



## Third Grade



**NUMi**  
FOUNDATION

*Celebrating People, Planet & Possibility*

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.

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## 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.SL.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:

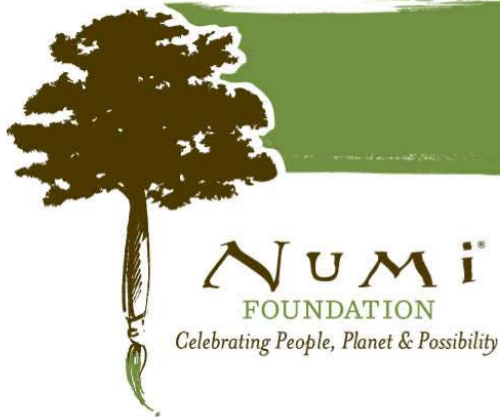
- Students enter the garden and explore.
- Gather students, check in about season and weather.
  
- Review your class agreements. Ask a student to read the garden rules.
- “Today we are going to work on team building. Why do you think we start the year with team building? What are some jobs in the garden 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:**



## 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.

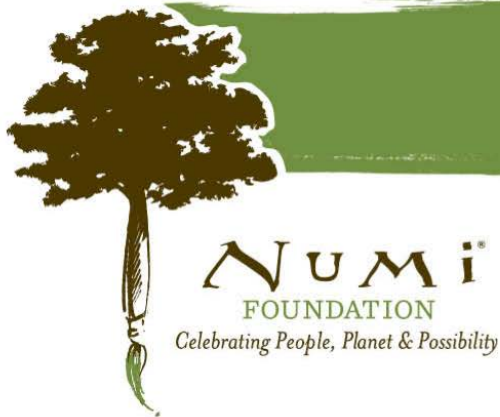
#### Procedure:

- 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.

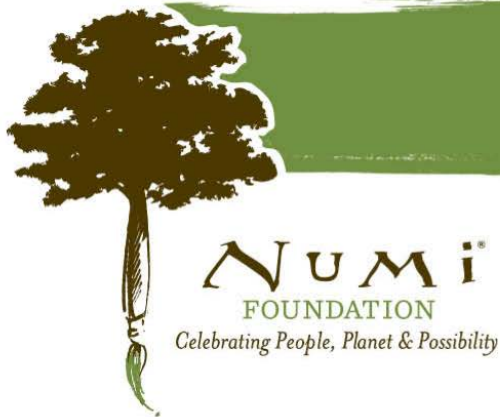
#### Procedure:

- 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:**



## 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.

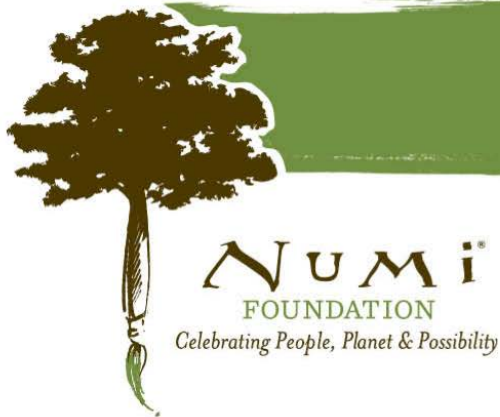
#### Procedure:

- 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.

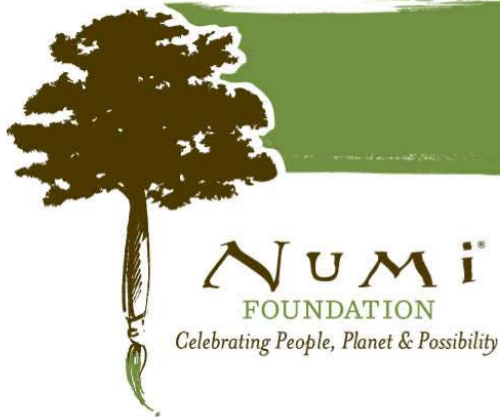
As students finish, send them into the garden to find more examples of symmetry in nature. They should draw an example in their journal.



**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.

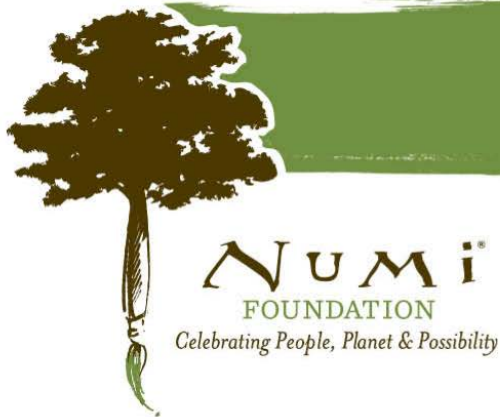
**Procedure:**

- 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:

45

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 way 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:**



## 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 comprised 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:**



## Ecosystems part two

**Week 12.2**  
**STANDARDS**  
3.SL.1

### **MATERIALS**

- Journals, pencils
- Watering cans, if necessary

### **Preparation:**

**Determine whether the lettuce needs watering.**

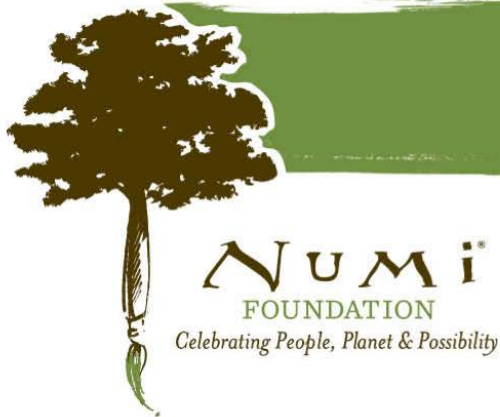
### **Procedure:**

- **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:**





## 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. It took 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.

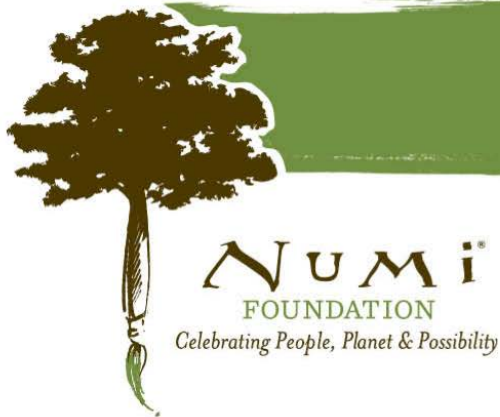
**Procedure:**

- 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 for 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 banana 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

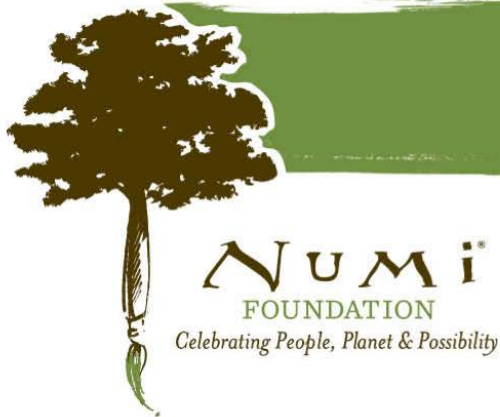
#### Procedure:

- 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.





## Journaling

### Week 15.2

#### STANDARDS

3.PS2.1, 3.SL.1, 3.SL3.1b

#### MATERIALS

- Journals, pencils

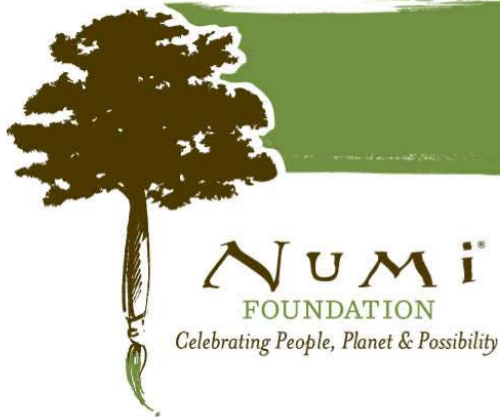
#### Procedure:

- 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:

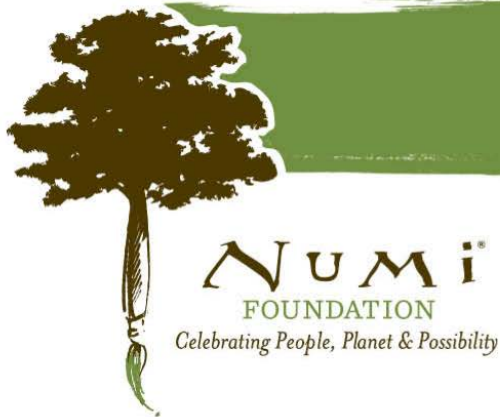
- Students enter the garden and explore. Some students are recording weather data.
- Gather students, check in about the season, the weather and the leaf cage.
- Weather collectors share data.
- If there is a Redwood tree on campus, skip the above and go straight to the tree.
- "Today we are going to 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.

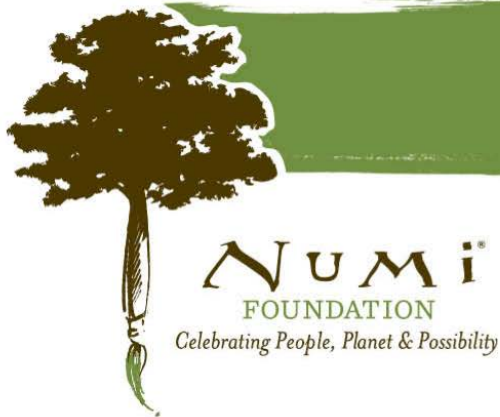
#### Procedure:

- 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:

78

- 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:**

80

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.

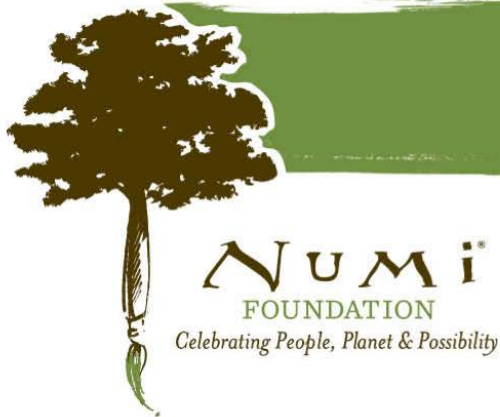
**Procedure:**

- 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 “I” 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



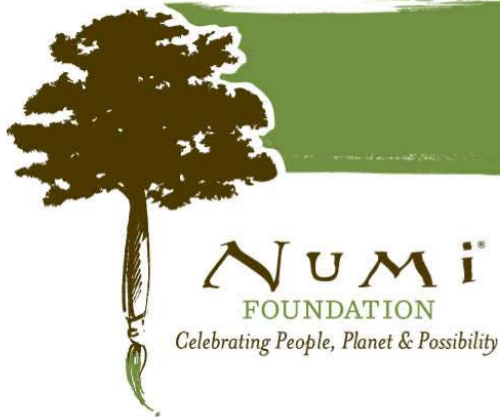
3) Tallest sprout in the no-compost bed and 4) Shortest sprout in the no-compost bed.

- 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:

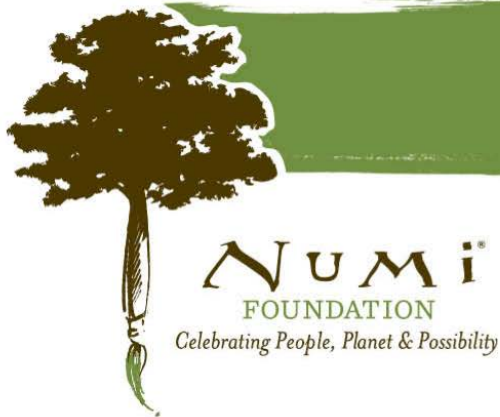
- Students enter the garden and explore. Some students are recording weather data.

- 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 word 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!

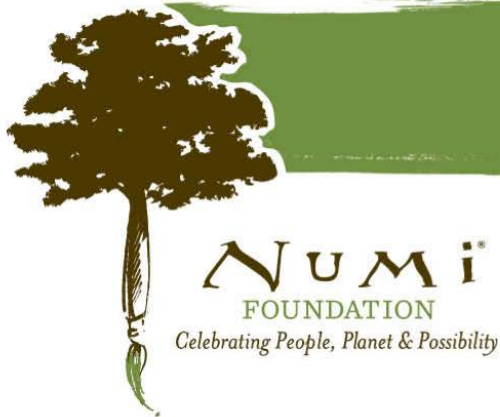
### **Procedure:**

- 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:

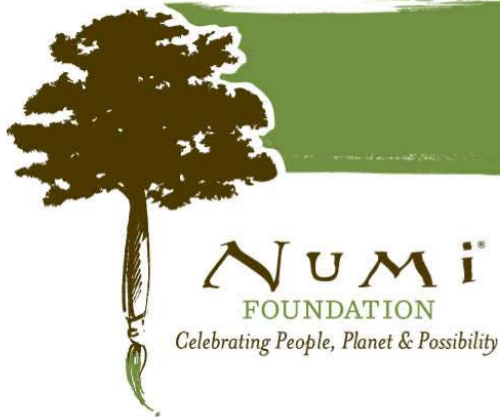
The Tilden Regional Park Botanic Garden is amazing, free and open to the public. Coordinate with their staff at least a month in advance if you would like to schedule a tour.

#### 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 each 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).

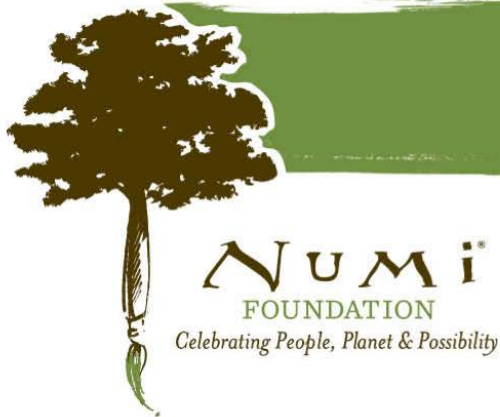
#### Procedure:

- 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 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:**



## 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

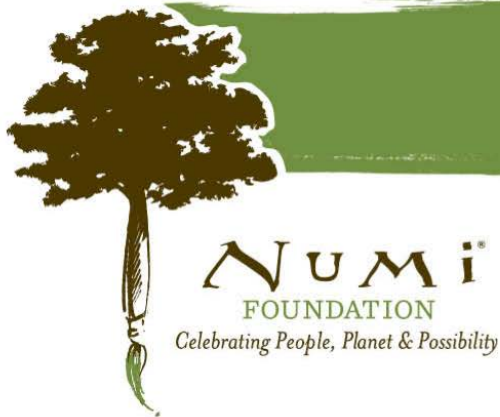
- “Dear Children of the Earth” by SchimSchimmel
- Rulers, clipboard, pencil, paper
- Watering cans

#### 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 in 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.

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- 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:**





## 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: