NUMI®
FOUNDATION
Celebrating People, Planet & Possibility

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

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

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

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Welcome Back!

Week 1
STANDARDS
2.SL.1

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

MATERIALS
- Poster board and pens
- Garden tools

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

Procedure:

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

Wrap up:

If there is extra time, continue exploring.

Notes/Feedback:

Scavenger Hunt

Week 1.2
STANDARDS
2.SL.1

Preparation:

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

Procedure:

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

Notes/Feedback:

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Teamwork

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

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

MATERIALS
- Four Bandanas

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

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

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

Wrap up:

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

Notes/Feedback:

Teamwork part 2

Week 2.2
STANDARDS
2.SL.1

MATERIALS

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

Preparation:

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

Procedure:

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

Notes/Feedback:

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Fall

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

OBJECTIVES

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

MATERIALS

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

Preparation:

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

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

Background Information:

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

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

Procedure:

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

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

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

Wrap up:

Collect and return materials.

Notes/Feedback:

Garden Journals

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

MATERIALS
- Journals, pencils

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

Wrap up:
Share, in partners.

Notes/Feedback:

Wildflowers

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

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

MATERIALS
- Wildflower Seeds
- Soil to mix with the seeds

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

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

Procedure:

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

Wrap up:

Wash hands, if necessary.

Notes/Feedback:

Journaling: Wildflowers

Week 4.2
STANDARDS
2.LS2.2

MATERIALS

- Journals, pencils, crayons

Procedure:

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

Wrap up:

Share, in small groups.

Notes/Feedback:

Plant Part Review

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

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

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

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

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

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Plants part 2

Week 5.2
STANDARDS
2.SL.1

MATERIALS
- Journals, pencils, crayons

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

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

Notes/Feedback:

Erosion

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

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

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

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

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

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Erosion part 2

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

Procedure:

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

Wrap up:

Wash hands.

Notes/Feedback:

Planting Day!

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

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

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

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

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

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

Procedure:

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Watering and Journaling

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

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

Preparation:
Fill watering cans.

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

Wrap up:
Collect all materials.

Notes/Feedback:

The Insect Club

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

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

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

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

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

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

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

Wrap up:

Return watering cans.

Notes/Feedback:

Insects part 2

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

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

Preparation:
Fill the watering cans.

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

Wrap up:
Share, in partners.

Notes/Feedback:

Where Do Insects Go?

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

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

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

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

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

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

Wrap up:

Return materials, wash hands.

Notes/Feedback:

ASSESSMENT

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

MATERIALS

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

Preparation:

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

Procedure:

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

Wrap up:

Collect all materials.

Notes/Feedback:

The Weeds Must Go!

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

OBJECTIVES

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

MATERIALS

- Buckets to collect weeds

Preparation:

Know beforehand areas in the garden that need weeding.

Procedure:

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

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Are You An Ant?

Week 10.2
STANDARDS
W.2.8

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

Preparation:
Fill the watering can.

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

Wrap up:
Collect hand lenses.

Notes/Feedback:

Winter

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

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

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

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

Background Information:

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

Procedure:

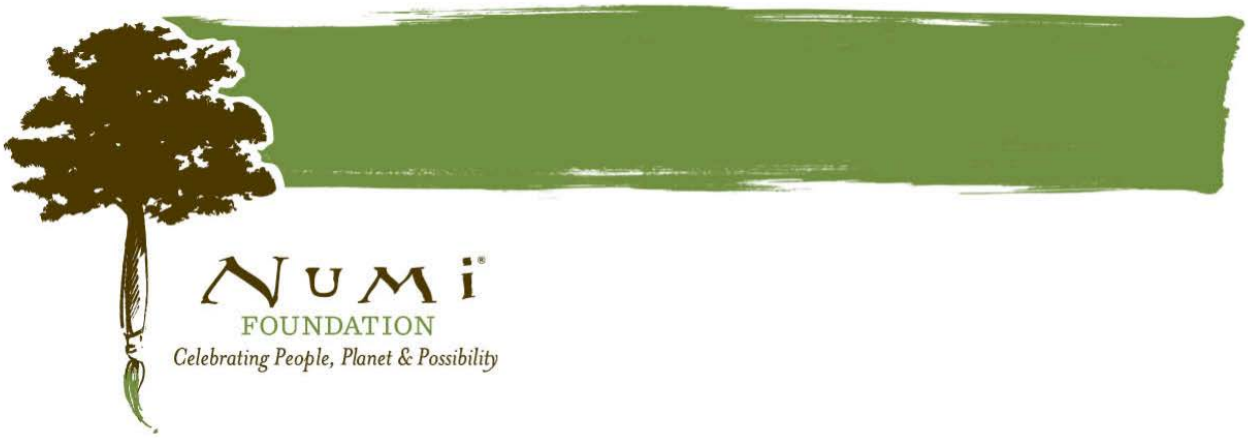
- Start class by taking students on a walk through your campus, looking for signs of winter. Before you even go outside, ask students what kinds of things they may be looking for. Signs of winter can even be a lack of insect activity, no blooming flowers, or barren trees.
- After your exploration, come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

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

Wrap up:

Return materials.

Notes/Feedback:



Winter part two

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

MATERIALS

- Journals, pencils
- Materials for garden work

Preparation:

What work needs to be done in the garden?

Procedure:

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

Wrap up:

Share, in partners.

Notes/Feedback:

Soil Types

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

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

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

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

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

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

Wrap up:

Return materials, wash hands.

Notes/Feedback:

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Soils part two

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

MATERIALS
- Journals, pencils

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

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

Wrap up:
Share in small groups.

Notes/Feedback:

The Garden Ecosystem

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

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

MATERIALS
- Materials for garden work

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

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

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

Procedure:

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

Wrap up:

Return tools, wash hands.

Notes/Feedback:

Ecosystem part two

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

MATERIALS
- Journals, pencils, crayons

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

Wrap up:
Share, in partners.

Notes/Feedback:

Garden Map

Week 14
STANDARDS
2.ESS2.2

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

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

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

Procedure:

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

Wrap up:

Collect all materials.

Notes/Feedback:

Garden Map part two

Week 14.2
STANDARDS
2.ESS2.2

MATERIALS

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

Procedure:

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

Wrap up:

Collect all materials.

Notes/Feedback:

Compost Saves the Day!

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

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

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

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

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

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

Procedure:

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

Wrap up:
Return materials, and wash hands.

Notes/Feedback:

Garden Work

Week 15.2
MATERIALS
- Watering cans
- Tools necessary for garden work.

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

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

Wrap up:
Return materials, wash hands.

Notes/Feedback:

What Else Do Plants Need?

Week 16
STANDARDS
2.SL.1

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

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

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

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Garden Work Continued

Week 16.2
MATERIALS

- Watering cans
- Tools necessary for garden work.

Preparation:

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

Procedure:

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

Wrap up:

Return materials, wash hands.

Notes/Feedback:

ASSESSMENT: Give Me Space!

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

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

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

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

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

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

Wrap up:

Collect seed packets.

Notes/Feedback:

Journaling

Week 17.2
STANDARDS
2.W.7

MATERIALS

- Journals, pencils, crayons

Procedure:

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

Wrap up:

Collect all materials.

Notes/Feedback:

How'd You Get Here Anyway?

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

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

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

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

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

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

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

Wrap up:

Return materials.

Notes/Feedback:

Bug Houses

Week 18.2

Procedure:

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

Wrap up:

Go on a “tour” of each group’s house.

Notes/Feedback:

Ladybug Symmetry

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

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

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

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

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

Procedure:
- Students enter the garden and explore.

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

Wrap up:

Collect materials, wash paintbrushes, wash hands.

Notes/Feedback:

Ladybugs part two

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

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

Preparation:
Bring student work out to the classroom.

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

Wrap up:
Collect all materials.

Notes/Feedback:

ASSESSMENT: Planting

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

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

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

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

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

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

Procedure:

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

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Journaling

Week 20.2
STANDARDS
2.W.7

MATERIALS
- Watering cans, full
- Journals, pencils

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

Wrap up:
Gather students, take volunteers to read stories.

Notes/Feedback:

Spring has Begun!

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

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

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

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

Background Information:

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

Procedure:

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

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

Wrap up:

Return materials.

Notes/Feedback:

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Spring part two

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

MATERIALS

- Journal, pencil, crayons
- Watering cans, full

Procedure:

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

Wrap up:

Share, in partners.

Notes/Feedback:

Seeds on the Go

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

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

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

Preparation:
Prepare garden work.

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

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

Wrap up:

Return materials, wash hands.

Notes/Feedback:

Journaling: Seeds

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

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

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

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

Notes/Feedback:

Seed Collections

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

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

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

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

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

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

Procedure:

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

Wrap up:

Collect materials.

Notes/Feedback:

Garden Poem

Week 23.2

Procedure:

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

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

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

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

Wrap up:

Continue to explore, if there is time.

Notes/Feedback:

Build a Seed, Part I

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

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

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

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

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

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

Wrap up:

Collect materials to bring inside.

Notes/Feedback:

Worms

Week 24.2
MATERIALS
- Watering cans

Preparation:
Fill the watering cans.

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

Wrap up:
Return worms, wash hands.

Notes/Feedback:

ASSESSMENT: Test a Seed

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

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

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

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

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

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

Procedure:

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

Wrap up:

Make sure all materials are collected.

Notes/Feedback:

Natural Paintbrush

Week 25.2
MATERIALS

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

Preparation:

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

Procedure:

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

Wrap up:

Collect all materials, wash hands.

Budding, Blooming, Pollinated

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

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

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

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

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

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

Procedure:

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

Wrap up:

Return scissors.

Notes/Feedback:

Garden Exploration

Week 26.2
STANDARDS
2.LS2.2

MATERIALS
- Watering can
- Bucket to collect weeds

Preparation:
Prepare a weeding project.

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

Wrap up:
Collect all materials, wash hands.

Notes/Feedback:

Seed Museum

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

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

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

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

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

Wrap up:

Collect seeds to bring inside, if you would like.

Notes/Feedback:

Journaling

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

MATERIALS
- Journals, pencils
- Tools for garden work

Preparation:
Know what garden work needs to be done.

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

Wrap up:
Collect all materials.

Notes/Feedback:

Flower Symmetry

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

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

MATERIALS
- Journals, pencils, crayons

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Flower Symmetry part two

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

MATERIALS
- Printed pictures of symmetry in nature

Preparation:
Print different pictures of symmetry in nature.

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

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

Wrap up:
Share, in partners.

Notes/Feedback:

The Buzz on Bees

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

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

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

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

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

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

Procedure:

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

Wrap up:

Wash hands.

Notes/Feedback:

Bees part two

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

MATERIALS
- Journals, pencils

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

Wrap up:
Collect journals.

Notes/Feedback:

Preparing for Summer

Week 30
STANDARDS
2.SL.1

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

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

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

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

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

Wrap up:

Collect materials.

Notes/Feedback:

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Summer part two

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

Preparation:
Is there more garden work to be done?

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

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

Notes/Feedback: