

Growing a Kinder-Garden: Unit Roadmap

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The purpose of this unit is to allow students to gain an understanding and appreciation for the natural world through gardening. Students will engage in the development and design of the school gardens. School gardens provide an environment for awareness and stewardship, in which students and teachers work collaboratively to improve their school grounds, while at the same time connecting with the life cycles and interdependence of the natural world. In this unit, students will engage in content-rich, hands-on experiences which will provide meaningful opportunities to use their senses to explore nature, conduct research, share and record observations, and make connections to the real world.

Essential Questions:

- What do living things need to survive?
- How do seeds grow?
- What are the parts of a plant?
- How do plants get food?
- What is the purpose of a garden?

Engage:

- Students will work together to map, investigate, explore, and create a school garden. Students will care for and maintain the garden, as well as harvest the fruits of their labor. This will be a continual project for the other kindergarten classes to come.



Students will understand:

- K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.
 - LS1.C: Organization for Matter and Energy Flow in Organisms—All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.
- K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
 - ESS2.E: Bio-geology—Plants and animals can change their environment.
- K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
 - ESS3.A: Natural Resources—Living things need water, air, and resources from the land, and they



live in places that have the things they need. Humans use natural resources for everything they do.

Students will know:

- The needs of living things
- Various types of garden tools and their uses
- How to care for and maintain a garden
- Vocabulary: life cycle, seed, roots, stem, leaf, flower, compost, soil, photosynthesis, germination, tools (trowel, rake, wheelbarrow, hoe, watering can)



Students will be able to:

- Describe the main things that living things need to survive (food, water, air, shelter).
- Describe the life cycle of plants (from seed to plant).
- Identify the various parts of plants (roots, stem, leaves, flower).
- Explain the process of photosynthesis.
- Explain the benefits of gardening and farming.
- Understand that plants provide resources for clothing, food, and oxygen.

Assessments of learning:

- Nature Notebooks (recording observations and journaling)
 - Whole- and small-group discussions
 - Teacher observations
 - Life Cycle sequencing activities
 - Dissecting and labeling plant parts
 - Plant Needs Journal and summative writing prompt



Length of Unit:

- Approximately 6 weeks, beginning in early spring, with ongoing care and observations which may extend past that time. Lessons will be approximately 45 minutes long, at least 3 times a week.

Lesson Plans/Learning Activities to support learning targets:

Lesson:	Books/Activities/Assessments:
<p><i>Living v. Non-Living</i> (2 days, 45 minutes)</p>	<ul style="list-style-type: none"> • View the "Is It Living?" PowerPoint to elicit prior knowledge (found at: http://crisscrossapplesauce.typepad.com/files/is-it-living.ppt). • Record students' ideas about what makes something living or non-living on chart paper. • Read, "Living or Non-Living? My Science Library" by Kelli Hicks. Engage in a whole group discussion about the characteristics of living things. • Living v. Non-Living Sort: Students will cut pictures of living and non-living images from magazines and sort on labeled chart paper. *Assessment • Take students on a living and non-living hunt. Walk around the forest and ask students to find one living and one non-living thing. Have students draw their chosen things in their

	<p>Nature Notebooks. *Assessment</p> <ul style="list-style-type: none"> • Additional Suggested Books/Activities: “What’s Alive?” by Kathleen Zoehfeld, “Living or Non-Living” and “Living Things” (Concept Science) by Judith Holloway, Living Things BINGO
<p><i>Seeds: Living or Non-Living?</i> (Several days, 30-45 minutes)</p>	<ul style="list-style-type: none"> • Review information learned from previous lesson. Show the PowerPoint from previous lesson, to check for understanding and to dispel any myths. • At the end of the PowerPoint, there are “challenge” questions (egg, apples, and seeds). Ask students to share their rationale for what might make each item living/non-living. • Rock v. Seed Experiment: In plastic sandwich bags with a moist paper towel, place a rock in one and a seed in the other. Students will make a hypothesis about which they think is living. Over a period of several days, they will observe and record observations, and will analyze the results to determine if rocks and seeds are living or non-living. • Additional Suggested Books/Activities: “Nature’s Miracles: Once There Was a Seed” by Judith Anderson, seed sorting, seed collages, seed/plant matching, “Where Do Seeds Come From?” exploration
<p><i>Seed Dissection</i> (1 day, 45-60 minutes)</p>	<ul style="list-style-type: none"> • Read “Exploring Seeds” by Kristin Sterling. Discuss the importance of seeds to a plant. • Give each student a dry lima bean seed and a magnifying glass. Ask students to examine the seed and draw in the Nature Notebooks. On chart paper, write any observations that students had. • Give students a lima bean seed that has been soaked overnight and ask students to examine and record observations in their Notebooks. Write observations on chart paper; ask, “How are these seeds the same? Different?” • Before opening the seed, ask students to make a large outline in their Notebooks and draw what they think they might find on the inside. • In small groups, show students how to remove the seed coat, split the seed, and examine the various parts of the bean. Guide students to locate the embryo (with root and leaf) and the food storage. • Students will draw and label the parts of the seed in their Nature Notebooks. *Assessment • Additional Suggested Books/Activities: “One Bean” by Anne Rockwell
<p><i>Sensory Soils</i> (1 day, 60 minutes)</p>	<ul style="list-style-type: none"> • Holding a handful of garden soil, ask students to identify what you are holding. Tap into prior knowledge by asking, “What do you know about soil? What is soil made from? Are all kinds of soil the same?” • Set up four stations with various types of soil: clay, compost, sand, and garden soil (one station for each type). • Divide students into 4 groups and assign each group to a station. At their stations, provide magnifying glasses, tweezers, and collection jars. Ask students to explore the various types of soil with the materials provided. At each station, have a piece of paper where children or adults can write observations. • Provide ample time for exploration, then rotate groups until all students have visited each station. • Join together for whole-group discussion of observations, questions, and findings. • Additional Suggested Books/Activities: “Dirt: The Scoop on Soil” by Natalie Rosinsky, mud pies/mud kitchen
<p><i>Plant Needs Experiment</i> (Every few days, 30-45 minutes, spans 2-3 weeks potentially)</p>	<ul style="list-style-type: none"> • Recall prior knowledge to ask students if plants are a living thing and to share rationale. • Pose the question, “Do plants <i>really</i> need water, sun, and air in order to live?” • Experiment set-up: Using fully grown marigold plants (similar size and flowers), tell students that you will deprive each plant of one essential need (no water, no sun, no air) and give one plant all of the required needs. • Students will draw and write their observations in the Plant Needs Journals (every few days), which will allow them to track the changes over the course of several days/weeks. • At the end of the experiment, students will document their findings in their Plant Needs Journals, and summarize their rationale either through writing and drawings or a

	<p>combination of both. <i>*Assessment</i></p> <ul style="list-style-type: none"> • Additional Suggested Books/Activities: “Living Sunlight: How Plants Bring the Earth to Life” by Molly Bang & Penny Chrisholm, plant needs sorting, “What Do Plants Need?” poster
<p><i>Plant Food Magic: Introduction to Photosynthesis</i> (1 day, 45 minutes)</p>	<ul style="list-style-type: none"> • Acting Out Photosynthesis: Collect the props necessary for the role play (pictures of sun, drops of water, and carbon dioxide sign). Call on a student to act as the plant in the story. Read the following story for students: <ul style="list-style-type: none"> • It was a beautiful day. The sun was shining brightly (place picture of sun above head). It shined its light all over, and it was shining brightly in the garden at our school. Out in the garden, in its soft dirt home, sat a plant (point to the child). The plant knew it was a beautiful day; a perfect day for making food! In order to make its food, it first has to collect all of the ingredients and then it would turn them into food to help it grow. So, the plant stretched toward the sky (ask student to stretch arms up) and opened its leaves wide to take in as much sunlight as possible. It needs LOTS of sunlight to make food. Then the plant took some deep breaths (ask students to take large breaths). The plant is looking for the right parts in the air. Ah, yes, carbon dioxide floating in the air is perfect (put up carbon dioxide sign). Carbon dioxide is a very important part of the recipe. The plant takes the carbon dioxide into its leaves. Now it just needs one more ingredient. It wiggled its roots around looking for water (ask student to wiggle toes). Ah, the soil is nice and damp. It was easy to bring the water from the roots to the leaves where the carbon dioxide and sunlight are waiting. Now, it’s time to make food. The plant mixes together the sunlight, water, and carbon dioxide all together (instruct child to twirl hands in front) and presto, it has made enough food to keep itself healthy and alive. • Can lead all students in whole group acting out if necessary and appropriate. Have a class discussion about the process once more, asking students to help with the retelling. • Bring students outdoors to the garden. Ask students to find a green plant to draw in their Nature Notebooks. Ask students to draw or write the “ingredients” that the plant needs in order to make food for survival. <i>*Assessment</i> • Additional Suggested Books/Activities: “How Do Leaves Breathe?” science observation, Photosynthesis anchor chart
<p><i>Garden Tools</i> (1 day, 45 minutes)</p>	<ul style="list-style-type: none"> • In a bucket, place a variety of garden tools (hand rakes, trowels, garden fork, shovel, hoe, gloves, etc.). Pull out tools and name for students, briefly describing tool use. For duplicate tools, ask students to recall tool name and sort accordingly. • Discuss appropriate safety and care (do not leave tools on the ground, point tools toward the ground when walking, do not use in crowded areas, clean after use and return to desired location when finished, etc.). Model for students each rule, or ask students to model. • In small groups, give each group a few garden tools to explore. Monitor groups for appropriate use, safety, and care. • After clean up, give students the name of a tool and ask them to draw in their Nature Notebooks. <i>*Assessment</i> • Additional Suggested Books/Activities: Garden tool picture sorting, picture/word vocabulary cards for writing center, indoor sensory table with tools
<p><i>Plant a Tiny Seed</i> (1 day, 45 minutes) Care for daily</p>	<ul style="list-style-type: none"> • Read, “The Tiny Seed” by Eric Carle. • Tell students that they will begin starter seeds indoors which will be planted in the garden once they have begun growing. • Choose a variety of seeds to begin starters. Try to find plants that need to be started around the same time frame. • Give each student a starter pot. Place several large buckets of soil and several trowels for easy access for students. • Students will first fill their pots with soil, loosely. Ask students to fill the soil to the top. • Depending on the seed type, plant the seed accordingly (sprinkle, use finger to make hole, etc.).

	<ul style="list-style-type: none"> • Provide students with several spray bottles to moisten the soil. • Place pots either in the window where there is plenty of light, or in a growing station. If using a growing station, discuss how the light from the grow lamps are different than the light from a regular light bulb (grow lamps offer full spectrum light, much like the sun, which regular bulbs only offer red or blue spectrum light). • Check plants daily to water and care for as needed. • Additional Suggested Books/Activities: “Plant the Tiny Seed” interactive book by Christine Matheson, “The Carrot Seed” by Ruth Krauss, plant flower seeds for Mother’s Day/decorate plant pots
<p><i>Plant Life Cycle</i> (1 day, 30-45 minutes)</p>	<ul style="list-style-type: none"> • Read, “If You Plant a Seed” by Kadir Nelson.” Discuss the changes that a seed goes through as discussed in the book. • Show students the “Plant Life Cycle” anchor chart, with 4 simple stages: seed, sprout, seedling, and plant. Review the cycle with students. • Have students act out the various stages of the life cycle of a plant: seed (have students “dig” and hole, and sit on bottom with body curled), add water/sun/air, sprout (wiggle toes for roots and lift up head for sprout), seedling (stand kneeling and spread arms a little), plant (slowly move up to the sky and moves arms out wide). • Provide students with a paper with four boxes labeled #1-4. Ask students to draw the various stages of the life cycle in order. Depending on student level, can lead as a directed drawing or can provide pictures for students to color, cut, and paste. • Additional Suggested Books/Activities: “Plant Life Cycles” by Julie Lundgren, life cycle picture/word cards for writing center, life cycle sequencing cards
<p><i>Plant Parts</i> (1 day, 45 minutes)</p>	<ul style="list-style-type: none"> • Explain to students that living things are often made up of various parts. Ask, “What parts do humans have?” Have students stand and point to the various parts in which the students name. Explain that like humans, plants also are made up of various parts. • Read “National Geographic Kids: Seeds to Plant.” Draw students’ attention to the section that discusses the parts of the plant. Point to a label the various plant parts on the page. • Tell students that they will investigate the various parts of a plant. Break students into small groups (about 3-4 students in each group). Give each group a potted flower plant and magnifying glasses. • Ask, “What parts of the plant can we see? (Have students point to and label.) What parts of the plant can we not see?” Model for students how to carefully remove the plant from the pot and brush the soil away. Allow groups to remove their plants as well, and then use their magnifying glasses to examine the plant and its various parts. • Students will draw the plant in the Nature Notebooks and label the various parts. • Additional Suggested Books/Activities: Let’s Find Out--Scholastic video: “Parts of a Plant” (http://letsfindout.scholastic.com/search?query=parts+of+a+plant&commit=Search&view=list), plant parts craft (string for roots, straw for stem, paper leaves, and tissue paper for flowers), plant parts taste test
<p><i>Getting our Garden “Grow” Ready</i> (1-2 days, 45-60 minutes)</p>	<ul style="list-style-type: none"> • Encourage parent volunteers to come to the classroom to help lead small groups. • Bring students out to the garden. Tell students that we will prepare the soil in the gardens to begin transplanting our seedlings (which we have started indoors), or various starter plants/seeds (make sure to check each plant/seed for best planting times). • Break students into small groups (2-3 students) and assign each a section of the garden. If possible, ask a volunteer to monitor 1-2 groups. • Show the garden tools they will be using and review the rules/expectations/care for each. • Steps for preparing the soil: Remove any sod/grass as necessary and till the first 6-8 inches of soil, remove any large stones and weeds, add compost or partially composted manure and ask students to turn with tools, rake to smooth and aerate the soil, and clean the surrounding beds. Students can also search for earth worms to add to the soil. • Additional Suggested Books/Activities: “Jack’s Garden” by Henry Cole, “Anywhere Farm”

	by Phyllis Root, "In the Garden" by Elizabeth Spurr
<i>Mapping the Garden</i> (1 day, 45 minutes)	<ul style="list-style-type: none"> • Prior to this lesson, create a square foot grid in the prepared garden beds using nails and twine. Depending on age and adult support, you can measure and create your grid with the students. • Bring students out to the gardens. Tell students that the same variety of plants are best placed in rows near each other, but that they should have enough space for the plants to grow and spread out. • Explain to students that you have created a grid which will help you decide where to plant the seedlings, and the grid will act as a map so you can remember where to find each plant. • Tell students that before they plant, they will create a map of the garden individually, and then will decide as a class where to put each plant. • Give students a map of the garden beds with grid lines drawn. Call on students to share the various types of plants that they plan to plant in the garden. • Provide colored pencils and hand-held sharpeners, and allow students to draw their plans for the garden. • Join students together in a whole group. On a large poster, draw the garden beds with grid lines (2 inches=1 foot of garden). Prior to the lesson, make copies of 4-H Plant Spacing Cards for each of the seed starters that you plan to plant in the garden (for younger students, draw a picture of the fruit/vegetable that will grow). Read each card to students and place on the floor around the large poster paper. Have students take turns placing one card at a time on the garden map grid. Discuss as a class appropriate placement for each card. • Once a final plan has been map, tape the cards onto the poster paper for use when you take the seedlings outside to plant. • Additional Suggested Books/Activities: "In the Garden" by Elizabeth Spurr, "Planting a Rainbow" by Lois Ehlert, students draw final garden grid map on paper with colored pencils
<i>Planting in the Garden</i> (1-2 days, 45 minutes)	<ul style="list-style-type: none"> • Bring the garden map chart paper from the previous lesson outdoors and place near garden. • Demonstrate for students the correct method for transplanting seedlings. Demonstrate how to use the garden map to figure out where to plant, and how many of each plant goes there. • Remind students about care/handling of garden tools. • Have students work in small groups. If possible, ask parent volunteers to help and place a volunteer with each group. Assign each group a specific section of the garden. • Students take turns transplanting the seedlings/planting seeds, referring to the map as necessary. • Students should label the seeds/seedlings they planted with row markers or signs. • Using a hose or watering cans, have students water the area in which they planted. • Additional Suggested Books/Activities: "Up in the Garden and Down in the Dirt" by Kate Messner, "Anywhere Farm" by Phyllis Root, "Jack's Garden" by Henry Cole, "Up, Down, and Around" by Katherine Ayres
<i>Garden Observations and Routine Care</i> (Ongoing)	<ul style="list-style-type: none"> • Take regular trips out to the garden to help maintain the space (watering and weeding as needed). • Bring Nature Notebooks and ask students to draw observations from the garden (how the plants are growing, any bugs/insects they find, etc.). • Additional Suggested Books/Activities: Give students unifix cubes or rulers for measuring and keeping track of plant growth (can make a chart to record), Garden Diary to keep outdoors in a mailbox for community members and other classes to write observations in.

Supporting resources: (websites, book titles, videos, human resources, etc.)

- **Educator Resources:**

- “Getting Started: A Guide for Creating School Gardens as Outdoor Classrooms,” <https://www.ecoliteracy.org/sites/default/files/uploads/getting-started-2009.pdf>
 - 4-H Growing Connections: A Garden Enhanced Nutrition Education Program (UVM Extension) by Michelle Monagas
 - Gardening Projects for Kids by Jenny Hendy
 - How to Grow a School Garden: A Complete Guide for Parents and Teachers by Arden Bucklin-Sporer
 - Project Seasons: Hands-On Activities for Discovering the Wonders of the World by Deborah Parrella and Cat Bowman Smith
 - The Garden Classroom: Hands-On Activities in Math, Science, Literacy and Art by Cathy James
 - The Growing Classroom: Garden-Based Science by Roberta Jaffe and Gary Appel
- ***Children’s Books for Read-Alouds (Fiction and Non-Fiction) :***
 - Animals in the Garden by Melvin and Gilda Berger
 - Anywhere Farm by Phyllis Root
 - Bugs in the Garden by Catherine Hopkat
 - Concept Science books by Collin Walker: How New Plants Grow, Gardening is Fun, Living Things, Living or Not Living
 - Curious George Plants a Tree by Margaret & H.A. Rey
 - Dirt: The Scoop on Soil by Natalie M. Rosinsky
 - Eating the Alphabet: Fruits and Vegetables from A-Z by Lois Ehlert
 - Garden Wigglers: Earthworms in Your Backyard by Nancy Loewen
 - How a Seed Grows by Helene Jordan
 - If You Plant a Seed by Kadir Nelson
 - In the Garden by Elizabeth Spurr
 - It’s a Good Thing There are Earthworms by Jodie Shephard
 - Jack’s Garden by Henry Cole
 - Living or Non-Living? (My Science Library) by Kelli Hicks
 - Living Sunlight: How Plants Bring the Earth to Life by Molly Bang & Penny Christolm
 - Nature’s Miracles: Once There Was a Seed by Judith Anderson
 - One Bean by Anne Rockwell
 - Plant Life Cycles by Julie Lundgren
 - Plant the Tiny Seed by Christine Matheson
 - Planting a Rainbow by Lois Ehlert
 - Round the Garden by Omri Glaser
 - Strega Nona’s Harvest by Tomie DePaola
 - The Carrot Seed by Ruth Krauss
 - The Little Gardener by Emily Hughes
 - The Tiny Seed by Eric Carle
 - Underground by Denise Fleming
 - Up in the Garden and Down in the Dirt by Kate Messner
 - Up, Down, and Around by Katherine Ayres
 - What’s Alive? by Kathleen Zoehfeld
 - Wonderful Worms by Linda Glaser
 - Worm Weather by Jean Taft

- **Videos:**
 - Scholastic News: Let's Find Out, Parts of a Plant video:
<http://letsfindout.scholastic.com/search?query=parts+of+a+plant&commit=Search&view=list>
 - Living v. Non-Living Slideshow: <http://crisscrossapplesauce.typepad.com/files/is-it-living.ppt>

- **Content Specialists:**
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