First Grade

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Celebrating People, Planet & Possibility

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

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

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

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

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Rules and Agreements

Week 1.1
STANDARDS
1.SL.1

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

MATERIALS
- Poster board and pens
- Garden tools

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

Procedure:

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

Wrap up:

If there is time, continue exploring.

Notes/Feedback:

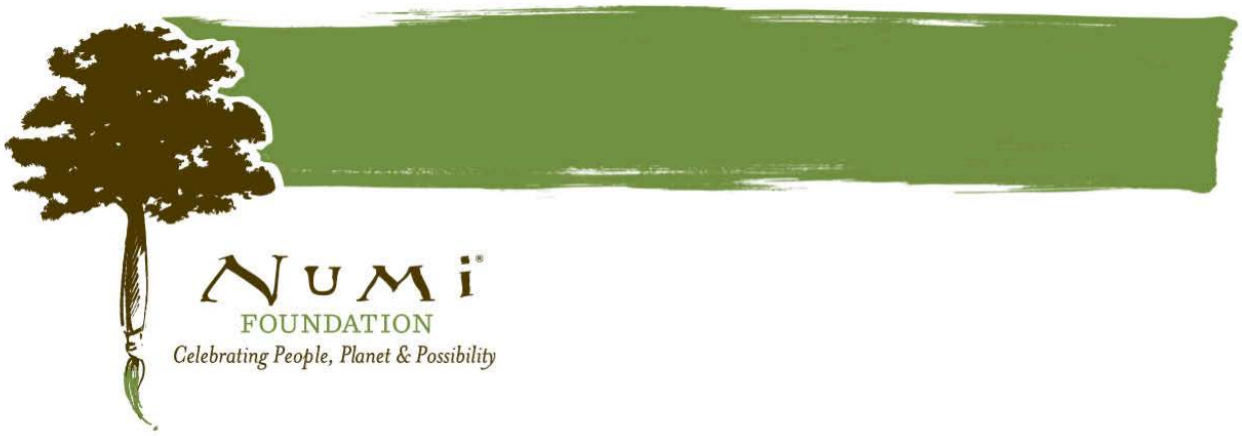
Journals

Week 1.2
MATERIALS
- Journals, pencils, crayons

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

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

Wrap up:
Collect journals.



Teamwork

Week2.1
STANDARDS
1.SL.1

OBJECTIVES

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

Procedure:

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

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

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

Wrap up:

Ask students to share what they found in the garden.

Notes/Feedback:

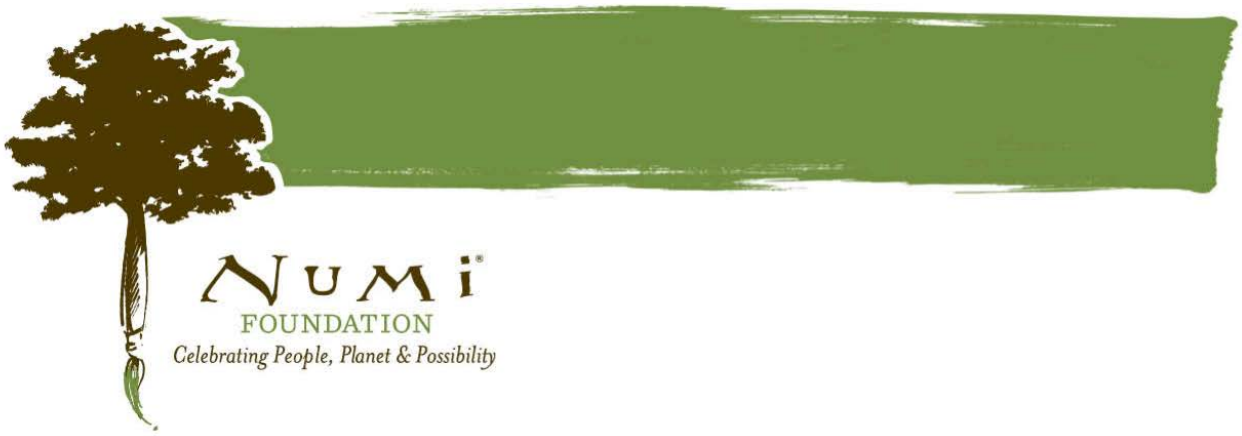
Journal Prompt: Ants

Week 2.2
STANDARDS
1.L.5.c

MATERIALS
- Journals, pencils, crayons

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

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



The Sun

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

OBJECTIVES

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

MATERIALS

- Craft sticks to mark spots in the garden.

Preparation:

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

Background Information:

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

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

Procedure:

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

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

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

Wrap up:

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

Notes/Feedback:

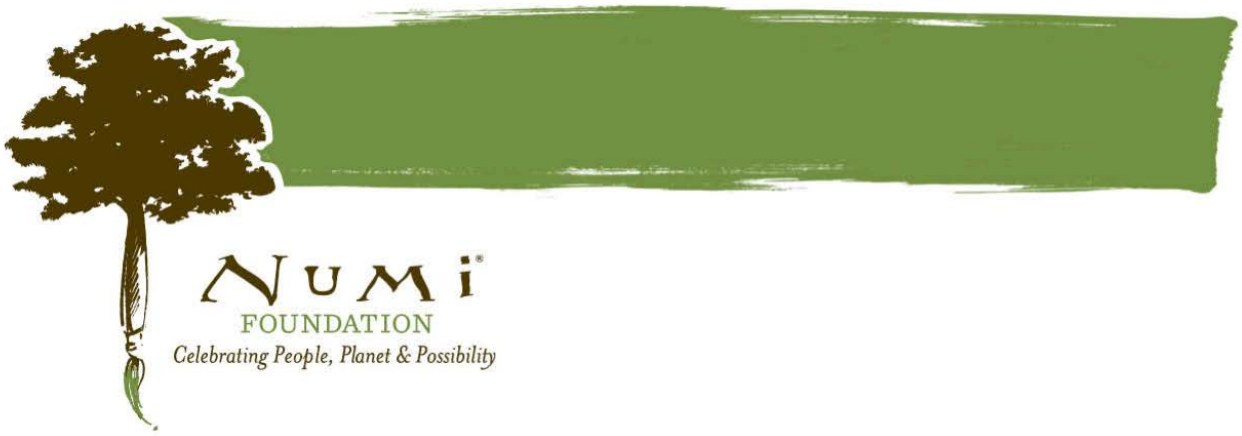
Journal Prompt: Drawing

Week 3.2
STANDARDS
1.L.5.c

MATERIALS
- Journals, pencils, crayons

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

Wrap up:
Share drawings.



Planting

Week 4.1
STANDARDS
1.ESS1.2

OBJECTIVES

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

MATERIALS

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

Preparation:

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

Background Information:

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

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

Procedure:

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

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

Wrap up:

Gather tools and wash hands.

Notes/Feedback:

Journal Prompt: Wheat

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

MATERIALS
- Journals, pencils, crayons
- Watering cans

Preparation:
Fill watering cans.

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

Wrap up:
In partners, share pictures and stories.

Plant Anatomy

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

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

MATERIALS
- Watering can

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

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

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

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

Wrap up:

Return materials.

Notes/Feedback:

Plant Anatomy part 2

Week 5.2
STANDARDS
1.L.5.C

MATERIALS

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

Preparation:

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

Procedure:

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

Wrap up:
As a class, share drawings.

Notes/Feedback:

Seeds part one

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

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

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

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

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

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

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

Wrap up:

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

Notes/Feedback:

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Seeds part two

Week 6.2
MATERIALS
- Watering cans

Preparation:
Fill the watering cans.

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

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

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

Wrap up:

Return watering cans.

Notes/Feedback:

Roots

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

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

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

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

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

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

Procedure:

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

Wrap up:

Return materials.

Notes/Feedback:

Roots part two

Week 7.2
STANDARDS
LS1.A, W.1.8

MATERIALS

- Journals, pencils, crayons
- Tools for garden work

Procedure:

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

Wrap up:

In partners, share.

Notes/Feedback:

Stems

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

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

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

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

Background Information:

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

Procedure:

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

Wrap up:

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

Notes/Feedback:

Stems part two

Week 8.2
STANDARDS
LS1.A

MATERIALS

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

Procedure:

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

Wrap up:
Share, as a class.

Notes/Feedback:

Leaves part one

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

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

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

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

Background Information:

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

Procedure:

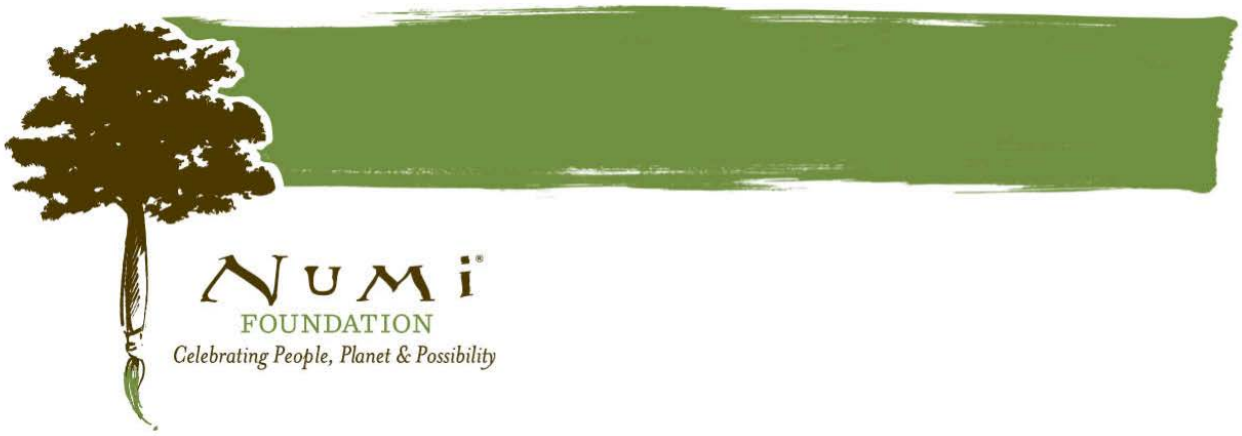
- Students enter the garden and explore, especially the wheat and the light spots.
- Gather students, check in about the season, the weather (especially as winter is approaching), the wheat and the light spots.
- "Who remembers what we talked about last week? What is the job of the stem?"
- Have students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

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

Wrap up:

Return tools.

Notes/Feedback:



Leaves part two

Week 9.2

MATERIALS

- Journals, crayons
- Leaves collected from the last lesson

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

Procedure:

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

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

Notes/Feedback:

Flower Power

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

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

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

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

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

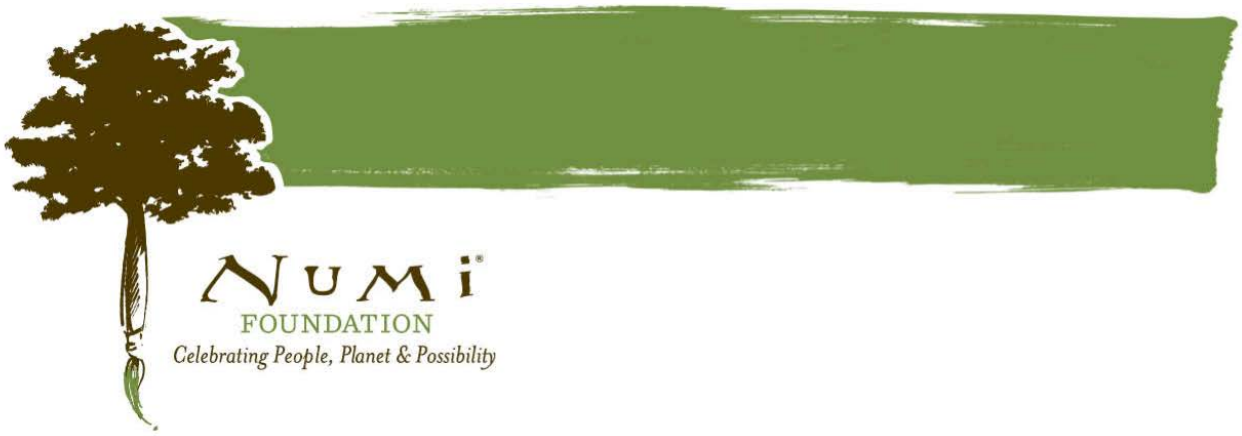
Procedure:

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

Wrap up:

Return materials.

Notes/Feedback:



Flowers part two

Week 10.2

MATERIALS

- Journals, pencils, crayons
- Tools for garden work

Preparation:

Know what garden work needs to be done.

Procedure:

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

Wrap up:

Wash hands, and share flower drawings with a partner.

Notes/Feedback:

Fruit

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

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

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

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

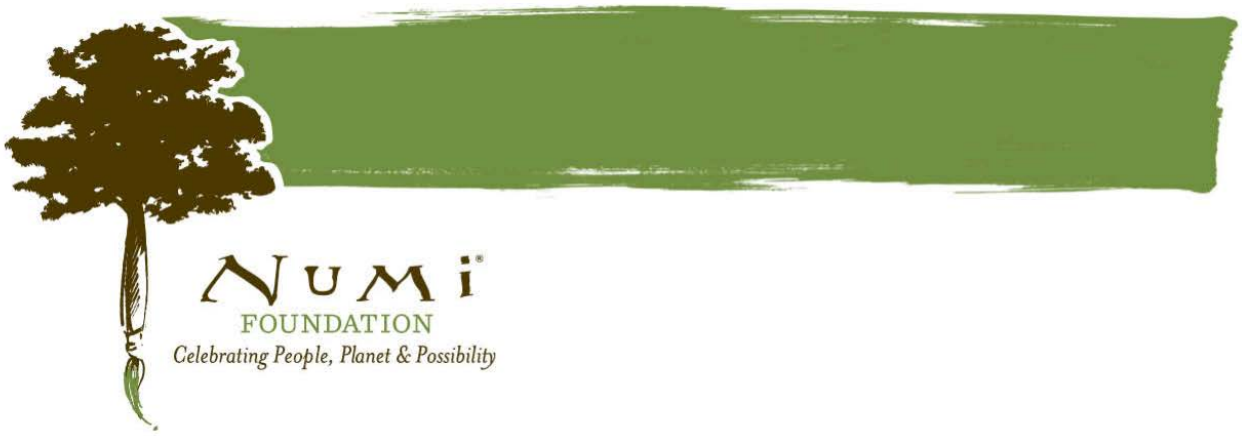
Procedure:
- Students enter the garden and explore.
- Bring students to the three places in the garden where you are tracking sun and shadows. Have a conversation at each spot, noticing changes. Have the shady spots become shadier? Has the tree shadow changed? Reinforce that in the winter, the sun appears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

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

Wrap up:

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

Notes/Feedback:



Fruit part two

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

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

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

Notes/Feedback:

Leaves part three

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

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

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

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

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

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

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

Wrap up:

Return tools, and wash hands if necessary.

Notes/Feedback:

Journal Prompt: Tree

Week 12.2
STANDARDS
1.SL.1

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

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

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

Wrap up:
Share, in partners.

Notes/Feedback:

Assessment: Putting It All Together

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

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

MATERIALS
- Construction paper
- Glue
- Pencils and clipboards

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

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

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

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

Wrap up:

Return materials and share plants!

Notes/Feedback:

Insect Houses

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

Procedure:

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

Wrap up:

Wash hands.

Notes/Feedback:

The Parts We Eat

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

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

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

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

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

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

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

Wrap up:

Return tools, and wash hands again, if necessary.

Notes/Feedback:

Journaling

Week 14.2
MATERIALS
- Journals, pencils, crayons

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

Wrap up:
Share, in small groups.

Notes/Feedback:

Seeds have Needs

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

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

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

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

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

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

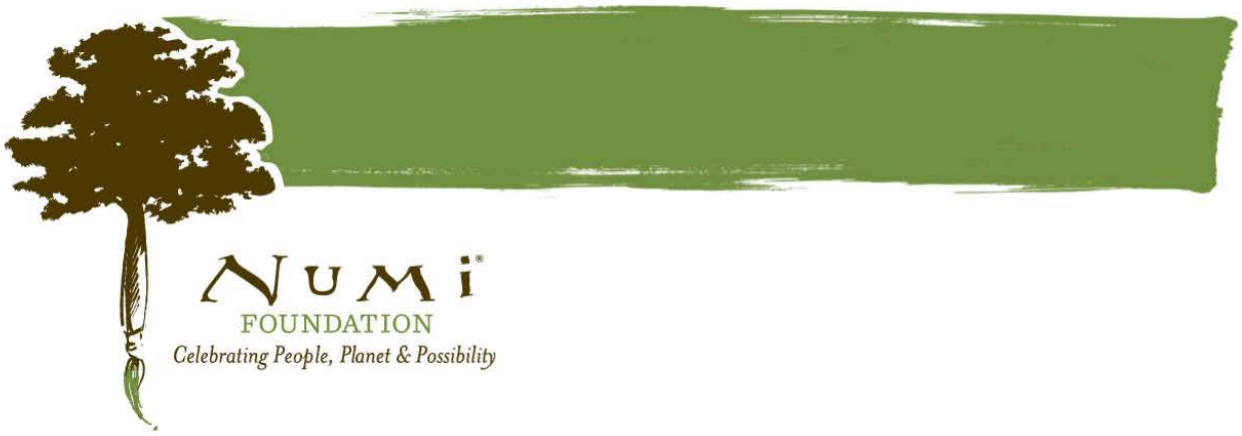
Procedure:

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

Wrap up:

Return journals and pencils.

Notes/Feedback:



Explore

Week 15.2
STANDARDS
LS1.A

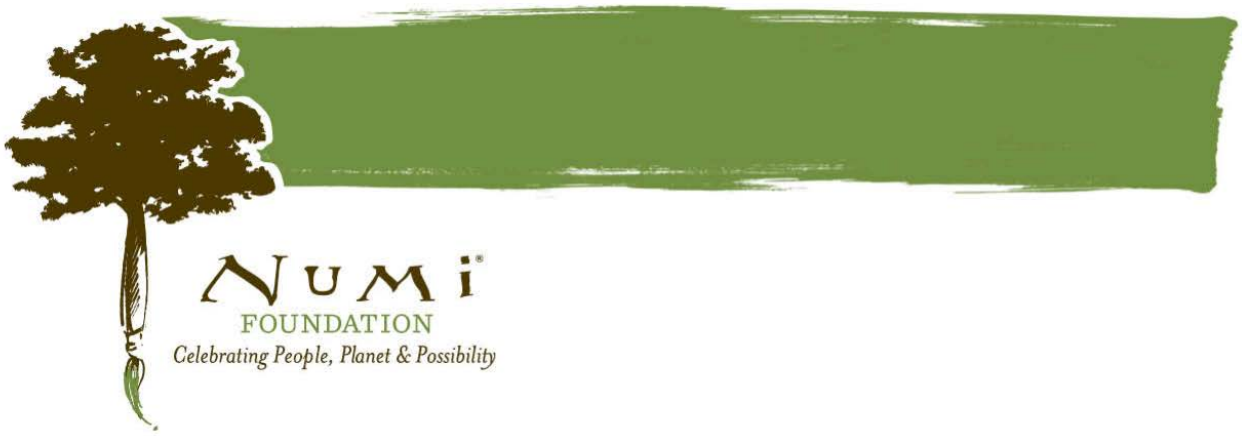
Procedure:

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

Wrap up:

If there is something leafy to harvest, taste it!

Notes/Feedback:



Seed Needs continued

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

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

MATERIALS
- Journals/pencils
- Bags from the week before

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

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

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

Wrap up:

Find something edible in the garden, and eat it.

Notes/Feedback:

Journaling

Week 16.2
MATERIALS
- Journals, pencils, crayons

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

Wrap up:
Return materials.

Notes/Feedback:

Habitats

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

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

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

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

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

Procedure:

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

Wrap up:

Have students help collect materials.

Notes/Feedback:

Habitats part two

Week 17.2

MATERIALS

- Journals, pencils, crayons

Procedure:

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

Wrap up:

Harvest something to taste.

Notes/Feedback:

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Worms!

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

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

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

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

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

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

Procedure:

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

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

Wrap up:

Gently return worms to their home, and wash hands.

Notes/Feedback:

Worms part two

Week 19.2
STANDARDS
LS1.A

MATERIALS
- Hand shovels

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

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

Wrap up:

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

Notes/Feedback:

Would a Worm Eat it?

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

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

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

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

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

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

Wrap up:

Return tools, wash hands.

Notes/Feedback:

Journaling: Worms

Week 19.2
MATERIALS
- Journals, pencils, crayons

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

Wrap up:
Collect materials, wash hands.

Notes/Feedback:

Getting Ready for Spring

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

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

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

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

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

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

Procedure:

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

Wrap up:

Return tools, wash hands.

Journaling Prompt: Spring

Week 20.2

MATERIALS

- Journals, pencils, crayons
- Spray bottles

Procedure:

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

Wrap up:

Return materials.

Notes/Feedback:

And Then It's Spring

Week 21
STANDARDS
1.ESS1.2

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

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

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

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Spring Poem

Week 21.2
Procedure:

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

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

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

Wrap up:

Return worms, wash hands.

Notes/Feedback:

Tendrils need Trellises

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

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

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

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

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

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

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

Wrap up:

Return materials.

Notes/Feedback:

Jack and the Beanstalk

Week 22.2
STANDARDS
1.LS1.1

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

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

Wrap up:
Return materials.

Notes/Feedback:

Planting Day!

Week 23
STANDARDS
LS1.A

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

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

Preparation:
Mark spots for planting.

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

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

Wrap up:

Return materials and wash hands.

Notes/Feedback:

Journaling

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

MATERIALS
- Journals, pencils, crayons

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

Wrap up:
Share work, in partners.

Notes/Feedback:

Circles and Cycles

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

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

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

Preparation:
Do the peas need watering?

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

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

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

Wrap up:

Return materials.

Notes/Feedback:

Journaling

Week 24.2
MATERIALS
- Journals, pencils, crayons

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

Wrap up:
Share, in partners.

Notes/Feedback:

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Worm Cycles

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

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

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

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

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Journaling

Week 25.2
STANDARDS
1.SL.6

MATERIALS
- Journals, pencils

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

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

Notes/Feedback:

Butterflies

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

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

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

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

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

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

Wrap up:

If there are peas to harvest, have a snack!

Notes/Feedback:

Journaling

Week 26.2
MATERIALS

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

Procedure:

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

Wrap up:

Share butterflies, in partners.

Notes/Feedback:

Pea Harvest

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

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

MATERIALS
- Scissors

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

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

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

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

Wrap up:

Harvest peas to share with other teachers or staff.

Notes/Feedback:

Assessment: Life Cycle

Week 27.2
STANDARDS
LS1.A, LS1.B

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

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

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

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

Wrap up:

Harvest and eat peas.

Notes/Feedback:

Cutting the Wheat

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

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

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

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

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

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

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

Wrap up:

Harvest and eat peas.

Notes/Feedback:

Tortilla Factory

Week 28.2
STANDARDS
1.W.3

MATERIALS

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

Procedure:

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

Wrap up:

Ask for volunteers to share their letters.

Notes/Feedback:

Little Red Hen's Wheat Party

Week 29
STANDARDS
LS1.A

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

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

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

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

Procedure:

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

Wrap up:

Compost plates, clean classroom.

Notes/Feedback:

Journaling

Week 29.2
STANDARDS
W.1.8

MATERIALS

- Journals, pencils, crayons

Procedure:

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

Wrap up:

Share, in partners.

Notes/Feedback:

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Preparing for Summer

STANDARDS
1.ESS1.2, LS1.A

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

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

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

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

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

Wrap up:

Wash hands.

Notes/Feedback:

Journaling

Week 30.2
STANDARDS
W.1.8

MATERIALS

- Journals, pencils, crayons

Procedure:

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

Wrap up:

Share as a class.

Notes/Feedback: