be a natural ecosystem or a human community.) Key ideas from this unit will inform how students analyze the health of their own school community. For the vocabulary building exercise scheduled for this lesson, you will want to decide on which terms you want to focus on. Some suggestions are: ecosystem, producer, composer, decomposer, omnivore, herbivore, carnivore, etc.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Making Connections: Explain that we are starting a new unit today. Thus far we have studied our own personal health, the health of plants, and the health of soil. Now, we are going to study healthy ecosystems. Have them read over the unit essential question: "What does a healthy ecosystem look like?" Just like with our soil unit we are going to be looking at the health of a whole system, and how the parts of that system can influence its overall health. But rather than focusing in on one type of ecosystem, we are going to be looking at ecosystem patterns overall.**
- **Prepare students to play vocabulary matching game. Explain that we are taking the time to do this to make sure that we can all use the same sort of language to talk about what we are learning. This is a matching game- the goal is to create a complete triad with one definition, one vocabulary terms, and 2-3 examples. Once you find your triad, sit down. Once everyone is seated, or I call time, we will review and the possibly play the game one more time.**
- **Explain that one of the important patterns or components we often see in healthy ecosystems are the connections between the different living and non-living elements. (Get out labels and a marker.) Ask students to think about what they might see if they were taking a walk through the East Bay Hills. What would be the different elements of this eco-system? (As student say things, write them down, but do so selectively. You want to get a mix of living and non-living things such as worm, hawk, coyote, oak tree, grasses, creek, soil, rocks, snake, mouse, mushrooms, etc.) Ask for 10 volunteers, and let students know that we will do a second round of this game later during class. Have the 10 volunteers form a circle and give each of them one label.**

Have them affix this label to their shirt. Have the rest of the class make a larger circle surrounding them- let them know that they can make suggestions and give support to the inner circle. Tell students that the way this activity works is that we start the rope/yarn off with one element. That person finds another element they have a connection with, they say the connection, and while holding onto one end of the yarn, they carefully throw the ball of yarn to that person. An example would be, "I am the hawk and I have a nest in the oak tree." We keep going with this "connection building" until we run out of connections or time!

- **Have students do this activity until there is a thick web connecting each element to many other elements. Ask students to hold tightly onto their strings (connections.) Invite students to take a moment and just appreciate all of the different sorts of connections this ecosystem has. Walk behind one of the students in the circle and ask the rest of the class, "Let's say something happens with our hawk population- maybe they are moving into other area, maybe some are sick. Will that have an impact on the other elements?" (Yes, because they are connected. They have some sort of relationship.) Then, gently move the "hawk's" hands so that the yarn moves. There should be a ripple effect in the circle. Ask students if they think a healthy ecosystem has lots of connections or few connections. Have them explain their reasoning.**
- **Next, ask students to think about what will happen if say the water supply is poisoned or the trees are cut down. Have them give their responses. Then, cut all of the yarn coming from the water or tree person. What happens to the connections and the ecosystem?**
- **Clean up activity and create space for any lingering questions or concerns. This might prove to be an emotional activity for those students who are really connected to the environment because it highlights the implications of deforestation, water contamination, or other man-made impacts.**
- **Have students get out clipboards, journals, and pencils. Explain that you want them to observe the ecosystem of their garden. They can do a typical journal entry, but in addition, they need to make a list of all living and non-living elements that live or wander through the garden. (Suggest that they can write down elements that they have seen in the past or that they find evidence of- bird poop, a cat they once saw, etc.)**
- **Have students gather back together and share out their elements. Write them down on the white board as they say them**

- **Prepare for one last web activity. This time students will be modeling the connections in their garden ecosystem. Use the model from above. (Make sure that you have someone be a student/human element in this ecosystem.)**

Wrap up:

Gather students into classroom area. Ask students to continue to see ecosystems in this way- a collection of connections or relationships between different loving and nonliving elements. Have them go through the rest of their week with "ecosystem vision."

Assessment:

Teacher observation

Notes/Feedback:

Connections II

What sorts of connections might you see in a healthy ecosystem?

15.2
STANDARDS
NGSS: MS-LS2-1, MS-LS2-2
Arts: VA2.5

OBJECTIVES

- I can reflect on ecological webs, connections, and relationships while weaving a piece of garden art.

MATERIALS

- White board, markers, eraser
- Small forked tree branches (enough for each student to have one)
- Weaving supplies (multiple pairs of scissors, yarn, rawhide, grasses, feathers, seedpods, moss, raffia, grapevines, try to find as many natural materials as possible)
- An example of a twig weaving (for an excellent example, look at Nature Crafts for Kids by Gwen Diehn and Terry Krautwurst- a copy of the relevant page is included)

Preparation:

Put essential question for the lesson and the objectives on the board. Set out art supplies and a twig weaving example.

Background Information:

This lesson gives students a chance to try their hand at weaving. This art project will give them a chance to feel what it is like to build lots of connections into something. As they construct the warp and weft, they will realize that each element is in someway connected to every other element in their weaving.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Show students the example. Point out the branches of the twig. Show them the first step which is using one material (most likely yarn) to make the foundation or the warp. Then show how you weave the other materials through with an up and down or over and under motion. Have them notice that the materials have different textures and thicknesses, and that some are flexible and others or not. Ask for questions and then let students get to work. **Optional- let students know if they want to take their art work to the next level, they can create a weaving that represents or symbolizes a particular ecosystem. Let them think about what this might mean or look like.**
- **Making Connections: As students work on their garden art, encourage them to talk about what they are doing is related to what we talked about in the last lesson. Are we making webs of connections? Could this symbolically be an ecosystem?**

Wrap up:

Clean up and gather students back in the classroom area. Have students share their weavings. Find someplace to display these- possibly on the garden fence or in the school.

Assessment:

Teacher observation

Notes/Feedback:

Diversity I

How does a lack of diversity affect an ecosystem?

16.1

STANDARDS

NGSS: MS-LS2-4

CCSS: 6.SL.1, 6.W.10, 6.L.6

OBJECTIVES

- I can use ecological terms in the proper context.
- I can understand the importance of ecological diversity.

MATERIALS

- White board, markers, eraser
- Clipboards, journals, pencils,
- Vocabulary cards with term on one side and definition on the other
- Monoculture simulation index cards
- Large paper, markers

Preparation:

Put the essential question for the lesson and the objectives on the board. Decide upon vocabulary words for today's lesson. Some suggestions are: monoculture, diversity, population, habitat, species, etc. Also, create monoculture simulation cards. Choose one type of tree, say an Elm tree, and create a class set of index cards with this name on the back of each. Then choose a variety of plants and trees that would happen in similar habitat, and create a class set of index cards with these names written on the back (i.e. Coyote Bush, Manzanita, Lupine, Black Oak, Toyon,

Elderberry, Deer Grass.) Make sure you have at least ten different species, and at least 2 cards of each species.

Background Information:
This lesson introduces students to the concept of bio-diversity. As one of the central components of healthy ecosystems, the importance of bio-diversity cannot be overstated. The opposite of bio-diversity is a monoculture- this is where you have one species to the exclusion of all else. Examples of common monocultures are golf courses, lawns, and much of modern day large scale agriculture. These homogenous landscapes fly in the face of natural design, and as a result require huge inputs of pesticides and herbicides to maintain. The simulation in this lesson gives students a graphic example of why bio-diversity is so important.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today we will be continuing our study of healthy eco-systems by working with the concept of diversity, specifically bio-diversity. Before we begin the simulation and the observation portion of this lesson, we need to build some background vocabulary.**
- **Divide the class up into groups of 3-5. Have each group pull a vocabulary term from the hat. Explain that they are responsible for teaching the rest of the class their term through a skit, a rap, or a drawing. Tell students that they need to be focused- they have 5 minutes to prep, and two to present.**
- **Have students present their vocabulary terms to their classmates.**
- **Monoculture simulation: have students sit in a circle with their pencils. Tell them that you are going to hand each one of them a card and they need to keep in face down. When you call time, they are going to stand up and WALK around. When they meet up with another student they are going to do a secret share of their cards (i.e. quietly look to see what the other person has.) If they both have the same species, they will write the other person's name on the back of their card. They need to do this until they have five names and then they will sit back down. Do NOT show your card to the whole class, and do NOT talk. This is supposed to be secretive!**
- **Once everyone is reseated, tell students the following story, "Once upon a time, a landscaper decided to fill a park area with American Elm trees. He liked these trees because of their beautiful leaves and he**

thought that they would eventually make nice shade once they were full grown. So, he planted the small saplings and over the years they grew up to become large, lovely trees. After one really rainy winter, one of the trees started to look really bad- some of the leaves started to turn brown and curl up. Pretty soon, the whole tree looked like it was dying. This tree had gotten Dutch Elm Disease, a fungal infection."

- **At this point in the story, have all of the students stand up in a circle. Walk over to one of the students, and identify him/her as being an elm tree. Ask him/her to sit down- by sitting they are indicating that they are diseased or dead. Have this student read off the names on the back of their cards and ask these elms to sit down as well. Then have those students read off the names on their card. Continue until everyone is diseased or dead. Ask students what happened. (The disease passed from one tree to another; they infected each other, etc.) Emphasize that this scenario is an example of a monoculture.**
- **Have all of the students revive and stand back up. Tell them that we are going to do another simulation, and follow the same steps, but this time we are going to be looking at a system that has bio-diversity as opposed to a monoculture. Pass out cards and follow the same procedures. This time it will be more difficult for students to find partners because there are so many different species. They may only find one other person.**
- **Call time and have everyone take a seat in a circle. Tell the students this story, "A group of college students decided that they wanted to restore a native habitat. (This means that they wanted to take an area of land that was not healthy, and replant native plants.) So they went to a nursery, bought all different sorts of grasses, shrubs, and trees that were native to their area, and planted them. This garden became really valued in the community and volunteers often came to help maintain it. Over the years all of the plants grew strong and healthy. One year though, a new disease came to town! Sudden Oak Death. This is a fungus like organism that kills oak trees.**
- **Have all of the students stand up. Walk around until you find an oak tree, and ask this student to sit down and read off the names on their card. Continue this until there are no more names to read. Ask students what happened. How was this a different outcome than the previous simulation? Why was the outcome different?**

- **Making Connections: Invite the other students to share what plant they were. Was this a bio-diverse ecosystem? What impact did bio-diversity have on the spread of disease?**
- **Leaf collection and journaling: Take 10 minutes and have students collect leaves from the garden. Make sure they are only collecting 5 leaves, and only 1 leaf from a plant. Also, invite students to journal about their experience during the simulation. When the time is up have kids come back together and put all of their leaves into the center of the circle. Talk about the different sorts of leaves we found. Does our collection of leaves demonstrate bio-diversity within our garden?**

Wrap up:

Making More Connections: Ask students if the large fields of wheat, corn, soybeans, etc, that we see on TV sometimes are examples of bio-diversity? If not, does this type of farming create a healthy eco-system? What sorts of problems do you think these large farms might experience as a result of their monoculture?

Assessment:

Teacher observation and student journal entries.

Notes/Feedback:

Diversity II

How does a lack of diversity affect an ecosystem?

16.2
STANDARDS
CCSS: 6.RP.3, 6.SP.1

OBJECTIVES

- I can use ecological terms in the proper context.
- I can understand the importance of ecological diversity.
- I can use math to calculate species diversity in different ecosystems.

MATERIALS

- White board, markers, eraser
- Bio-diversity bottles, trays (cookie sheets- something with an edge)
- Bio-diversity data collection worksheet (one for every student)
- Clipboards, journals, pencils, calculators

Preparation:

Put essential question and objectives on the board. Create bio-diversity bottles. These containers model species diversity within a particular habitat. Each one will have a label on the outside that identifies its habitat, "grassland, corn field, rain forest," and inside each will have a certain number of colored beads to statistically represent the different kinds of animal species present.

Background Information:

To determine how many beads to put in each of the bio-diversity bottles, please see the data collection worksheet. This bio-diversity sampling activity is drawn from an

incredible curriculum developed by ConEd. To take a more in-depth look at what they have created, look at:
http://www.fishwildlife.org/files/ConEd-Schoolyard-Biodiversity-Guide.pdf

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today we will be continuing our study of healthy eco-systems by working with the concept of diversity, specifically bio-diversity. Today we are going to be amateur ecologists as we look at the biodiversity of animals in different habitats. Tell students that today we actually have managed to squeeze a couple of different habitats into our very own outdoor classroom! We have forests, grasslands, rainforests, and farms. Show students the biodiversity bottles and explain that obviously we can't bring whole habitats to them, so instead we are bringing models of those places. Hold up the rain forest bottle and ask them to notice the different colored beads inside. Each color of bead represents a different animal. So, if we have red, blue, orange, and black beads, how many different kinds of animals we have? And if agree that the red beads are monkeys, how many monkeys do we have?**
- **Pass out the data collection sheets. Ask students to read over the different habitats. Which do you feel like is going to be the most diverse? Put a star next to it. Which do you feel like is going to be the least diverse? Put a check next to it. Read over the sheet together and talk about how to count beads, where to record the information and how to calculate the simplified biodiversity index. Work on one biodiversity bottle/habitat as a class so that students understand how to do this.**
- **Divide students into groups of 3-5 and let them work on one bottle/habitat at a time. Once they finish with a bottle, they can start work another one.**
- **Once all groups have had an opportunity to analyze at least two habitats, clean up and have groups share out their index numbers. Explain how the index system works- 0 is no diversity, 1 is high diversity, .05 is average diversity. Discuss the results and compare the indexes.**
- **Have students keep worksheets, and pass out journals, clipboards, and pencils. Ask them to do a quick 5-minute observation of the garden.**

When they see an animal species (lady bug, Daddy Longlegs, Robin, squirrel, etc.) they write its name down in their journal and make a tally mark. If they see a second animal of the same species, they make another tally. If they don't know the proper name of the animal, write down a quick description, "large fly with stripes." Explain that once we are seated we will all need to be still and silent for this to work.

- **Analysis: Gather back to together. Discussion prompts: How many different species (or types) of animals did you see (count your headings)? How many different animals total did you see (count all tallies)? What sort of diversity index would we wind up with? (Pass out calculators and assist as needed.) Do you think we have biodiversity in our garden? Do our statistics (our math, our numbers) match what we see or know? [Teacher note: Let's say that we observed 5 animals total, and 4 different species- that would give us an index of .8. This would seem to indicate a high level of bio-diversity, but is it really? Biodiversity means having lots of different species (species richness), having lots of individuals within each species (species evenness)]**

Wrap up:

Gather student together in the classroom area. Ask what steps we could take to increase animal species biodiversity within our garden.

Assessment:

Teacher observation, student journals, and biodiversity collection sheets

Notes/Feedback:

Ecosystem Niches I

What sorts of roles do different species play in a healthy ecosystem?

17.1

STANDARDS

NGSS: MS-LS2-2, MS-LS2-3

CCSS: 6.SL.1, 6.L.6

OBJECTIVES

- I can do my job when I am part of a group.
- I can demonstrate the roles different species have in a particular ecosystem.

MATERIALS

- White board, markers, eraser
- Peel off labels, roll of string or yarn, scissors
- Seeds, potting soil, seed pots (any kind, even plastic cups will work), water and watering cans, trowels.

Preparation:

Put essential question and objectives on the board. Set up the seed planting supplies in different parts of the garden- put soil in one area, seeds in another, watering cans in another.

Background Information:
This lesson teaches students about the importance of roles or niches in an ecosystem by reminding them of how group work doesn't get done unless every member fulfills his or her role. The first group activity needs to be engineered so that it doesn't go that well. The point is for students to see what happens when individuals in a system don't play their role- things fall apart. Within the procedures, one method for sewing a bit of chaos will be introduced, but feel free to use your artistic license. But, be sure to monitor this situation closely as students who care about succeeding will probably feel angry and upset.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today we will be continuing our study of healthy eco-systems by working with the concept of roles or niches. In ecology, the word "niche" means the particular function or job that a species has. So, in an ecological sense, your niche at this school is to learn and grow. For an ecosystem to be healthy, species need to be in their niche, or doing their job (eating what they are supposed to eat, living where they are supposed to live, etc.)**
- **Explain that first, we are going to have an exercise in team work. We want to get some seeds planted in pots. The most important rule that everyone needs to follow is that you can only do the job you have been assigned. Do NOT take on anyone else's job.**
- **Divide class into teams of 4 members each. Have team members number themselves off 1, 2, 3, 4. Explain that 1's are responsible for getting and holding the cup, 2's are responsible for getting the soil and putting it into the cup, 3's are responsible for planting the seed, and 4's need to water the cup. Point out where everything is. Before the seed planting begins, ask for a quick meeting with all of the 2's, have a secret huddle with them and tell them to wander around a bit like they can't find the trowels or the soil before they actually get the soil to their group. Make sure they don't tell anyone else about our plan. Then call the 4's over to you, and ask them to bring the watering cans over to their group without water first, and then get water but pour it as slowly as possible- like a drop at a time!**
- **Remind groups that they are to only do their job, and that they need to remain patient and calm. Let groups get started.**

- **Keep an eye on things, if it seems like some groups are getting really overheated and upset, call time. Gather everyone together and explain the set-up. Give groups a moment to apologize/calm down if they need to, and then ask students to reflect. Making Connections: Discussion prompts- How did this activity go? How did you feel? Did everyone perform their role? What happened to the whole system/activity when one person didn't fill their niche? How does this compare to species niches in an ecosystem? What happens when the hawks don't eat enough gophers?**
- **Clean up and move on to looking at Food Webs. One of the major relationships species have to one another is prey/predator or who eats who. To better understand roles in an ecosystem, let's construct some webs. Create a label with the word "sun" on it, and have one student become the sun. Ask who uses the sun to make food? Who is a producer? (Plants) Create a label with the word, "grass" on it and have another student become grass. Have another student hand one end of the yarn to the sun and the ball of yarn to the grass. Who eats the grass? Continue making labels and having student come up to occupy the different niches. If students are stumped, suggest that different animals can eat the same plant, also remind them about decomposition. Once this web is as messy and full as it can be, start asking questions, "What happens if the deer doesn't eat the grass?" What happens if the farmer kills all of the coyotes? Have students trace the impacts as far as they can along the yarn connections.**
- **If time permits create food webs for different habitats, or try to build a food web that they are part of- this might illuminate some interesting points about where their food comes from.**

Wrap up:

Gather student together in the classroom area. Redo the seed planting activity with everyone performing their role appropriately. Have students take seeds home to remind them that everyone has an important role to fill.

Assessment:

Teacher observation

Notes/Feedback:

Ecosystem Niches II

What sorts of roles do different species play in a healthy ecosystem?

17.2
STANDARDS
NGSS: MS-LS2-2
CCSS: 6.W.10

OBJECTIVES

- I can use ecological terms in their proper context.
- I can understand the importance of ecological niches.
- I can observe ecological phenomena in the garden.

MATERIALS

- White board, markers, eraser
- Magnifying glasses, trowels, tweezers, bug collection boxes
- A number of different insect id guides (kid friendly versions)

Preparation:

Put essential question and objectives on the board. Bring in a number of good insect id guides. These can be books, pamphlets, or even laminated posters. Also, do a bit or reconnaissance in the garden before the kids get there to determine some rich insect habitats.

Background Information:

This lesson makes the idea of roles even more personal by inviting student to engage in written reflections about their own roles and by having them observe insect roles in the garden.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today we will be continuing our study of healthy eco-systems by working with the concept of roles or niches. Ask students to raise their hand if they fit the role you say aloud. Say terms like, "daughter, brother, aunt, cousin, student, teacher, helper, artist, athlete, mathematician, gardener, etc."**
- **Lightening Round Sharing: Have students turn to a neighbor and have them compare roles that they fill and jobs that they do. Ask students to think about what would happen if they didn't fill that role?**
- **Pass out journals, clipboards, and pencils. Give students some time to think and write about what ecosystem/community they are part of, and what roles they play. Why are those roles important? What other roles would they like to play?**
- **Wrap up journaling and invite students to share their reflections if they would like.**
- **Focused Observations: Explain that now we are going to spend some time observing insects and the roles they play in our garden ecosystem. Demonstrate how to observe insects by using tools carefully and disturbing the insects as little as possible. Also, show students how to draw and take notes on the insect, being sure to include detailed physical descriptions as well as hypotheses about the insect's role. Point out the insect id materials.**

Wrap up:

Gather student together in the classroom area. Ask students to share what they discovered about insect roles in our garden.

Assessment:

Teacher observation

Notes/Feedback:

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Stability I

Why is stability a key component of a healthy ecosystem?

18.1

STANDARDS

NGSS: MS-LS2-4

CCSS: 6.W.1, 6.RI.7, 6.L.6

OBJECTIVES

- I can use ecological terms in their proper context.
- I can understand the importance of stability.
- I can make predictions based on what I know about ecological stability.

MATERIALS

- Ecosystem scenarios (one for each student)
- Building blocks
- Some sort of props for tag game (something to identify the decomposer, and something to identify two death characters)
- Vocabulary words with definitions on small cards (for group vocabulary work)

Preparation:

Place essential question objectives on the board. Decide on vocabulary for the lesson- try reviewing some of the words introduced in previous lessons as well as some new terms: bio-diversity, niche, limiting factor, stability, mutualism, parasitism, commensalism, etc. Determine a safe place for playing tag.

Background Information:
This lesson focuses on the concept of ecological stability- this idea is closely linked to species diversity as well as niches. 6th graders have a pretty good understanding of balance, but they will need to be helped in applying this concept to an ecosystem. In short, the more diversified an ecosystem is, the more easily it will recover from system disturbances or upsets. More diversity, more niches, more redundancy of connections equals a more resilient ecosystem.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today we will be continuing our study of healthy eco-systems by working with the concept of stability. Stability has the same root as stable. Chat with your elbow partner and develop a definition for stability or stable.**
- **Have students share out their definitions. Share the definition of ecological stability: An ecosystem that will maintain or return to its original condition following any disturbance.**
- **Have 4-5 volunteers come up and build really unstable structures. These should fall down easily with a light wind or touch. Discussion prompt: Why were these building unstable? What might make them more stable?**
- **Have 4-5 volunteers come up and build stable structures. These should withstand some touch and some wind. Why are these structures more stable? (wider base, more connections, an array of different blocks (diversity), the blocks at the bottom are distributing the force evenly (niches, roles.)**
- **Invite students to think about ecosystem stability in a similar way. Lots of species, lots of connections between species, individual species doing what they should- all of this creates an ecosystem that can withstand more pressures, stresses, etc. It can stay stable and return to stability more easily.**
- **Vocabulary Building Activity: Divide students into groups of 4-5. Give each group one vocabulary card. Have them read the card aloud to the group, while you write the words on the board. Talk through the definitions as a class, and help students make meaning of them. Explain to students that there job is to make connections between their word and the other terms. They could create a sentence, or a drawing, etc. They want to come up with as many connections to the other terms as possible in 5 minutes. Remind students that their**

sentences should demonstrate their understanding of how these words are linked, if they come up with something like, "Niche comes after diversity in the dictionary," they will forfeit their turn. Give an example if you feel it is warranted.

- **When time is up, gather everyone together. Choose one group at random to go first. If they share something (sentence, drawing, poem) that links their words with another word, then the group who has that other word has to go next. Play until students run out of connections, or until you feel like everyone understands the words.**
- **Pass out ecosystem news article and stories, journals, clipboards, and pencils. Explain that we are going to read the stories aloud and the students are going to use what they have learned about healthy ecosystems to do some analysis and some hypothesizing.**
- **Read the article together and make sure students understand what the conclusion being drawn from the Antarctic research. Next read both eco vignettes aloud and then give students time to analyze them in their journal.**
- **Have students share their responses with a partner, and then amend their own if they feel revisions are warranted.**
- **Analysis: Gather students back together and ask a few closing questions: Which of these two ecosystems was more stable? Why? Which ecosystem recovered more quickly? Why? How does biodiversity allow an ecosystem to be more stable? How do relationships between different species build a more stable, resilient ecosystem?**
- **Decomposition tag: Explain that this game does a lovely job of reviewing one of the key concepts from the soil unit, as well as show how a system in balance can just keep going, whereas a system that is not stable, will quickly fall apart. Part of what keeps a system stable is species' niches or individuals playing their roles. Outline the game quickly, "We will play two rounds of this game so that you can compare your experiences between the first round and the second. In the first round, one person will be "death." When she taps you on the shoulder, you must sit down and then stay seated until I call time. Make it clear where the boundaries are and explain that if anyone runs out of the boundaries, they will also have to sit down. Choose who will be "death" and give them a hat, shirt, or scarf to wear to set them apart. Everyone else will be different biotic elements (living things) within this ecosystem.**

- **Let students play until everyone is dead. Announce that the first round of the game is over. Say, "With the second round, things are pretty similar. We still have "death," but now we also have the "decomposer." What does the decomposer do? (She breaks down organic matter and frees it up so that other living things can use it to grow and live.) So, with this round, when death taps you, you need to sit down. BUT, when the decomposer comes over to you, and runs around you in a circle one time, you can get back up because your organic matter is back in the game. Check for comprehension. Dress up death and decomposition characters and set them free to play.**
- **Making Connections: This game could go on indefinitely (which really is the point.) So call time once students are starting to get bored/tired. Discussion prompts: How was this round different than the first round? Which round was more stable? Why? How is this last round similar to a stable ecosystem?**

Wrap up:

Gather student together in the classroom area and ask them to really reflect on the idea of stability and balance from a variety of perspectives. (Physically, emotionally, etc.)

Assessment:

Student written responses

Notes/Feedback:

Stability II

Why is stability a key component of a healthy ecosystem?

18.2
STANDARDS
NGSS: MS-LS2-4, MS-ETS1-2
CCSS: 6.W.10

OBJECTIVES

- I can balance my body in space.
- I can communicate with others about what I need and what I see

MATERIALS

- Yoga props- mats, blankets
- Yoga pose suggestions for partners and groups- Yoga Planet and Yoga Pretzels are great
- Clipboards, pencils, and garden journals
- Bird nest examples- photos
- **Optional: Bird nest supplies so that students can try to make a bird nest that is balanced being light with being strong.

Preparation:

Decide on which yoga poses you'd like to do with your class today- remember that the focus is balance and stability. The lesson includes a suggested progression, but you can design your own flow.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain to students that today we will be finishing up our study of healthy eco-systems by playing around a bit with the concept of stability.**
- **Making Connections: Pass out journals, clipboards, and pencils. Have students turn to their individual health pledges from the beginning of the year. Thinking prompts: Now that you know more about health, both your own and the health of other living things and larger systems, do your goals still make sense? Do you feel like your goals are helping you to live a more balanced, stable life? (ie. Are you eating balanced meals that contain a diversity of foods? Are you taking care of the important connections in your life with family and with friends? Are you doing a good job in your different roles (student, son/daughter, etc.) Invite students to spend some time responding in writing to their health pledge progress in light of what they have learned about health.**
- **Put away journal materials, and have students share their reflections.**
- **Set up for yoga, making sure that everyone has space to stretch out and be comfortable.**
- **Begin with some sort of breath work and meditation. Students can breathe in a rainbow, they can tense and relax body parts, they can send breath to different body parts- there are many options.**
- **Have students move into child's pose for a minute, and then have them sit up. Discussion prompts: Was this pose relaxing? Did it feel stable? Why do you think?**
- **Challenge students to find the most stable pose possible and demonstrate it for everyone else. Compare poses.**
- **Now challenge students to find the most unstable poses possible with the caveat that there should be no "stands" (head or handstands.) Compare poses.**
- **Move through a series of individual balancing poses- tree, eagle, dancer, warrior 3, etc. Demonstrate how to do them and then let students experience the poses. Explain that building up strength and focus will improve balance.**

- **Suggest that we make things a little more complicated- let's do some partner balance poses. Some of the poses from** Yoga Pretzels **are great for this purpose- double boat, rooftops, elevator, back-to-back chair.**
- **If time permits, play yoga pretzels. One person says a couple of body parts like, "Ear, elbow, knee," and everyone else has to construct poses where those body parts are on the ground." Once again you will need to remind students that head and hand stands are not allowed.**

Wrap up:

Have students return to a comfortable seated or prone position. Have them focus on slowing their breath, calming their mind and feeling balanced. Clean up!

Assessment:

Teacher observations

Notes/Feedback:

Healthy Ecosystems I

What does a healthy ecosystem look like?

19.1

STANDARDS

NGSS: MS-LS2-4, MS-LS2-2, MS-LS2-1

CCSS: 6.W.10

OBJECTIVES

- I can make meaningful observations of natural landscapes.
- I can evaluate the health of different ecosystems based on specific criteria.

MATERIALS

- Field trip supplies: permission slips, first aid, lunches, water, etc.
- Clipboards, pencils
- Field trip note taking form

Preparation:

Make whatever field trip preparations you would normally make (permission slips, chaperones, lunches, etc.) This field trip should be to a place where students can analyze ecosystem health, and work with a naturalist or ecologist. East Bay Parks offers some great field trips- they even tailor them to your needs. A couple of suggestions would be: The Watershed Ecology Boat Tour at Del Valle and the Habitat Hunters at Tilden Nature Area.

Procedure:

- **Once you get to field trip area, gather everyone together and review field trip rules and guidelines.**
- **Do some sort of brief team building activity to ground everyone and remind them that we are a community. (The human knot or some other simple activity would work.) Also, remind students that they are here for two reasons: to connect with nature and appreciate it on a spiritual, emotional level and to look at the environment around them as an ecologist would. Pass out clipboards, pencils, and field trip note taking form.**
- **Follow field trip program.**

Wrap up:

Have students thank the naturalists then gather in a large circle. Have students go around and each share one thing they thought was inspiring. Get on the bus!

Assessment:

Teacher observations and field trip notes

Notes/Feedback:

Healthy Ecosystems II

What does a healthy ecosystem look like?

19.2

STANDARDS

NGSS: MS-LS2-4, MS-LS2-1

CCSS: 6.W.10, 6.W.1

OBJECTIVES

- I can evaluate the health of different ecosystems based on specific criteria.
- I can combine information from different sources to better understand the world around me.

MATERIALS

- White board, markers, eraser
- Field trip notes
- Clipboards, pencils, and garden journals
- Mind map template for students to copy into their journals
- Chalk for macro ecosystem model

Preparation:

Put essential question, mind map template and objectives on the board.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Summarize: Have students look at the mind map template on the board and then work with a partner to come up with concepts they have learned from this unit. Encourage them to look through their journals and talk with each other. Thinking prompts: What activities have we done? What sort of art have we created? What vocabulary have we learned? What essential questions have we answered?**
- **Gather students back in the classroom area, have students share out their ideas, and write them on the mind map.**
- **Place the following three questions on the board:**
    c. **Given what we have learned about ecosystems, would you say that the ecosystem we visited on our field trip was healthy? Why or why not?**
    d. **How can humans help natural ecosystems to be healthy?**
    e. **Do you think that healthy human ecosystems (healthy communities) are like healthy natural ecosystems? Why or why not?**
- **Have students answer these questions in their journal. Read over the questions with them and make sure they understand them. Explain that this is their chance to show off all that they have learned in this unit. Encourage them to do their best work.**
- **Making Connections: Have students think about what sorts of careers focus on the topics of this unit? Suggest that if they enjoyed these concepts, topics, and activities, they might enjoy being an ecologist, biologist, wildlife conservationist, etc.**

Wrap up:

Making More Connections**:** Have students gather in the classroom area. Explain that we are going to create one last web in this unit- this web is going to show the students the next level of systems thinking. The ecosystems we have been talking about are not these neat, clean, unchanging things. They are messy, and full of ever-evolving, ever-moving life. They also bump into each other and overlap. They affect each other. Can we draw some sort of model on the ground that shows how some different ecosystems relate to each other? (Some examples could be school garden, local park, San Francisco Bay, Oakland hills, Lake Merritt, Wetlands, local stream or watershed,

Redwood Park, etc.) Are these completely separate ecosystems? Do they touch, overlap, and/or influence each other? What is our role in these systems?

Assessment:
Ecosystem health evaluations

Notes/Feedback:

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Health Across Contexts I

What have we learned about health so far?

20.1
STANDARDS
CCSS: 6.SL.1, 6.W.10

OBJECTIVES

- I can use what I have learned about health to help me think about the health of our community.

MATERIALS

- Mind map template
- Clipboards, garden journals, and pencils
- Seeds, seedlings, trowels, watering cans, gloves, measuring sticks, twine, plant labels

Preparation:

Purchase seeds and seedlings of spring vegetable plants (peas, greens, root crops.) Decide on a planting area. Put essential question for the unit and the lesson, objectives, and mind map on the board.

Background Information:
This unit has students take what they have learned thus far about health and apply it to
their own school community. They will take the concepts, activities, and vocabulary and use these items as a lens through which they view the health of their school. Ultimately, they will construct their own definition of community health, define

factors that contribute to that health, and administer a survey to measure these attributes.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Making Connections: Explain to students that today we are starting a new unit about community health. The overarching essential question for this unit is, "How can we use what we have learned so far to evaluate the health of our school community? Help students to break this question apart. Discussion prompts: What does the word evaluate mean? Who makes up our school community? What are the biotic (living) and abiotic (nonliving) factors? (teachers, students, staff, parents, school building, garden, donors, neighbors, etc.)**
- **Summarize: Pass out clipboards, pencils, and journals and have students copy the mind map into their journals. Explain that first we need to try and summarize what we have learned this year about health. Ask them to use their brain and their journals to unlock and organize that knowledge. Have students work by themselves to complete their mind maps.**
- **Next, have students break into triads and share what they have on their mind maps. As they chat with their partners have them update what they have written.**
- **Gather students back together and collaboratively fill in the mind map on the board.**
- **Take a moment to acknowledge just how much students have learned this year and the hard work they have done. Discussion prompts: So, we have learned a lot about health this year- our own health, the health of plants, soil, and of ecosystems. Why are we studying this topic of health in the garden? Why study personal health in the garden? And why are we going to talk about community health here? (strong communities make good use of green spaces, community health is very similar to ecosystem health, community health is connected to personal health, and as we have found personal health is very much rooted in nature and plants, etc.)**
- **Prepare for planting: Say something along the lines of, "In acknowledgement of the links between personal health, community health, and planet health we are going to begin this unit by doing some planting. How does planting vegetables serve all of these health**

needs?" Show planting areas to students, and explain what we will be planting. Have students engage in a lightening round session of partner sharing to review how to plant seeds and seedlings. Then have student volunteers demonstrate.

- **Have students plant and water in seeds and seedlings.**

Wrap up:

Gather student together in the classroom area and explain that we have moved lots of health-related learning into the front of our brains, so that we can use them over the next couple of weeks. Reflect on what we have talked about today, and be prepared to create some puzzling art with it during our next class time.

Assessment:

Mind maps

Notes/Feedback:

Health Across Contexts II

What have we learned about health so far?

20.2
STANDARDS
CCSS: 6.SL.1, 6.L.6
Arts: VA2.5

OBJECTIVES

- I can use what I have learned about health to help me think about the health of our community.
- I can use art to express what I have learned.

MATERIALS

- Clipboards, garden journals, and pencils
- Markers, crayons, colored pencils, ec.
- Large pieces of heavy weight poster paper cut into puzzle shapes (you might need to use more than one poster board.)

Preparation:

Put essential question and objectives on the board. Draw puzzle lines on the poster board and then in fairly large bold letters, write the word, HEALTH, across the puzzle. Precut puzzle pieces and set out art supplies.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Pass out clipboard, pencils, and journals. Have students review their mind maps from the last class.**
- **Explain that today we are going to create a collaborative piece of artwork. We are going to make a giant puzzle that contains all of our learning about health so far. Show students the puzzle pieces.**
- **Discussion prompts: How do we want to go about this project? Do we want to give everyone complete freedom to do their own thing and then just see how it turns out? Do we want people to take on different concepts or ideas to make sure that we represent everything we have learned? Do we want to have a master plan?**

Let students discuss with a partner and then share out. Take a vote if needed and then proceed according to the agreed upon plan.

- **Set guidelines: Tell students that they need to do a sketch/rough draft in their journal first. Their puzzle piece needs to contain both words and artwork and it needs to be colorful and readable- no white space showing!**
- **Art time!**

Wrap up:

Gather student together in the classroom area and assemble the puzzle.

Assessment:

Class concept puzzle

Notes/Feedback:

Evaluating Community Health I

How can we apply what we have learned to the concept of community health?

21.1
STANDARDS
CCSS: 6.SL.1, 6.W.10
NGSS: MS-LS2-2, MS-LS2-3

OBJECTIVES

- I can determine which health concepts are useful in a community context.
- I can analyze elements and connections within our school community.

MATERIALS

- Clipboards, garden journals, and pencils
- T-chart template for ecosystem/community comparison
- String and peel-able labels
- Watering cans

Preparation:

Put essential question, t-chart, and objectives on the board.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Pass out clipboard, pencils, and journals. Have students review their mind maps from the last class. Explain that today we are going to start**

really making the connections between ecosystem and community health.

- **Give students a chance to reflect on this idea on their own and to jot down some questions and ideas in their journals. Thinking prompt: What communities are you part of? How do you know if a community is healthy or not? What sorts of indicators should we look for?**
- **Have students copy down the t-chart into their journals. Explain that we are going to use this chart to compare how we determine if these systems (eco and community) are healthy. We are going to get our ideas flowing by doing speed-chats. First, you will have 2 minutes to jot down all of your ideas, then you will meet with another person for 2 minutes, and then another, and another.**
- **Begin speed chats. Make sure that you are engaged with the students during this time, as some of them may have difficulty thinking about how to look at community health. Offer suggestions and ask questions.**
- **Making Connections: Gather students back together in the classroom area, share-out ideas, and fill in the t-chart on the board. This should be a brainstorming session- all ideas go on the board, we evaluate and organize them later on. Ask if there are any lingering questions or confusion.**
- **Community web building: Remind students that we constructed a couple of different webs when we were learning about ecosystem health. Discussion prompts: Can we remember how we did this? What did we wind up seeing? Do you think it might be helpful to construct a web that represents our community? Do you think it might inspire some new ideas about what makes a healthy community?**
- **Create community web- being sure to have a variety of elements/roles (student, custodian, secretary, teacher, therapist, administrator, elders, parents, siblings, classroom, books, library, cafeteria, office, play yard, garden, neighborhood, etc.)**
- **Once the web is constructed, use the label to tape it to the ground. Have students try to copy the web into their journals.**
- **If time permits, have students water the baby plants.**

Wrap up:

Gather student together in the classroom area and ask for reflections on the community web. Discussion prompts: Does this seem like an accurate representation of our school community? Did you come up with any other community health indicators?

Assessment:
Teacher observation and comparison chart

Notes/Feedback:

Evaluating Community Health II

How can we apply what we have learnedto the concept of community health?

21.2
STANDARDS
CCSS: 6.SL.1, 6.SL.2
Arts: VA2.4

OBJECTIVES

- I can summarize key community health indicators.
- I can envision a utopian community.

MATERIALS

- Clipboards, garden journals, and pencils
- T-chart template for ecosystem/community comparison
- Drawing paper
- Markers, colored pencils, rulers, etc.

Preparation:
Put essential question, completed t-chart, and objectives on the board.
Set out art supplies.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Pass out clipboard, pencils, and journals. Have students review their t-charts from the last class. Explain that today we are going to create a list of key community health concepts. For each unit we have studied so far, we have looked at what different individuals and systems need to be healthy. Discussion prompts: What do you need to be healthy? What three areas did we talk about? What do plants need to be healthy? What would you expect to find in healthy soil? What are the key indicators of a healthy ecosystem?**
- **Synthesis and organization: Have students focus on the community health column of their t-chart and on their community web drawing. Discussion Prompt: If we had to develop a list of 8-10 key community health concepts, what would they be? (Possibilities: safety, communications, physical, mental, spiritual health of members, diversity, niches or roles for everyone, sustainability (good use of resources), pleasant healthy surroundings, connections)**
- **Have class reach some sort of agreement on the most important 8-10 concepts and have everyone write these down in their journal.**
- **Utopian Community Maps: Keeping these community health indicators in mind, we are going to draw maps of our idea school community. It does not need to look like our current school- it can look any way you want, as long as you build in spaces to support our agreed upon concepts. Discussion prompts: How could you create space that would support physical health of students and staff? How would your utopian community space increase diversity?**
- **Pass out art supplies and let students get to work!**

Wrap up:

Gather student together in the classroom area and ask students to share their favorite design feature from their map.

Assessment:

Teacher observation and maps/designs

Notes/Feedback:

Evaluating Community Health III

How healthy is our school community?

22.1
STANDARDS
CCSS: 6.SL.1, 6.W.7

OBJECTIVES
- I can create survey questions that will gather useful data about the health of our school.

MATERIALS
- Clipboards, garden journals, and pencils
- Sample community health surveys and survey guidelines

Preparation:
Put essential question and objectives on the board. Decide what survey samples you want to share with students and think through some possible questions.

Procedure:
- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Pass out clipboard, pencils, and journals. Have students review their list of 8-10 community health indicators.**
- **Discussion Prompt: So, now we have identified some community health concepts. Examples: We believe that a healthy community has**

members who are healthy in mind, body, and spirit. Also, a healthy community has clear roles for everyone and everyone feels very connected to each other. But, how do we figure out if our community has these markers or indicators? Have students discuss with their elbow partner. Have students share out ideas.

- **Introduce the idea of a survey. Define, explain it, and share examples. Point out that there are structured and unstructured questions, and discuss the benefits of each. Look at multiple choice, rating scales, etc. Explain that the most difficult part is creating good questions- and for us good questions are clear, and get to the heart of the matter about our community's health.**
- **Choose one health concept that the class has developed and demonstrate how to create a question around it. For example, if the concept is: "A healthy community supports the emotional and spirit health of its members," a possible question might be: "Do you feel like our school provides adequate emotional health support in the form of counseling, class meetings, therapy groups, and other activities that build relationships between its members?"**
- **Break class into groups (depending on the number of concepts, you will probably want to have 2-3 students per question.) Give each group one health concept to develop 3-4 questions around. Have students record their health concept and their rough draft of questions in their journals.**
- **Let students work on their survey questions.**

Wrap up:

Gather student together in the classroom area and ask students to share out some of their potential survey questions.

Assessment:

Teacher observation

Notes/Feedback:

Evaluating Community Health IV

How healthy is our school community?

22.2

STANDARDS

CCSS: 6.SL.1, 6.W.7, 6.W.5, 6.W.10

OBJECTIVES

- I can create survey questions that will gather useful data about the health of our school.

MATERIALS

- Clipboards, garden journals, and pencils
- Sample community health surveys and survey guidelines
- Survey question final draft worksheet
- Watering cans

Preparation:

Put essential question and objectives on the board. Decide if there are other survey examples you'd like to share.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives. Explain to students that today they will be finishing their final draft of two survey questions. You will collate these questions and create the survey, and then you will distribute the survey. Discussion prompt: We can't have everyone in the school answer this survey because it would be too much data for us to process. So, who should answer it to make sure we have an accurate sample of the community population? We want to make sure we have people from every segment of the community answer this survey.**
- **Pass out clipboard, pencils, and journals. Have students get into their survey groups and review their questions. Give them 5 minutes to check-in and share any new insights.**
- **Peer Review: Have each group present what they have to the class as a whole, and receive feedback. Prepare class to be a helpful audience- i.e. I really liked…, this part wasn't clear to me because…., what about if you added/change this….**
- **Let students get back into groups, rework their questions based on class feedback, and then record their top two questions on the final draft paper.**
- **If any groups finish early, invite them to meditate, reflect in their journals, or water plants.**

Wrap up:

Gather students into the classroom area. Collect surveys. Let students know that one or both of their questions will be used.

Assessment:

Survey questions

Notes/Feedback:

Evaluating Community Health V

How healthy is our school community?

23.1
STANDARDS
CCSS: 6.SL.1, 6.RP.3

OBJECTIVES

- I can use a survey to gather useful data about the health of our school.
- I can compile data using my math skills.

MATERIALS

- Clipboards, garden journals, and pencils
- Completed surveys
- 8-10 different colors of construction paper
- Blank surveys- enough for each survey question group to get one.
- highlighters

Preparation:
Put essential questions and objectives on the board. Collect completed surveys and divide them into enough piles so that you have one for each group. Put each pile in a different colored folder.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives. Explain to students that today we will start examining the data we have gathered with our surveys. This is the exciting part- we get to see what our community members feel about the health of our community.**
- **Pass out clipboards, pencils, and journals plus one blank survey per group. Let students read over the survey, and mark the questions that are theirs.**
- **Data gathering: Explain to students how this process works. Have whole class sit in a large circle with survey question groups seated together. Show students the piles of surveys in colored folders. Explain that each group is going to get a folder of surveys, they will tally the results on their blank survey for only their questions, and then they will pass the folder with all of the surveys to the right. We will keep doing this until each group has had each folder once. Demonstrate how to tally results.**
- **If students asked an open-ended question, they should read over the responses, and highlight the portions they think are powerful or make a good point. Ask them to double check their tallies for each folder.**
- **Give each group a colored folder and have them record that color name on the top of their surveys (this is so that students can know when they have seen all folders.) Let students begin gathering data.**
- **If time permits, have students add up tallies in preparation for the next class.**

Wrap up:

Gather students into the classroom area. Ask students to share out initial findings: open-ended responses they really liked, how people seemed to respond to different questions, etc.

Assessment:

Teacher observations

Notes/Feedback:

Evaluating Community Health VI

How healthy is our school community?

23.2

STANDARDS

CCSS: 6.SL.1, 6.RP.3, 6.W.10

OBJECTIVES

- I can use a survey to gather useful data about the health of our school.
- I can compile data using my math skills.
- I can reflect in writing on my own experience and emotions.

MATERIALS

- Clipboards, garden journals, and pencils
- Calculators
- Blank surveys (where students recorded tallies)
- Completed surveys in folders

Preparation:

Put essential questions and objectives on the board.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives. Explain to students that today we will start analyzing the data we collected during the last class.**
- **Demonstrate how to find a percentage from tally marks. (Add up tallies for each response, record total number of tallies, and divide. This will give you a decimal which you multiply by 100 to get a percentage.**
- **Analysis: Explain that during group work time today they need to accomplish two tasks:**
    f. **Find percentages to all responses (to their survey questions)**
    g. **Write down quotes they like from any of their open-ended questions.**
- **If groups finish early, ask them to reflect in their journal about their experience with administering a survey. What did they learn? What would they do differently next time? Were there any surprises?**
- **Give groups time to work.**

Wrap up:
Gather students into the classroom area. Ask students to share out one exciting bit of analysis they have done.

Assessment:
Teacher observations and journal entries

Notes/Feedback:

ASSESSMENT-Evaluating Community Health

How can we use what we have learned so far to evaluate the health of our community?

24.1

STANDARDS

CCSS: 6.SP.1, 6.SP.5, 6.RI.1, 6.RI.7

OBJECTIVES

- I can use survey data to draw conclusions about the health of our school.
- I can illustrate data through the use of charts, graphs, and artwork.

MATERIALS

- Clipboards, garden journals, and pencils
- Calculators
- Blank surveys (where students recorded tallies)
- Completed surveys in folders
- Drawing paper and markers, crayons, colored pencils, etc.
- Large post-its of blank and graph paper
- Measuring sticks

Preparation:
Put essential questions and objectives on the board. Also, draw examples of bar graphs and charts on the board.

Procedure:

- **Analysis and Evaluation: Gather students into the classroom area and have them read the essential question and the objectives. Explain to students that today we will continue analyzing and evaluating the data we have collected. Today, groups will be responsible for working on the following tasks:**
    h. **Create one graph or chart for each close end survey question.**
    i. **Create one piece of quote based artwork for each open-ended survey question. Your artwork should contain the quote as well as some sort of drawing that is connected with the quote.**
    j. **Make an overall determination or judgment call BASED ON THE DATA about the health of our community. This means that you need to figure out how people rated your particular indicator. Your determination should sound something like, "75% of people seem to feel like our community is doing a good job supporting individual mental health. Therefore, we feel like this community health indicator is present." OR "21% of people feel like we could provide more mental health services. Therefore, we feel like individual mental health is not being taken care of in our community."**
- **Show students how to graph or chart data. (Make this just a quick overview- students should already know how to do this. Give groups more help individually if they need it.)**
- **Give groups time to work.**

Wrap up:
Gather students into the classroom area. Ask students to share out one exciting bit of analysis they have done.

Assessment:
Charts/Graphs and teacher observations

Notes/Feedback:

ASSESSMENT-CONTINUED

How can we use what we have learned so far to evaluate the health of our community?

24.2

STANDARDS

CCSS: 6.SP.1, 6.SP.5, 6.RI.1, 6.RI.7

OBJECTIVES

- I can use survey data to draw conclusions about the health of our school.
- I can illustrate data through the use of charts, graphs, and artwork.
- I can engage in conversation with others about health-related topics.

MATERIALS

- Clipboards, garden journals, and pencils
- Calculators
- Blank surveys (where students recorded tallies)
- Completed surveys in folders
- Drawing paper and markers, crayons, colored pencils, etc.
- Large post-its of blank and graph paper
- Measuring sticks
- Large number line from 1-10 and stickers
- **Optional: Tea supplies (you can decide how complicated or fancy you want this to be)- cups, tea bags, and hot water

Preparation:

Put essential questions and objectives on the board. Also, find some place to put the large number line.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives. Explain to students that today we will share our findings with one another.**
- **Give students about 15-20 minutes to finish up their survey work. Remind them about the three parts they need to complete:**
    k. **Create one graph or chart for each close end survey question.**
    l. **Create one piece of quote based artwork for each open-ended survey question. Your artwork should contain the quote as well as some sort of drawing that is connected with the quote.**
    m. **Make an overall determination or judgment call BASED ON THE DATA about the health of our community. This means that you need to figure out how people rated your particular indicator. Your determination should sound something like, "75% of people seem to feel like our community is doing a good job supporting individual mental health. Therefore, we feel like this community health indicator is present." OR "21% of people feel like we could provide more mental health services. Therefore, we feel like individual mental health is not being taken care of in our community."**
- **Call everyone back together. Put away supplies but keep out charts, graphs, artwork and statements. Find a way to set up these items so that students can do a gallery walk and read and look at what their peers have created.**
- **Make tea and then have students sip the tea as they walk around and look at each other's work. Encourage them to have academic conversations about the graphs, charts, and artwork. Examples, "I think it is interesting that so many people responded like…." OR "I wonder why people responded in this fashion."**
- **Evaluation: Gather everyone back into a group. Have each survey question group share their overall determination or judgment. Then give each student a sticker and explain that they need to place their sticker on the community health continuum. By placing their sticker, they are giving their community an overall health rating BASED ON THE DATA they have reviewed and listened to today. A ten means that our community is in perfect health, and a 1 means that our community is not healthy at all. Before you place your sticker, really evaluate the**

evidence you have seen presented today. Let everyone place their stickers and then discuss the distribution.

- **Make Connections: If you loved what we did in this unit, you might want to look into a career as a researcher, statistician, community health worker, etc.**

Wrap up:
Clean up and gather students into the classroom area and do group appreciations. [Make sure to carefully store all data, charts, graphs, etc. for the next unit.] Ask students to think about what we will be doing next. We have one unit left. What would make sense as a final unit of study based around the concept of health?

Summative Assessment:
Charts/graphs and teacher observation

Notes/Feedback:

Setting the Stage for Growth I

How can we prepare ourselves for our Capstone Project?

25.1

STANDARDS

CCSS: 6.RI.1, 6.RI.2, 6.RI.7, 6.SP.1

OBJECTIVES

- I can use our survey data to draw conclusions about the health of our school.
- I can use tools to plant seeds and seedlings.

MATERIALS

- White board, markers, eraser
- Survey data sheets
- Project packet- expectations and summary
- Garden tools- shovels, trowels, hand rakes, weeders, buckets, gloves
- compost

Preparation:

Put essential questions (unit and lesson) and objectives on the board. Decide which beds are going to be weeded and side-dressed with compost. **At this point in time, you might want to send out some sort of invitation/save the date announcement to the community members you would like to have present at the health summit featured at the end of this unit.**

Background Information:

This unit has students working on a Capstone Project. This project is meant to be the culmination of years' worth of garden learning. Students have spent a year

thinking, talking, and writing about many different health related concepts. They have looked closely at their own health and then compared their health needs to those of plants. They have looked at large and small ecosystems, and they have conducted research on the health of their own school community. Now they are ready to take on the role of problem-solver, and propose some solutions to some of the health-related issues within their school. On a more practical note, students will "side-dress" their plants with compost today. This involves taking a small amount of compost and applying it to the top of the soil around the plant stem. Be careful to not get compost on the leaves or the stem. Gently, so that you don't disturb the roots, rake compost into the soil.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Welcome students to the last unit of study of their 6th grade year. Let them know that this unit is meant to be a place where they can really shine by combining what they have learned with their own creative ways of finding solutions. Have students read over the essential question of the unit, and talk about what a Capstone Project is.**
- **Share project expectations. Highlight the end of unit community health summit- where they get to share their ideas with their community. Discuss briefly and allow some time for questions.**
- **Analysis: Share survey data and results. Give students time to look at this information with a partner, just to refresh their understanding of the findings. Ask students to try to identify a few key areas, as identified by survey respondents, which might need some attention. Write these ideas on the board.**
- **Explain that we have now planted the seeds for this project, and now we are going to let them sit for a bit as we engage in a bit of metaphorical garden work. You might want to say something like, "Today we are going to pull weeds and side-dress our plants with compost. While doing this, think about how we are contributing to the health of the plants and the soil through our actions. We are removing weeds which compete with our plants for sunlight, water, and nutrients (thereby weakening our plants, or lessening their health.) We are also adding compost (which as you know from the plant health and soil health units) adds nutrients, as well as air and water space to soil. So we are both adding and removing items in order to better the health of our beds. What sorts of things need to be added and/or removed from our school system to improve its health?"**

- **Demonstrate how to pull weeds and side-dress with compost.**
- **Encourage students to process the concepts of ecosystem and community health as they work.**

Wrap up:

Clean up and give students to share any lingering questions or thoughts about the Capstone Project.

Assessment:

Teacher observation

Notes/Feedback:

Setting the Stage for Growth II

How can we prepare ourselves for our Capstone Project?

25.2
STANDARDS
CCSS: 6.SL.1, 6.W.10

OBJECTIVES

- I can be an effective group member.
- I can use writing to reflect on my goals.
- I can use stretching and breath work to calm my mind and body.

MATERIALS

- White board, markers, eraser
- Project packet- time line and rubric
- Clipboards, garden journals, and pencils
- Yoga mats, blankets, any other yoga props you might want
- Yoga Planet and or Yoga Pretzels publications

Preparation:

Put essential question and objectives on the board. Determine a good spot for a yoga class. Read through a couple of kid's yoga publications (some are listed above) and decide which meditation and poses you would like students to do. I would recommend starting with one simple meditation, then doing a couple of poses involving balance, flexibility, etc. and finally closing with a couple of partner/group poses.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Today we are going to review our own health progress in preparation for the Capstone Project. We will also learn about the project time line and rubric. Finally, we will take some time to do some stretching and breathing so that we can be sure that our bodies, minds, and spirits are ready to take on this project.**
- **Evaluation: Have students open their journals to the individual health pledges they created at the beginning of the year. Ask them to find a quiet place to sit for about 8-10 minutes so that they can reflect in writing on their progress. Have them evaluate what they have accomplished in terms of each goal that they set.**
- **Gather students back together in the classroom area and invite students to share out any inspiration or ideas they had while reflecting on their own health.**
- **Pass out project packets and give students a couple of minutes to review the timeline and the rubric. Let them talk about this project and ask questions of you and each other.**
- **Yoga Time! Have students put away journals, clipboards, pencils, and project packets. Move to whatever space you have designated for this group practice and let students get comfortable. Proceed with the flow you have decided on ahead of time. Remember to model acceptance and non-judgment. Demonstrate different options, ask questions and offer suggestions. Allow space for students to do what they need to be healthy- for some this might mean remaining in child's pose for a long time!**

Wrap up:

Clean up yoga supplies and gather in a circle. Do a quick check-in by asking the following questions: "Show with one hand how healthy you are feeling. 0 fingers means really poor health, 1 finger is poor health, 2 fingers is fair health, 3 fingers is good health, 4 fingers is very good health, and 5 fingers is great health. Next, show with one hand, how you are feeling about this project. 0 fingers means scared and not prepared, 1 finger is worried, 2 fingers is okay, 3 fingers is I think I know what is expected of me, 4 fingers is I feel pretty confident about what I am doing, and 5 I am excited and ready to go.

Assessment:

Student journals and teacher observation

Notes/Feedback:

Choosing an Area of Improvement I

How do we determine which issues to focus on?

26.1
STANDARDS
CCSS: 6.SL.1
NGSS: MS-ETS1-1

OBJECTIVES

- I can work with a team to devise solutions for a community problem.
- I can engage in conversations about health-related topics.

MATERIALS

- White board, markers, eraser
- Project packets- areas of improvement/solutions lists
- Survey data
- Clipboards, garden journals, and pencils

Preparation:

Put essential question and objectives on the board. Decide how you want teams to be formed- can students choose their own 4-6 person teams, will you choose the teams, or some combination of both? Also, take some time to decide how you want to model brainstorming for them.

Background Information:
Today students begin formally working on their project.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain that last week we were preparing our bodies, minds, and spirits for this project and this week we are going to dive on in! Pass out project packets, and ask students to skim sections on expectations, guidelines, time line and rubric. Ask if there are any questions.**
- **Have students break apart into their teams. Pass out the survey data and review as a class. Co-create a list of identified areas of improvement, BASED ON THE DATA. Write this list on the board and have students write it in their project packets.**
- **Model how to brainstorm solutions. Choose a silly problem and write a description of it on the board- "Squirrels keep eating blueberries off of my blueberry bushes." Explain that when you are brainstorming, you write ideas down without evaluating. That step comes later on. Be as wild and silly as you want with this process! So, for my blueberry problem, some possible solutions are: pull out blueberry plants, get a dog, cover blueberries, create a motion sensor alarm, move blueberry plants, put out poison, plant other blueberry plants for the squirrels, etc."**
- **Give groups time to identify 3-4 areas of improvement they might be interested in, and brainstorm solutions for each.**

Wrap up:

Clean up and gather in the classroom area. Ask students to share any questions or concerns that might have at this point in the process.

Assessment:

Problem/solution brainstorming lists

Notes/Feedback:

Choosing an Area of Improvement II

How do we determine which issues to focus on?

26.2

STANDARDS

CCSS: 6.SL.1, 6.W.1, 6W.4

NGSS: MS-ETS1-1

OBJECTIVES

- I can be an effective group member.
- I can generate creative solutions for shared problems.
- I can evaluate ideas based on certain criteria.

MATERIALS

- White board, markers, eraser
- Project packets- problem statement and constraints/considerations page
- Clipboards, pencils, garden journals

Preparation:

Put essential question and objectives on the board. You will also need to be prepared to help groups choose their area of focus. While it would be ideal to have every group choose a different area of focus, groups can choose the same area, as long as they wind up developing different solutions.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**

- **Explain that today groups are going to think through some considerations/constraints that have a bearing on their project, and they will choose one problem on which they will focus their time and energy.**
- **Explain that considerations/constraints are things you want to think about when planning your project- things you want to take into account- obstacles, issues you might need to work around. These constraints aren't deal breakers, but you might have to find creative ways to work around them.**
- **Model how to think through this portion of the assignment using your fictitious problem from the last lesson. "When I sit down and think about the factors that might have an impact on my ability to solve this problem, here is what I come up with: I only have a budget of about $100, my backyard isn't fenced in, I REALLY like blueberries, I have some extra pots that are close to the house, I have a cat who likes to eat all sorts of things (even things that aren't good for her, etc.) Ask students if they can think of any other factors that we might want to consider. Then ask them to work out why these factors matter in terms of the plausibility (or workability) of the proposed solutions. For example, if my yard isn't fenced in, I might not be able to get a dog."**
- **Give teams time to work. Remind them that their goals for today are:**
    n. **Choose one problem, and write it as a statement. (I.e. Some students are bullying other students.)**
    o. **Identify constraints/considerations/obstacles in solving this problem.**
    p. **Evaluate your solutions list based on your constraints.**
- **Circulate as teams work, answer questions and redirect as needed.**

Wrap up:

Clean up and gather students together in the classroom area. Ask students to rate their progress today.

Assessment:

Teacher observations and project drafts in packet

Notes/Feedback:

Creating a Plan I

How should our solution be implemented?

27.1

STANDARDS

CCSS: 6.SL.1, 6.W.1, 6.W.4

NGSS: MS-ETS1-1

OBJECTIVES

- I can be an effective group member.
- I can generate creative solutions for shared problems.
- I can explain the steps in a process.

MATERIALS

- White board, markers, eraser
- Project packets- solution proposal and project implementation steps
- Clipboards, garden journals, pencils

Preparation:

Put essential question and objectives on the board.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain that today we are going to work in our teams to choose one solution based on our evaluation of the project constraints AND we are going to start generating project implementation steps.**

- **Pass out project packets and have teams review what they have done so far and give students some time to ask questions of each other and of you.**
- **Model how to evaluate solutions using your narrative from earlier lessons. "As I review my list of constraints, I realize that some of my solutions are too expensive or just impractical, like getting a dog, which would involve putting up a fence. Some solutions don't fit with my moral code, or what I believe in (using poison, killing the squirrels.) Some solutions might be doable, but I don't have the "know-how" at this time to make them happen (a motion detection system.) This leaves me with a couple of possibilities- covering the berries with something so that the squirrels can't get to them, and planting more berries for the squirrels to have so that they will leave mine alone. I use my background knowledge to decide that putting in plants for the squirrels is not a workable solution. I have tried something like this with strawberries, and wound up just giving the pests more to eat! That leaves me with installing some sort of cover."**
- **Tell students once they have one solution to focus on, they need to start thinking about the steps that would have to be taken to implement this solution. **Have students keep in mind that they are not going to be the ones implementing these solutions- they are simply going to be making recommendations to the community.****
- **Give teams time to work and remind them that their goals for this lesson are to:**
    - **Finish evaluating potential solutions**
    - **Choose one solution and write it as a proposal: "We propose that our school community create a peer mediation group that would help students deal with conflict."**
    - **Start brainstorming the steps the school community would have to take in order to implement their solution.**

Wrap up:

Clean up and gather students into the classroom area. Remind them to be as detailed as possible when developing their implementation steps. It is possible that they don't have enough background knowledge right now to develop their plan. If this is the case, what should they do? (Some research- talk with teachers, administrators, family and community members who have some experience with solving community problems and implementing plans.)

Assessment:
Teacher observations and project drafts in student packets

Notes/Feedback:

Creating a Plan II

How should our solution be implemented?

27.2

STANDARDS

CCSS: 6.SL.1, 6.W.1, 6.W.4, 6.W.5

NGSS: MS-ETS1-1

OBJECTIVES

- I can be an effective group member.
- I can explain the steps in a process.
- I can use tools safely in the garden.

MATERIALS

- White board, markers, eraser
- Project packets- project implementation steps
- Garden tools- trowels, weeders, gloves, watering cans, brooms, rakes, etc

Preparation:

Put essential question and objectives on the board. Walk the garden and determine what work needs to be done both to take care of the plants, but also to prepare the space for the health summit.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**

- **Explain that today we are going to work on our project plans but we are also going to do some garden work to give ourselves time to be in our bodies and think about things from a different point of view. Highlight the importance of taking a break, switching activities, engaging our body and breath when we are doing important work on a project. By "switching gears or channels" we can refresh ourselves and often develop new insights.**
- **Pass out project plans, clipboards and pencils. Ask teams to review their work thus far. Ask for questions or thoughts. Spend a little bit of time covering the components of a strong project implementation plan.**
    - **It needs to be clear (i.e. both the writing and the ideas are understandable)**
    - **It needs to be detailed (explain exactly what folks will need to do to implement your plan)**
    - **It needs to be sequential (don't tell folks to buy the chickens and then build the coop.)**
    - **It needs to assume nothing (if a project is going to take money, where is that money going to come from, if someone needs to teach a class, how do they get the knowledge/skills to teach that class?)**
- **Model how to do this briefly with the narrative from the previous classes. "Ok, so I have decided to build a cover for my blueberries. I have some ideas, but I am not sure what is going to work. Step one- I need to draw a map of my blueberry area including width, depth, height of my plants. On this map, I also need to show any other structures/plants that might impact my design like a fence right next to it, or a large tree. Step two- I need to do some research on how to build a cover. I am going to go on the internet and visit my local hardware store to get ideas.**
- **Explain to teams that they are going to have the rest of the time to be working on their plans. I will be pulling teams of students to "switch gears" and do some garden work. During this time, they need to work on the following portions of their project:**
    - **Project implementation steps**
    - **List of considerations relevant to this plan**
    - **Problem-solve any team issues that have arisen (communication, work sharing etc.)**

Wrap up:

Clean up and gather students into classroom area. Do a round of appreciations where team members appreciate one another for the hard work they each have done thus far.

Summative Assessment:

Teacher observations and project drafts in student packets

Notes/Feedback:

Presenting a Plan I

How do we convince others that our ideas are important?

28.1
STANDARDS
CCSS: 6.W.5
NGSS: MS-ETS1-1, MS-ETS1-3, MS-ETS1-4

OBJECTIVES

- I can be an effective group member.
- I can use the editing process to create a polished final draft
- I can accurately sketch the world I see around me.

MATERIALS

- White board, markers, eraser
- Project packets
- Clipboard, pencils, garden journals
- Final Project Summary Sheets
- **Optional** computer lab time for students to type up final drafts

Preparation:

Put essential question and objectives on the board. **This would be a good time to send out a formal invitation to the community members you would like to have present at the health summit featured at the end of this unit. Be sure to invite school administrators, school partners, families, and possibly the 5th grade class.**

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain that today, they are going to be working on the last stages of their project rough draft, and beginning the final draft. As a team they will be working on the following components today:**
    - **Finish up rough draft list of solution specific considerations (or just circle/mark the ones that are relevant from the original list in the packet.)**
    - **Develop 3-4 alternative solutions- these suggestions should come from your original list. You are doing this to present your audience with some feasible alternatives, in case they don't agree with the solution you have focused on.**
    - **Create list of pressing questions- things your team has thought of but not answered to your satisfaction. This is a step we are taking because it shows we are aware that we don't have all the answers, but we are actively engaged with trying to think through this entire process.**
- **In addition, we are going to be taking some time today to some garden sketching. We are doing this because sometimes when we engage in artistic endeavor, we access other parts of our mind, and uncover new inspiration. As we sketch things in the garden today, be looking for examples of Mother Nature's inventiveness or as seen in another light- nature's endless ability to adapt. How does nature deal with problems? What sorts of solutions are developed? Reflect on these concepts as you draw today.**
- **Pass out clipboards, packets, final draft pages and suggest that teams make a fair and inclusive plan for how they are going to complete all of the work they need to get done.**
- **Give teams work time. Pull teams to work on sketches throughout the rest of class time.**

Wrap up:

Clean up and gather student into classroom area. Debrief quickly and do a quick cheer or group hug to acknowledge all of the work everyone is doing.

Assessment:

Teacher observations and final draft of projects

Notes/Feedback:

Presenting a Plan II

How do we convince others that our ideas are important?

28.2

STANDARDS

CCSS: 6.SP.4, 6.SP.5, 6.W.5
NGSS: MS-ETS1-1, MS-ETS1-3, MS-ETS1-4
Arts: VA2.5

OBJECTIVES

- I can be an effective group member.
- I can represent ideas symbolically.
- I can use the editing process to create a polished final draft.

MATERIALS

- White board, markers, eraser
- Project packets and Final Project Summary Sheets
- Survey data (for visual aide material)
- Clipboards, garden journals, and pencils
- Assorted art supplies (poster paper, markers, rulers, scissors, crayons, colored pencils)
- **Optional** computer lab time so that students can create final drafts and charts/graphs

Preparation:

Put essential question and objectives on the board. Set up art supplies.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **As a class, discuss the essential question. How do we get our audience to agree that our ideas are important? What steps should we be taking now to make sure that our presentations are effective? (Guide students to think about the importance of neat, detailed, thoughtful written work, attractive clear visual aids, and strong oral presentations.**
- **Ask students what we should be working on today, in order to accomplish this goal of having presentations that are taken seriously and listened to?**
    q. **Editing rough drafts and writing up final drafts of our project plans**
    r. **Begin work on visual aids (Briefly discuss how visual aids can support a presentation. What sorts of artwork, maps, charts, graphs might help your team to make its point?)**

2. **Let teams get to work. Circulate, answer questions, pose problems, and redirect as necessary.**

Wrap up:

Clean up and give students to chance to share out visual aide ideas in an effort to inspire other teams.

Assessment:

Teacher observations and project drafts in student packets

Notes/Feedback:

Presenting a Plan I

How do we convince others that our ideas are important?

29.1

STANDARDS

CCSS: 6.SP.4, 6.SP.5, 6.W.5
NGSS: MS-ETS1-1, MS-ETS1-3, MS-ETS1-4
Arts: VA2.5

OBJECTIVES

- I can use my breath to calm my mind and body.
- I can represent ideas symbolically.
- I can summarize large concepts and plans.

MATERIALS

- White board, markers, eraser
- Project packets and Final Project Summary Sheets
- Survey data (for visual aide material)
- Clipboards, garden journals, and pencils
- Assorted art supplies (poster paper, markers, rulers, scissors, crayons, colored pencils)
- Yoga Pretzels or Yoga Planet publications (or other online or print meditation sources)
- **Optional** computer lab time so that students can create final drafts and charts/graphs

Preparation:

Put essential question and objectives on the board. Set up art supplies. Decide on what sort of whole group meditation you would like to do.

Procedure:

3. **Gather students into the classroom area and have them read the essential question and the objectives.**
4. **Suggest that we have been trying to remain well balanced and healthy while working on this project by "shifting gears" occasionally. We have been doing this by gardening, sketching, doing yoga, etc. Today we are going to do a group meditation to help calm our bodies and minds and to help us prepare for our health summit next week.**
5. **Have all students get comfortable and begin meditation.**
6. **End meditation and pass out project supplies (clipboards, pencils, packets, final drafts.) Ask students what we should be working on today, in order to accomplish this goal of having presentations that are taken seriously and listened to?**
    a. **Finishing up final drafts of our project plans**
    b. **Finish work on visual aids**
    c. **Develop "pitch." A pitch is a catchy summary of your team's proposed problem and solution. It needs to be no more than 4-5 sentences long, and it needs to try and capture the essence or spirit of your project. This will be part of how you introduce your problem to your audience.**
7. **Let teams get to work. Circulate, answer questions, pose problems, and redirect as necessary.**

Wrap up:

Clean up and give students to chance to share out pitch ideas in an effort to inspire other teams.

Assessment:

Teacher observations and project drafts in student packets

Notes/Feedback:

The Presentation

What can we do to improve the health of our community?

29.2

STANDARDS

CCSS: 6.SP.4, 6.SP.5, 6.W.5

NGSS: MS-ETS1-1, MS-ETS1-3, MS-ETS1-4

OBJECTIVES

- I can speak publically about topics that interest me.
- I can present information that will improve the health of my community.

MATERIALS

- White board, markers, eraser
- Clipboards, pencils, garden journals
- Final project summary sheets in folders
- Visual aides

Preparation:

Put essential question and objectives on the board. Decide on what sort of whole group meditation you would like to do. Determine presentation order for health summit and overall agenda.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**
- **Explain that today we are going to do a group meditation to help calm our bodies and minds and to help us prepare for our health summit next week.**
- **Have all students get comfortable and begin meditation.**
- **End meditation and pass out project supplies (final drafts in folders, visual aids.) Ask students what we should be working on today:**
    8. **Fine tune "pitch." A pitch is a catchy summary of your team's proposed problem and solution. It needs to be no more than 4-5 sentences long, and it needs to try and capture the essence or spirit of your project. This will be part of how you introduce your problem to your audience.**
    9. **Practice rest of oral presentation- Introductions, overview of considerations, major steps that need to be taken, thanking those who have helped. Figure out how visual aid is going to be used.**
- **Share summit agenda. Let students know the order they will go in. Explain that after everyone makes their very brief presentation- each team will move to a separate area of the garden so that community members can wander around to the different teams and ask questions and get more information.**
- **Let teams get to work. Circulate, answer questions, pose problems, and redirect as necessary. While teams are preparing, pull them one at a time to practice their presentation- introductions, pitch, key project steps, and giving thanks.**

Wrap up:

Clean up and gather students in classroom area. Take a deep breath together and wish each other luck on the community health summit next week.

Assessment:

Teacher observations

Notes/Feedback:

ASSESSMENT: The Presentation

What can we do to improve the health of our community?

30.1

STANDARDS

CCSS: 6.SP.4, 6.SP.5, 6.W.5

NGSS: MS-ETS1-1, MS-ETS1-3, MS-ETS1-4

OBJECTIVES

- I can speak publically about topics that interest me.
- I can present information that will improve the health of my community.

MATERIALS

- Final project summary sheets in folders
- Visual aides
- **Optional** food and drink for community members, video camera to record presentations, microphone

Preparation:

Make sure all of the presentation supplies are accessible. Make sure there are places for community members to sit or stand.

Procedure:

- **Gather health experts into presentation space and welcome community members.**
- **Explain flow of health summit to everyone.**
- **Let the summit begin!**

Wrap up:

Gather students together and share observations about the event and share appreciations.

Summative Assessment:

Capstone Project- oral presentations and written projects

Notes/Feedback:

Closing of the Garden

What have we learned about the concept of heath this year?

30.2
STANDARDS
CCSS: 6.SL.1, 6.W.10

OBJECTIVES

- I can share my ideas and emotions with others.
- I can enter into dialogue with others about health-related topics.
- I can make the world a healthier place.

MATERIALS

- White board, markers, eraser
- Clipboards, garden journals, pencils
- Salsa recipe of your choice
- Cooking supplies for making salsa (recipe ingredients, cutting boards, knives, big bowl for mixing, mixing spoon, juicer, colanders, buckets, and soap for washing hands and produce, chips, bowls for students)

Preparation:

Put essential question and objectives on the board. Set up cooking area, and decide how to divide up cooking tasks.

Procedure:

- **Gather students into the classroom area and have them read the essential question and the objectives.**

- **Have students turn to their personal health pledges from the beginning of the school year and read over them. Let them talk briefly with their coach about their progress, and then give them about 10 minutes to reflect and write in their journals.**
- **Analysis: Gather back in the classroom area. Pose the essential question to students and cover the white board with their responses. Let them page through their journals if that helps them to remember what we have learned. Ask what new questions they have about health (personal, plant, soil, ecosystem, community.)**
- **Making Connections: Many of the topics we have learned about this year lend themselves to exciting professional work. If you enjoy what we did during this unit, you might want to think about the fields of: city planner, health worker, politician, social worker, educator, consultant, etc.**
- Handout recipe, divide up cooking tasks, and review kitchen safety.
- Make, eat, and enjoy salsa and chips.
- Clean up.

Wrap up:
Let students take a couple of moments to say good-bye to the garden.

Summative Assessment:
Student written reflections

Notes/Feedback: