AFTER SCHOOL PROGRAM

SPRING GARDENING CLUB CURRICULUM

GREEN MOUNTAIN FARM-TO-SCHOOL

Green Mountain Farm-to-School (GMFTS) is a non-profit organization in Newport, VT that strengthens local food systems by promoting positive economic and educational relationships between schools, farms, and communities. GMFTS supplies fresh, local food to schools and institutions and gives students of all ages the knowledge and skills they need to make healthy food choice through school gardens, farm-to-school programs, a regional food hub, and mobile learning kitchen. For more information, visit www.GreenMountainFarmtoSchool.org.

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SPRING GARDENING CLUB

The following questions provide a framework for the curriculum and our teaching. The questions are meant to lead our discussions and encourage student thinking. Each lesson also has its own guiding questions and goals that relate back to these questions.

ESSENTIAL IDEA

A flourishing garden comes from healthy soil, a variety of seeds, and hard work.

K-2 ESSENTIAL QUESTIONS:

What do plants need to grow?

What can we plant in our garden?

How can we help the plants grow into food?

3-6 ESSENTIAL QUESTIONS:

What do plants need from the environment to grow?

What people, tasks, steps, and resources are required to produce food and bring it to the table?

In what ways do people depend on food webs, soil food webs in particular, to survive?

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SPRING GARDEN CURRICULUM FLOW

Each lesson is divided into different sections. Use the lesson as a template to follow when teaching a class, but feel free to add your own personality and ideas.

GOALS

The goal of the Spring Garden curriculum is to provide a time and space to:

1. Teach students about planting and caring for plants.
2. Plan how to plant a garden for the school.
3. Plant the school garden for food, education and beauty.

LESSONS

- The lessons are set up to be taught in a specific order, but they can be rearranged.
- Each lesson has several components. The filler activities and books are there if you have extra space in a lesson.
- The components you should do in the spring are:
    1. The pre and post survey (for evaluating the success of the program).
    2. Planting seedlings to grow in the school's grow labs.
    3. Create paths and beds in the garden.
    4. Plant the school garden.
- Fun Fillers is a great section to use when you need to fill a few minutes with a joke, quick run around game, or a circle activity.
- Remember to take pictures of the students doing the activities.

When you see the camera symbol there is a photo opportunity in the activity.

BEFORE GETTING STARTED

Explain that the after-school program is a place for fun learning. In after-school program, the same rules they follow during the day at school are the rules they will follow with you. Similar to a classroom, we have some basic rules to ensure that all students have fun and are safe.

1. Explain that we have four basic expectations. We want all students to be:
   i. Safe – with tools, bodies, and materials.
      • Have a student show you an example of what being safe looks like.
   ii. Respectful – use kind language, be good listeners, br careful while cooking
      • Have several students show you an example of what being respectful looks like: using respectful words, being a respectful listener and speaker, being respectful with cooking tools, being respectful to the room.
   iii. Responsible – participate in activities, take care of belongings, stay on task in the garden or classroom.
      • Have a student give an example of what being responsible is.
   iv. Have Fun
      • How can you tell if someone is having fun in a safe, respectful way? We expect that everyone will want to participate in the activities and have fun. If, for some reason, someone is being unsafe, disrespectful, or irresponsible, there will be consequences like there are during the school day. Students are still in school, even though it is after school, and the same school rules apply. Inform them of any consequences you have discussed with the principal.
2. Signal for attention: Explain to the students that there will be a signal for when you want to get everyone's attention and have them listen for new directions. Everyone is to respond to the signal by having quiet mouths and eyes on the teacher. Until this happens, you should wait quietly until they respond appropriately, try the method again, or use a different method. Do not move on to the next direction/activity until they are all listening to you.
3. Every day we will do similar activities:
   • Welcome Circle with a thinking question
   • A lesson or activity
   • Some active games and partner games
   • A book
   • Journal time
   • A snack

TOP 10 EDUCATOR TIPS

1. Set your expectations for the students at the beginning.
   a. Ask principal for school expectations and procedures. Most discipline structures look like this:

      1st offense: warning – "It is not okay to …. You need to …. The next time you do that, you will have to sit out."

      2nd offense: sit out/take a break/time out – "It is not okay to …. You were warned before. I need you to take a break." Student will sit out for an activity or a few minutes. You will need to talk with the child before they reenter the group. Explain why what they did was not okay and what they should be doing. Remind the student of the consequence for a 3rd offense.

      3rd offense: This will be based on the school and your conversation with the principal or site coordinator. They will either need to call home, be removed from the program, or talk to the principal the next day.

   b. Ask students for their suggestions.

   c. Have a short but specific list of expectations.

      i. Be safe, Be Respectful, Listen to Directions, Have Fun

   d. Take time to talk about what each expectation looks like, act it out.
2. Use a signal to get students attention and use it every time. Wait for everyone to stop, look, and listen before you give directions. If it isn't working, try another one.

   a. Use a visual sign: peace, quiet coyote, hand in the air

   b. Use a verbal sign: "When I say 'Sprouts!' you say 'What?'," clap a pattern
3. Be prepared and organized. Have everything ready to go before students arrive.
4. Be flexible. You might need to change an activity if it isn't working or a game may not last as long as you thought. It's okay to change your plan. Also look for teachable moments that aren't connected to the lesson but are important and interesting for students.
5. Have a few games or activities in mind that don't involve any materials that you can do at a moment's notice.
6. Watch the group's body language. Circles are best for discussions and giving directions. Tables are good for doing group activities.
7. Be as enthusiastic and involved as you want the kids to be. They will pick up on your attitude and behavior.
8. Have a sense of humor!
9. Let students find the answers. Instead of giving them all the information, ask questions to allow them to come up with the answers themselves.
10. Give an overview so they know what to expect for the day and individual activity.

SPRING GARDENING SURVEY

Name: _____ Grade:_____ School:_____

Directions: Check the correct answer(s) in the box or write the answer on the line.
It's okay if you don't know the answer.

1. What part of the plant does the fruit come from?

Root Stem Flower Leaf

2. What part of a plant do we eat?

Root Stem Flower Leaf All of these

3. How long does it take to make an inch of top soil?

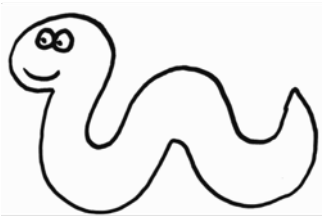
1 week 1 year 10 years 50-100 years

4. Worms are good for the garden because…

_____

_____.

5. On this worm, draw how many hearts it has.



6. Where do potatoes grow?

Underground On top of a plant
On a vine In a tree

7. What does a plant need to grow?

1. _____ 2. _____

3. _____

SPRING GARDENING SURVEY

ANSWER KEY

1. What part of the plant does the fruit come from?

   Root Stem Flower Leaf

2. What part of a plant do we eat?

   Root Stem Flower Leaf All of these

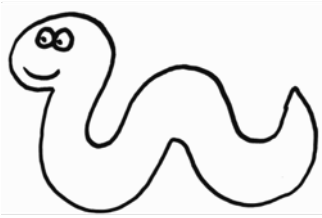
3. How long does it take to make an inch of top soil?

   1 week 1 year 10 years 50-100 years

4. Worms are good for the garden because…

   Some possible answers: Eat things in the soil and help break them down; mix the soil up; put more air and water in the soil; help roots spread out by making the soil easier to move through

5. On this worm, draw how many hearts it has. 5



6. Where do potatoes grow?

   Underground On top of a plant

   On a vine In a tree

7. What does a plant need to grow?

   Some possible answers: sun/light, soil, water, nutrients, time, warmth, air

SPRING GARDEN CLUB

JOURNAL

PLANTING SEEDS INDOORS

Students will be planting seeds indoors so the school garden has seedlings to plant. It is best to incorporate this into the lesson you are doing that week. Find an activity in the lesson students can do independently and have 2-4 students at a time plant seeds.

WHAT YOU NEED:

- A grow lab, grow lights, or a sunny window
- Seed trays or containers to plant in
- Potting soil, slightly moist
- Spray bottle and watering can
- Tarp or blanket to lay down to help control the mess
- A broom handy
- Seeds
- Popsicle sticks to label rows

WHAT TO PLANT:

Check the Planting Schedule in the back of the curriculum to know when to plant what crop. For a quick glance:

SECOND WEEK IN APRIL

Gourds
Pumpkins
Winter Squash

END OF APRIL

Brussels Sprouts
Cauliflower
Tomatoes

FIRST WEEK IN MAY:

Basil
Calendula
Chard
Cosmos
Kale
Larkspur
Leeks
Lettuce
Marigold
Parsley
Zinnia

WHAT TO DO WITH STUDENTS:

Explain:

1. It is still too cold outside but we need to get some plants started because they have a longer growing season, meaning they take longer to grow than other plants. We will transplant them into the garden when they are bigger and the weather is warmer.
2. Have you ever seen farmers planting seeds in a field? How do you think they do it? We are going to become farmers with very small fields. As a matter of fact, our field is inside this tray (or containers). We will be using a potting soil mix, so we are sure our seeds get all the nutrients they need. Once we fill our flats with soil, we will make rows and plant our seeds. What else will our seeds need to grow (water)? We will make sure that the soil is always moist. We will also label our flats to know what we planted and record what we do in our garden journal.
3. Have a volunteer fill one flat with soil. Tell students to run their hands gently over the soil surface so that it is flush with the top of the flat.
4. Demonstrate how to plant the seed. Poke a shallow hole for each seed, plant the seed, and then cover gently with soil. Explain that a rule of thumb for planting is that seeds should be planted to a depth that is roughly 2-3 times the size of their seed. The bigger the seed, the deeper it goes, but not too deep! If the seed is small, you only need to place the seed on top of the soil and sprinkle it with a little more soil on top.
5. Hand out packets to students and talk them through the seeding. Have each student seed one whole row with the same kind of seed. Take turns in the group.
6. Have students write the name of seed sown along with the date on a craft/popsicle stick and place at the end of each row in the flat.
7. Have students water the flats thoroughly and be sure that they are kept moist all the time.
8. Create a Seed Caretaker list. Have 1-2 students sign up per day. They are responsible for coming in on that day to water the seeds. Show how to properly mist the seeds with a spray bottle. You will create another Seed Caretaker list next week.

HOW TO CARE FOR PLANTS:

The seedlings will need to be under the lights for about 12 hours a day. A timer attached to the lights can help. As the plants grow, raise the lights up so they are only a few inches away from the top of the plant.

A few weeks before the seedlings need to be planted outdoors, you will need to “harden them off.” You can do this by slowly introducing them to the outside, placing them in a shady spot, and bringing them inside when there is a chance of a frost. This will increase plant productivity once they are planted.

LESSONS

LESSON ONE

SEED NEEDS

SUMMARY

Students will learn what seeds need in order to thrive in the garden.

MATERIALS:

Journal Sheets:
- My Seed Experiment
- Fruit and Seed Gorp Recipe

Cherry tomatoes

Paper plates (cut in half)

Plastic knives

Seed needs cards

Garden base cards

A Seed is Sleepy by Dianna Hutts and Sylvia Long

Clear plastic cups (enough for each student)

Permanent markers

Potting soil

Watering can

Group Experiment labels

Pencils

Crayons / colored pencils

Gorp ingredients

Bowl

Plates for snack

Plastic bags for snack

GUIDING QUESTIONS:

1. What does a seed need to grow? (K-3)
2. What happens if a need from a living organism is removed? (4-6)

GOALS:

1. Students will name four things a seed needs to grow.
2. Students will hypothesize what might happen if a need is removed.

OUTLINE:

- Welcome Circle and Attendance
- Tomato Planet
- A Seed is Sleepy by Dianna Hutts and Sylvia Long
- Seeds With a View
- Seed Needs Experiment
- Snack: Fruit and Seed Gorp
- Filler, Journal: What Will it Look Like (Part 1)
- Filler, Game: Seed, Sprout, Plant, Flower, Fruit
- Wrap-Up

WELCOME CIRCLE AND ATTENDANCE – 5 MINUTES

Greeting: Welcome! We are going to decide what plants we would like in our garden. We'll explore a few seed catalogs see all the different fruits, vegetables, and flowers!

Today's Questions: What do people need to live? What do seeds need to grow? Are these things the same or different? (This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

TOMATO PLANET – 20 MINUTES

An interactive, physical game for students to learn what seeds need. *Adapted from Shelburne Farm's Project Seasons.

*Educator Note: There are 2 parts for this activity.

Part 1: Tomato Dissection

1. In a large group, the educator holds up a cherry tomato. Ask the group, What is this? (A cherry tomato!). What do you think is inside? Seeds!
2. Split the students into groups of two. Each group will have a cherry tomato. Without opening the tomato, their job is to guess how many seeds are inside the tomato.
3. Pass out tomatoes. Give students a few minutes to estimate the amount of seeds. Have partners share their best guess.
4. Next, give students half a paper plant and a plastic knife to cut open their tomato. Instruct them to scoop out the seeds and count them. After each group is finished and they have counted their seeds, have them once again go around and share the number of seeds they found.
5. Ask the group, Will all of these seeds turn into plants? (No.) What might affect whether or not they turn into plants? (Temperature, water, soil, nutrients, space, sunlight).

Part 2: Seed Dance

1. Ask students to set their plates and tomatoes aside. Have them assist in pushing desks and tables to the edges of the room so there is a large space. When they are finished, gather back together as a large group.
2. Ask, What do seeds need? (Temperature, water, air, time)
3. On the floor, place in different locations the Garden Base cards.
4. Distribute throughout the group the Seed Needs Cards.
5. Have students stand up around the outdoor edges, forming a circle.
6. Start the music/ have students sing a song. While the music is playing students can dance around the open space. Once the music or song stops, students must find a Garden Base to stand on. The goal is that each planet will have all seed needs items.
7. In their Garden Base have the students see if they have all the seed needs. Will their seed grow? If not, what do they need? Each group should have a seed, water, temperature, air, time.

8. Do the activity a few more times, every time checking each Garden Base.

Reflect: What do seeds need to grow? Will a seed grow if it is missing one of these needs? Do all seeds need the same thing?

BOOK – 10 MINUTES

A Seed is Sleepy by Dianna Hutts and Sylvia Long

From tiny redwood seeds to giant coconut seeds, from bright red-orange mountain laurel seeds to pods of fluffy milkweed seeds, an incredible variety of seeds are celebrated in all their beauty and wonder. Poetic in voice and elegant in design, the book introduces children to an intriguing array of seed and plant facts.

Listening Question: How many seeds and plants did you read about?

Reflect: Are all seeds the same?

*Educator Note: Try a different way of reading the book. Bring multiple books and break students into groups. Have them pick two words that describe a seed. Students can present to the class what their word is and what it means.

SEEDS WITH A VIEW – 10 MINUTES

This hands-on experiment will show students that while most seeds need the same things in order to grow, not all seeds grow the same way! This experiment will carry over and be used next week.

1. Give each student a clear plastic cup. Have each student write their name on the side of the cup.
2. Have them turn their cups upside down and carefully poke holes (1-3) in the bottom with a pencil. This will help with water drainage.
3. Have students take turns filling their cup with soil. Students should leave 1/2" – 1" of space between the soil and the lip of the cup. The soil should not overflow the cup.
4. When they are finished filling their cup with soil, pass out 1 bean seed and 1 corn seed to each student. Have them plant the seeds in the cup on opposite sides of each other, making sure to lightly press the seed down and against the side of the cup. We should be able to clearly see the seed on the side of the cup.
5. Place planted cups in the grow lab.
6. Spray with water using mist bottles.

Reflect: What do you think will happen to the seeds? What will they look like in a few days?

SEED NEEDS EXPERIMENT – 25 MINUTES

This experiment continues with the theme of seed needs. Students will observe this experiment and will plant seeds by using different variables and by removing a need, seeking to answer the question: How will the seed grow?

1. Explain to students that they will be planting seeds in different conditions. We will see which condition seeds like the most and the least.
2. Break students into three groups. Give each group 2 plastic cups. Have the groups carefully poke 3 holes in the bottom of the cups. They can use pencils to do this.
3. In the previous activity (Plants With a View) students already planted the "Control Group". This control group will be the perfect condition for our seeds. All the cup shave soil, water, and light. Each of the three groups will be missing something. We'll find out next week if our seeds will grow.
4. Groups are:
    a. Group 1: dry soil with seeds
        i. Group 1 will plant their seeds in dry soil. Their experiment will be kept at a good temperature in the grow lab, but they will not be watered.
    b. Group 2: water with seeds
        i. Group 2 will place their seeds in the bottom of plastic cups and then cover seeds with water. Their experiment will be kept at a good temperature in the grow lab, but will not have soil.
    c. Group 3: soil, water, and poor temperature with seeds
        i. Group 3 will plant their seeds in soil and water their seeds. They will then place their seeds in a refrigerator or another cool place. Their experiment will have soil and water, but will not have a good temperature.
5. Ask students what they predict will happen to their group's experiments. What do you think will happen to the other groups'?
6. Next week you will get to revisit your experiments to see what happened.
7. Have students complete their experiments. Make sure to print the labels at the end of the lesson. These can be taped onto the cups to remind students and inform others about the experiment.
8. Place all experiment cups in the appropriate locations.

Reflect: What do you think will happen to each experiment? What would happen if we took away all water? Which experiment will grow tallest?

SNACK: FRUIT AND SEED GORP – 5 MINUTES

Students will have the chance to taste test a variety of seeds in a trail mix.

FILLER JOURNAL: WHAT WILL IT LOOK LIKE? (PART 1) – 15 MINUTES

Students will draw what they think their group experiment seeds will look like if they germinate.

FILLER GAME: SEED, SPROUT, PLANT, FLOWER, FRUIT – 5-15 MINUTES

Students start as seeds. They will squat and move low to the ground. Students will pair off and play Rock Paper Scissors. The winner of the game becomes a sprout; the other person stays a seed. From this point, sprouts can only play against sprouts; seeds can only play against seeds. The next winners move up as a plant and the game goes on forever. When a fruit wins, they become seeds again – showing the cycle of plants making more plants!

The flow of the game follows this pattern: seed > sprout > plant > flower > fruit

Students should have their bodies in the following positions corresponding to their level:

a) Seeds – squatting
b) Sprouts – bent over
c) Plants – standing straight
d) Flowers – hold hands in circle over head
e) Fruit – arms in a circle stretched out in front of their body

*Educator Note: Throw some variety into the game! Use the following options as rounds or ideas to switch the game up.

Optional:

a) Round 3: There is a drought! All the seeds are still alive, but the sprouts must start over as new seeds because they did not survive!

b) Round 5: It's been a really sunny week, and every seed, sprout, plant, flower, and fruit is sooo happy that they progress to the next stage without winning a game! We're all winners right now!

c) Round 7: There has been a flood! The seeds love the water, but the plants on the right half of the group are too wet! They die and become seeds again.

d) Round 8: Oh No! There's a cold snap in early autumn! The plants, and fruits on the outside of the group were not protected from the elements and they de, becoming seeds again.

e) Round 12: It's winter! Everyone who is not a seed doesn't make it through this season. Start over as a seed.

WRAP-UP – 5 MINUTES

Reflect: What did you learn about seed needs today

GARDEN BASE #1

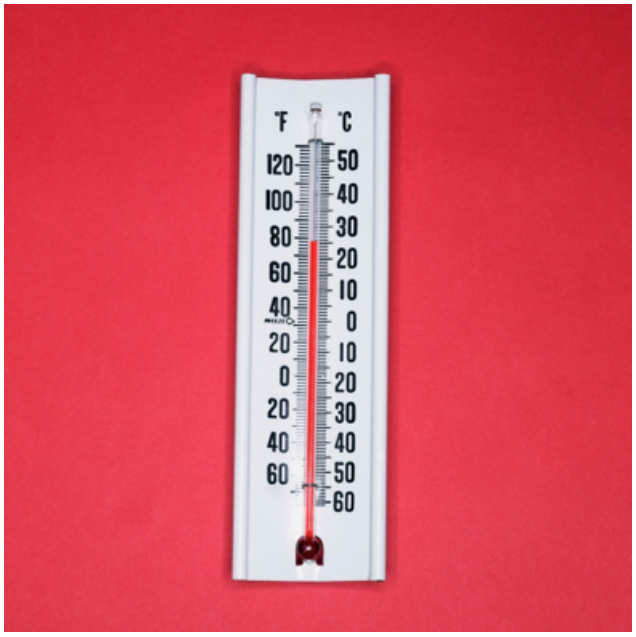
GARDEN BASE #2

GARDEN BASE #3

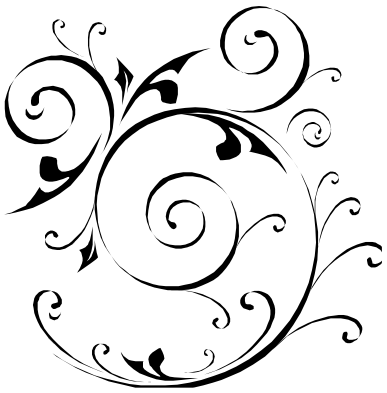
GARDEN BASE #4

WATER

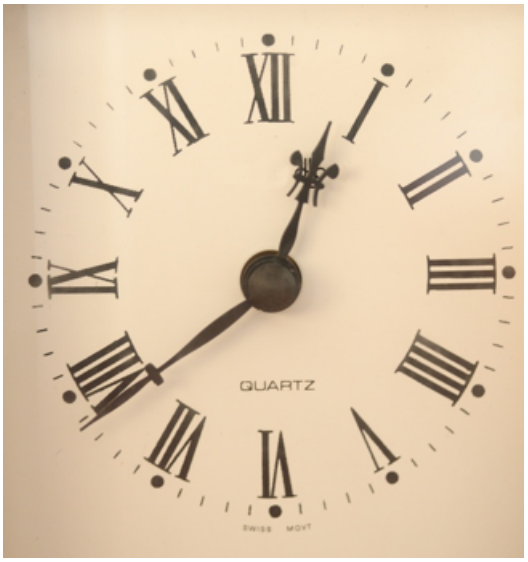
TEMPERATURE



AIR



TIME



SEED

MY SEED EXPERIMENT

Name: _____

Date:	Date:
Draw what you think your plant will look like next week.	Draw what your plant really looks like.

GROUP 1

DRY SOIL AND SEEDS

GROUP 2

WATER AND SEEDS

GROUP 3

SOIL, WATER, SEEDS, AND POOR TEMPERATURE

FRUIT AND SEED GORP

INGREDIENTS & MATERIALS

1/2 cup sunflower seeds
1/2 cup pumpkin seeds
1/4 cup chia seeds
1/4 cup pine nuts
1 cup dried cranberries
1 cup dried apples

DIRECTIONS

1. In a large bowl, add all ingredients.
2. Stir to combine.
3. Enjoy!

LESSON TWO

BE A SEED

SUMMARY

Students are introduced to the lifecycle of seeds by participating in a taste test, a role play, and seed germination.

MATERIALS:

Spray bottle
Raisins
Cotton balls
Plastic bags
Yarn
Bean seeds
Fruits for Seed Extraction: mango or avocado, strawberry, kiwi, snap peas, cucumber or red pepper
Cutting board
Knife
Napkins
Pencils
Colored pencils or markers
Student Journals
Scissors
Seed Germination Necklace journal sheet
How to care for necklace handout

GUIDING QUESTION:

1. Where do plants come from? How do they grow?

GOALS:

1. Students will know that plants come from seeds.
2. Students will learn the things seeds need in order to grow: water, sun, soil, air, time, nutrients, and heat.

OUTLINE:

- Welcome Circle
- Intro Survey
- Journal cover
- Seed Extraction (snack)
- Seed Role Play
- Seed Germination Necklace
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Welcome! What is something you are looking forward to this spring? I'm excited to plant our school garden. What are some things you'd like to plant in it? (Accept all brainstorm ideas with interest, even if they won't work.)

Today's Plan: We are going to be learning about the beginning of all fruits and vegetables. Do you know where all plants come from? Seeds! We will be learning what they need to grow.

PRE/POST TEST KNOWLEDGE SURVEYS – 10 MINUTES

1. Explain that before we begin today, you need to learn a little bit more about them as students. Let them know that it is not a test, so they should not worry about getting answers right.
2. Inform them of the importance of the surveys because they help us find out what they already know. They will take another survey when the program is over to see what they have learned.
3. Pass out the surveys and pencils. Make sure that the students write their first and last name on the survey in addition to their grade.
4. It is okay to read each question one at a time and write for them if needed. We do not want any child to feel frustrated or upset by the questions.
5. As students finish their surveys, you can pass out journal covers.

JOURNALS – 5 MINUTES

This will be a journal that will be kept throughout the session. All journal sheets will be kept in the garden journal. The best way to assemble the journals is by 3 hole-punching all of the pages and attaching them together with a brad fastener. As the students add to the journal every week, it will get bigger. To avoid students losing them, collect them at the end of each class.

1. Pass out the Journal Covers. Explain that they will be keeping all of the work they do in the journals so they can keep track of their learning. You will collect the journals every class to give their completed journals back at the end of the program.
2. Each student needs to write their name (first and last) on the cover. They can decorate the cover with images of gardening, food, nutrition, exercise, etc. for a few minutes.

SEED EXTRACTION – 15 MINUTE

To begin our discussion about seeds we are going to try to find some seeds! Have students gather around the fruits on the cutting board.

1. Place the fruits out on a cutting board and have the students name them. Find 4-5 fruits that have various sizes of seeds. We like mango or avocado, strawberry, kiwi, snap peas, cucumber or red pepper
2. Have them work as a group to guess the size and quantities of the seeds inside each fruit. Arrange the fruits in order of their smallest seed to largest.
3. Cut open the fruits to find the seeds. Pass around the seeds on a napkin or plate so everyone can see them. Discuss and observe with the students the color, shape, size, and quantity of seeds in each. As you talk about them, cut up the fruit into pieces for the students to eat later.
4. When all of the fruits have been cut open, it's time to eat the fruits! Pass out fruits on napkins to all of the students. Ask the students to describe the taste and texture.

   Don't Yuck my Yum: This is a phrase used to encourage people who are trying new foods. It is meant to remind them to be respectful of other's opinions. It's okay to not like a food, but it is not okay to express disgust or disrespect. It is also important to remember that everyone's taste buds are different and that our taste buds are changing all of the time (especially children's). If, for example, you do not like strawberries, remember that you have never had THIS strawberry. It's also okay to say, "I don't care for them," or even, "I don't like them." If you were to say, "They are discussing," or "Yuck, those are gross (or nasty)," do you think other people would want to eat them? Do you think someone who has never had a strawberry before would want to eat them?
5. Optional: Read a book as they snack.

Reflect: Are the seeds the size you had guessed? What are seeds? (Life comes from seeds. A whole plant grows from a seed. Inside that apple seed there is an entire apple tree and more apples). Why does a plant make seeds? (To produce more of the plant.) Why does the plant produce seeds inside or outside the fruit? (So that we humans or other animals like deer or moose, eat the fruit and spread the seeds.) What signs suggest that a fruit is ripening? (Color, smell, mushy)

SEED ROLEPLAY – 10-15 MINUTES

Students do a role play to learn more about the lifecycle of a seed.

Each student should plant themselves in a comfortable spot and think about what kind of seed they want to become. Read the following script as students act it out. An adult should do what is in parenthesis.

- It's FALL and seeds are curled up tight under the ground getting ready for a long winter rest.
- Each seed has its own food to help begin life in the spring. (Hand out 1-2 raisins to each student.)
- In order to survive winter, they must not eat their food until the spring rains begin to fall. The food will then give them the energy to sprout when the weather is just right.
- WINTER comes. (Turn off lights or cover them with a large blanket.)
- Winter is long, cold, and quiet. They are sleeping. (Have a quiet moment.)
- Now SPRING is here. The soil is starting to warm, the sun is out longer, and the seeds are slowly wake up. The spring rains have not come yet, so you can't grow, but you know it's almost time. (Turn on the lights.)
- The spring rains come. (Mist students with water from a spray bottle.)
- Now the seeds uncurl and eat some of their stored food.
- They now have energy to grow and sprout from underground. (On the count of three stretch their arms upward.)
- Slowly rise to standing position and stretch out your leaves (arms) to gather sunlight. There is a light breeze and the sun is shining.
- Now it's SUMMER. The plants are forming flowers (hands and fingers).
- Now the flowers need to be pollinated by bees. (Buzz around and pollinate all of the flowers.)
- Summer is coming to an end and FALL is in the air. It's getting a little bit colder.
- Every plant, where there was a flower, a fruit has begun to grow (hands become fruits and grow bigger and bigger).
- The fruit is so big it falls to the ground and breaks open.
- What do we find inside? What's all over the ground? SEEDS. Now what will happen?

Students are really excited to do this role play again. Consider a high-speed life cycle, or one focused on seed needs or plant parts!

GERMINATION NECKLACE – 10-15 MINUTES

Explain to students that we will learn about how seeds grow firsthand by sprouting them around our necks!

Drawing:

So that we can monitor the changes in our seed over time, we are going to do an observational drawing.

1. Pass out a bean to each student.
2. Have them do a drawing of their seeds on their Seed Germination Necklace journal sheet in the first box.
3. Ask them to record every detail about their seed. What makes their seed unique?
4. Have students record the date.

We are going to germinate our seeds. What does germination mean? (To begin or cause to sprout or grow.)

Necklace:

1. Pass out: plastic bag, cotton ball, string.
2. To assemble:
    a. Poke a hole in the plastic bag just above the zip lock line with a pencil (this can be done ahead of time).
    b. Add water to cotton ball. It should be moist—not too wet or too dry. Two squirts with a spray bottle should be fine.
    c. Insert one seed into cotton ball and place in plastic bag.
    d. Zip up the bag.
    e. Cut a piece of yarn two feet long. Thread the piece of yarn through the hole in the bag and tie the ends with a knot. (This can be done ahead of time.)
3. Place necklace around your neck and place it under your shirt.
4. (Optional) Make an extra one and place it somewhere in the room you are in. Be sure to pick a spot where no one can see it or accidentally throw it away.

"Let's think back to our role play, what were some things that the seed needs to sprout? How can we care for our necklaces?"

Recommend that students wear it around their neck to keep it warm and place it under their pillow at night. Consistent temperature is very important. If they watch it closely, in the next week it will sprout and start to grow around their neck! Send students home with the Caring for Your Seed Germination Necklace sheet.

Reflect: Will the seeds be able to germinate without soil? How long will it take? Ask them to record their predictions. Make an extra necklace and leave it at school for comparison.

Note: You may want to sprout some extra seeds on your own for the next week. Students may lose or damage their seeds and not have one to plant.

WRAP-UP

Reflect: What would the world look like without seeds?

Take Home: Seed germination necklace and care instructions.

SEED GERMINATION NECKLACE

Name: _____

Date: Day #:	Date: Day #:
What does your seed look like?	What does your seed look like?

CARING FOR YOUR SEED GERMINATION NECKLACE

TO HELP YOUR SEED GERMINATE AND BEGIN TO GROW, IT NEEDS:

1. Warmth: Your necklace must stay warm. Keep it around your neck or under your pillow at night. If it gets too cold, it will not grow.
2. Moisture: Check on your cotton ball to make sure it has the right amount of water – not too wet and not too dry.

Enjoy your seed as it begins to grow. Look for roots, a stem, and its first leaves!

** Please remember to bring it back next week to your after-school program.

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LESSON THREE

SEED STARTING

SUMMARY

Students will review what a seed needs to survive and start seeds for the school garden.

MATERIALS:

Spray bottle
Potting Soil
Seeds
Tarp
Seed Starting Trays
Watering can
Popsicle Sticks
"A Seed Needs…" journal page
Pots to plant in
Soil
Permanent markers to label pots/seed rows
Seed Catalogues (1 for each student)
What Will We Grow journal sheet

GUIDING QUESTIONS:

1. How do you start seeds for transplant into the garden?
2. Who will take care of the seeds we plant?
3. When will we plant them in the garden?

GOAL:

1. Students will begin planting seeds for the school garden.

OUTLINE:

- Welcome Circle
- Share Seed Necklace and Plant
- What a Seed Needs
- What Will Our Garden Grow
- Seed Starting
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: What is your favorite season? What do you like about that season?

Today's Plan: Today we are going to start seeds that will grow indoors until the weather is warmer when they will be transplanted into the garden. First, we will check out your seed germination necklaces!

SHARE SEED NECKLACE AND PLANT – 10 MINUTES

Students will update the class on the progress of their seed germination necklace and they will plant their sprouts. Don't forget to get the seed you hid in the room to share with the group.

1. Sit in circle. Ask for volunteers to share two things about their necklaces, and then show them to the class.
2. Pass out Seed Germination Necklace journal sheet and have students draw what their seed looks like now.
3. Missing something here?
4. Once every student has shared, pass out pots and have students write their names on them. The pots can be peat pots, cleaned out milk cartons, plastic containers, or anything else you have on hand.
5. Have students line up and, one at a time, fill each of their pots with soil.
6. Give new seeds to those students whose necklaces were unsuccessful. If a student forgot their necklace at home, allow them to prepare a pot and take it home to plant their sprout.
7. Demonstrate how to plant the sprout carefully and with the leaves above the soil.
8. Plant seeds and spray with water.

Reflect: What are some things that your sprouts needs to grow?

A SEED NEEDS – 10 MINUTES

To reflect back on the lifecycle and what each plant needed to grow, we are going to do a drawing.

1. Pass out "A Seed Needs…" journal page. Ask students to follow along with the drawing you will make on the board.
2. Point out the seed in the center of the drawing. Explain: "This is like the seed you are wearing around your neck! It is also like the seed you became during our role play when you started sprouting out of the ground. As a seed, you needed it to be warm and you needed water from the spring rains. As a plant, you needed different things. This will be important to remember when you bean seed sprouts! What will the plant need to grow?"

3. Call on one student at a time to suggest something to add to the drawing. If they need ideas, use the hints to encourage more thinking. Illustrate and label each item as you go:
    a. SOIL (a line across the page above the seed)… Hint: What do seeds grown in?
    b. WATER (rain droplets)… Hint: It sometimes comes from the sky or we pour it on the plants. It is wet.
    c. SUN (a circle at the top of the page)… Hint: Almost all plants need this to survive. It's big and in the sky.
    d. AIR/CO2 (the open space above the soil)… Hint: Plants don't breathe like we do, but they still need this to live.
    e. TIME (a clock)… Hint: If we plant a seed today, will I get a tomato tomorrow? What about next week? Why not? What do they need?
    f. HEAT (a thermometer)… Hint: If we plant corn seeds outside in the winter, will the plant grow? Why not? Do plants grow in the snow? Why not, what do they need?
    g. NUTRIENTS (dots in the soil)… Hint: There are things in the soil that help the plants grow.
    h. optional: LOVE

Reflect: Review the drawing. This is a long list, did anything surprise you? As we begin our garden, we are going to need to keep all of these things in mind so that our plants thrive.

WHAT WILL OUR GARDEN GROW? – 20 MINUTES

Explain to the students that before we begin planting, we need to plan what we will grow in our garden. How will we decide? Explain that seed catalogues are a good source of information about what we can grow and how.

1. Show students a seed catalogue. Explain the different sections, alphabetical listings, etc. Explain how to read the seed description and plant information.
2. Ask: Why is there more than one type of tomato in the catalogue?
3. Pass out one seed catalogue to each student.
4. Give them a moment to look through the catalogue.
5. Pass out the Garden Planting journal sheet.
6. Ask each student to select 5-10 things they would like to grow in the garden. Gardens are a great opportunity to try new things and they should pick at least one thing that they have never eaten or seen before.
7. The journal sheet asks why you would want to plant something. Ask: What are some reasons that you might want to grow different plants? (they taste good, are new to you, look pretty or funny, etc.)
8. After students have created their own individual lists, explain that we are going to create a master plant list with everyone's plants on it.

9. Ask students to suggest one thing they would like to grow in the school garden and how we should start the plant (indoor or direct seed and when). Record their suggestions on a large easel pad sheet with three columns: April | May | Outdoor.
10. If necessary, assign students different responsibilities (reading plant guide, recording info on the poster, suggesting plants). Rotate duties as needed.

Reflect: Is the list of plants what you expected? Why do we start plants at different times? Why do we go through this planning process?

PLANTING SEEDS – 30-45 MINUTES

Students will begin planting seeds for the school garden!

We are going to begin growing plants today. It is still too cold outside but we need to get some plants started because they have a longer growing season, meaning they take longer to grow than other plants. We will transplant them into the garden later.

1. Have you ever seen farmers planting seeds in a field? How do you think they do it? We are going to become farmers with very small fields. As a matter of fact, our field is inside this tray. (Show students the flat.) We will be using a potting soil mix, so we are sure our seeds get all the nutrients they need. Once we fill our flats with soil, we will make rows and plant our seeds. What else will our seeds need to grow (water)? We will make sure that the soil is always moist. We will also label our flats to know what we planted and record what we do in our garden journal.

*Educator Note: If you have a large group, you might want to select some students to begin planting and have the rest play a game, or do this project in conjunction with poetry. Rotate as needed.

2. Have a volunteer fill one flat with soil. Tell students to run their hands gently over the soil surface so that it is flush with the top of the flat. (Alternatively, have all students gather and each put a cup full of soil in the flat so they can all get their hands dirty.)
3. Demonstrate how to plant the seed. Poke a shallow hole for each seed, plant the seed, and then cover gently with soil. Explain that a rule of thumb for planting is that seeds should be planted to a depth that is roughly 2-3 times the size of their seed. The bigger the seed, the deeper it goes, but not too deep!
4. Hand out packets to students and talk them through the seeding. Have each student seed one whole row with the same kind of seed. Take turns in the group.
5. Have students write the name of seed sown along with the date on a craft stick and place at the end of each row in the flat.
6. Have students water the flats thoroughly and be sure that they are kept moist all the time.

7. Seed list:

    a. Tomatoes
    b. Cauliflower
    c. Brussels sprouts

8. Create a Seed Caretaker list. Have 1-2 students sign up per day. They are responsible for coming in on that day to water the seeds. Show how to properly mist the seeds with a spray bottle. You will create another Seed Caretaker list next week.
9. Introduce students to the garden journal. Explain that we will record everything we do in the garden so that we can use it for reference next year. Ask for a volunteer to record what we did today.

Reflect: Review what seeds need to grow: water, time, air, and temperature. When will we see our seeds come up? Was it fun starting our garden?

A SEED NEEDS...

A PLANT NEEDS THESE THINGS TO GROW:

IN OUR GARDEN I WANT TO PLANT...

Name: _____

PLANT NAME	WHY?

LESSON FOUR

PLANT NEEDS

SUMMARY

Students will learn what plants need in order to thrive in the garden.

MATERIALS:

Pipe cleaners (one per student)

Sandwich bags with beads of different colors (one per student of yellow, blue, clear, brown, black, green)

Visual clues for "Fabulous Five"

Tape

Markers

Vaseline

Soil

Rubber Band

Paper Towel

Plastic Cups

A variety of sprouts for snack

Book:
From Seed to Plant
by Gail Gibbons

GUIDING QUESTIONS:

1. Do plants and people have the same needs? (K-3)
2. How are plants and people connected? (4-6)

GOALS:

1. Students will identify what plants need to grow.
2. Students will build awareness of what living things need to survive.

OUTLINE:

- Welcome Circle and Attendance
- What Plants Like
- The "Fabulous Five"
- Plant Needs Experiment
- Filler, Song: The Needs of a Plant
- Snack: Sprouts
- Filler, Book: From Seed to Plant by Gail Gibbons
- Filler, Journal: Seed to Sprout Observation
- Filler, Drama: The Life of a Tomato Plant
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Last week we sprouted seeds and talked about seed needs. Today you will learn what plants need to grow and survive through a number of activities and a scientific experiment.

Today's Questions: How have our seeds changed since we started to sprout them last week? Do we need the same things as plants to grow and stay healthy? (This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

WHAT PLANTS LIKE – 10 MINUTES

Students will use their bodies to imagine what plants need to grow.

1. Lead in to the lesson by asking students how to tell if a plant is sick. Ask how you can you tell if it is healthy.
   a. Sick: small, dry, bent/drooping, yellow/brown, spotty, leaves eaten, etc.
   b. Healthy: strong, erect, straight, green, big, juicy, bushy, whole leaves, new leaves
2. Ask students why they think some plants are not well. Ask: "What makes plants well?"
3. Have students stand in a circle and imagine they are plants, with roots (feet) and leaves (fingers). (Ask questions, demonstrating physically while learners copy.)
   a. Do your roots like space to move, or do they like to be squashed together?
   b. Do your roots like to be very dry? Very wet? Or nicely damp?
   c. Do your leaves like to be in the dark, or to have some sun and light?
   d. Do your leaves like to be in the open air, or under the ground?
   e. Do your leaves like to be blown in the wind all the time, or protected?
   f. Do you like to be growing under a lot of big weeds or in your own space?
   g. Do you like to have nothing to eat, or plenty of good food from the soil every day?
   h. Do you like bugs and insects? (Learners speculate–some insects are good and some are bad.)

Reflect: What do you think the plants will like in our garden? Do we have a healthy garden for our plants? How do you know?

THE FAB FIVE – 20 MINUTES

Students will follow and solve clues in a scavenger hunt. They will discover the "The Fab 5": the five things a plant needs to grow.

1. Before Sprouts begins, find time to place clues around your classroom or garden (weather permitting). Find clue cards at the end of the lesson.

Materials Needed:

Pipe cleaners

Clue card

Colored Beads, Images & Clue Cards:

a. Seeds: bag of black beads
b. Sun Station: bag of yellow beads, image of a sun, clue card
c. Water Station: bag of blue beads, watering can, clue card
d. Air Station: bag of clear beads, a pinwheel, clue card
e. Space Station: bag of green beads, picture of plants nicely spaced in a row, clue card
f. Soil Station: bag of brown beads, bucket or picture of soil, clue card

2. Begin your activity by showing the children the beans that sprouted last week. Ask, "What do you think these plants will need to keep growing and living?" After they have shared some ideas, invite students to go on a scavenger hunt to discover what their seedlings need to grow into a larger plant.

3. Explain to students that along the way they will be making a bracelet to help them remember what plants need to live.

4. Read clue number one. Have students see if they can spot the answer or label in the classroom or garden space. Distribute the pipe cleaners and the first black bead (bean seed).

5. After you read each clue, and as you visit each corresponding station, identify the visual clue that indicates one of the Fab 5: a picture of the sun, a watering can, a pinwheel, a bucket or picture of soil, and a picture of plants nicely spaced.

6. At each of the following stations, help children add a bead to their pipe cleaner. Review each bead as you add a new one. (black bead = seeds, yellow beads = sun, blue beads = water, clear beads = air, brown beads = soil, green beads = space the plants need to grow.

7. Visit each station to complete your bracelets!

Reflect: Do people need the "fabulous five"? What other needs do we have as people? How are they similar to plants? How are they different?

PLANT NEEDS EXPERIMENT – 15 MINUTES

Now that students have learned about the "Fab 5," we will conduct an experiment to see if plants can survive if deprived of certain needs.

1. Break students up into five groups.
2. Use five of last week's healthy bean plants and deprive each plant of one different need.
3. Use tape and a marker to record which need each plant will be missing.
4. Assign each group one healthy plant and their experiment.
5. Prepare each plant as follows:

   a) Deprive one plant of water, by not watering the plant for the next week.
   b) Deprive one plant of air, by coating the underside of its leaves with Vaseline.
   c) Deprive one plant of soil, by leaving it bare in the plastic cup.
   d) Deprive one plant of sun, by keeping it in a dark place.
   e) Deprive one plant of space, by rubber-banding a paper towel around its roots.
   f) The rest of the plants will be used as the control.
6. Revisit your plants one week from now and see how they compare!

Reflect: How might these changes affect the growth of these plants? What do you think they will look like next week? Which plant do you predict will be most healthy/most sick?

FILLER, SONG: THE NEEDS OF A PLANT – 5 MINUTES

This is a repeat-after-me-song. Students can use your gestures or make up their own to match the song's lyrics. (Visit this site to hear: http://www.youtube.com/watch?v=OQT-6piZOX7c)

"For a plant to stay alive,
It needs 5 things, I would not lie.
It needs WATER so it can grow. (hands and arms come down like sprinkling rain)
And it needs SOIL just like so. (hands are cupped in front as if to hold soil)
Plants need SPACE, they can't be tight! (arms open wide)
The SUN helps plants by giving light. (arms arch to make sun-shape above head)
Don't forget to give plants AIR. (hands fan face and deep breaths)
Repeat the needs if you dare: (repeat all gestures below)
Need 1, water.
Need 2, soil.
Need 3, space.
Need 4, light.
Need 5, air.
Hoorah!"

SNACK: SPROUTS – 5 MINUTES

Students will have the chance to taste test a variety of sprouted seeds, preferably from the same variety of seeds that were eaten during last week's lesson. Try pea, sunflower, pumpkin, lentil or bean sprouts!

FILLER BOOK – 10 MINUTES

From Seed to Plant by Gail Gibbons

This book explores the relationship between seeds and the plants they produce! Follow the journey through a plant's life cycle from seed to plant.

Listening Question: What will help the seed grow into a strong, healthy plant?

Reflect: What are the different stages of a plant's life? Why was the seed able to grow into a healthy plant? What will it need for its life cycle to continue?

FILLER JOURNAL: SEED TO SPROUT OBSERVATION – 10 MINUTES

Students will observe their sprouted seeds from last week's experiment. They can record their observations in the 2nd box of their journal sheet last week, "My Seed Experiment".

FILLER DRAMA: THE LIFE OF A TOMATO PLANT – 15 MINUTES

Students can write/act a play about the dramatic adventures of an orphan tomato plant. The life story can include: overshadowed by a family of sunflowers greedy for light; saved by being moved to a row of onions; nearly eaten by a large slug; invaded by leaf-sucking bugs; rescued by a child.

WRAP-UP – 5 MINUTES

Reflect: A plant needs the Fab 5 (air, water, soil, space, sun) to grow successfully. Just like you and me, plants have needs which help them grow healthy and strong! Do we have needs that are the same? Do we have needs that are different?

Copy and cut-out these Clue Cards and place at the station indicated on each card.

CLUE 1

In order for me to grow big and strong,
You are going to need to help me along.
Five things I need to stay alive–
We'll call them the fabulous five!
The first will surely help me wake,
It's cold in here for goodness sake!
I must warm up and feel the light–
Take me where it's warm and bright.

CLUE 2

I'm warmer now, thanks a bunch
But I think it's getting time to munch.
I make my own food whenever I'm hungry
But the problem is, I'm really thirsty!

Look around–you need to think,
And find something for plants to drink.

CLUE 3

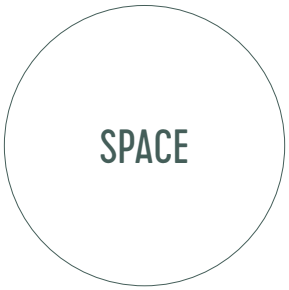
You need me and I need you!
Soon you'll learn a step or two
We eat and drink and need to share,
'Cause both of us must breathe the ____.

Look around–think and observe.
Can you see where wind is pushing air?

CLUE 4

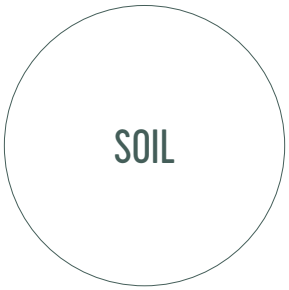
Even though I'm little now
I'll soon be big–somehow.
I'll grow with others (it's not a race)
Just don't plant me too close,
I need my _____.

Look around! You'll see a sign,
Showing plants with room, growing fine.



CLUE 5

Sun, water, air and space–
All things I need to live
But there's one more, to me, you must give
It's dark and brown, under your feet
Without it my life will be incomplete!
Look around–a bucket and a sign–
Complete the Fab Five and your plants will grow fine!



CLUE 6

Sun
Water
Air
Space
Soil

Plant your seeds!

LESSON FIVE

PLANT PARTS

SUMMARY

Students are introduced to the different parts of the plant and the parts of the plant that we eat.

MATERIALS:

Plant Part Snack (carrot, sunflower seeds, broccoli, apples, celery, spinach)

Knife

Cutting board

Napkins

Plastic foods

8 paper bags

Pencils

Plant Parts Diagram journal sheet

Liquid glue

Tape

Craft supplies to make plant, anything you have on hand: pipe cleaners, beads, toilet paper rolls, construction paper, feather, etc.

GUIDING QUESTION:

1. What parts of plants do we eat?

GOAL:

1. Students will name the six different plant parts and give an example of a food we eat for each one.

OUTLINE:

- Welcome Circle
- Plant Parts Drawing
- Plant Part Snack
- Brown Bag Lunch
- Design-A-Plant
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: If you were a plant, what plant would you be?

Today's Plan: Today we are learning all about plants and going to eat lots of different parts of the plant.

PLANT PARTS DRAWING – 15 MINUTES

Let's begin our discussion of plants by looking a little closer at one plant and see if we can begin to identify its different parts. *Note: Plant Part Snack can be done in conjunction with the Diagram activity.*

1. Draw a picture of a plant on the board and pass out the plant part journal sheet to the students.
2. Ask the students to identity and label the different parts of the plant: roots, stem, leaf, flower, fruit (contains seeds). As you talk about each plant part, can they think of what the part does for the plant? Can they think of any foods they eat that are that part?

   a. Roots (store nutrients and support plant) beet, carrot, radish
   b. Stems (transport water, nutrients, etc.) celery, rhubarb, asparagus
   c. Leaves (photosynthesize to make sugar and carbs) lettuce, cabbage
   d. Flowers (reproductive organs, attract pollinators) cauliflower, broccoli
   e. Fruits (protection to developing seeds) apple, squash, tomato
   f. Seeds (genetic info to reproduce plant) peas, beans, corn

Reflect: Do you think we eat all of these different parts?

PLANT PART SNACK – 5-10 MINUTES

Now that we agree that we eat every part of the plant, let's share a snack that features each part of the plant!

1. Show students the various snack items: carrot, celery, spinach, broccoli, apples, and sunflower seeds.
2. Ask them to identify the parts of the plant that the food items came from.
3. Although these snacks each came from different plants, ask the students to imagine that one plant produced all these snack items, a SUPER plant! What would that plant look like? How could we arrange these snack items, based on the part of the plant that they represent, to become on new plant in which every part is edible?
4. Each student will arrange the ingredients on a napkin or plate to create their own SUPER plant!
5. Eat snack!

Reflect: Which part of the plant do you think you eat the most of? Which part of the plant is your favorite?

BROWN BAG LUNCH RELAY – 10 MINUTES

The class will be doing a sorting activity based on the different plant parts that people eat.

1. Set up: Obtain 8 brown grocery bags and write a plant part name on 6 of them: root, leaf, flower, fruit, and seed. Place the bags in different places around the room you will be in. Students will be "racing" to get food items into the bags, so they should be easy to find and get to. Divide the plastic and real food items into 2 other bags. Try to get at least one plant part item into each bag. Place the bags where students will be standing to start the game.
2. Divide the students into 2 groups.
3. Explain that you have set up six brown grocery bags around the room, each labeled with a different plant part: root, stem, leaf, flower, fruit, and seed.
4. Give each group a grocery bag filled with a different selection of food items made from plants.
5. Each team member will take turns grabbing 1 food item and placing it in the correct plant part bag. Each group can and should work together to look at the food item selected and deciding which part of the plant they are made from.
6. After all of their food items are gone, the team can sit down.
7. After both teams have finished sorting the plant parts, bring all the plant part bags to the front of the room. Select a few food items from each bag and ask the group whether they agree with the classification of the food.

Reflect: Come back to the question, do we eat all the parts of the plant?

DESIGN-A-PLANT – 15-20 MINUTES

Now that we have talked about all the parts of a plant, everyone is going to design their own plants.

1. Using a craft bin, students will make their own plant.
2. Show them a sample plant identifying each part.
3. Encourage students to be creative as they design their own plant: it can be large or small, bright or dark, move or still, etc.
4. When designing their plants, each student must include all six plant parts (write list on board): • Roots • Stem • Leaves • Flower • Fruit • Seeds
5. Each student should come up with a name for their plant and decide whether any part of the plant is edible. Give them an estimated time to complete their job.
6. Students should use various materials from the craft bin to create their plant. They can use glue, tape, scissors and/or hole punches.
7. Allow students to share their creations in a circle.

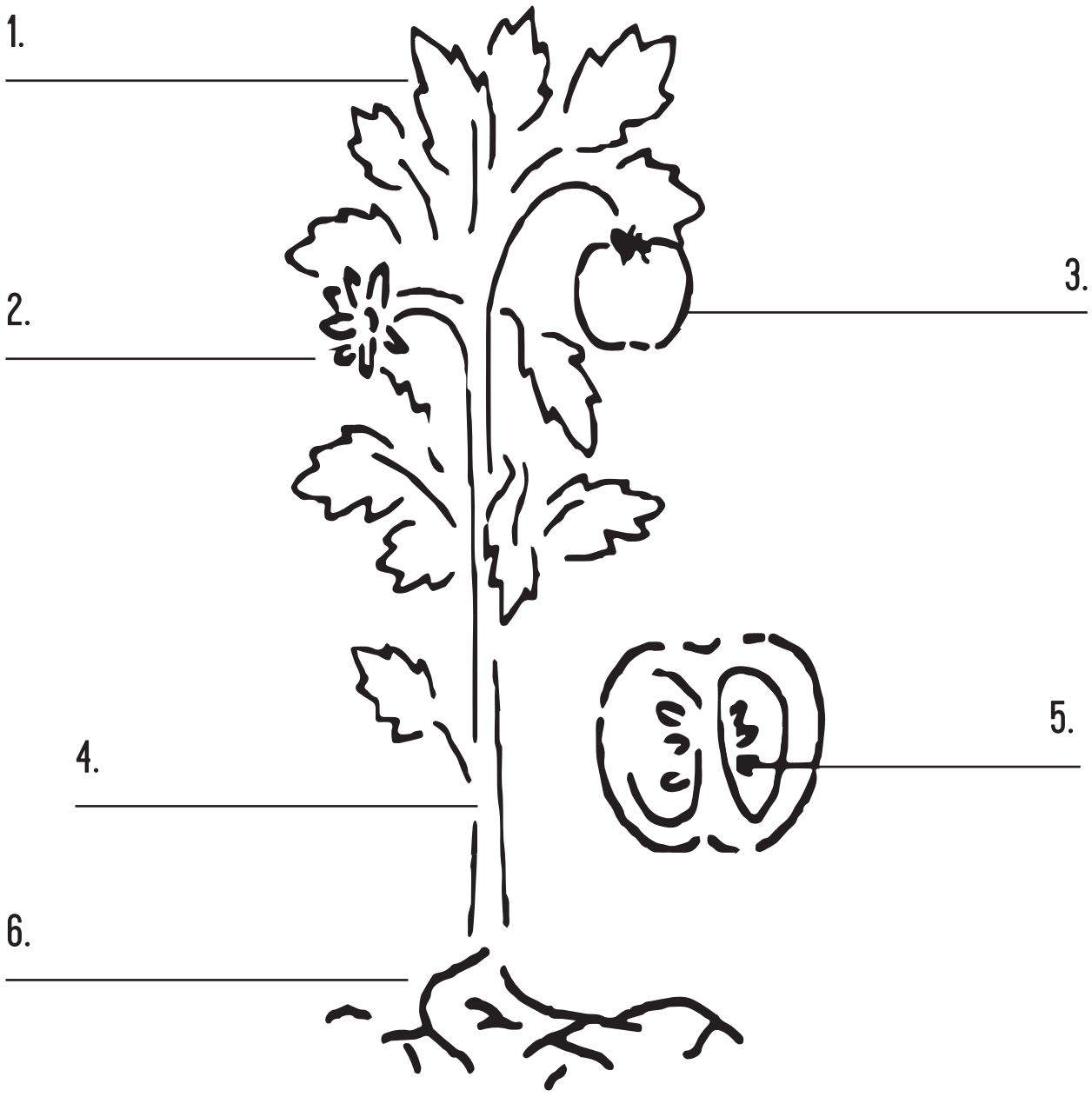
Reflect: Have each student present their plant (name, explain parts, etc) to the group.

WRAP-UP

Reflect: There are many parts to plants that you can eat!

Next Week: We will discuss the Garden Plan.

PLANT PART DIAGRAM



LESSON SIX

COMPANION PLANTING

SUMMARY

Students will learn about companion planting and how it can help our gardens grow. We will talk about the meaning of “the three sisters” and other examples of beneficial relationships.

MATERIALS:

Journal Pages
  Friend or Foe:
    Design a Garden Bed

Find Your Match Cards
  (in image tub)

Ingredients for
  Three Sisters Salsa

Corn Chips

Book:
  Chicks and Salsa
  by Aaron Reynolds

Friend or Foe companion
  planting cards

GUIDING QUESTIONS:

1. How do plants and living creatures help each other in the garden? (K-3)
2. How does “companion planting” help our garden grow? (4-6)

GOALS:

1. Students will be able to identify at least 2 examples of beneficial relationships in the garden.
2. Students will be able to communicate the meaning of “the three sisters.”

OUTLINE:

- Welcome Circle and Attendance
- Everyone Needs a Friend
- Find Your Match
- Three Sisters Role Play
- Snack: Three Sisters Salsa
- Filler, Game: Aphids and Chard
- Filler, Book: Chicks and Salsa by Aaron Reynolds
- Filler, Journal: Friend or Foe: Design A Garden Bed
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Today we will explore how plants and other living creatures help each other in the garden.

Today's Questions: Who or what do you take care of? Who or what takes care of you? Do you think plants and other living creatures take care of each other, too? (This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

EVERYONE NEEDS A FRIEND – 10 MINUTES

Through a quick reflection and discussion, students will understand the meaning of companionship in the garden.

1. Ask students to think about who or what they take care of in their lives OR who/what takes care of them. "Who/what do you take care of you? How so? Who/what takes care of you?"
2. Go around the circle and have each student share one thing or person they take care of. Alternatively they can share one thing or person who takes care of them.
3. Explain: Do you think plants and other living creatures take care of each other, too? Just like people, plants have companions. Does anyone know what a companion is? "Companion" means friend. We have friends, or companions, and so do other living things!
4. Explain: Sometimes plants can be companions because they like the same growing conditions: sun/shade, moister/drier soil, etc. It makes sense for them to grow together if they like the same growing conditions. Other times, plants can be companions because they help each other out – one plant may provide shade for the other, or one might add a nutrient to the soil that the other needs, or one might smell bad to insects that would otherwise eat the other plant."
5. Add: Sometimes plants do not get along with each other so well. They like to be planted with some distance between each other. This helps them succeed better in the garden-staying healthy and growing strong!

FIND YOUR MATCH – 15 MINUTES

Students will learn about garden companions by playing a match-up game. Each student will be given a picture and short blurb about a plant. Instruct students to read about their plant, and find another plant in the room that would make a good companion. There should be at least one match for each card.

*Educator Note: These images can be found in the image tub.

THREE SISTERS ROLE PLAY – 10 MINUTES

Three sisters is a companion planting that the Native Americans were using long before Pilgrims came over to America. The students will act out the Three Sisters as you describe how the companion planting works in the garden.

1. Ask for a volunteer to be Sister (or Brother) Corn and give her/him a corn stalk to hold while they stand tall. Say: "Sister Corn stands tall and strong. It was a very important food in Native American's diet and it is still important in ours today (corn syrup, corn starch, etc). Corn is a heavy feeder that takes a lot of nutrients out of the soil, like Nitrogen. If you plant corn by itself, you need to put it in a different spot the next year so it can grow into good corn."
2. Ask for a volunteer to be Sister Bean. Give them the beans to hold and have them sit on the ground next to Sister Corn. You have to plant a vine bean that will grow up the corn. It makes the corn stalks sturdier and helps keep birds and some animals from taking the corn off the stalk. Bean also fixes Nitrogen. What that means is it takes Nitrogen from the air and releases some of it into the soil. Sister Corn really likes this. In fact, Three Sisters help each other so much, you can plant them in the same spot in your garden for several years in a row.
3. Next is Sister Squash. Ask for a volunteer and have them hold the squash and lay on the ground in front of the other two. You have to plant a winter squash or pumpkin because they grow out. Summer squash and zucchini grow like bushes. Sister Squash grows around the corn and beans and prevents weeds from growing and taking the water, sun and nutrients. It also helps detract animals and rodents from running up to the corn and stealing its fruit.

Reflect: Any questions? Which plant is getting the most help? Would you plant something like this in your garden?

SNACK: THREE SISTERS SALSA – 15 MINUTES

Now that students have learned about the three sisters, we will be making a tasty salsa snack to celebrate the sisterhood.

1. Pass out recipes and ask students to identify the three sisters in the ingredient list.
2. Make sure to wash hands before passing out ingredients.
3. Divide the class up into groups to make the salsa. Pass out the recipe and ask them to read the ingredient list. Ask where the three sisters are. Demonstrate how to cut vegetables properly.
4. It may be best to divide the tasks up by groups
    a. Table 1: skin and cube cooked squash
    b. Table 2: cut onions
    c. Table 3: cut tomatoes
    d. Table 4: open cans and drain beans, measure out cilantro, add oil and salt, and mix all of the ingredients together.

5. Once the salsa is made, divide into bowls and give each student chips to try the salsa. Send recipes home with them.

Reflect: What other things could you make with Three Sisters?

FILLER, GAME: APHIDS AND CHARD – 10 MINUTES

(This game is a variation of "Frogs and Flies.")

Assemble students in a sitting circle. Choose one student to sit in the middle of the circle; this student is the "detective." Have all students close their eyes, and tap two students on the shoulder; these students are the aphids. The rest of the students are chard. The aphids' goal is to eat the chard by quickly sticking out their tongue at the chard, without being seen by the detective. If a chard student gets killed by an aphid, that student (dramatically!) leans back on the floor. The detective has three chances to guess who the aphids are before all the chard has been eaten!

FILLER BOOK – 5 MINUTES

Chicks and Salsa by Aaron Reynolds

This book tells a humorous story about some chickens at Nuthatcher Farm who get tired of their usual cuisine and decide to whip up some spicy salsa. Soon all the animals and the Nuthatchers themselves want to join in on the fiesta!

Listening Question: What is harvested out of the garden to help make this Southwestern feast?

Reflect: What are the different stages of a plant's life? Why was the seed able to grow into a healthy plant? What will it need for its life cycle to continue?

FILLER JOURNAL: FRIEND OR FOE: DESIGN A GARDEN BED – 10 MINUTES

Students will use the companion planting cards to design/draw a garden bed. Pass out 1-2 cards per student or have students share cards with each other. Explain that each card has the picture of a garden plant. On the backside of the card are two plants: one friend and one foe. The green background means "friend;" the red background means "foe." Remind students that garden friends like to be planted next to each other, while garden foes like some distance. Encourage them to "plant" at least two friends in their design.

WRAP-UP – 5 MINUTES

Reflect: A plant needs the "fabulous five" (air, water, soil, space, sun) to grow successfully. Just like you and me, plants have needs which help them grow healthy and strong! Some of our needs are the same, and some are different.

THREE SISTERS SALSA

INGREDIENTS & MATERIALS

1 (15-ounce) can black beans, drained

1 cup frozen or canned corn

4 tomatoes, small dice

1 zucchini, diced or shredded

1 small red onion, finely chopped

½ large bunch fresh cilantro, roughly chopped

Juice of 2 limes

2 tablespoons extra virgin olive oil

1 teaspoon chili powder

Salt and pepper to taste

DIRECTIONS

1. Dice tomatoes, zucchini and onion.
2. Shred cilantro.
3. Juice limes by hand.
4. Combine all ingredients and serve with corn chips.

Serves: 16 for snack

FRIEND OR FOE: DESIGN A GARDEN BED

Name: _____

Using your companion cards, design your own garden bed of friends, not foes!
Let's plant at least 2 friendly plants!

EGGPLANT

CABBAGE

CORN

TOMATO

CARROT

PEPPER

POTATO

CUCUMBER

LETTUCE

SPINACH

BROCCOLI

SQUASH

PUMPKIN

ONION

CAULIFLOWER

KALE

LESSON SEVEN

GARDEN PLANNING

SUMMARY

Students will design a garden map, and then name and explore the garden.

MATERIALS:

Clipboards

Measuring tape (large enough to measure the garden)

Pencils and markers

Easel pad

Markers

Pencils

Garden Mission journal sheet

GUIDING QUESTION:

1. Where should we plant our crops in the garden?

GOAL:

1. Students will familiarize themselves with THEIR garden.

OUTLINE:

- Welcome Circle
- Simon Says Garden Visit
- Garden Measuring
- Our School Garden Mission
- Name That Garden (for garden's without names)
- Garden Mapping
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: What is your favorite gardening activity?

Today's Plan: We are going to think about what to plant in our garden.

SIMON SAYS GARDEN VISIT – 15 MINUTES

If the weather allows, take the students out to visit the garden space.

1. Stand around the garden space. You want to get the students thinking about the garden as a place for our food to grow. Ask:

a. Do you remember what plants need to grow? Where can we find those things in the garden?

   i. Sun & warmth – which way does the sun travel through the sky?
   ii. Water – where is the closest water source if we need to water the plants?
   iii. Soil – is the ground ready to plant in? How do you know?
   iv. Nutrients – we will get nutrients from the soil and we will add some more using compost. We have a compost pile in the garden in which to put weeds, dead plants, and fruit we won't eat. Where is it?

2. Following the rules of Simon Says, ask the students the following questions:

   • Simon says to go to the North side of the garden.
   • Simon says to find the water source for the garden.
   • Simon says to go to the West side of the garden.
   • Simon says to find the garden compost.
   • Simon says to go to the East side of the garden.
   • Simon says to find the side of the garden the sun will set on.
   • Simon says to go to the South side of the garden.
   • Simon says to find the side of the garden the sun will rise on.

Note: Really follow the rules of Simon Says and try to trick the students. Ask them to find impromptu garden items (sprouts, worms, sun, etc).

GARDEN MEASURING – 10 MINUTES

To begin planning our garden we need to understand our garden site.

1. What do we need to know to plan our garden map? Get all of the students' ideas and do what you can.
2. Measure the garden sides so you know the size of the garden.
3. Look at any permanent structures around the garden like the compost, garden sign, roads, trees, etc. How do they impact the garden?
4. They will need to remember these items, or they can draw them on a piece of paper before you travel back indoors.

OUR SCHOOL GARDEN MISSION – 10 MINUTES

Goal/Objective: Students discuss the definition of a garden.

Guilding Question: What does the word garden mean?

1. Pass out the Our School Garden Mission journal page. It is important for everyone to understand who the garden is for and for what purpose the food is being grown. This journal is to help us imagine what we would like the garden to be like.
2. Ask students to use the lines and drawing space to illustrate their vision for the garden. What are some things that might be included in their drawings as important elements of the garden (plants, animals, people, rain, sun, etc.)?

Reflect: Ask students to share parts of their drawing or description of the school garden.

NAME THAT GARDEN (UNNAMED GARDENS ONLY) – 15 MINUTES

Students choose a garden name.

1. Ask students to brainstorm potential names for the garden. Record suggestions on the board. Encourage them to suggest words, phrases, or complete names related to food, farming, and community.
2. Review the list of potential names with the students.
3. Since the garden will be for the entire school, ask the students' advice about how to get input from the rest of the school. Would creating a list of the best names and having the whole school vote on that list be a good idea?
4. Narrow the suggested names by the students down to 3 or 4 by taking a vote by raise of hands and then tally the votes on the board.
5. Ask for a volunteer(s) from the after school program to be responsible for conducting a survey during school the next day. (Connect with the site coordinator or a teacher before you leave the school to help facilitate the voting process.)

GARDEN MAPS – 20 MINUTES

Before we can plant our garden, we need a map. The map will tell us where we will put everything and how much room we have.

1. Ask students: What is a map? What are some examples of maps? What do you find on a map?
2. Each of the students will design a garden map. First, we will map the outline of the garden and the space around it. Then, we will fill in our garden map with paths and beds. If there is time after that, we can place the plants we chose into our maps.
3. Each map must include (explain each element to the students):
   - Title
   - Sunrise and sunset
   - Garden with dimensions
   - Some permanent structures around the garden: garden sign, compost, road, buildings, etc.

4. Pass out blank maps and pencils. Let students have some time to design their garden. You can work as a group to map out the general site and dimensions. Each student should create their own design for the garden within the garden plot. This is their chance to be wild and creative. Think back to the list of plants if that helps. Will we have winding paths or straight, hiding spaces and community spaces, food and art, etc.? Make some suggestions like bean teepees and sunflower houses.
5. When everyone is finished, share the map designs and ask what people's favorite elements are.
6. You, the garden coordinator, can incorporate some of the students' ideas into one map for the garden. It is important to get their point of view to help make it into a children's garden.

WRAP-UP

Reflect: The first step in planting a garden is planning it. Now how excited are you to plant!?

OUR GARDEN MISSION

Garden Name: _____

We are growing: ☐ Fruits ☐ Vegetables ☐ Flowers

Who will care for the garden? _____

Who can visit the garden? _____

What should we do with the food from the garden? _____

_____

Why should we have a garden? _____

_____

_____

Me in the garden this summer:

PLANTING GUIDE

Plant	Start Indoors	Direct Seed	Planting Date
Green Beans		✓	June
Basil	✓	✓	May
Beets		✓	May/June
Broccoli	✓		April
Brussels Sprouts	✓		April
Cabbage	✓		April
Calendula (flower)	✓	✓	May
Cantaloupe/Honeydew	✓		
Carrots		✓	June
Cauliflower	✓		April
Chard	✓		May
Cilantro		✓	June
Corn		✓	June
Cosmos (flower)	✓	✓	May
Cucumber	✓	✓	May/June
Dill	✓	✓	May
Dry Beans		✓	June
Eggplant	✓		March
Garlic		✓	Sept. with mulch
Green Beans		✓	June
Kale	✓	✓	May
Larkspur (flower)	✓	✓	May
Lettuce		✓	May
Marigold (flower)	✓	✓	May/June
Watermelon	✓		May
Nasturtium (flower)	✓	✓	May
Onion	✓		February
Peas		✓	May/June
Peppers	✓		March
Potatoes		✓	June
Pumpkins	✓	✓	May/June

Plant	Start Indoors	Direct Seed	Planting Date
Radish		✓	May
Rutabaga		✓	June
Spinach		✓	May
Sunflower (flower)		✓	June
Swiss Chard	✓	✓	May
Squash	✓	✓	May
Tomatoes	✓		April
Turnip		✓	June
Wheat		✓	June
Zinnia (flower)	✓	✓	May

SCHOOL GARDEN MAP

Name: _____

LESSON EIGHT

SOIL 101

SUMMARY

Students will learn about the different types of soil that make up a healthy garden.

MATERIALS:

Journal Sheet
  Edible Soil Recipe
  "I Love Dirt" Song
Metal tins
Sand
Dead plant material
Spray bottle and water
Fork for mixing
Soil samples (three types)
Potting soil
Seeds
Flats
Craft sticks
Tarp
Watering can
Fine tip marker
Edible soil profile ingredients
Large glass jar
Laundry detergent
Salt
Clear plastic cups
Spoons
Book:
  Dirt by Steve Tomecek

GUIDING QUESTIONS:

1. What are the three major types of soil? (K-3)
2. How is soil made? (4-6)

GOALS:

1. Students will name the three types of soil and a few of their respective properties.
2. Students will be able to explain the process of how soil is made.

OUTLINE:

- Welcome Circle and Attendance
- How Soils Are Made
- Clay/Silt/Sand
- Planting Seeds
- Snack: Edible Soil Profile
- Filler, Activity: Mudshake Experiment
- Filler, Book: Dirt by Steve Tomececk
- Filler, Activity: Song
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Today we are going to learn about one of the most important parts of our garden: soil! We'll learn how soil is made, identify different types of soil, and maybe eat a soil snack!

Today's Questions: What are the different types of soils? What makes these soils healthy? (This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

HOW SOILS ARE MADE – 15 MINUTES

Rocks are broken down in several ways to make soil. By demonstrating one type of process, students will make their own soil like substance.

1. Tell the students that they are going to make their own soil. What do you think is in soil? Rocks, leaves, etc.
2. Break the students up into groups or pairs. Before passing out any materials explain the directions first and have them repeat the steps to make sure they heard you. You can also write it on a white board so they can reference it later.
3. Each group will get a metal tin. The first step is to put some sand into the tin (just a handful is fine). This is the mineral that makes up soil.
4. Your group will then break up some leaves or other plant material (not alive) into tiny pieces. Put as much of this as the sand in your tin. This is called organic material or humus. It is the living or once living part of your soil.
5. Now add just enough water to lightly moisten your mixture. (Use a watering can, bring a jar, or spray bottle of water for the students to use.) Use your fork to mix this all up. Set the tin aside for a few minutes.
6. Once all of the students have completed the soil activity, ask them a few questions:
    a. Look closely at the rocks and sand. Where do sand particles come from?
    b. If you had two rocks and you rubbed them together (you can actually have them rub two rocks together), are you making the organic or the mineral part of soil?
    c. Compare the mixture you made with the soil samples we looked at earlier. How are they the same? How are they different?
    d. Air and water are two of the four things that make up soil. What are the other two?

CLAY/SILT/SAND – 15 MINUTES

Students will learn about the three different soil types.

1. Now that you have learned one process of how soil is created, let's look more closely at different types of soil. Clay, silt, and sand are the major components in soil.
2. Set out containers of the three soil types: clay, silt, sand. You may set out a fourth container that includes compost. Have a spray bottle of water ready to gently squeeze or spray a drop or two of water.

3. Start with one soil type:

   a. Have students rub some soil with a little water between their fingers. Ask the following questions while they are doing this:
      i. Does it feel gritty? (it is sand: big grains)
      ii. Does it feel smooth, like flour? (it is silt: medium grains)
      iii. Does it feel sticky? (it is clay: tiny particles)

4. Next, have students try to roll the 1/2 handful of soil examples into a worm, with a little water. Try this with all soil examples, one at a time.

a. Does it fall apart? (sand)

   b. Does it stick together? (clay)

   c. Can you form a "worm" with any of these examples? What do you think would happen if we combined all three and tried to make a worm?

5. Repeat with the next soil type.

6. Experiment with a combination of the different soil types to see if a worm can be created. Does using 1/4 handful of sand and a pinch of clay and silt work? What is the best recipe for making a soil worm?

Reflect: Do you think plants may thrive in specific types of soils?

PLANTING SEEDS – 15 MINUTES

Students will begin planting seeds for the school garden!

1. We are going to begin growing plants today. It is still too cold outside but we need to get some plants started because they have a longer growing season, meaning they take longer to grow than other plants. We will transplant them into the garden later.
2. Have you ever seen farmers planting seeds in a field? How do you think they do it? We are going to become farmers with very small fields. As a matter of fact, our field is inside this tray. (Show students the flat.) We will be using a potting soil mix, so we are sure our seeds get all the nutrients they need. Once we fill our flats with soil, we will make rows and plant our seeds. What else will our seeds need to grow (water)? We will make sure that the soil is always moist. We will also label our flats to know what we planted and record what we do in our garden journal.

*Educator Note: If you have a large group, you might want to select some students to begin planting and have the rest play a game, or do in conjunction with poetry. Rotate as needed.

3. Have a volunteer fill one flat with soil. Tell students to run their hands gently over the soil surface so that it is flush with the top of the flat. (Alternatively, have all students gather and each put a cup full of soil in the flat so they can all get their hands dirty.)
4. Demonstrate how to plant the seed. Poke a shallow hole for each seed, plant the seed, and then cover gently with soil. Explain that a rule of thumb for planting is that seeds should be planted to a depth that is roughly 2-3 times the size of their seed. The bigger the seed, the deeper it goes, but not too deep!
5. Hand out packets to students and talk them through the seeding. Have each student seed one whole row with the same kind of seed. Take turns in the group.
6. Have students write the name of seed sown along with the date on a craft stick and place at the end of each row in the flat.
7. Have students water the flats thoroughly and be sure that they are kept moist all the time.

8. Seed list: Tomatoes, Cauliflower, Brussels sprouts
9. Create a Seed Caretaker list. Have 1-2 students sign up per day. They are responsible for coming in on that day to water the seeds. Show how to properly mist the seeds with a spray bottle. You will create another Seed Caretaker list next week.
10. Introduce students to the garden journal. Explain that we will record everything we do in the garden so that we can use it for reference next year. Ask for a volunteer to record what we did today.

Reflect: Review what seeds need to grow: water, time, air, and temperature. When will we see our seeds come up? Was it fun starting our garden?

SNACK: EDIBLE SOIL PROFILE - 15 MINUTES

Students will make their own soil profiles they can eat.

1. Make sure students wash their hands before making their soil profiles. Each student will start with a clear plastic cup.
2. Explain that the plastic cup represents the parent material, the rock the soil came from.
3. (See recipe journal sheet.) Each student will now get a cup or ½ cup of cereal/granola to put in their "parent material." The whole cereal in the soil under our garden (the subsoil). The soil on top of our garden that we plant in is softer and more broken up (topsoil)—so take the top layer of your soil and "break it down" by crushing it up. Top it off with organic material like grass (coconut) and/or plants (cranberries). If you use milk, it will move through the "soil" like rain does.
4. Enjoy the soil!

Reflect: How did your soil taste? Are the layers what you expected?

FILLER ACTIVITY: MUDSHAKE EXPERIMENT – 10 MINUTES

Students will create a visual that will show the different soil types. The Educator should check with the teacher to make sure you can leave the Mudshake in an out-of-the-way place in the classroom.

1. Fill a large glass jar about one-third full with different soil types.
2. Add a tablespoon of table salt and one tablespoon of laundry detergent. Fill with water.
3. Close well, shake vigorously for 5-10 minutes and leave to settle.
4. Set the jar someplace in the classroom. Label with a piece of tape, "Sprouts ASP". Leave until next week.
5. Re-visit this next week. You will be able to see clearly the composition of the soil: sand and gravel at the bottom, then silt, then clay, and organic material floating on the top. The ideal proportions are clay 4, silt 4, sand 2, and about 5% organic matter.

FILLER BOOK – 10-15 MINUTES

Dirt by Steve Tomecek

This book tells about the importance of soil. The author explains in detail about the differences between types of soils, the layers of soil, and what types of creatures live and depend on soil.

Listening Question: What makes up dirt? Who or what depends on dirt to live?

Reflect: Why is dirt so important to the environment? Why do animals and humans rely on the health of soil? What would happen if humans covered over all of the dirt with buildings, houses, etc.?

FILLER SONG: I LOVE DIRT – 5 MINUTES

I Love Dirt (sung to the tune of "Three Blind Mice")

Adapted from Oklahoma Ag in the Classroom

I love dirt.
I love dirt.
It won't hurt
On my shirt
I love to squirt it with a hose
I love to squish it between my toes
The fun we have just grows and grows
Oh, I love dirt.
I love dirt.

WRAP-UP - 5 MINUTES

Reflect: What are the different types of soil? How do they look different?

BACKGROUND INFORMATION

How is soil made?

Soil is formed very slowly from rock, on or near the earth's surface. It is formed as rocks are continuously broken down into smaller and smaller pieces by weathering. There are two types of weathering: mechanical (physical disintegration by ice, wind and rain) and chemical (mineral composition changes by water dissolving certain minerals). Over centuries, broken down minerals mix with decaying organic material (humus) to form soil. Soil also contains water and air.

EDIBLE SOIL RECIPE

INGREDIENTS & MATERIALS

5 cups of granola or cereal (1/2 cup per person)

1 ¼ cup shredded dried coconut (1/8 cup per person)

1 ¼ cup dried cranberries (1/8 cup per person)

2 ½ cups milk

DIRECTIONS

1. Start by filling a plastic cup with whole cereal or granola as the bottom layer of the soil (subsoil)
2. Crush some of the very top of your cereal layer to act as the topsoil
3. Add dried coconut over top, followed by cranberries to act as plant material (grass, vegetation)
4. Pour milk over the top (water/rain, about ¼ cup) and watch it drain through!
5. Eat and enjoy.

Serves: 10

I LOVE DIRT

(Sung to the tune of “Three Blind Mice”)
Adapted from Oklahoma Ag in the Classroom

I love dirt.
I love dirt.
It won’t hurt
On my shirt.

I love to squirt it with a hose.
I love to squish it between my toes.
The fun we have just grows and grows.
Oh, I love dirt.
I love dirt.

LESSON NINE

SOIL SLEUTHS

SUMMARY

Students learn about different soil types.

MATERIALS:

Brown paper lunch bags or small plastic bags

Bowl, spoon, apron

Soil ingredient cards

Construction paper

Glue stick (if gluing soil poetry)

Scrap paper cut into strips

Pencils

Soil samples (clay, potting soil, sand, compost) – try to get obvious examples

GUIDING QUESTION:

1. What is soil and how is it different from dirt?

GOAL:

1. Students will explore different types of soil and understand the importance of soil.

OUTLINE:

- Welcome Circle
- Soil Recipe
- Sensing Soil
- Soil Poem
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: What is something that grows in the soil?

Today's Plan: Today we are learning all about soil.

SOIL RECIPE – 10 MINUTES

Explain that we are going to make a special batch of soil. You have forgotten the recipe and you hope they can create a special class recipe for soil. We need soil not dirt.

1. First job is to gather the necessary soil ingredients to have on hand. Divide the class into pairs and head outdoors.
2. Each pair should try to find some ingredients (such as leaves, pinecones, grasses, small sticks, etc.) that they think will make good soil. Give each pair a small paper bag in which to collect the materials and remind them to collect mostly non-living things (suggest some different things so they don't all come back with handfuls of dirt).
3. Head back into the classroom (or circle up outside) with the students and gather together with all the ingredients.
4. Ask for a volunteer who enjoys cooking to be the soil chef. Have them wear the apron.
5. Ask students to add ingredients one at a time to the mixing bowl.
6. Record these ingredients as a recipe (so you won't forget it again!) on the board or piece of paper.
7. After all the items have been placed in the bowl, explain that there is a bit of magic in the science of making soil.
8. Ask the soil chef to cover the bowl with the napkin and tap on the bowl three times with the magic spoon. Tell the students to focus on soil, to picture it in their heads, imagine smelling it, feeling it, seeing it, and tasting it (kidding!).
9. In unison, have the class whisper magic words (such as abracadabra, hocus-pocus or any other favorites).
10. Have the students give a drum roll by slapping their thighs, while the soil chef removes the cloth with a flourish.
11. Nothing has happened! Ask the students what went wrong. Suggest that perhaps some ingredients were missing.
12. Again compare making soil to baking and make the analogy of baking chocolate chip cookies and leaving out the chips, the baking time, and temperature.
13. Pull out the shopping bag and tell the students you might have some of the missing ingredients inside. Give the students clues to the missing ingredients (sunlight, water, nutrients, earthworms, bacteria, time, and temperature) and as they guess them add the cards or props to the mixing bowl. Discuss the role of each item in the life of the soil.
14. Ask the students how much time they think is needed.

15. Explain that it takes 50 to 100 years to make an inch of topsoil. Using their grandparents age, give them a sense of the time span involved. Hold up a handful of soil and explain that when they are grandparents their soil ingredients will finally look like this.

Reflect: What are some ways to care for our soil?

SENSING SOIL – 15 MINUTES

Now that we know something about soil, we are going to explore several different types.

1. Set up: There should be four stations around the room with four containers of different types of soil (clay, compost, sand, garden soil), 4 lunch bags with one type of soil written on each, scrap paper, and pencils.
2. Show students one container. Explain that they will be using their senses to explore the container.
3. What are some words you would use to describe something that you see? Hear? Smell? Feel? You may need to talk about adjectives and give some examples of descriptive words they may use. In this activity, they will spend a few minutes at each station. They will have the chance to look closely at the soil at each station: smell it, rub it between their fingers to hear the sounds, etc.
4. After a minute of observing the soil, they should choose 1 word to describe it, write it on a slip of paper, and put the paper in the lunch bag with the soil type on it.
5. Divide the group into four groups. Each group will spend a few minutes at each soil station exploring each sample and recording their descriptive word. Then move on to the next station.
6. Tell them that you will come back to those words later, so be fun and descriptive!

Reflect: What do the different soils remind you of? Which is most like the soil you find in the garden?

SOIL POEM – 10 MINUTES

Students will make a poem (it doesn't have to rhyme) about one soil type.

1. Break students into 4 groups. Explain that they will me making a poem about one of the soil types they explored earlier.
2. Give each group a paper bag with the descriptive words in them, a piece of paper or construction paper, and a pencil. Have them use all of the words in the bag to compose a Soil Poem by playing with the order of the words and gluing it onto the sheet of paper (and repeating words on the slips of paper need to be repeated in the poem). It could even have a title if the students are so inspired. Encourage the use of other words too…there are no limits to creativity with poetry!

Reflect: Have one person from each group read their poem to the class. Post the poem and attach the proper classification (sand, compost, garden soil, or clay) to each one.

WRAP-UP

Reflect: Today you learned about the importance of soil and its ingredients.

BACKGROUND

Soil requires both water and oxygen to support strong plant growth. The ideal soil is a combination of sand and clay. Sand provides fast drainage and good aeration but fails in the water-holding department. Clay is tops in water-holding ability but dangerously low in supplying air to the soil. As water fills the spaces between soil particles, it drives out air. In soils with a high proportion of clay, water remains a long time in pore spaces, and plant roots are deprived of oxygen for many hours. This temporary lack of oxygen can be very damaging to some plants; it is easy to drown plants in a clay soil.

How can soils be different from each other? How can some of these differences affect how fast water drains from the soil? Bigger particles will allow faster drainage. Why is water drainage important to plants? If water drains too fast, the plants will not get enough; if it drains too slowly, they may drown. Let's make some predictions. Of the four soils we have, which do you think will drain the fastest? Which will drain the slowest? Which will drain all of the water? Which will hold some water and stay moist? Write predications on the board.

SAND is composed of fairly large particles with rough edges, has a gritty texture, and a lot of air spaces between the particles.

CLAY is made of very fine particles with smooth edges. It is sticky and slippery when wet and can become hard and packed when dry. It is often hard to work.

LOAM is a mixture of particles sizes and has a crumbly texture and moderate air spaces. Soil rich in organic material tends to act like a sponge and holds water.

SOIL POETRY

Soil Type: _____

LESSON TEN

HEALTHY SOIL

SUMMARY

Students will learn about the healthy soil that makes up the school garden.

MATERIALS:

Journal Sheets:
- Soil Has A Structure
- Dirt Made My Lunch?
- Dirt Made My Lunch song lyrics

Soil samples

Jars and lids

Plastic containers and lids

Spray bottle

Paper plate

Newspaper

Potting Soil

Seeds

Tarp

Flat

Watering can

Pencils

Grocery bag of foods, or labels of foods, that kids might use for breakfast, lunch, or dinner

Snack ingredients

GUIDING QUESTIONS:

1. What components make up healthy soil? (K-3)
2. Why is healthy soil important? (4-6)

GOALS:

1. Students will be able to name different elements that make up healthy soil.
2. Students will understand the connection between healthy soil and the food we eat.

OUTLINE:

- Welcome Circle and Attendance
- Starting with Soil
- What Makes Good Soil?
- Planting Seeds
- Dirt Made My Lunch?
- Snack: Critter Creations
- Filler, Song: Dirt, Made My Lunch
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Today we will learn about soil quality and what makes up good, healthy soil.

Today's Question: What does a good soil look like? What does a poor soil look like? What do these soils feel like? Or smell like? (This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

STARTING WITH SOIL – 15 MINUTES

Students will experiment with soil to find out EVERYTHING that is in their soil sample.

*Educator Note: Prior to this lesson, gather several soil samples from the garden.

1. Experiment 1: AIR
    a. Learners put a sample of soil in a container and fill it up with water.
    b. Ask them what they see on the surface (bubbles).
    c. Explain that there is air in the soil.

2. Experiment 2: WATER
    a. Explain that this experiment will take a little time.
    b. Learners put a little soil in a dish, cover it with a plate or lid and leave it in the sun or a warm place.
    c. Ask them to guess what will happen. We'll come back to this at the end of the lesson.

3. Experiment 3: SORTING COMPONENTS
    a. Divide the class into groups.
    b. Give each group a large sheet of newspaper/cloth, a small box, and a jar or can.
    c. Put a small spade full of soil on each sheet. Ask groups to see what they can find in their soil, and to separate elements on the four corners of the sheet like this:
        i. Anything that comes from plants (seed, bark, bulb, leaf, root, twig, flower, grass)
        ii. Anything coming from animals (e.g. dung, bone, bit of insect wing, dead beetle)
        iii. Anything live (keep it but don't hurt it) in a box or jar
        iv. Anything else (e.g. stones, household rubbish)

4. Feedback
    a. Groups say and show what they have found.

5. Experiment 2: WATER REVISIT
    a. Go back to the water experiment.
    b. Have a volunteer remove the plate/lid carefully, without turning it upside down, and look underneath.
    c. What can they see? (Drops of water) Where does the water come from? (Soil)

Reflect: What does good soil have? (Air, water, organic material, living things) Good soil is _____? (Damp, dark, crumbly, full of life)

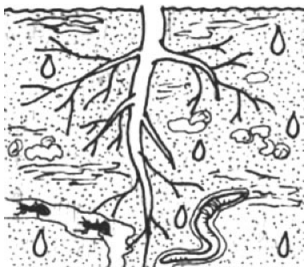
WHAT MAKES GOOD SOIL? – 10 MINUTES

Students will understand what makes good soil – components and structure.

*Educator Note: This worksheet could be done as a self-guided activity while the group is planting. Make sure to go over the answers together.

1. Review what students found in the soil. Ask why they found those things in soil. Ask if any of the things students found in the soil do anything to help make our soil healthy.
2. Ask what other things might we find in our soil that will make it healthy? Together, we are going to do a quick journal page to help us learn what parts or components of the soil do to make our garden healthy.
3. Pass out the Soil Has a Structure journal sheet.
4. Do the worksheet together while discussing with the students the following questions:
    a. What opens up the soil, makes space for air, water, roots? (worms, organic matter, roots)
    b. What keeps the soil surface soft? (organic matter, water, cultivation, nobody walking on it)
    c. What provides essential food/nutrients for plants? (organic matter, water)
    d. What holds the plants firm, so they don't wash away or fall over? (roots, soil in general)
    e. What allows animals and bacteria to live and breathe? (water, air, organic matter)
    f. What traps the water so it does not drain away too fast? (organic matter, clay)
    g. What helps the water to drain away? (organic matter, sand, worm holes)
    h. What holds the soil in place? (roots, organic matter, mulch, rocks)
    i. What dissolves the nutrients so roots can drink them? (water, worm urine)

Reflect: Now that we know what makes up healthy soil and some of the creatures that rely on it, why is healthy soil so important to us?



DIRT MADE MY LUNCH? – 10 MINUTES

Students will think about how their meals connect back to healthy soils.

1. Inform students that no matter what they have packed for lunch, ultimately, they are eating food from dirt.
2. Hand out the Dirt Made My Lunch journal sheet. Have a bag ready, filled with food items. Pull each item out, one at a time, and brainstorm and trace each food's origin back to the earth. Example: Mayonnaise came from eggs that came from chickens that ate grains grown in the dirt.
3. After going through the items in the bag, tell students to list a few items they had for lunch on their journal sheet, filling out the main ingredients and origins for each.
4. Once students have made a list of ingredients, have the students draw pictures of where their lunches came from (an animal farm, a garden, etc.).
5. If there is time, have students share some of their examples.

Reflect: What would we do without dirt? Are there any foods we could eat that don't rely on soil?

PLANTING SEEDS – 20 MINUTES

Students will continue to plant seeds for the school garden.

1. Have a volunteer fill one flat with soil. Tell students to run their hands gently over the soil surface so that it is flush with the top of the flat.
2. Water the flat so the soil is damp.
3. Demonstrate how to plant the seed. Explain that a rule of thumb for planting is that seeds should be planted to a depth that is roughly 2-3 times their size. The bigger the seed, the deeper it goes, but not too deep! Poke a shallow hole for each seed, plant seed, then cover gently with soil and pat down. (If the soil is not wet enough, water with a fine mist.)
4. Hand out packets to students and talk them through the seeding. Have each student sow one whole row with the same kind of seed. Take turns in the group.
5. Have students write the name of seed sown along with the date on a label and place at the end of each row in the flat.
6. Have students water the flats thoroughly and be sure that they are kept moist all the time.

7. Seed list: Basil, Leeks, Flowers (calendula, cosmos, larkspur, marigold, zinnia), Chard, Kale, Parsley
8. Create a Seed Caretaker list. Have 1-2 students sign up per day. They are responsible for coming in on that day to water the seeds. Show how to properly mist the seeds with a spray bottle. You will create another Seed Caretaker list next week.
9. Record planting in the garden journal.
10. Take group garden photo!

Reflect: Review what seeds need to grow: soil, water, sun, air, temperature, time, nutrients. When will we see our seeds come up? Was it fun starting our garden?

SNACK: CRITTER CREATURES – 5 MINUTES

Critters are an important part of healthy soil. Allow students to make their own insects with different healthy food items. Use ingredients such as: peanut butter, cream cheese, crackers, pretzels, celery, raisins, nuts, beans, etc.

FILLER SONG: DIRT MADE MY LUNCH – 5 MINUTES

Sing the song, "Dirt Made My Lunch", by the Banana Slug String Band. Visit this website to hear their song: http://www.youtube.com/watch?v=SCeyXW64cns.

WRAP-UP – 5 MINUTES

Reflect: We learned a lot today about what makes up healthy soil! Can you name something we learned?

Where does our food come from? It's important we take care of the environment and our soil if we want to eat!

BACKGROUND INFORMATION

SOIL HAS A STRUCTURE:

AIR
Is essential for roots, for animal life, for bacteria, and for keeping the soil open

ORGANIC MATTER
E.g. bits of plants and animals dead bacteria; opens up the soil, makes space for air, traps water, provides essential nutrients

ROOTS
“Cultivate” the soil, take up nutrients, hold the soil in place

ANIMAL LIFE
E.g. earthworms, beetles; opens up the soil for air and water, digests organic matter

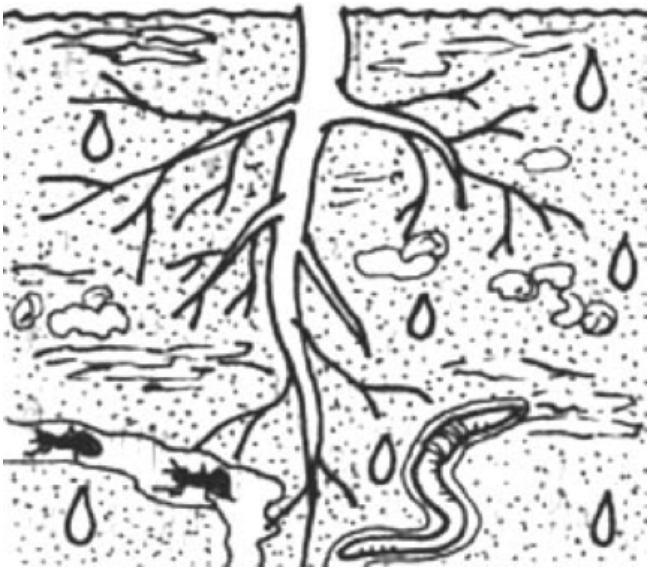
BACTERIA AND FUNGI
Break down organic matter, release nutrients

WATER
Essential for growth of plants, dissolving nutrients and bacterial activity. It needs to get into the soil, but also needs to run away so that the soil is not waterlogged.

CLAY SOIL
Helps to trap water, holds plants in place

SANDY SOIL
Helps water to drain away

SOIL HAS A STRUCTURE



Draw a line to connect the parts of soil to its job?

PART	JOB
Air	To keep soil in place
Organic Matter (compost)	To feed plants
Roots	To open up the soil
Animal Life	To keep water in
Bacteria Fungi	To let animals and bacteria live
Water	To give support
Clay Soil	To let water drain out
Sandy Soil	To keep the soil soft

DIRT MADE MY LUNCH?

Start by listing one item you ate at lunchtime in the blank space.
Then, see if you can trace each food to where it came from (all the way back to soil).
If you need more space, write steps underneath the given lines.
Ex: Chicken Sandwich > Chicken > Corn (Feed) > Soil

1. _____ > 2. _____ > 3. _____ > SOIL

1. _____ > 2. _____ > 3. _____ > SOIL

1. _____ > 2. _____ > 3. _____ > SOIL

Draw a picture of where one of your food items came from:

DIRT MADE MY LUNCH

BY THE BANANA SLUG STRING BAND

CHORUS:

Dirt made my lunch, Dirt made my lunch.
Thank you Dirt, thanks a bunch,
For my salad, my sandwich, my milk and my munch 'cause
Dirt, you made my lunch.

Dirt is a word that we often use,
When we're talkin' about that earth beneath our shoes.
It's a place where plants can sink their toes;
In a little while a garden grows.

CHORUS

A farmer's plow will tickle the ground,
You know the earth has laughed when wheat is found.
The grain is taken and flour is ground,
For making a sandwich to munch on down.

CHORUS

A stubby green beard grows upon the land,
Out of the soil the grass will stand.
But under hoof it must bow,
For making milk by way of a cow.

CHORUS

LESSON ELEVEN

WRIGGLY WORMS

SUMMARY

Students will learn about earthworms through a fun game and then explore the garden for earthworms to observe.

MATERIALS:

Hand lens or magnifying glasses, one for each student

Spray bottle

Earthworms, enough for each student (can be found in garden)

Markers

Pencils

Snack: lettuce leaves and sunflower seeds

GUIDING QUESTIONS:

1. Are all worms the same?
2. Why are worms important to the soil?

GOALS:

1. Students will learn the anatomy of the worm and how it helps them live in the soil.
2. Students will observe worms and how they interact with their environment.

OUTLINE:

- Welcome Circle
- Hookworm
- Earthworm Search
- Observing Earthworms
- Essential Earthworms
- Soil Snack
- Wrap-Up

WELCOME CIRCLE – 10 MINUTES

Greeting: What is your favorite garden creature?

Today's Plan: Today you will learn about earthworms. You'll get to hold them, inspect them, and learn about why they are important for the garden.

HOOKWORM – 10 MINUTES

Students will be introduced to the anatomy of the worm by playing a game as a group.

1. Tell the students that they will be meeting some earthworms later, but before they do, they need to know what an earthworm looks like and how it works. This game is played like hangman but for each letter they get wrong, a new worm body part is drawn.
2. On a board, draw a fishing hook and the outline of a worm.
3. Write the riddle: "What do earthworms give to the soil?" and 8 dashes to spell castings.
4. Ask students to raise hands if they want to guess a letter for the riddle. As the students guess the correct letters, fill them in the blanks.
5. If they guess a wrong letter draw a body part of a worm, explaining the purpose of each part. Keep a letter bank for incorrect letters. (Keep the descriptions of each body part at the level of the students. There is more information given than you need to share with students.)

a. Body segments: is divided up into about 150 ring-like segments.

b. Head: end tapers to a point and the tail end is capable of broadening. It is not necessarily true that if you cut a worm in half it will turn into two worms. It depends on the species and where it is cut. Depending on where you cut most worms, it may be able to regenerate one half of itself. For example, sometimes the worm holds on so tight and the robin pulls so hard that the worm comes apart! The robin keeps the front end and the hind end wriggles back into its burrow. If the bird pulled off the first 7-8 rings of the worm's body, new segments will grow back, or if the worm is pulled in half the head end will grow back.

c. Mouth: it has an overhanging lip like a flap that protects the mouth until its ready to eat. Then, the flap helps pull food into the mouth.

d. Setae: each segment on the worm has 2 pairs of special bristles called Setae (pronounced SEE-tee, singular form seta pronounced SEE-tah). They help the worm move through the soil. Imagine a robin trying to pull an earthworm out of its burrow; the worm will use the bristles to hold on tight to the walls of its tunnel in the soil.

(Later, when the students are observing the worms, they can wet their fingers and run them down both sides of the worm. They may feel the short stiff bristles. You can also pass out a dry paper plate and have each student be completely silent as they place their worms on the plates to wriggle around they listen to the sound that the bristles make, it is a faint scratching noise.)

e. Clitellum: Worms are hermaphroditic; they have both male parts and female parts, but still need another worm to reproduce. Two worms line up next to each other facing opposite directions where they have a swollen band, or clitellum, around them. They trade mucus and then wiggle on. The clitellum will then begin to swell. The worm will wiggle out of the clitellum and it will close up on each end, forming a cocoon. Inside of each cocoon are 2-20 baby worms! You can find the clitellum closer to the head than the tail.

f. Muscles: Although you cannot see the muscles they are the secret to how earthworms move. While the worm is wriggling and moving around notice how it moves. The worm has 2 layers of muscles; ring shaped ones that stretch around its body like many belts, and strong muscles that run from one of its ends to the other. The ones running around the body make it thinner and longer, and those running end to end make the worm shorter and thicker.

    i. How it moves in detail: using its ring-like muscles, it makes itself longer and thinner. Then it anchors the front of its body with its setae and then it pulls its rear end forward with the end-to-end muscles that make it shorter and thicker. Then it repeats this process over and over!

g. Eyes: Ask the students if they see any eyes on the earthworms. They do not have any. Instead they have light sensitive cells scattered in their outer skin. The cells do not allow worms to see images, or forms, but they do give their skin the capacity to detect light and changes in light intensity. So, although the earthworm cannot see the robin, he can still avoid the robin all together because he can feel the vibrations of the bird as it touches the surface of the ground. Demonstrate this to the students by stomping on the ground or pounding on the desk. If he feels it in time then he will retreat back into his burrow.

h. Hearts: Find a light colored worm. Wet its upper surface and use a magnifying glass to observe the surface that is near the head. Look close enough and you will be able to see the worms FIVE beating hearts through its skin. Show all students.

i. Brain: Earthworms have simple brains which only specialize in directing its body movement in response to light.

j. Lungs: Earthworms have no lungs. As stated before, they breathe through their moist skin, and their blood absorbs oxygen. Their skin must be moist for this to happen and if they dry out they die.

k. Gizzard: When a worm eats soil or organic matter what happens to it? Does it have a stomach, esophagus, intestines, etc? No, the earthworms' digestive system is very different from ours; it is more like that of a chicken. A worm needs to eat sand or small pebbles to crush its food up. Demonstrate by rubbing sand and leaves together.

l. Lifespan: Most worms live about 1 year

Reflect: Earthworms seem like simple creatures, however they really are exceptionally well organized throughout their bodies, more so than one would expect from looking at its simple body. How are worms similar to us and how are they different from us?

SEARCHING THE SOIL FOR EARTHWORMS – 10 MINUTES

Let's find some worms!

1. Take students outside near the garden and explain to them that they will be searching for worms. Review the practices of respectful behavior that are to be exercised in the garden and in relationship with garden animals.
2. Identify areas with different types of soil, terrain, rocks etc.
3. Split the students into groups and have each group look in different places in search of earthworms. Have containers with soil for them to carefully place their earth worms in.
4. Explain that they might have to dig kind of deep; earthworms are nocturnal feeders and typically spend their days with their head ends just below the soil's surface often with a pebble or piece of leaf drawn over the opening of the burrow for protection. They also may be under larger rocks. However, if it is really cold the earthworms will retreat below the frost line where they lie coiled up in an enlarged soil chamber.
5. Compare the different amount of worms found in different locations.
6. Take the worms inside.

Reflect: Where did we find the most worms? What was the soil like there? Where do worms like to live the best? (Healthy good soil with a lot of organic matter for earthworms to eat, they live in deep, dark, long, and narrow tunnels or burrows under the ground.)

OBSERVING EARTHWORMS – 20 MINUTES

Students will get to take a very close look at earthworms and learn about their anatomy.

1. Have each student take a seat at a table.
2. Pass out moistened paper towels for the desk surface.
3. Pass out a worm to each student to place on the paper towel so they do not dry out. If a worm's skin dries out it will die because the earthworms breathe through their moist skin by their blood absorbing oxygen.
4. Pass out the journal sheet and have the students draw their worms.
5. Now let's take a closer look and add more details! Pass out magnifying glasses.
6. Have each student look through the magnifying glass and see how many parts of their worms they can identify.
7. Have students add details to their drawings as they go.
8. When time is up, have students place their worms carefully back into the containers and pass them to you. Have an adult put them back into the garden after class.

SNACK WHILE STUDYING EARTHWORM DIGESTION – 15 MINUTES

Students eat a wriggly worm snack while they discuss how an earthworm's digestion is different from their own.

1. Have all students wash their hands well.
2. Ask the students, "What does a worm eat and how does it eat it?"
3. Tell them that at night earthworms come part way out of the ground but leave their tail end anchored with their setae in their burrow to ensure a hasty retreat if a predator comes by. In the circular area within their reach, they feed on grass cuttings, bits of leaves, and scraps of organic matter of almost any kind.
4. Pass out the snack of lettuce leaves and seeds (something worms may eat).
5. Ask students to recall whether or not the worm had teeth? No, so how does he digest food?
6. Describe the following process to them as they all munch on their snacks.
7. You can challenge the students to pretend that they are worms and have them act out eating like one! (there are some parts they should not try to do–they should always chew their food completely before swallowing)
8. Have the students follow soil/food through an earthworm's body:
    a. First, the earthworm pushes his pharynx, or throat, out of his mouth to grab leaves and to pull them back into his mouth. And then he gets them nice and wet with his saliva. (Put food in mouth with your hand and get it wet with your saliva.)
    b. Once the food is good and wet he pushes it down his esophagus and into his crop. (Keep the food in your mouth for this step.)
    c. His crop is a storage compartment for his food and other things he swallows. From the crop the food goes to his gizzard.
    d. His gizzard is where the work happens. He uses any stones that he has swallowed and the strong muscles of his gizzard to grind up the leaves. These muscles work in place of his teeth. (Use your "stones," or teeth, to grind up the food.)
    e. Once all of the leaves are ground up they move to his intestines where the digestive juices break them down even more. (Swallow the food once it's chewed so that it goes into your stomach and intestines where the digestive juices will break it down even more.)
    f. Now that the leaf is all digested the nutrients will pass into his bloodstream and the waste will pass out of him as castings that contain all of the extra nutrients that were not absorbed by his body.

Reflect: How is an earthworm's digestive system similar to yours and how is it different? Can you think of any other animals that have crops and gizzards?

WRAP-UP – 10 MINUTES

Reflect: Some amazing facts about earthworms were learned today. Earthworms are very important for all soil and they are very beneficial for our school garden!

BACKGROUND INFORMATION

DETAILED LIST OF WHAT GOOD EARTHWORMS DO:

Earthworms dramatically affect soil structure, water movement, nutrient cycling, and plant growth. They are not essential to have in the soil, but their presence can be an indicator of good soil quality. Earthworms perform several beneficial functions:

DECOMPOSITION AND NUTRIENT RELEASE. Many organisms are responsible for assisting in the decaying of organic matter that eventually reaches the soil. Soil microorganisms are the primary agents of decomposition, breaking down plant and animal residues into useable nutrients for plants and other soil organisms. Not all plant material is subjected to immediate decomposition by soil microorganisms. Some plant materials are broken up and made into smaller pieces by other soil animals. Earthworms break up larger plant organic matter by their feeding activities.

MIXING AND CASTINGS. Earthworms feed on plant litter as well as a wide range of decaying organic substances. Earthworms remove plant litter, dung or manure, and other organic materials from the surface of the soil and within the soil. Charles Darwin calculated that earthworms could move large amounts of soil from the lower layers of the earth to the surface and also carry organic matter down into the deeper soil layers. A large proportion of soil passes through the guts of earthworms and they can turn over the top six inches (15 cm) of soil in ten to twenty years. As they consume organic matter and mineral particles, earthworms excrete wastes in the form of casts. Earthworm casts are excreted masses of mineral soil often mixed with smaller bits of digested plant residues. Earthworms that mostly live in horizontal burrows select food from in the soil, deposit casts within their burrows or in other spaces within the soil. Earthworms that make mostly vertical burrows that open to the soil surface often feed on organic materials that are on or just under the soil surface. These earthworms mostly deposit castings on the soil surface. No doubt you have seen piles of castings on your lawn or in your garden in the morning especially if there has been a rain. The earthworm activities of eating, burrowing, mixing, and casting act to form soil aggregates, aerate the soil, and improve soil water infiltration and holding capacity that improve soil habitat structure.

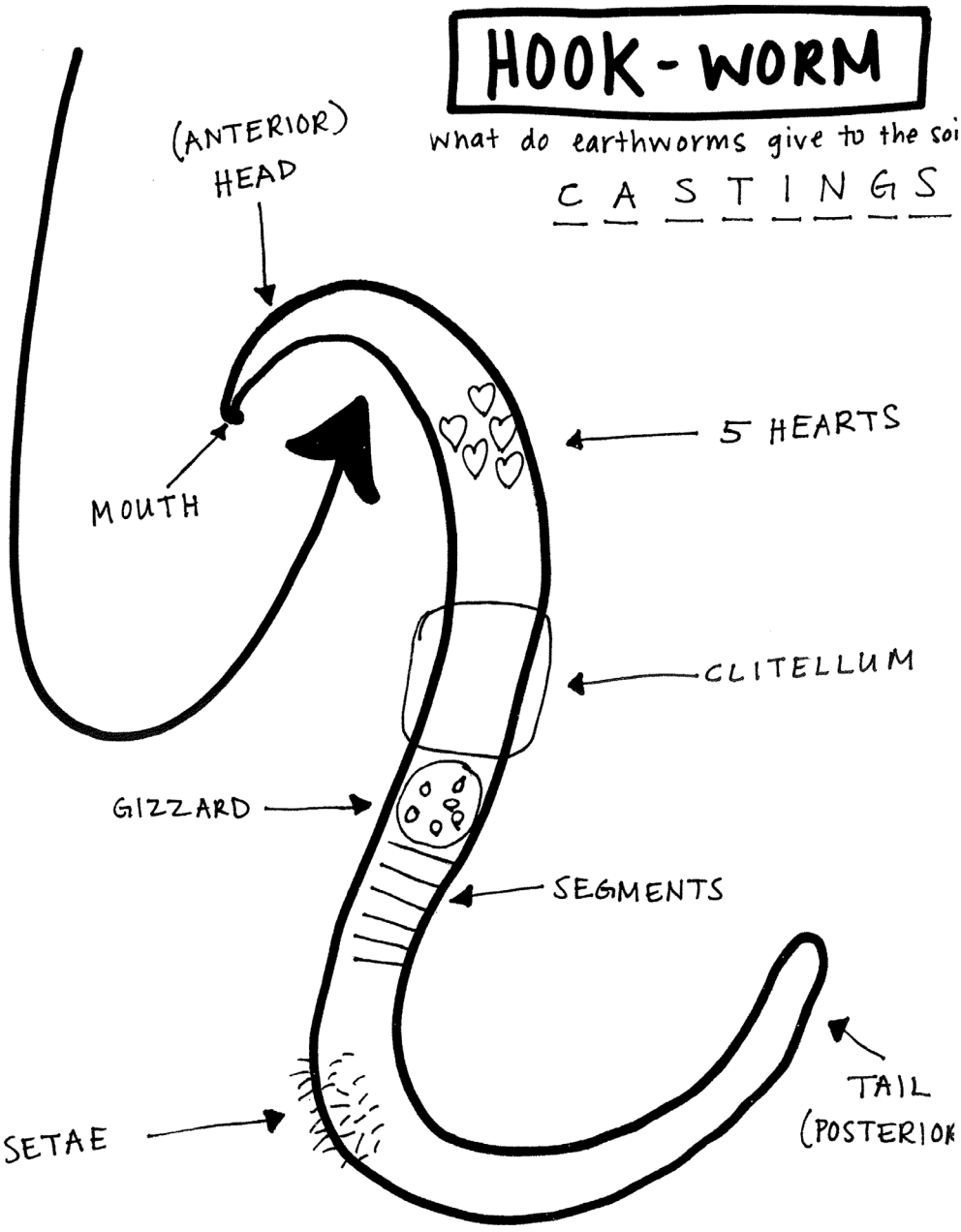
AGGREGATES. Soil aggregates are mineral granules that are joined together in such a way that they stay together in what looks like a crumb after wetting, erosion or compaction, and remain loose in the soil when the soil is either wet or dry. A soil that is rich in aggregates is well aerated and drained. Scientists have agreed that earthworm casts contain more stable aggregates than other soil. However, earthworms are not essential to the process of forming soil aggregates because the activity of other soil organisms including bacteria and fungi can also stabilize soil aggregates.

INCREASE AIR AND WATER INFILTRATION. Earthworms improve the amount of air that is contained in the soil (aeration) by their burrowing activity and at the same time they improve soil porosity by improving the overall structure of the soil as a habitat for themselves and other soil organisms. This means that soils with earthworms not only contain more air but also fill and drain water faster. Earthworms enhance porosity in the soil by creating tiny holes as they move through it. This allows water to soak into the soil more easily. Some species make permanent burrows deep into the soil. These burrows can persist long after the earthworm has died, and can be major channels for soil drainage, particularly under heavy rainfall. At the same time, the burrows limit the loss of soil on the surface of the land that might otherwise be eroded by water collecting there.

PROVIDE CHANNELS FOR ROOT GROWTH. The channels made by deep-burrowing earthworms are lined with readily available nutrients. This makes it easier for roots to penetrate deep into the soil and for food to be available for plants to grow.

MY EARTHWORM

Name: _____


HOOK-WORM
what do earthworms give to the soil
C A S T I N G S
(ANTERIOR) HEAD
5 HEARTS
MOUTH
CLITELLUM
GIZZARD
SEGMENTS
TAIL (POSTERIOR)
SETAE

LESSON TWELVE

SPRING SPROUT SALAD

SUMMARY

Students identify signs of spring and early spring foods.

MATERIALS:

Salad ingredients (lettuce, carrots, sprouts, wild leeks, etc)

Bowl

Cutting board

Jars to mix dressing ingredients

Measuring spoons and cups

Mixing spoon

Plates, napkins, and forks

Salad journal sheet

Dressing recipes

Signs of Spring BINGO journal sheet

GUIDING QUESTION:

1. What are some of the first signs of spring?

GOAL:

1. Students will be able to identify some common signs of spring and spring foods.

OUTLINE:

- Welcome Circle
- Signs of Spring BINGO
- What's Sprouting in Spring?
- Spring Salad
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Have you noticed the weather lately? How is it different than in the winter?

Today's Plan: We are going to celebrate spring foods by making a salad.

SIGNS OF SPRING BINGO – 10 MINUTES

Students participate in an outdoor scavenger hunt that involves acute observation of their environment and identification of signs of spring.

1. Head outside with students. Tell them that they will be going on a scavenger hunt outside to look for signs of spring.
2. Pass out pencils and Sign of Spring BINGO journal sheet. Look at some of the items on the list. Do they think they can find all of these? Instead of trying to get a BINGO, encourage all students to get all of the boxes.
3. Pair students together (or let them go on their own) and point out the boundaries for the scavenger hunt. Review tips for collecting objects while being respectful of the environment.
4. When most students have filled in all of their boxes on the list, gather together. Go around and have everyone share their favorite sign of spring that they found.
5. End by sharing a favorite sign of spring…dandelion leaves! Explain that every part of the dandelion is edible. If possible, have everyone pick 2-3 leaves and flowers to take inside to make salad…avoid ones that may be close to a road or sidewalk or may have been sprayed or otherwise contaminated. You can also include clover in the wild harvest.

Reflect: Are there other things that we could have found; baby animals being born, raining a lot, planting garden/ farm activities, etc...

SPRING SPROUT SALAD – 30 MINUTES

So now that we know what some of the spring loving vegetables are, let's use some of them to create a Spring Salad!

1. Divide students into 3 groups and set up 3 stations as follows (it may be helpful to split into groups before mentioning the tasks to avoid arguments):
   a. Salad Prep: greens washing, drying, tearing/cutting, carrot grating, etc.
   b. Dressing (A) Prep
   c. Dressing (B) Prep
2. Have the dressing groups read over their recipes while you get the washers set up and going (it may be helpful to put one of the more responsible students in this group so you can focus on the dressing-prep).
3. For the dressing, ask the students why there are directions and why can't we just add the ingredients as they are listed.
4. Have one volunteer from each dressing group come to you to ask for and collect the ingredients (one at a time). Remind them to take note of the quantity for when they approach you to retrieve it.
5. Once dressings are finished, and the salad is ready, have each group clean up their area and sit down around the table.
6. Have each group tell everyone a little bit about what is in the part that they made.
7. Pass around the salad bowl and let everyone take as much as they would like to try into a plate or napkin. Review "Don't Yuck My Yum" and have everyone dip a piece of their lettuce into one of the dressings to try it.
8. The recipes can go into their journals, go home with them that day, or both.

Reflect: What do we think of spring vegetables? Now that you know what to look for in spring you can dress these vegetables up in all sorts of delicious healthy ways!

WRAP-UP – 5 MINUTES

Reflect: Spring is a time of birth and growth, change of weather, and awakening!

SIGNS OF SPRING BINGO

As you explore the garden, look for the things below. Fill in the box with a drawing of what you've found.
Call out 'BINGO' when you've found and marked 5 items in a row.

Water (not snow)	Sprouting Plants	An insect	Bird nest	A plant that smells
A shaded place	A circle	Buds on trees	A sprouting seed	A Robin
Blowing winds	Insect home	FREE SPACE	A plant that is green	A bright color
A worm	Something mushy	Something brown	Dead leaves	Signs of animals
Something yellow	2 kinds of flowers	A triangle	Something that has been nibbled	Something soft

SPRING SALAD DRESSINGS

MAPLE BALSAMIC DRESSING

INGREDIENTS

2 tablespoons balsamic vinegar

2 tablespoons maple syrup

1 clove garlic, minced

1/2 cup olive oil

salt and pepper to taste

DIRECTIONS

1. Whisk all ingredients together in a bowl.
2. Pour dressing over fresh green salad!

RASPBERRY VINAIGRETTE DRESSING

INGREDIENTS

1/2 cup white wine vinegar

1/4 cup olive oil

1/4 cup fresh or frozen raspberries

2 teaspoons honey

DIRECTIONS

1. Put all ingredients in a blender or food processor and blend until smooth. Or whisk until smooth.
2. Pour dressing over fresh green salad!

LESSON THIRTEEN

STARTING A GARDEN

SUMMARY

Students will prepare the garden and plant early spring seeds.

MATERIALS:

White board

Dry Erase Markers

Garden tools (kid and adult)

Seeds

Garden Tub: tools, permanent markers, paint sticks, string on stakes (3-4), rulers

Watering Can

Tool cleaner

Water cooler and cups

GUIDING QUESTIONS:

1. How do we plan and plant our garden?

GOALS:

1. Students will know the difference between a path and a bed.
2. Students will demonstrate appropriate garden behavior as outlined by the garden rules.

OUTLINE:

- Welcome Circle and Attendance
- Garden Rules
- Pathways
- Making Garden Beds
- Plant
- Wrap-Up

WELCOME CIRCLE AND ATTENDANCE – 5 MINUTES

Greeting: We are planting the garden!

Today's Question: What is the first thing we need to do to start our garden? (This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

GARDEN RULES – 5 MINUTES

We are going to plant our garden today. The garden is a bit like a classroom: we are working together, doing activities, learning. Just like a classroom, we need to create rules so that we can be safe and respectful and have fun.

Ask students to suggestion rules for garden behavior. Record rules on a white board you can have near the garden board. The list might include the following:

- Always walk when in the garden.
- Stay on the paths.
- Always ask before using any tool or harvesting any crop.
- Keep tools below shoulder level.
- Do not use tools in crowded areas.
- Respect each other and the plants and animals in the garden.

Reflect: Review list. Can we all agree to this?

PATHWAYS – 15-20 MINUTES

Students use the garden map to prepare the garden paths. Have all kids' tools ready near the garden before the students arrive.

1. If you are not by the garden, head out to the tilled and composted garden.
2. Show the students the garden map (it can be on paper or a simple version can be copied onto a white board for everyone to see).

3. Explain that before planting can begin the garden beds need to be prepared. Ask students what they think the ideal garden path looks like. They should be flat, smooth, and 1.5-2 feet wide (two rakes wide is a good visual).
4. To start making the paths, ask students to form a line behind you at the edge of the garden. Begin stomping out the path with all the students following along behind. Go over all of the paths several times or until you can see them clearly before you let the students stomp on their own.
5. Pull out a few students to use the rakes and hoes to rake the paths where they stomped. They can rake the extra dirt into the beds.

MAKING GARDEN BEDS – 10 MINUTES

A few students at a time will prepare a few garden beds to plant in.

1. Now that everyone knows where to walk, the students can begin making some garden beds. Ask students what the beds should look like. It should be smooth, level, light and fluffy soil, no rocks, etc.
2. Demonstrate how to use the tools properly
    a. Keep the tool below your waist
    b. Move to a space without others around you
    c. Rake the soil back and forth – keeping the soil flat and level (no hills or trenches)
    d. Pull out any rocks or weeds and place them at the edge of the garden (rocks typically go under the garden sign)
    e. Move around the garden leveling the soil as you go
    f. When finished using a tool, always place it working edge down on the ground, or lean it against a shed or fence.
2. Have students work in different areas to prepare the garden beds.

PLANT – 10 MINUTES

Students learn about plant spacing and plant early spring vegetables.

1. Ask the students to gather together right next to each other.
2. Everyone should curl up tightly in a ball and then ask them to stretch out slowly to their full height.
3. How do you feel? Do they think they could get enough food and water? Ask them to turn to the sun. Do you think they would each get enough sunlight?
4. How can they change their spacing so that everyone is happy? What would that look like?
5. When we are planting we need to remember that each plant needs a certain amount of space so that they can get all the things they need to be happy. Refer students to the plant spacing guide in their journal.

Demonstrate to the group how we are going to seed our garden using string lines and garden rulers:

1. Set up the string line
2. Make a trough with the hoe under the string line
3. Review the seed spacing guide and/or seed packet for particular planting instructions
4. Have students line up at the end of the string line
5. Decide what seeds you want to plant. Some crops will germinate quickly and may be edible by the end of the school year, some can be used in the summer program, and others won't be ready until the fall.
6. Put the amount of seeds you want each student to plant in their hands instead of giving them the seed packet. Remind them how far to plant their seeds by showing the spacing on the garden ruler.
    a. Radishes
    b. Mesculin Mix/Arugula
    c. Spinach
    d. Kale
    e. Swiss Chard
    f. Carrots
    g. Beets
7. The first student lays her seeds in the trough, covers the seeds, and pats the soil down firmly. The next student plants and covers their seeds and students continue taking turns until the row is completed.
8. Label the row with a paint stick marker

As some students are planting other students should work on various tasks including:

1. Raking the garden
2. Working on the pathways
3. Setting up the string line
4. Making signs for the planted seeds
5. Recording the activities in the garden journal

WRAP-UP

Reflect: A lot was accomplished today! What are some things we did? What do you think the garden will look like next week? What do we still need to do?

PLANT SPACING GUIDE

	D=Direct Seed T=Transplant	Spacing	Depth to Plant
VEGETABLES			
Arugula	D, T	1", thin to 6"	1/4"
Beans, Bush	D	4", 8" btw beds	1"
Beans, Pole	D	4 seeds/hill, 16" btw hills	1"
Beets	D	2"greens; 3"summer; 4"storage	1/2"
Broccoli	D, T	15-18" staggered	1/4"
Brussels Sprouts	D, T	16-18", staggered	1/4"
Cabbage	D, T	12-18"	1/4"
Carrots	D	2" rows 6-8" apart	1/4-1/2"
Cauliflower	D, T	15", staggered	1/4-1/2"
Celeriac	T	8", 3 rows/bed	Just cover
Chard	D, T	4-5", staggered	1/2"
Corn	D,T	12-15"	1"
Cucumber	D	18",trellised; 36",on ground	1/2-1"
Kale	D, T	16"	1/2"
Leeks	D	6" in rows	1/4"
Lettuce	D, T	1/2"-cutting; 6-8"-heads	1/4"
Onion	T	3-4"	1/2-1"
Peas	D	1" supported	1"
Peppers	T	12"	1/4"
Potatoes	D	12"	3-4"
Pumpkins	D, T	12-18"	1/2-1"
Radish	D	1", thin to 4-6"	1/2"
Rutabaga	D	8"	1/2"
Spinach	D	12"	1/2"
Summer Squash	D	12-18"	1/2-1"
Wheat	D	Scatter	Just cover
Winter Squash	D, T	24-36"	1"
Tomatillos	T	2 1/2"	1/4"
Tomatoes	T	15" supported	1/2"
Watermelon	D, T	16"	1/2"

	D=Direct Seed T=Transplant	Spacing	Depth to Plant
HERBS			
Basil	D, T	4-8”	Just cover
Cilantro	D, T	6-8”	1/4-1/2”
Dill	D, T	6-8”	Just cover
Mint	T	6-8”	
Oregano	T	6-8”	
Parsley	D, T	6”	1/4”
FLOWERS			
Calendula	D, T	8”	1/2”
Cosmos	D, T	6-10”	1/4”
Nasturtium	D, T	10-16”	1”
Marigold	D, T	12-16”	1/2”
Larkspur	D,T	6-8”	1/4”
Sunflower	D, T	12-18”	1”
Zinnia	D, T	8”	1/2”

LESSON FOURTEEN

PLANTING 101

SUMMARY

Students continue to make garden beds and plant transplants in the garden.

MATERIALS:

Teepee poles

Twine

Scissors

White board

Dry Erase Markers

Garden tools (kid and adult)

Seeds

Transplants

Garden Tub: tools, permanent markers, paint sticks, string lines, rulers

Watering Can

Tool cleaner

Water cooler and cups

GUIDING QUESTION:

1. What do seedlings need to grow in a garden?

GOAL:

1. Students will demonstrate how to properly plant transplants and seedlings in the garden.

OUTLINE:

- Welcome Circle and Attendance
- Garden Rules
- Planting in the Garden
- Building Garden Structures
- Wrap-Up

WELCOME CIRCLE AND ATTENDANCE – 5 MINUTES

Greeting: We are planting the garden and continuing to make beds!

Today's Question: Today we are going to transplant seedlings into the garden. What can we do to help them grow into plants?

TRANSPLANTING IN THE GARDEN

Students will be introduced to what a transplant is and how they need to be treated while being planted.

1. Have students sit in a circle. Show students a tray of seedlings you will be planting that day.
2. Ask students:
    a. What are these? (seedlings)
    b. Does anyone know what kind of seedlings these are? How do you know? (look at the label, it looks familiar, etc.)
    c. What do you think we are going to do with these today? (plant them in the garden)
    d. Does anyone know how to take these out of the tray? (If the seedling is large, you can pinch the bottom of the stem and pull gently. You can also put your hands on the bottom of the seed tray and pinch the cell to push the dirt up and grab the plant.)
    e. Why is it so important to be careful with the seedling? (They are very delicate and can break easily. They are baby plants and any damage to the roots, stems, or leaves could kill the plant. Because of that, tell students you will be getting any seedling out of the tray and handing it to the person who will plant it, or you will be placing it on the ground where it needs to be planted.)
    f. You will be planting the seedling in the ground, or transplanting it from the seed tray to the garden bed. Show me how you would dig the hole. How large should it be? Show me how you would hold the seedling. How would you place it in the ground? Show me how you would finish planting it by filling in the empty spaces with soil.
    g. It looks like everyone is ready to go into the garden and plant!

GARDEN RULES – 5 MINUTES

Review garden rules discussed in the previous week.

- Always walk when in the garden.
- Stay on the paths.
- Always ask before using any tool or harvesting any crop.
- Keep tools below shoulder level.
- Do not use tools in crowded areas.
- Respect each other and the plants and animals in the garden.

PLANT – 15 MINUTES

Students learn about plant spacing and plant early spring vegetables.

1. Ask the students to gather together right next to each other.
2. Everyone should curl up tightly in a ball and then ask them to stretch out slowly to their full height.
3. How do you feel? Do they think they could get enough food and water? Ask them to turn to the sun. Do you think they would each get enough sunlight?
4. How can they change their spacing so that everyone is happy? What would that look like?
5. When we are planting we need to remember that each plant needs a certain amount of space so that they can get all the things they need to be happy. Refer students to the plant spacing guide in their journal.

Demonstrate to the group how we are going to seed our garden using string lines and garden rulers:

1. Set up the string line
2. Make a trough with the hoe under the string line
3. Review the seed spacing guide and/or seed packet for particular planting instructions
4. Have students line up at the end of the string line
5. Decide what seeds and transplants you want to plant.
6. Put the amount of seeds you want each student to plant in their hands instead of giving them the seed packet. Remind them how far to plant their seeds by showing the spacing on the garden ruler.

   a. Seed in the garden

      i. Beans–bush and pole
      ii. Cucumber
      iii. Flowers
      iv. Herbs
      v. Lettuce
      vi. Potatoes

   b. Transplant into the garden

      i. Calendulas
      ii. Cosmos
      iii. Leeks
      iv. Marigolds
      v. Onion sets or seedlings
      vi. Zinnias

7. The first student lays her seeds in the trough, covers the seeds, and pats the soil down firmly. The next student plants and covers their seeds and students continue taking turns like this until the row is completed.
8. Label the row with a paint stick marker.

As some students are planting other students should work on various tasks including:

- Raking the garden
- Working on the pathways
- Setting up the string line
- Making signs for the planted seeds
- Recording the activities in the garden journal

BUILDING GARDEN STRUCTURES – 30-45 MINUTES

Students build the bean teepee, trellises, and any other garden structure.

1. Ask students to imagine what some of the plants will look like when they grow bigger. Will supporting any of them help them to grow healthier, or will it help to produce better fruits or vegetables? (Tomatoes, peppers, beans, etc.)
2. Show the students the tools and materials that are available to use for support. Ask them how they think the materials should be used.
3. Divide the students up into groups and build the structures.

Reflect: Would the plants still grow if they were not supported? Why are they getting supported?

WRAP-UP

Reflect: A lot was accomplished today! It will be fun to watch the seeds and seedlings grow!

LESSON FIFTEEN

GARDEN ECOSYSTEM

SUMMARY

Students will learn about ecosystems, what is needed for a healthy ecosystem, and how the garden can be seen as an ecosystem.

MATERIALS:

Journal Sheets:
- My Garden Ecosystem
- Ecosystem Inventory

Our Garden As An Ecosystem labels

Ecosystem Journey garden labels (glue label to a paint stick)

Pencils

Blank paper

Crayons

Colored pencils

Clipboards

White board

Dry erase markers and eraser

Potting Soil

Seeds

Tarp

Flat

Watering can

GUIDING QUESTIONS:

1. What is an ecosystem? (K-3)
2. What makes a healthy ecosystem different from an unhealthy one? (4-6)

GOALS:

1. Students will be able to explain how the school garden is an ecosystem.
2. Students will identify parts of a healthy ecosystem.

OUTLINE:

- Welcome Circle and Attendance
- What is an Ecosystem?
- Our Garden As An Ecosystem
- Ecosystem Journey: An In-Depth Look At The Garden
- Planting Seeds
- Filler, Journal: Ecosystem Inventory
- Filler, Game: Producer and Consumer Relay
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Today we will take a look and explore in depth the ecosystems that surround our garden!

Today's Question: Who lives in an ecosystem? Do we live in one? What other things might live in our ecosystem? (This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

WHAT IS AN ECOSYSTEM? – 15 MINUTES

Students will discuss what an ecosystem is.

1. Ask students if they have heard of the term, 'ecosystem'. The plants and animals that are found in a particular location are referred to as an ecosystem. These plants and animals depend on each other to survive. Ask: What are some things you think living things need to survive?
2. What are some examples of ecosystems you might be able to think of? A pond, the ocean, and the Sahara, are just a few examples of ecosystems.
3. Together, let's brainstorm a few ecosystems that might exist in Vermont. What kinds are there?
    a. Meadow/field
    b. Pond/stream
    c. Mountain tops
    d. Lake
    e. Beach
    f. Woodland
4. Let's think together about one type of ecosystem. How about a lake? What types of animals and plants might be around a lake in Vermont?
    a. Turtles
    b. Fish
        i. Sturgeon
        ii. Darters
        iii. Lamprey
    c. Birds
        i. Eagles
        ii. Sparrows
        iii. Wrens
        iv. Seagulls
        v. Owls
        vi. Falcons
    d. Snakes
    e. Insects
    f. Invertebrates
        i. Snails
        ii. Mussels

g. Mammals
   i. Moose
   ii. Bats

h. Plants
   i. Ferns
   ii. Reeds

5. Each ecosystem is different. Again, the organisms found in an ecosystem depend on each other for survival.
6. What makes an ecosystem healthy? Checks and balances. Let's look back at our lake ecosystem. Would the lake ecosystem be considered healthy if the plants died? Why or why not? What would happen to the animals?
7. What about if the fish population increased, or grew, drastically? Would the lake be healthy then? What would happen to the plants, to the birds? Who else might be affected?
8. An ecosystem is healthy when everything is in balance, when there are enough producers (i.e. plants) for the consumers (i.e. moose) and enough consumers for possible secondary consumers (i.e. wolves).

Reflect: Think of an ecosystem near your home. What types of animals might live there? What plants? What do these things need to live?

OUR GARDEN AS AN ECOSYSTEM – 10 MINUTES

Now that students have a reference point for ecosystems, they will learn about the garden as its own ecosystem.

1. Let's learn about an ecosystem that is really close to us: the garden! What plants might we find in our garden? What animals are part of our ecosystem?
2. Assign each student the role of a plant or animal that is in the garden.
   a. Praying mantis
   b. Ladybugs
   c. Lettuce
   d. Flowers
   e. Bees
   f. Robin
   g. Grass
   h. Spiders
   i. Deer
   j. Corn

3. Ask one plant or animal to sit down or move out of the circle. For example, “Would the flowers please sit down?” The child/children would represent all the dying flowers in our garden.

4. Ask students if any other species depended on the flowers (or whatever species you asked to sit down). Give them hints if they are unsure (e.g. bees would need flowers, butterflies). If any species are named, they need to leave the group as well. Continue until there are no (or very few) students left standing.

5. What happens to the plants and animals in the area when one species dies out? All organisms in an ecosystem really depend on each other.

6. Travel out to the garden as a group.

7. Have students sit around the garden and draw the garden ecosystem as a whole. They should draw what they see in the garden (i.e. weeds, soil, bugs, animals, seedlings, etc.).

Reflect: What do you see in our garden? Why are these living organisms important?

ECOSYSTEM JOURNEY: AN IN-DEPTH LOOK AT THE GARDEN – 20 MINUTES

Students will use their senses and imaginations to take a comprehensive look at the garden ecosystem.

*Educator Note: Before this lesson, place the labels around the garden.

1. Divide Sprouts into 4 groups.

2. Each group will rotate through the 4 stations in the garden: Fly, Land, Creep, Burrow. Allow 4-5 minutes per station.

3. At these stations students can discuss, draw, or act out what they think is happening:

   a. Flying: The Big Picture
      i. Imagine you are flying slowly over the site like birds. What terrain do they see? What colors? What shapes?
   b. Landing: One Plant
      i. Imagine you see a particular plant (weed, tomato, grass, etc.) and decide to land on or near it. What is it? What does it live on? What does it produce? What lives on it? Does it give shelter?
   c. Creeping: Ground Level
      i. “Shrink” to beetle size. What plants are around you? What is going on? Who lives here? What passes by? What food is there? What eats it?
   d. Burrowing: Underground
      i. Imagine you are burrowing into the soil like worms. How does it feel? (Soft? Dry?) Who lives here? What happening underground? What eats what?

Reflect: How many living organisms could you think of that live in our garden ecosystem?

PLANTING SEEDS – 20 MINUTES

Students will continue to plant seeds for the school garden.

*Educator Note: Take all planted seeds home. These seedlings will need to be placed outdoors to harden off.

1. Have a volunteer fill one flat with soil. Tell students to run their hands gently over the soil surface so that it is flush with the top of the flat.
2. Water the flat so the soil is damp.
3. Demonstrate how to plant the seed. Explain that a rule of thumb for planting is that seeds should be planted to a depth that is roughly 2-3 times their size. The bigger the seed, the deeper it goes, but not too deep! Poke a shallow hole for each seed, plant seed, then cover gently with soil and pat down. (If the soil is not wet enough, water with a fine mist.)
4. Hand out packets to students and talk them through the seeding. Have each student sow one whole row with the same kind of seed. Take turns in the group.
5. Have students write the name of seed sown along with the date on a label and place at the end of each row in the flat.
6. Have students water the flats thoroughly and be sure that they are kept moist all the time.
7. Seed list: a. Pumpkins; b. Winter Squash; c. Gourds
8. Create a Seed Caretaker list. Have 1-2 students sign up per day. They are responsible for coming in on that day to water the seeds. Show how to properly mist the seeds with a spray bottle.

9. Record planting in the garden journal.
10. Take group garden photo!

Reflect: Review what seeds need to grow: soil, water, sun, air, temperature, time, nutrients. When will we see our seeds come up? Was it fun starting our garden?

FILLER JOURNAL: ECOSYSTEM INVENTORY – 5 MINUTES

Students can fill out the worksheet to determine if the garden has a healthy ecosystem.

*Educator Note: This can be done while students take turns planting seeds.

FILLER GAME: PRODUCER AND CONSUMER RELAY – 10 MINUTES

Students will take part in a food chain related game. Find out what happens when the ecosystem is in balance and when it goes out of control!

*Educator Note: See following page for diagram depicting how the game should be organized and run.

WRAP-UP – 5 MINUTES

Reflect: Do we live in an ecosystem? What things can we find in an ecosystem? Why are ecosystems important?

PRODUCER AND CONSUMER RELAY

1. **The Producer** takes from the soil (poop from Consumers and decomposing Consumers) to put in their pile.

2. **The Primary Consumer** takes energy (foods) from the producers to put in their pile.

3. **The Secondary Consumer** takes energy (foods) from the primary consumer to put in their pile.

Producer:
grass, weeds, small plants

Primary Consumer:
bunnies

Seconday Consumer:
fox, wolves, etc.

SCENARIOS

1. Drought
a. less plants, bunnies move slowly, fox doe (don't run relay)

2. Hunting Season (bunny)
a. bunnies can only run when teacher isn't looking (not often)
b. weed pile gets very big, while foxes get hungry (run slowly)

3. New Fence (stops foxes)
a. fox has no access to bunnies
b. bunnies get out of control
c. less plants

4. "Perfect" Harmony
a. items flow well from one pile to the next!

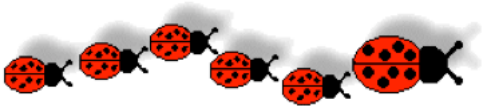
BACKGROUND INFORMATION

POND ECOSYSTEM

Bees

Flowers

Praying Mantis



Ladybugs

Robin

Lettuce

 Grass	 Spiders
 Deer	 Corn

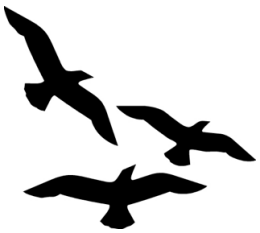
MY GARDEN ECOSYSTEM

Label the living organisms you found in the garden.

Name: _____

WHAT WOULD YOU SEE IF YOU WERE...

Flying over the garden like a bird?



WHAT WOULD YOU SEE IF YOU WERE...

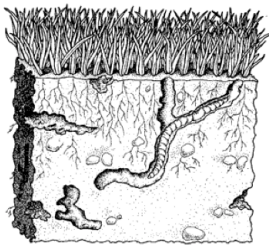
Landing on a leaf in the garden?

WHAT WOULD YOU SEE IF YOU WERE...

The size of a beetle on the garden soil?

WHAT WOULD YOU SEE IF YOU WERE...

Burrowing under the garden soil like a worm?



ECOSYSTEM INVENTORY

Name: _____

CAN YOU FIND:

WATER	YES ☐	NO ☐
SUN	YES ☐	NO ☐
GOOD (BENEFICIAL) INSECTS	YES ☐	NO ☐
COMPOST	YES ☐	NO ☐
HEALTHY LOOKING PLANTS	YES ☐	NO ☐
SIGNS OF GARDEN ANIMALS SUCH AS SPIDERS, BIRDS, SNAKES, RABBITS	YES ☐	NO ☐
OTHERS:	YES ☐	NO ☐
OTHERS:	YES ☐	NO ☐
OTHERS:	YES ☐	NO ☐

LESSON SIXTEEN

GARDEN GRADUATION

SUMMARY

Students will celebrate the garden and their participation in the Sprouts Program.

MATERIALS:

Journal Sheets
- Spring Garden Post-Surveys
- My Favorite Thing
- Garden Certificates

White board

Dry erase markers

Garden tools (kid and adult)

Seeds

Transplants

Garden Tub: tools, permanent markers, paint sticks, string lines, rulers

Watering can

Tool cleaner

Water cooler and cups with expo markers

Pencils

Colored pencils

Seed packets

Sunflower seeds

Sunflower seed planting directions

GUIDING QUESTION:

1. How do you celebrate summer?

OUTLINE:

- Welcome Circle and Attendance
- Spring Garden Survey & My Favorite Thing
- One last Seed to Plant!
- Garden Wishes
- Spreading Sunflowers
- Graduation Certificate
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Today you graduate from the garden program! You will have a survey to complete, we will work in the garden, and then we will celebrate the garden.

Today's Question: What are you most excited about doing this summer?

SPRING GARDEN SURVEY & MY FAVORITE THING – 20 MINUTES

Today is the last day of our program and we will spend a few minutes completing the final survey.

1. Pass out surveys and pencils.
2. Ask students to complete the survey as best they can. You can read it out loud and help with any writing.
3. As students finish the surveys, ask them to complete the "My Favorite Thing about Spring Gardening Club is…". Remind them of all of the things they did in the program and ask them to pick the activity they liked the best or would want to do again.

ONE LAST SEED TO PLANT – 15 MINUTES

We are going to finish up our spring planting in the garden.

Students learn about plant spacing and plant early spring vegetables.

1. Ask the students to gather together right next to each other.
2. Everyone should curl up tightly in a ball and then ask them to stretch out slowly to their full height.
3. How do you feel? Do they think they could get enough food and water? Ask them to turn to the sun. Do you think they would each get enough sunlight?
4. How can they change their spacing so that everyone is happy? What would that look like?
5. When we are planting we need to remember that each plant needs a certain amount of space so that they can get all the things they need to be happy. Refer students to the plant spacing guide in their journal.

Demonstrate to the group how we are going to seed our garden using string lines and garden rulers:

1. Set up the string line.
2. Make a trough with the hoe under the string line.
3. Review the seed spacing guide and/or seed packet for particular planting instructions.
4. Have students line up at the end of the string line.
5. Decide what seeds you want to plant.
6. Put the amount of seeds you want each student to plant in their hands instead of giving them the seed packet. Remind them how far to plant their seeds by showing the spacing on the garden ruler.

a. Seeds

i. Basil
ii. Beans
iii. Broccoli
iv. Brussels sprouts
v. Cabbage
vi. Carrots
vii. Cauliflower
viii. Rutabaga
ix. Summer squash
x. Sunflowers
xi. Wheat

b. Transplants
i. Corn
ii. Peppers
iii. Tomatoes
iv. Tomatillos
v. Winter squash

7. The first student lays her seeds in the trough, covers the seeds, and pats the soil down firmly. The next student plants and covers their seeds and students continue taking turns until the row is completed.

8. Label the row with a paint stick marker.

As some students are planting other students should work on various tasks including:

- Raking the garden
- Working on the pathways
- Setting up the string line
- Making signs for the planted seeds
- Recording the activities in the garden journal

GARDEN WISHES – 5 MINUTES

We are going to celebrate our garden by giving it our wishes for the summer.

1. Gather together around the garden in a circle.
2. Go around the circle and have students share a wish for the garden this summer…big tomatoes, lots of rain, big flowers, etc.
3. Have students write in pencil their garden wish on a small piece of paper (a piece of brown paper bag would be best).
4. Go to the side of the garden or some other spot that won't be disturbed by digging. Have students dig a shallow hole with their hands and "plant" their wish for the garden.
5. Gather together to take a group photo in front of the garden.

SPREADING SUNFLOWERS – 20 MINUTES

Everyone will make a sunflower packet to take home to make their own sunflower house.

1. Everyone put in a lot of hard work to make the school garden this summer. In order to thank them, you want to give them Mammoth Sunflower seeds to take home to make their own sunflower house or sunflower row.
2. Give students empty envelopes. They will place their seeds in there.
3. Give students copies of a sunflower label for their envelopes. They will glue these on to their packets so they know how to plant them.
4. Show students the markers. They need to write “Sunflowers” on one side and they can draw a picture if they like.
5. Show students the sunflower seeds. Once their seed packets are complete, they can take 10-15 sunflower seeds and place them into their packet.

GRADUATION CERTIFICATE – 15 MINUTES

Students will officially graduate from the Spring Garden Club!

1. Everyone in our program has worked hard this spring to plant the garden. We are going to take a moment to say thank you for all your efforts.
2. Call each student up one at a time.
3. Share a memory from the program.
4. Present them with their certificate.
5. Shake hands and thank “Gardener ____” for all their work.
6. Applause.

WRAP-UP – 5 MINUTES

Reflect: Review the activities of the day and say goodbyes and wishes for happy & fun summers!

Take Home: Seed packets, journals, graduation certificate, summer brochure

MY FAVORITE THING ABOUT SPRING GARDENING WAS...

Name: _____ Grade: _____ School: _____

CONGRATULATIONS

GARDEN GRADUATE!

Successfully completed the SCHOOL garden program
and planted a beautiful garden that will help feed the school!

Garden Teacher

FUN FILLERS

JOKES

Why did the girl go out with the mushroom?
He was a fungi!

How does a flower ride a bike?
By using its petals!

Why do potatoes make good detectives?
Because they keep their eyes peeled.

How do you lead a horse to water?
With lots of carrots.

What vegetable can tie your stomach in knots?
String beans.

What did the carrot say to the wheat?
Lettuce rest, I'm feeling beet.

What kind of socks does a gardener wear?
Garden hose.

What do you call two young married spiders?
Newly webs.

What does the letter "A" have in common with a flower?
They both have bees coming after them.

What lives in the winter, dies in the summer, and grows with its roots upward?
An icicle.

GAMES

GARDEN CHARADES: In this activity, students will act out different events in the garden and have others guess what they are.

1. Prepare note cads ahead of time or quietly tell each student or group of students the garden event they will act out when it is their turn.
2. Keep items simple. Possible garden charades include: A bee, a flower. a worm, a butterfly, a seed growing, or a person doing any of the following activities in the garden: weeding, watering, smelling a flower, digging, planting seeds, harvesting vegetables, etc.
3. Finish the activity with a short discussion of favorite activities in the garden.

VARIATION: The leader begins the activity by saying, "I see!" The students respond by saying "What do you see?" The leader describes an event in the garden and the entire group of students acts out the event.

ROOTS AND LEAVES: In this activity, students will play a physically active game using vegetables as a theme.

1. Divide the group into two vegetables--e.g., carrots and spinach. Have the "root" group stand together and the "leaves" group stand together.
2. Have each group line up facing each other on opposite sides of a field or a large room. Create a goal line behind each group.
3. The object of the game is to have one group catch every member of the other team. The instructor will call out a group name and all the leaves will try to run past the roots without being tagged. If they are tagged, they become a member of the team that caught them (a spinach who is tagged by a carrot becomes a carrot).
4. Finish the activity with a short discussion of favorite roots and leaves to eat.

ALPHABET SCAVENGER HUNT: Assign a student or groups of students with a letter of the alphabet. Set a time limit and challenge students to find as many classroom items as possible that begin with the assigned letter.

CATCH MY CLAP: This is a good transition activity. There is no talking in this game. One player is the leader. All players rub their hands together. They watch the leader and when she claps, they try to clap in unison.

PLANT PART BINGO

Students will play a bingo game where they have to guess the part of the plant that each food item came from.

1. Print off enough copies of the following page. It contains 2 bingo sheets. Cut the pages in half.
2. Pass out bingo sheets
3. Pass out sunflower seeds to use to cover spaces
4. Begin by holding up food cards. Ask the students to name the part of the plant that we eat.
5. Play for a few rounds or as time allows.
6. Students can eat sunflower seeds when you are done.

ADAPTATION: Use plastic fruit instead of calling out spaces. Another option is to hold up the fruit, and the first student to identify which part of the plant it is from marks their spot.

PLANT PART BINGO

FLOWER	ROOTS	FLOWER	ROOT	STEM
LEAF	FLOWER	FRUIT	FRUIT	FLOWER
ROOT	STEM	FREE SPACE	STEM	LEAF
SEED	SEED	ROOT	FLOWER	FRUIT
FRUIT	STEM	SEED	ROOT	FRUIT

FLOWER	ROOT	STEM	SEED	LEAF
STEM	LEAF	FLOWER	ROOT	STEM
LEAF	ROOT	FREE SPACE	FRUIT	FRUIT
STEM	SEED	SEED	FRUIT	LEAF
LEAF	ROOT	FLOWER	STEM	LEAF

GARDEN MAP

SUMMARY

Students will explore the garden using their 5 senses and then create an edible garden map!

MATERIALS:

Journal Sheet
Using Your 5 Senses in the Garden

School Garden Map

Clipboards

Pencils

Garden Food Map ingredients

Book:
A Garden for a Groundhog by Lorna Balian

Pumpkin seed or lima bean

GUIDING QUESTIONS:

1. Where should we plant our vegetables? (K-6)
2. What different features should we incorporate in our garden? (K-6)

GOALS:

1. Students will name the different senses and recognize how they can use them in the garden.
2. Students will be creative and innovative by using food to make a map.

OUTLINE:

- Welcome Circle and Attendance
- Introduction to Our Garden
- Garden Sense
- Garden Food Map
- Filler, Book: A Garden for a Groundhog by Lorna Balian
- Filler, Game: Seed, Seed, Who's Got the Seed?
- Wrap-Up

WELCOME CIRCLE – 5 MINUTES

Greeting: Today we are going to really think about our garden for next year and what it will look like. You will get to create your own garden map using food!

Today's Questions: What are the different types of soils? What makes these soils healthy? (This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

SPRING GARDEN SURVEY & MY FAVORITE THING – 20 MINUTES

Today is the last day of our program and we will spend a few minutes completing the final survey.

1. Pass out surveys and pencils.
2. Ask students to complete the survey as best they can. You can read it out loud and help with any writing.
3. As students finish the surveys, ask them to complete the "My Favorite Thing about Spring Gardening Club is…". Remind them of all of the things they did in the program and ask them to pick the activity they liked the best or would want to do again.

INTRODUCTION TO OUR GARDEN – 5 MINUTES

Students will spend a few minutes discussing properties about their school garden.

1. Gather students in a circle or group inside the classroom.
2. Ask students, "What is a garden? What does our school garden do?"
3. Ask students, "What belongs in our garden?"
4. Ask students, "Are there things that don't belong in our garden?"
5. Ask students, "Are you excited to design our garden today?!"

Reflect: What is one thing you would like to see in our garden?

GARDEN SENSE – 15-20 MINUTES

Students will travel out to the garden and use their senses to familiarize themselves with the garden space. (Adapted from SLUG City Sprouts activities.)

1. Explain to the group that we will be traveling out to the garden where we will use all of our senses. Who can name all 5 senses? (Sight, smell, hear, taste, touch) How might we use our sense in the garden?

2. Bring the group out to the garden.

3. Review the garden rules.
    a. Be safe – i.e. no running in the garden, walk on paths or edges of the garden, ask before eating anything
    b. Be responsible – i.e. listen to directions, raise their hands to ask or answer questions, follow through with the job or task at hand
    c. Be respectful – i.e. keep hands to yourself, take turns, no throwing anything in the garden
    d. Have fun!
4. Give each student (or they may work in pairs) a clipboard and a copy of the journal sheet "Using your 5 Senses in the Garden".
5. Explain that students will be drawing or writing about things they hear, touch, see, smell in the garden. Which sense is missing? Taste! You must ask a teacher before picking and tasting anything from the garden. Have students repeat the rule back to you to check for understanding.
6. *Educator Note: To make the tasting experience more safe, taste something as a group such as dandelion greens, chives, chocolate mint, other perennial herbs, spinach. Also, don't worry too much about not being able to eat anything, the next activity is all about eating!
7. Give students 10 minutes to be in the garden, completing the worksheet. If students finish early, have them turn their paper over and start working on a garden map.
8. When all students are finished, briefly go over a few things they wrote down or drew on their paper.
9. Gather students in a circle around the garden. Ask them to take 1 minute to take a mental photo of what the garden looks like.
10. Explain that we are now going to go inside to create a map of what you would like the school garden to be this year!

Reflect: What did you like best about being out in the garden? Do you want to create your garden map!?

GARDEN FOOD MAP – 15-20 MINUTES

Students will create a map of the garden using food!

1. Before starting this activity, remind students of garden structures or ideas you have discussed as a group.
2. What are the vegetables you would like to have in the garden?
3. What are some structures you would like to have? Sunflower house? Bean teepee? Cucumber trellis? Entrance way, sunflower path, archways?
4. What about theme gardens? Pizza, ABC's, Storybook, Fairy, Rainbow?
5. Where would you like the entrance to be? Where will our paths be? How will we get out of the garden?
6. Pass out the School Garden Map journal sheet.
7. Give students 5 minutes to quickly draw/jot down ideas of how they would like the garden to look.
8. After time is up, or as students are ready, pass out materials. Use the vegetables to represent their plant, i.e. a cherry tomato would stand for a tomato plant.
   a. Tortilla shell – the garden space
   b. Hummus or peanut butter – the garden soil
   c. Pretzel sticks – to outline garden paths or beds, to show the entrance/exit (because not all paths are straight, students can feel free to break pretzels into pieces)
   d. Corn (frozen or canned)
   e. Cherry tomatoes
   f. Carrots (baby or grated pieces)
   g. Spinach
   h. Sunflower seeds
   i. Pumpkin seeds
   j. Broccoli
   k. Sweet bell peppers (diced)

9. Take photos of every students map.
10. Gather the group together and go on a museum walk to see everyone's work. Have students clasp hands together so they do not touch each other's work.
11. Now that we have created our garden maps, DIG IN!
12. As students eat their map snacks, ask them what features or designs they liked in the maps they created or saw. Create a collective garden map design for the school garden and save it for spring when the garden paths and beds will be created.

Reflect: What features or designs did you see from other people's gardens that you liked? What do you think we should have in our garden?

FILLER BOOK – 10 MINUTES

A Garden for A Groundhog by Lorna Balian

Students follow the O'Leary's through all four seasons of garden chores, including dealing with a hungry groundhog!

Listening Question: In how many of the four seasons are the O'Leary's doing tasks for the garden?

Reflect: What are some garden chores that the O'Leary's do in spring? What is the groundhog doing in spring?

FILLER GAME: SEED, SEED, WHO'S GOT THE SEED? – 10 MINUTES

This game can be played indoors or outdoors using a large seed such as a pumpkin or lima bean.

1. The goal of this game is to guess who has the seed.
2. Have the group stand or sit in a circle and hold their hands in front of them.
3. One person takes the seed and goes around the circle, pretending to put the seed in someone else's hand. They actually deposit the seed in one person's hands, but then continues the rest of the way around the circle, pretending to put it in everyone else's hands.
4. Then, going around the circle, each player tries to guess who has the seed now. Before each person's guess, the group asks together, "Seed, seed, who's got the seed?" Then the player can state their guess.
5. Once the player with the seed is finally guessed, that person distributes the seed during the next round.
6. Other versions: One child stands in the middle of the circle and the seed gets passed around the backs of the rest of the group. Those without the seed pretend to pass it. When the passing stops, the player in the middle has to guess as to who actually has the seed.

WRAP-UP – 5 MINUTES

Reflect: What are some structures we can have in our garden? How different can our garden look?

USING YOUR 5 SENSES IN THE GARDEN

Name: _____ Grade: _____ School: _____

LIST or DRAW 3 plants you saw :

LIST or DRAW 3 living things you heard :

LIST or DRAW 3 plants you touched :

LIST or DRAW 3 garden items (plants, soil, compost, etc.) you smelled :

LIST or DRAW 3 plants you tasted :
(Remember to always ask your teacher before eating anything growing in the garden.)

SCHOOOL GARDEN MAP

Things to think about: entrance and exit, path, themed gardens, vegetables you want to plant, structures, etc.

Name: _____

SHALL WE HAVE A GARDEN?

SUMMARY

Students will be welcomed into the Spring Garden Club and will help to decide if the club should build and plant a school garden.

MATERIALS:

Introduction surveys

Photo release/allergy forms

Dry erase board

Dry erase markers

Eraser

Seed catalogs

Construction paper,
cut into halves

Scissors

Glue

Markers

Crayons

Pencils

Erasers

Snack ingredients

Book:
A Gardener's Alphabet
by Mary Azarian

Extras for Filler Activities
Slips of paper
Pencils
Bowl

GUIDING QUESTION:

1. Should we have a school garden? (K-6)

GOALS:

1. Students will brainstorm plants to have in the school garden.
2. Students will work together to create a garden collage.

OUTLINE:

- Welcome Circle and Attendance
- Ground Rules
- Introduction Survey
- To Garden or Not to Garden?
- Garden Collage
- Snack: Ants on a Log
- Filler, Game: Crows and Cranes
- Filler, Activity: Garden Animal Charades
- Filler, Book: A Gardener's Alphabet by Mary Azarian
- Wrap-Up

WELCOME CIRCLE AND NAME GAME – 5 MINUTES

Greeting: We are going to take a quick survey and then look through seed catalogs to see what we would like to plant in our garden. Together we'll make a garden collage!

Today's Question: What is something you are looking forward to this spring? What are some things you'd like to plant in your school garden?

(This is an open-ended, no-right-or-wrong-answers, question. Revisit this at the end of class and see if their answers have changed.)

Name Game: Have the students introduce themselves by giving their name and one plant (fruit, vegetable, flower, tree, etc.) that begins with the same first letter as their name. (For example, Tonya Tomato.) Challenge the students to remember everyone's name and plant.

GROUND RULES – 5 MINUTES

Explain that the after-school program is a place for fun learning. In after school program, the same rules you follow during the day at school are also the same rules they will follow with you. Similar to a classroom, we have some basic rules to ensure that all students have fun and are safe.

1. Explain that we have four basic expectations. We want all students to be:

    ii. Safe – with tools, bodies, and materials.

    - Have a student show you an example of what being safe looks like.

    iii. Respectful – use kind language, be good listeners, careful while cooking

    - Have several students show you an example of what being respectful looks like– using respectful words, being a respectful listener and speaker, being respectful cooking tools, being respectful to the room.

    iv. Responsible – participate in activities, take care of belongings, stay on task in garden

    - Have a student give an example of what being responsible is.

    v. Have Fun

    - How can you tell if someone is having fun in a safe, respectful way?

We expect that everyone will want to participate in the activities and have fun. If, for some reason, someone is being unsafe, disrespectful, or irresponsible, there will be consequences like there are during the school day. Students are still in school, even though it is after school, and the same school rules apply. Inform them of any consequences you have discussed with the principal.

We expect that everyone will want to participate in the activities and have fun. If, for some reason, someone is being unsafe, disrespectful, or irresponsible, there will be consequences like there are during the school day. Students are still in school, even though it is after school, and the same school rules apply. Inform them of any consequences you have discussed with the principal.

2. Signal for attention: Explain to the students that there will be a signal for when you want to get everyone's attention and have them listen for new directions. Everyone is to respond to the signal by having quiet mouths and eyes on the teacher. Until this happens, you should wait quietly until they respond appropriately, try the method again, or use a different method. Do not move on to the next direction/activity until they are all listening to you.
3. Every day we will do similar activities:
    - Welcome Circle with a thinking question
    - A lesson or activity
    - Some active games and partner games
    - A book
    - Journal time
    - A snack

INTRODUCTION SURVEYS – 15-20 MINUTES

Surveys are used to calculate and record student knowledge and progress. We use them to help guide us in lesson planning.

1. Explain that before we begin today you need to learn a little bit more about them as students; what they know, what they would like to learn about. Tell them not to worry if they don't know some of the answers, it is not a test; we just want to know what they already know. All of the topics will be covered in the program.
2. Let students know that these surveys are very importance for us because they help us gauge the success of the program. We like to know when students have a memorable time and what they learn. This helps us get funding for the program and to stay at the school.
3. Pass out the surveys and pencils. Consider reading the questions one by one as a group. "If you would like to go ahead and read the questions to yourself, please start. If you would like me to read the questions to you, sit by me and I will read them one by one."
4. When students are done and waiting, they can draw on the back or work on a journal page. Gather the surveys when they are complete and store safely to use at the end of the session.

TO GARDEN OR NOT TO GARDEN? – 10-15 MINUTES

Students will get a chance to brainstorm together what plants should be grown in the garden.

1. Gather students together in a circle. You can choose to have them sit in desks, chairs at a table, or on the floor.
2. To start generating enthusiasm about the garden, begin by asking students several questions, Should we have a school garden? Would you like to help plan this garden? Do you want to help start seeds? Do you want to play in the soil of the garden?

3. Using a dry erase board and markers, jot down student answers as you receive them. Remember, ideas are to be encouraged. Never discourage students from offering their ideas; there is no right or wrong.
4. Ask students the following questions and encourage students to give you specific answers (i.e. “vegetables” is too general; would they like cherry tomatoes or green peppers):
    a. Now that we’ve decided we will have a garden, what should our garden grow?
    b. What have you seen in other gardens that you would like to try in ours?
5. Now that we know what our garden should grow, what should we do with all the food?
    a. Should we eat it? How can we eat it?
    b. Should we share it? Who should we share it with? How do you think they will use our food?
    c. Can we cook with it? What can we make?
    d. Ask students what should happen to specific crops such as, tomatoes, wheat, sunflowers, potatoes, beans.
6. The final set of questions is work based.
    a. What do we need to do in order to have a school garden? (Look at seed catalogs, get seeds, start seeds, talk to the Food Service Director)
    b. What kind of work do we need to do in a garden? (Digging, making the beds, planting, spreading manure, tilling, harvesting, weeding, watering)
    c. When should we do this work? (Winter-talk to FSD, look at seed catalogs, order seeds; Early Spring-start seeds; Spring-tilling, manure, weeding, planting; Summer-weeding, watering, harvesting; Fall-weeding, watering, harvesting, planting)

Reflect: You all worked together really well as a team to make decisions about our garden! In what other activities for the garden do we need to work together?

GARDEN COLLAGE – 15 MINUTES

Surveys will use seed catalogs as a reference for creating a garden collage.

1. You can choose to either have students go back to their tables/desks or work on the floor.
2. Pass out seed catalogs. Students can choose to share by working together in pairs or work independently.
3. Encourage students to take 1-2 minutes to look through the catalogs. They will have a chance next week to look more closely at the catalogs. For now, they should browse through. If anything catches their eye, they can mark the page by bending the top or bottom corner over.

4. After the 1-2 minutes of browsing time is complete, pass out the ½ sheets of construction paper, glue, colored pencils, and crayons. Students should write their names on the back of their paper.
5. Tell students to pretend that their ½ sheet of paper is the school garden. Using the catalog as a reference or plants they know from memory, they can design or create their ½ sheet of paper to be the garden. Allow students 10 minutes or so to complete this. Encourage them to be creative and use their imagination. (They should not cut anything from the seed catalog since they will be using it next week!)
6. When students are finished, allow the group to work together to create a collage of their gardens. This can be done by creatively arranging the sheets of paper together to produce a unique garden!
7. Gather students around their collage and take a photo!
8. (Each sheet of paper can be hole punched to fit in the Sprouts journal.)

Reflect: Wow, there are so many ideas! What are a few of the plants that you see? What do you like best about our collage?

SNACK: ANTS ON A LOG – 10 MINUTES

Students will enjoy a healthy garden friend snack!

*Educator Note: 1 celery stick per person.

FILLER GAME: BEETS AND BEETLES

Students play a fun chasing game.

1. Split the group in half. Designate one side as Beets, the other as Beetles.
2. Have the teams get in a line, shoulders touching, facing the other team. There should be about 4 feet between the teams.
3. Choose a safety spot for each team. The safety for Beets is behind their line, a nice running distance away. The same for the Beetles. The safety zone can be marked with a jacket, a cone, a tree, or other object.
4. The educator chooses a the chaser team by yelling either “Beets!” or “Beetles!”. The team that is called must chase the other team. The team that is not called, must turn and run back to their safety. If anyone is tagged, they join the opposite team.
5. If a student chooses to not play, allow them to yell the chaser team name.

FILLER ACTIVITY: GARDEN ANIMAL CHARADES

Students will act out critters that might visit the garden while the rest of the group tries to guess!

1. Before you begin, cut or tear small strips of paper.
2. Have students write down an animal they might find in the garden (deer, squirrel, bee, grasshopper, frog, etc).
3. They can then fold their paper in half and drop it in a bowl.
4. Ask for a volunteer to go first. The volunteer takes a piece of paper out of the bowl, silently reads it to themselves (they may need help), and then places the paper in their pocket or on a table. They must then act out their critter, without talking! The rest of the group needs to guess what animal the volunteer is.
5. Choose the next person either by volunteer or by whoever correctly guessed the previous animal.

FILLER BOOK – 10 MINUTES

A Gardener's Alphabet by Mary Azarian

The ABC's of gardens with beautiful pictures. Use the alphabet to reflect on the Fall Gardening class. Go letter by letter, ask the students to pick letters, or use the first letter of each student to lead your reading.

Listening Questions: Does this word or picture remind you of something you saw or did in the garden? Does it remind you of anything at home?

Reflect: What are the things you most remember about the class? What are all of the things we can do with the things we can harvest? Can we only eat it? Like this author, we can create art from our experiences.

WRAP-UP

Reflect: We did a lot today! Now that we decided a few plants we would like to have in the school garden, what are some plants you'd like to grow at home?

ANTS ON A LOG

INGREDIENTS

Celery

Peanut Butter (try Almond Butter for a different taste!)

Raisins

DIRECTIONS

1. Wash celery and divide.
2. Spread a thin layer of nut butter on celery sticks.
3. Top peanut butter with raisins and enjoy!

FROST SENSITIVITY LIST

This is a frost sensitivity guide, not a planting guide. This will help you determine when you can safely plant your crops. The length of time it takes for your crop to mature and when you want to harvest it will determine your planting date.

HARDY

Can plant 4-6 weeks before last frost date

- Lettuce
- Peas
- Radishes
- Spinach

MOSTLY HARDY

Can plant 2 weeks before last frost date

- Broccoli
- Beets
- Carrots
- Cauliflower
- Celeriac
- Kale
- Onions
- Parsley
- Potatoes
- Rutabaga
- Swiss Chard
- Turnips

FROST SENSITIVE

Can plant on or after last frost date

- Basil
- Bush beans
- Calendula
- Cilantro
- Cosmos
- Corn
- Dill
- Larkspur
- Leeks
- Marigolds
- Nasturtiums
- Pole beans
- Sunflower
- Zinnias

FROST INTOLERANT

Plant 2-3 weeks after last frost date

- Cucumber
- Peppers
- Pumpkin
- Summer squash
- Tomatoes
- Winter squash

SUGGESTED BOOK LIST

Richards, Jean. *A Fruit Is A Suitcase For Seeds.* Millbrook Press. PreSchool-Grade 2

Richards's carefully worded information provides an excellent introduction to seeds, their purpose, and growth that should be easy for young children to grasp. On each page, one or two short lines of text appear beneath a large painting. Hariton's use of bright watercolors adds sensual appeal to her illustrations of various fruits, vegetables, animals, and habitats. This cleverly presented book can be used as a read-aloud discussion starter, as a prelude to planting seeds and observing their growth, or in preparation for dissecting fruits and vegetables in order to find the seeds inside.

Balian, Lorna. *A Garden For A Groundhog.* Star Bright Books. Kindergarten–Grade 3.

During the winter, the O'Learys feast on the bounty from their summer garden, and Groundhog hibernates in his burrow home beneath the apple tree. The O'Learys know that the groundhog does not come forth on February 2 to forecast the weather but rather to check if the O'Leary garden is planted. Mr. O'Leary's plan to keep the groundhog out of their vegetables has one flaw, though, which is humorously revealed on the final page.

Henderson, Kathy. *And The Good Brown Earth.* Candlewick Press.

Throughout the seasons, Gram and little Joe work independently but side-by-side on their gardens, planning, planting, watering, weeding, and waiting. At harvest time, both have grown beautiful vegetables–Gram's in neat rows; Joe's "higgledy-piggledy, tangly, FANTASTIC!" Henderson writes in simple, musical poetry that evokes the delicious, "squashy," "squelching" physicality of garden work, and the mixed-media illustrations of a garden teeming with plants and creatures have a waxy texture that, while sometimes indistinct, nicely extends the awe and mystery in the refrain: "The good brown earth got on with doing what the good brown earth does best." Best, though, is Joe's freedom to discover, follow his instincts, and create something wonderful on his own.

Creasy, Rosalind. *Blue Potatoes, Orange Tomatoes.* Sierra Club.

An introduction to organic gardening which explains how to grow a cornucopia of fruits and vegetables in unexpected colors, outlining simple guidelines for planning, planting, caring for, and troubleshooting a rainbow garden. Also includes some special recipes.

McCloskey, Robert. *Blueberries For Sal.* Penguin Group.

This simple story of a mother and daughter picking blueberries, and a mother bear and baby bear eating blueberries, does a perfect job depicting the sweetness of the mother/child relationship. It shows the protective nature of loving mothers and the security a child feels when with his/her mother. And it's a great example of two little families preparing for winter by picking (or eating, as the case may be) blueberries.

Siddals, Mary McKenns. *Compost Stew.* Crown Publishing Group.

From eggshells to wiggly worms, this delightful recipe in bouncy verse features items–some familiar and some not so–that are fit for the home compost bin and will nourish Mother Earth. Vibrant collage illustrations use recycled and found materials to further a timely message. And to keep young environmental chefs fully informed about composting do's and don'ts, there's a note in the back about what's not fit for the bin.

Koontz, Robin. *Composting Nature's Recyclers.* Picture Window Books Publication.

Dead leaves, food scraps, and grass clippings for lunch? Small animals, fungi, and bacteria called decomposers turn trash into a tasty compost treat. Learn more about compost and how you can use it in your garden or yard.

Gibbons, Gail. *Farming.*
Holiday House Inc.

Gibbons depicts aspects of that life with her characteristic bright colors and stylized forms in a conceptual space that is intended to portray not one particular farm but a universal one. Every season brings its own specific chores, indoors and out, its own crops and its own food. There are the forces of nature, and the ways the farmer harnesses or copes with the elements using mechanical devices. Despite an overuse of the passive voice ("The vegetable garden is planted . . . water is lugged . . . fields are fertilized") this is a good addition to the author's energetic how-to books. Ages 4-8.

Gibbons, Gail. *From Seed to Plant.*
Holiday House, Inc.

The cover of this book has the title written in large, green font and it's not too wordy for kids. The illustration on the front cover is very colorful and would be appealing to young children. The content of this book is excellent. Gail Gibbons provides accurate information about plants in this book in a manner that is suitable for children. She researched the topic and worked with Bob Welch of Shearer's Greenhouses in Bradford, Vermont. At the end of the book she presents an exciting project for kids called A "From Seed to Plant" Project that ties in directly with the book. Additionally, she lists fun facts about seeds and plants. For example, did you know that some plants eat insects? Kids will love the end sections. The illustrations in this book are outstanding.

Rockwell, Lizzy. *Good Enough To Eat.*
Harper Collins Publishers.

Kindergarten-Grade 3 – This picture book about healthy eating begins at the beginning: food is necessary for one's well-being and it tastes good, too. Six categories of nutrients are introduced: carbohydrates, protein, fat, water, vitamins, and minerals. Digestion is described, as is the Food Guide Pyramid. Five recipes are given at the end. Every bit of information is illustrated with a large or small picture, sometimes accompanied by labels or dialogue balloons.

Ehlert, Lois. *Growing Vegetable Soup.* Reed Business Information, Inc.
Pre-School–Grade 1

This is the boldest, brassiest garden book to hit the market, and what a delight. Intensely colored graphics capture the complete growing process from seed to cooking pot, with the focus on the plants. The unseen narrator describes the process of growing vegetable soup, from preparing the tools and digging holes for the seeds to weeding plants; picking vegetables; washing, chopping, and cooking them and finally enjoying the homemade soup while planning to grow more next year. It's a fresh presentation of the gardening cycle with a joyful conclusion, and the added attraction of an easy and tasty recipe for vegetable soup on the flyleaf. A book to help nourish healthy readers.

Hooper, Meredith. *Honey Cookies.*
Frances Lincoln Children's Books.

For young Ben, nothing is better than his grandmother's honey biscuits. But what exactly goes into making this special treat? Grandma decides it's a good time for Ben to find out. When he learns how to make honey biscuits, he doesn't just find out how to bake biscuits, he also discovers where all the ingredients in the recipe come from and whose help he really needs. Alison Bartlett's warm, vibrant illustrations accentuate Meredith Hooper's simple, lively text. Including an easy recipe for honey biscuits, this is a perfect introduction to food and cooking for very young readers.

Priceman, Marjorie. *How to Make an Apple Pie and See The World.*
Dragonfly Books.

An apple pie is easy to make... if the market is open. But if the market is closed, the world becomes your grocery store. This deliciously silly recipe for apple pie takes readers around the globe to gather ingredients. First hop a steamboat to Italy for the finest semolina wheat. Then hitch a ride to England and hijack a cow for the freshest possible milk. And, oh yes! Don't forget to go apple picking in Vermont! A simple recipe for apple pie is included.

Tomecek, Steve. *"The Dirtmeister". Jump Into Science – Dirt.*
National Geographic Society.

What is soil? Who lives in dirt? How does earth help things grow? The answers are within this fun – and fact-filled picture book. Just follow the gardening star-nosed mole in the colorful outfits... and dig in!

French, Vivian. *Oliver's Vegetables.* Hodder Children's Books.

On a visit to his grandparents' house, Oliver wants to eat only French fries. Grandpa tells him that he may look in the garden for potatoes, but that he must eat what he finds, whatever it may be. On the first evening, Oliver pulls up carrots and discovers that he likes them. On successive days he discovers spinach, rhubarb, cabbage, beets, and peas all of which he eats with unexpected enjoyment. On the last evening, he finds the potatoes at last and as he is sitting down to supper his mother arrives. Oh dear! Too bad! She thinks Oliver is still eating only fried potatoes. Oliver and his grandparents laugh delightedly at the irony, and so will small listeners.

Naslund, Gorel Kristina. *Our Apple Tree.* Roaring Brook Press.

Here's a whimsical and very useful look at the life cycle of the apple tree. With two helpful tree sprites as guides, readers travel from spring, when the apple tree blossoms, through summer, when the fruit grows, to fall and the harvest. Along the way, you'll learn about the life of the tree and the animals that visit – from insects that pollinate the flowers to deer that eat the fallen fruit.

Carle, Eric. *Pancakes, Pancakes.* Aladdin Paperbacks.

Here's a whimsical and very useful look at the life cycle of the apple tree. With two helpful tree sprites as guides, readers travel from spring, when the apple tree blossoms, through summer, when the fruit grows, to fall and the harvest. Along the way, you'll learn about the life of the tree and the animals that visit – from insects that pollinate the flowers to deer that eat the fallen fruit.

Titherington, Jeanne. *Pumpkin Pumpkin.* Greenwillow Books.

Jamie plants a pumpkin seed in the spring and, after watching it grow all summer, carves a face in it for Halloween! But best of all, he saves some seeds that he will plant again next spring.

McKy, Katie. *Pumpkin Town.* Houghton Mifflin Harcourt Publishing Company.

What happens when a town has an accidental abundance of pumpkins? What do José and his well-intentioned brothers do with a mountain of pumpkins? An EXPLOSION of pumpkins? Step into Pumpkin Town and see!

Bunting, Eve. *Sunflower House.* Harcourt Books.

A young boy plants the seeds in a large circle. He waters them and waits patiently until they grow taller than with huge nodding blossoms that form a perfect "sunflower house." He and two friends play in the "house" all summer, even sleeping in it one night, until the leaves turn brown and the stems fall down. Then they fill their pockets with the seeds, the birds eat some, and the rest are left on the ground to grow again next summer.

De Paola, Tomie. *The Popcorn Book.* Holdiay House Inc.

Tomie dePaola seldom fails to delight and this offering is no exception. Kids get together to pop up some pop corn and the little story of their "adventure" is quite funny. Along with the story though, we get a great mini-lesson in the history of popcorn along with some wonderful scientific facts, i.e. why does popcorn pop, how do you store popcorn, etc. It tells us how the early Native Americans cooked and used popcorn as well as those in Central America. There are dozens of lessons that can be created from this little book, great handouts and projects can be made with just a touch of creativity on the teachers part. I use this one in the class room, but it would be great for the home school folks also.

Gibbons, Gail. *The Seasons of Arnold's Apple Tree.* Harcourt Books.

This book is a must-have for any elementary teacher. I used this book in my Kindergarten class to teach the seasons and the growth of apples. My students loved the pictures and really learned the material from the story and reviewing after. I kept coming back to this book day after day to reinforce the content and my students were excited each time. One activity I did to teach the seasons was make a "The Seasons of (students name) Apple Tree" book. There were four pages with a bare tree. At the top the students would write It is summer, It is fall, etc. Then we would look at our story and describe the picture. Then the students would add orange and red leaves for fall, etc. I love this book and would recommend it to all.

Hall, Zoe. *The Surprise Garden.* The Blue Sky Press.

We're planting the seeds for a surprise garden. Can you guess what we will grow?" Trace the progress of three small children (and various and sundry dogs, ladybugs, spiders, worms, and butterflies) as they loosen the soil, poke seeds in one by one, water the garden, and watch the small green shoots grow. Surprise! The gardeners find carrots and radishes, broccoli and cauliflower, peas, beans, squash, and even a sunflower. When it's harvest time, the children have a garden party to eat all their delicious produce.

Carle, Eric. *The Tiny Seed.* Children's Publishing Division.

This picture book admirably conveys the miracle of a seed. Flower pods burst and dispatch their seeds on the wind; the air-borne seeds are subject to myriad disasters; and the ones that make it through the perils of the seasons to become mature flowering plants are still susceptible to being picked, trod upon and otherwise damaged. But nature allows for survivors, and so the tiny seed grows into a giant flower, releasing its seeds and continuing the cycle. As he has demonstrated with The Very Hungry Caterpillar and other books, Carle has an extraordinary kinship with nature. Here we have not just the explanation of the life of a flower, but drama, lessons of life and a lovely spirituality.

Lin, Grace. *The Ugly Vegetables.* Charlesbridge Publishing.

The neighbor's gardens look so much prettier and so much more inviting to the young gardener than the garden of black-purple-green vines, fuzzy wrinkled leaves, prickly stems, and a few little yellow flowers that she and her mother grow. Nevertheless, mother assures her that these are better than flowers. Come harvest time, everyone agrees as those ugly Chinese vegetables become the tastiest, most aromatic soup they have ever known. As the neighborhood comes together to share flowers and ugly vegetable soup, the young gardener learns that regardless of appearances, everything has its own beauty and purpose.

Stevens, Janet. *Tops & Bottoms.* Harcourt Books.

Hare solves his family's problems by tricking rich and lazy Bear in this funny, energetic version of an old slave story. With roots in American slave tales, Tops & Bottoms celebrates the trickster tradition of using one's wits to overcome hardship. "As usual, Stevens' animal characters, bold and colorful, are delightful. . . . It's all wonderful fun, and the book opens, fittingly, from top to bottom instead of from side to side, making it perfect for story-time sharing."

Hoberman, Mary Ann. Whose Garden Is It. Houghton Mifflin Harcourt.

The gardener says the garden belongs to him. But the woodchuck insists that it's his. And so do the rabbit, the butterfly, the squash bug, and the bumblebee. Even the tiny seeds and whistling weeds think the garden just couldn't grow without them. As they stroll through the exquisite plants and flowers, Mrs. McGee and her child listen and wonder: Whose garden is it?