

The Circle of Life: Plants and Plant Growth

Grade Level or Special Area: Kindergarten

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Length of Unit: Eight lessons (approximately four weeks (eight days), one day = 45 minutes)

I. ABSTRACT

Through experimentation, kindergartners will discover the basic needs of plants, will understand a simplistic version of a plant's life cycle, and will comprehend plants' vital connection to humans. This unit includes guidance for growing fast plants in various conditions for experimentation, authentic assessments, ideas for bulletin boards, art projects, literature suggestions, and other hands-on activities.

II. OVERVIEW

A. Concept Objectives

1. Students will understand that plants have basic needs for survival.
2. Students will understand a simplistic version of a plant's life cycle.
3. Students will comprehend that plants have a vital connection to human existence.

B. Content from the *Core Knowledge Sequence*

1. What plants need to grow: sufficient warmth, light, and water. (*Core Knowledge Sequence* p. 19)
2. Basic parts of plants: seed, root, stem, branch, leaf.
3. Plants make their own food.
4. Flowers and seeds: seeds as food for plants and animals (for example, rice, nuts, wheat, corn)

C. Skill Objectives

1. Students will identify water, air, sunlight, and soil as important factors in the survival of plants.
2. Students will observe and use pre-writing skills to describe the growth of a plant.
3. Students will identify the basic parts of plants: seed, root, stem, branch, and leaf.
4. Students will identify some examples of seeds and flowers that are edible (for example, rice, nuts, wheat, and corn).
5. Students will sequence a plant's life cycle.
6. Students will create a message by drawing, telling, and/or emergent writing.
7. Students will record the date in numerical form.
8. Students will measure length using inches.

III. BACKGROUND KNOWLEDGE

A. For Teachers

1. Dietl, Ulla. *The Plant-and-Grow Project Book*. New York: Sterling Publishing, Co, Inc., 1993. ISBN 0-8069-0456-9.
2. Greenler, Robin; Greenler, John; Lauffer, Daniel and Williams, Paul. *Spiraling Through Life with Fast Plants: An Inquiry-rich Manual*. Dubuque, Iowa: Kendall/Hunt Publishing Company, 2001. ISBN 0-7872-6910-7.
3. Henry, Lucia Kemp. "Plant Parts Made Simple." *Mailbox Magazine*. April/May 2002. p. 12-15.

B. For Students

1. The intention of this unit is to expose kindergartners to the concept of plants and plant growth. There is no necessary prior knowledge needed in the area of

science. It may be helpful, however, to teach this unit towards the end of the year when the students pre-writing and writing skills are honed.

IV. RESOURCES

- A. *The Tiny Seed* by Eric Carle (Lesson Five)
- B. *Growing Vegetable Soup* by Lois Ehlert (Lesson Seven)
- C. *From Seed to Plant* by Gail Gibbons (Lesson Six)
- D. *A Seed Grows: My First Look At a Plant's Life Cycle* by Pamela Hickman and Heather Collins (Lesson Two)
- E. *The Sleepy Dormouse* by Mark Ezra (Lesson Three)

V. LESSONS

Lesson One: The Circle of Life (approximately 45 minutes)

- A. *Daily Objectives*
 - 1. Concept Objective(s)
 - a. Students will understand a simplistic version of a plant's life cycle.
 - 2. Lesson Content
 - a. What plants need to grow: sufficient warmth, light, and water. (*Core Knowledge Sequence* p. 19)
 - 3. Skill Objective(s)
 - a. Students will observe and use pre-writing skills to describe the growth of a plant.
 - b. Students will record the date in numerical form.
- B. *Materials*
 - 1. Overhead projector
 - 2. Markers
 - 3. Blank transparency sheets
 - 4. A copy of Appendix A (Garden Lab Worksheet) on transparency paper
 - 5. Ten copies of Appendix B (Plant Journals) for each student (copy the cover on green construction paper and bind the observation forms between the cover and another piece of green construction paper)
 - 6. A square plant container for each student labeled with his/her name
 - 7. Enough marigold seeds for each student to have four
 - 8. A watering can
 - 9. Enough pea gravel for each student to have a small amount on the bottom of their plant container
 - 10. Enough potting soil to fill the container separated out into sandwich bags for each student
 - 11. A plastic spoon for each student
 - 12. A large sunlit area where the plants can reside for 6 weeks
 - 13. A blooming marigold pre-planted in a plastic cup so the roots show and hid in a paper grocery bag
- C. *Key Vocabulary*
 - 1. Experiment – a test
- D. *Procedures/Activities*
 - 1. Several days before the start of the unit, purchase or plant a marigold seedling into an eight-ounce clear plastic cup. Make sure the cup has holes pre-cut in the bottom for drainage. Keep the cup on a sunny windowsill at home, watering the seedling regularly. Once a few roots begin to peek through the soil around the sides of the cup (and if you're lucky, it starts to bloom) bring the plant to school.

2. Secretly place the plant in a large grocery bag. Help the students to try to guess what is in the bag by giving them clues such as “It is something we can study,” “It is in soil,” “It is alive,” “It grows,” “It is green,” and “It has leaves.” After the students have identified the object as a plant, remove it from the bag for students to study and discuss.
3. Introduce the plant unit by telling the students what they will be studying over the next few weeks. Say: “We will be doing experiments to find out what plants need to be able to live and grow. You will get a change to plant bean seeds, marigold plants, and some small plants called watercress. Today, we are going to do our first plant experiment. But first, let talk about reasons why we do experiments. Why do you think scientists experiment?” List the children’s answers on the overhead transparency. (Use Socratic questioning to get the children to see that experimentation leads us to new knowledge or new ways of thinking. Give examples such as the Wright brothers experimenting with airplanes until they could get one to fly. Talk about what the world would be like if we didn’t have scientists to experiment, and therefore, discover new ideas.)
4. Explain to the group that the first set of plants the children will be planting will be similar to the one you have brought in today. It is called a marigold. Each child will get to plant a marigold and watch its complete life cycle. Explain that these plants will not be experimented with because we want to see a plant grow from a seed to a full-sized plant. These are the only plants that we will not experiment on. Since we are not going to experiment on the marigolds, it is important that they are treated in a certain way.
5. Ask the child to put their thumb up if they agree with you or thumb down if they do not agree with you on these statements:
 - a. We should give our marigolds enough water so the soil stays damp.
 - b. We should pour our morning milk on our marigolds.
 - c. We should pull off the leaves to take home to our mommies.
 - d. We should not touch the growing plants.
 - e. We should push and shove around the plants.
 - f. We should show respect around other people’s plants and ours.
6. Explain to the children that they will be planting a flower called a marigold today and that it will take quite a long time for the plant to become a flower. (The entire process, from seeds to seed harvest, will take 40 to 48 days, depending on soil, temperature, and light conditions, and will be an ongoing part of the plants unit.)
7. Do the first two questions on the Garden Lab Worksheet (Appendix A) as a group. Explain that we will have to wait and see what happens to the plants in order to finish the worksheet. Then have the students go to their desks where you have laid out planting containers with their names written on them, spoons, the small bags of potting soil, and the 10 small pebbles. Instruct the children to place the pebbles in the bottom of the container and explain that this allows the water to run all the way through the pot for proper drainage. Then have the children fill their containers half way up with soil using their spoons or their hands.
8. Distribute four seeds to each child and ask them to plant one in each corner of the container and then spoon the rest of the potting soil on top. As the children finish, help them water their plants with a watering can. When finished, they should do the first page in their plant journals by drawing a picture of what the plant looks like (in this case, just a seed) and they should record the date and any other observations using pre-writing or writing skills, depending on their skill levels.

9. The students should put their plants in a sunny area that has been pre-cleared for this purpose. The seeds will germinate in less than 12 hours, plants will emerge from the soil in 48 hours, flower buds will appear in 7 or 8 days, flowers will begin to open in 12 to 13 days, and seeds may be harvested in 40 to 48 days.
 10. Also note, it may be a good idea to plant extra containers in case one of the students' plants do not come up. However, chances are good that one of the four seeds that the children plants will come up. Have the children check their plants each day and record any observations in their plant journals.
- E. *Assessment/Evaluation*
1. Check to make sure each child filled out the first page in his/her plant journals. Informally check to see if the children understood the term "experiment."

Lesson Two: Plants Needs, Experiment #1 (approximately 45 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will understand that plants have basic needs for survival.
 2. Lesson Content
 - a. What plants need to grow: sufficient warmth, light, and water. (*Core Knowledge Sequence* p. 19)
 3. Skill Objective(s)
 - a. Students will identify water, air, sunlight, and soil as important factors in the survival of plants.
- B. *Materials*
1. The story *A Seed Grows: My First Look at a Plant's Life Cycle* by Pamela Hickman and Heather Collins
 2. Two petri dishes or margarine tub lids for every group of four students
 3. Six green bean seeds for every group of four students
 4. Paper towel
 5. An eye dropper for every group of four students
 6. An overhead transparency of Appendix A, Garden Lab Worksheet
 7. Access to a refrigerator
 8. Magnifying lens
- C. *Key Vocabulary*
- None
- D. *Procedures/Activities*
1. Draw the children to the circle area. Read the story *A Seed Grows: My First Look at a Plant's Life Cycle* by Pamela Hickman and Heather Collins. Discuss what needs the plants had in the book, such as the need for water, soil, sunlight, and air. Reintroduce the idea of "experimentation." Tell the children that they are going to do several experiments or tests to see if their theories that plants need water, soil, air, and sunlight are really true.
 2. The first experiment is going to test whether or not plants need to be kept warm. Fill out the first two questions of Appendix A, Garden Lab Worksheet, to determine the problem and the children's predictions.
 3. Separate the children into groups of four. Give each group two petri dishes or two margarine lids. The students should trace around the lids or dishes on paper towel and then cut out the circles and fit them into the bottom of the dishes. (This may be something the teacher could do ahead of time.) Moisten the paper circles with an eyedropper and place three green bean seeds on it. Have the groups set one of their petri dishes in a warm location (optimum temperature: 65-80 degrees) and set one of their petri dishes in a refrigerator.

4. Over the next 3-4 days, the children should check the water levels of both the refrigerated seeds and warm seeds. After a week's time, the children should compare the two sets of seeds. Encourage the children to examine the germinating seeds from the warm area with a magnifying lens. (See Appendix C for instructions on making an inexpensive film can hand lens.)
 5. Fill out the second set of questions on the Garden Lab Worksheet and discuss as a group what you learned. Discard the seeds and clean up the petri dishes or throw out the margarine lids. (Make a copy of the Garden Lab Worksheet on green paper before erasing the results from the lab. At the end of the unit, all the lab worksheets will be displayed on a bulletin board.)
- E. *Assessment/Evaluation*
1. Through discussion, determine whether the students understood the concept that plants require a warm environment, in order to survive.

Lesson Three: Plants Needs, Experiment #2 (approximately 30 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will understand that plants have basic needs for survival.
 2. Lesson Content
 - a. What plants need to grow: sufficient warmth, light, and water. (*Core Knowledge Sequence* p. 19)
 3. Skill Objective(s)
 - a. Students will identify water, air, sunlight, and soil as important factors in the survival of plants.
 - b. Students will measure length using inches.
- B. *Materials*
1. A large cardboard box with a lid with a two-inch in diameter hole cut into one side of it
 2. Two bean seedlings
 3. Water
 4. Appendix A transparency, Garden Lab Worksheet
 5. *The Sleepy Dormouse* by Mark Ezra
- C. *Key Vocabulary*
1. Light – plants need sunlight to produce food
- D. *Procedures/Activities*
1. Read the story *The Sleepy Dormouse* by Mark Ezra. Talk about the events of the story, focusing on the fact the plant grew through the hole in the upside-down pot towards the light. Ask the children if they think this would happen in real life. Tell the children you are going to find out the answer by doing an experiment. As a group, do the first two questions on the Garden Lab Worksheet. Then, explain to the children that plants need light to grow and to produce food. Most plants react to light and grow towards it, even when the light is dim.
 2. As the children watch, water and place a bean seedling into the cardboard box farthest from the hole, and then close the box. Place the other bean seedling in the sunlight, next to the box. Position the box so that the hole faces the sunlight.
 3. Every day or so, open the box to water the plant if necessary, and ask the children to observe the direction of plant growth. You may want to place the plants side by side to make the difference more apparent.
 4. Ask the children to compare the growth of the two plants over two weeks. As a group, measure the two plants in inches and record the measurements on the

- board. Talk with the children about their observations. Can they think of a rule (hypothesis) about plants and light?
5. Complete the last two questions on the Garden Lab Worksheet as a group. Keep the bean plants for experiment #5.
- E. *Assessment/Evaluation*
1. The children's discussion should indicate their understanding of the effects of light on plants. They should be able to infer that plants grow towards light.

Lesson Four: Plants Needs, Experiment #4 (approximately 45 minutes)

A. *Daily Objectives*

1. Concept Objective(s)
 - a. Students will understand that plants have basic needs for survival.
2. Lesson Content
 - a. What plants need to grow: sufficient warmth, light, and water. (*Core Knowledge Sequence* p. 19)
3. Skill Objective(s)
 - a. Students will identify water, air, sunlight, and soil as important factors in the survival of plants.

B. *Materials*

1. Large amount of water cress seed
2. Cotton batting (available a fabric stores)
3. A clean meat tray per student
4. Several water-proof markers
5. Appendix A transparency
6. Several plastic knives

C. *Key Vocabulary*

None

D. *Procedures/Activities*

1. Gather the children to the circle area. Talk about the experiments that you have conducted on plants. Ask: "What happened when we did the experiment of putting seeding in the refrigerator? Did the plants grow? Why not? What happened when we grew a seedling in a box with a hole cut in the side of it? Why did it grow towards the hole? What did this tell us about plants? So far, we know that plants need sunlight. What else do you think plants need? Today, we are growing to do a fun experiment to show that plants need water to grow."
2. Explain to the children that we are going to grow watercress. Cress is a sprout that will grow on a wet foundation. It will grow by itself, if you remember to water it. Begin by giving each student a piece of cotton batting that has been pre-cut to fit on a meat tray. The student should take a waterproof marker and draw in large letters, his/her initials. Then the student should set the cotton onto the tray and pour water over it until it is completely soaked.
3. Then students should scatter the cress seeds thinly following their marker drawings and being sure to leave ample space between the letters so that the seeds to not grow together. Straighten the seeds with a plastic knife, and remove any seeds that have spilled alongside.
4. While the students are completely their projects, the teacher should make a tray with cress on it, but that do not have access to water. The students should reconvene in the circle area to do Appendix A, Garden Lab Worksheet. Encourage the students to make predictions about their cress and about the cress that isn't being watered. Encourage the children to check their projects often to make sure they stay wet.

5. In just three or four days, the trays should be bulging with cress. Compare the cress that was given water to the cress that wasn't given water. Ask the children: "Can plants survive without water?" Go back and complete the Garden Lab Worksheet. Be sure to make a copy of the worksheet on green paper before erasing the results.
 6. Encourage the children to taste their cress, if they wish. Send the projects home immediately (they may begin to mold, if kept past their due).
- E. *Assessment/Evaluation*
1. It will be apparent in the discussion if a child didn't understand the reason for the experiment: Plants need water to survive.

Lesson Five: Plant Needs, Experiment #5 (approximately 30 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will understand that plants have basic needs for survival.
 2. Lesson Content
 - a. What plants need to grow: sufficient warmth, light, and water. (*Core Knowledge Sequence* p. 19)
 - b. Plants make their own food.
 3. Skill Objective(s)
 - a. Students will identify water, air, sunlight, and soil as important factors in the survival of plants.
- B. *Materials*
1. The two bean plants from Lesson Three
 2. A tub of petroleum jelly such as Vaseline
 3. Appendix A transparency
 4. *The Tiny Seed* by Eric Carle
 5. Artificial vines and flowers from craft store for bulletin board (optional)
 6. Paint, white paper, green construction paper, and scissors for hand print tulips for bulletin board (optional)
 7. One copy of Appendix D (Plants' Needs Assessment) for teacher
- C. *Key Vocabulary*
1. Carbon dioxide – the gas that we breathe out and that plants absorb
 2. Stomata – the small pores in leaves where oxygen is released and carbon dioxide is absorbed
- D. *Procedures/Activities*
1. Gather the children in the circle area. Review lessons learned in experiments 1-4. Continue to check the progress of the marigold plants and record it in plant journals. Read the book *The Tiny Seed* by Eric Carle. Talk about the kinds of conditions it takes to grow a seed. Use Socratic questioning to get to an idea that a seed and a plant need air to survive and grow. Tell the children that the next experiment is going to test if plants really need air.
 2. Do the first two questions on the Appendix A transparency. Then, using the bean plants from Lesson Three, coat both sides of a leaf with petroleum jelly. You may want to enlist help from the children. Then coat the topside only of a second leaf and the lower side only of a third leaf. If there is a fourth leaf, leave it alone.
 3. Observe the plant for two weeks, continuing to water it and reapplying petroleum jelly if needed. After two weeks, gather the students in the circle area and discuss what happened to the leaves. The coated leaves have lost their green color and are probably wilted. The leaves may even have dropped off the plant. What did the jelly prevent the leaf from doing? (absorbing carbon dioxide from

the air and releasing oxygen into the air.) This can be simplified for the children by having them first breathe out a big breath. Tell them that this is the air called carbon dioxide that plants take in their leaves. Then have the children sharply inhale. Tell them this is the air or oxygen that the plant makes inside it and releases for us to breath.

4. Have the children compare which of the four leaves were in the worst condition. (The one coated with jelly on the lower side.) This is because there are more pores on the lower side of the leaf than on the upper side of the leaf. These small pores are called stomata. Oxygen is released through these openings and carbon dioxide is absorbed through the same openings. Explain to the children that the jelly was like someone taking their hand and putting it over their mouth and nose and the same time (they will attempt this). The result is not being able to breath. The conclusion is: plants need air to stay alive.
 5. Complete the last two questions on transparency Appendix A as a group. After the lesson, make a copy of the transparency on green construction paper. Take the copies from the plant experiments 1-4 and arrange them on a bulletin board labeled "Look what's growing in kindergarten!" Decorate around the Garden Lab Worksheets with artificial vine and flowers, purchased from a hobby store. You may also want to make hand print tulips during art time. To do this, you have the children dip a palm in paint and print it on large paper. Then the children can either draw on or cut stems and leaves out of green paper to embellish the "tulips." To create a different paint-print flower, have the children experiment using other parts of the hand. For example, print with the bottom of your fist and add petals with thumbprints.
 6. After going over the results of all the experiments one more time as a group, send the children back to their seats to take an assessment (Appendix D) of their knowledge of plants' needs.
- E. *Assessment/Evaluation*
1. Give the Plants' Needs Assessment (Appendix D) orally to the group as a whole or to each individual student.

Lesson Six: Plants Parts (approximately one hour)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will understand a simplistic version of a plant's life cycle.
 2. Lesson Content
 - a. Basic parts of plants: seed, root, stem, branch, leaf.
 3. Skill Objective(s)
 - a. Students will observe and use pre-writing skills to describe the growth of a plant.
 - b. Students will identify the basic parts of plants: seed, root, stem, branch, and leaf.
 - c. Students will create a message by drawing, telling, and/or emergent writing.
- B. *Materials*
1. *From Seed to Plant* by Gail Gibbons
 2. Appendix E (Plant Parts Song words)
 3. Copies of Appendix F (Plants Parts Assessment) for each student
- C. *Key Vocabulary*
1. Roots - anchor and support the plant, take in water and food, and store food

2. Stems - holds leaves up to the light and move water and food up and down the plant
 3. Leaves - “catch” light and use it to make food
 4. Flowers - produce seeds and attract birds, insects, and other pollinators
- D. *Procedures/Activities*
1. Read the book *From Seed to Plant* by Gail Gibbons. Have a general discussion about the book and what the children have observed so far in growing marigolds. Ask the children: “What body parts do you have?” (head, arm, etc.) Say: “We are going to look at the many parts that make up a plant. Plants have parts just as your body has parts.”
 2. Place the plant on a table in front of the children. Identify and discuss the basic parts of the plant (roots, stems, leaves, and flowers), and discuss the function of each.
 3. Ask: “In what ways are our bodies like plants?” Tell the children that they will have an opportunity to collect plant samples. Give each child a plastic bag and a plastic spoon for digging. Take the children on a walk to a lot or roadside where weeds are plentiful. Encourage the children to dig up a few plants that demonstrate various plant parts.
 4. Return to the classroom, and have the children go to their desks. Tape down an index card with a piece of double sided sticky tape on it. Have the children dissect or cut a part their plants and arrange them on the tape strip. Have the words “flower,” “stem,” “roots,” and “leaves” displayed where all can see. Help the children label their plant parts on the index card.
 5. Re-gather the children in the circle area. Teach the children the Plant Parts song (Appendix E). Encourage them to teach the song to their parents when they get home.
- E. *Assessment/Evaluation*
1. Give the children the plants parts assessment (Appendix F).

Lesson Seven: Edible plants (approximately 30 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will comprehend that plants have a vital connection to human existence.
 2. Lesson Content
 - a. Flowers and seeds: seeds as food for plants and animals (for example, rice, nuts, wheat, corn)
 3. Skill Objective(s)
 - a. Students will identify some examples of seeds and flowers that are edible (for example, rice, nuts, wheat, and corn).
- B. *Materials*
1. The book *Growing Vegetable Soup* by Lois Ehlert
 2. Access to chalk board
 3. Copies of Appendix G (Tossed Salad Cards) cut out and strung with string to make necklaces (one per child)
 4. Various fruits and vegetables prepared for each child
 5. A chair for each student arranged in a circle
 6. Copies of Appendix H (Edible Plant Assessment) for each child
 7. A camera (optional)
- C. *Key Vocabulary*
- None

- D. *Procedures/Activities*
1. Gather the children in the circle area. Read the story *Growing Vegetable Soup* by Lois Ehlert. Discuss with the children the fact that some of the foods we eat daily originate from plants. They may not be aware of this. Many of them may think the grocery store is the one and only source of food. Ask the children what they ate the day before. Make a list of the foods on the chalkboard. How many of the foods that you ate came from plants? Circle these foods.
 2. Next, talk about the different plant parts that food comes from. Identify any that we listed on the board such as carrot as a root, lettuce as a leaf, etc. Then give each child a salad ingredient card (Appendix G), which has been strung to make a necklace. Write “Tossed Salad” on the board and then brainstorm ingredients for salad.
 3. As children volunteer their favorite salad ingredients, offer comments like: “You like carrots. That means you like to eat roots!” or “Stems are delicious! I like celery too.” Prepare to play Tossed Salad. Review the plant part each card represents – for example, when you eat a carrot, you’re eating a root. Other common vegetables are classified:
 - a. Roots: carrots, beets, radishes
 - b. Stems: celery, onions
 - c. Leaves: lettuce, spinach, cabbage
 - d. Fruits: tomatoes, oranges, grapes, cucumbers
 - e. Flowers: broccoli, cauliflower
 - f. Seeds: corn, oats, peanuts
 4. To play the game, arrange chairs in a large circle and have children plant themselves in seats. Call out one salad item – for example, “Carrots!” Have all children wearing carrots stand and find a new chair from among the ones vacated by the other carrots. After the children catch on, announce more than one item at once: “Carrots and Tomatoes!” Finally, call out “Tossed Salad” and have everyone get up and find a new seat.
 5. For a challenge, switch from the name of the fruit or vegetable to the name of the plant part. For example, call out “Stems!” or “Leaves and Flowers!”
- E. *Assessment/Evaluation*
1. Give the children Appendix H (Edible Plants Assessment). Serve carrot sticks, celery sticks, broccoli flowerets, lettuce leaves, cherry tomatoes, and other plant parts. Ask the children to name the plant part and then arrange the part in one of the four quadrants on the assessment. Take a picture of the completed assessment, for record keeping purposes. Allow the children to eat their work!

Lesson Eight: We’ve Come Full Circle (approximately 45 minutes)

- A. *Daily Objectives*
1. Concept Objective(s)
 - a. Students will understand a simplistic version of a plant’s life cycle.
 2. Lesson Content
 - a. What plants need to grow: sufficient warmth, light, and water. (*Core Knowledge Sequence* p. 19)
 3. Skill Objective(s)
 - a. Students will observe and use pre-writing skills to describe the growth of a plant.
 - b. Students will sequence a plant’s life cycle.
 - c. Students will create a message by drawing, telling, and/or emergent writing.

- B. *Materials*
1. Two copies of Appendix I (Plant Accordion Books) for each student (pre-made)
 2. A copy of Appendix J (Plant Life Cycle Assessment) for each student
 3. Orange finger paint
 4. Markers for all the children to use/share
 5. The children's plant journals
 6. The children's marigold plants
 7. Two envelopes per child
- C. *Key Vocabulary*
None
- D. *Procedures/Activities*
1. Gather the children in the circle area. Have a general discussion about the many new things they have learned about plants. Have the children make their final entry in their plant journals. (At this point, the marigold flowers have gone to seed.)
 2. Tell the students that today is a special day: Seed Harvest. Say: First, we are going to do a special art project that is going to show the life cycle of your marigold. You are not only going to make one project for you to take home, but you get to make an extra project for next year's kindergartners. Then we are going to make a special package for next year's class using the seeds from our marigolds. Just think how excited next year's kindergartners will be to open your packages and then get to use your seeds from their projects!
 3. Give each student two pre-made flower accordion books (Appendix I). Have the children color the cover of each book. Page 1: Color the bottom with a brown crayon to make dirt. Glue one marigold seed in the dirt. Use a green marker to draw a sprout coming out of the seed and up through the dirt.
 4. Page 2: Use a green marker to draw the sprout extending towards a bright yellow sun.
 5. Page 3: Use a green marker to draw the stem and leaves and then have the students dip their fingers in bright orange paint and press it on the stems to make the marigold flowers.
 6. Page 4: Use green and brown markers to draw the seedpods. Help the children to write one or two sentences about what they learned in the plant unit. Make sure they sign their names to both pieces of artwork. Repeat this procedure on the second booklet. Then have the children to carefully harvest their marigold seeds and place four to six seeds in an envelop that will include one of the flower booklets, once it has dried. This will be sealed and opened by a kindergartner next year. Send the remaining seeds home with the present kindergartner along with their plant journals and their assessments.
- E. *Assessment/Evaluation*
1. Give each child a copy of Appendix J (Plant Life Cycle Assessment) to complete.

VI. CULMINATING ACTIVITY

None

VII. HANDOUTS/WORKSHEETS

- A. Appendix A: Garden Lab Worksheet
- B. Appendix B: Plant Journal
- C. Appendix C: Hand Lens Instructions
- D. Appendix D: Plants Needs Assessment
- E. Appendix E: Plant Parts Song

- F. Appendix F: Plants Parts Assessment
- G. Appendix G: Tossed Salad Cards
- H. Appendix H: Edible Plants Assessment
- I. Appendix I: Flower Accordion Books
- J. Appendix J: Plant Life Cycle Assessment
- K. Appendix K: Plant Growing Tips

VIII. BIBLIOGRAPHY

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Appendix A

Garden Lab Worksheet

Problem: What do you want to find out?

Prediction: What do you think will happen?

Test and Observe: What did you do? What did you see?

Conclusion: What did you learn?



My Plant Journal

By _____

Date _____

I see _____

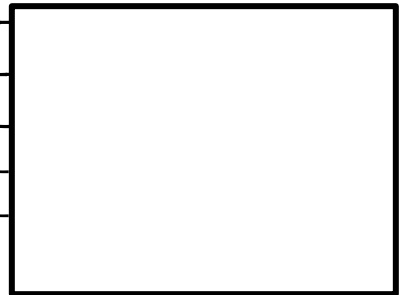
This is how it looks:



Date _____

I see _____

This is how it looks:



Appendix C

Film Can Hand Lens

A simple hand lens can be made with only an inexpensive lens, a film can and a soda bottle cap.

Materials:

- Translucent or clear film cans with lid, available at film-processing centers
- Plastic soda bottle cap
- Double convex plastic lens with 5x magnification, 26 mm in diameter, and a focal length of 59 mm (available from Carolina Biological Supply 1-800-334-5551)
- Electric drill
- $\frac{3}{4}$ -inch diameter wood bit with spurs
- $\frac{1}{8}$ -inch diameter drill bit
- Wooden dowel, 2.5 cm in diameter and approximately 5 cm long
- Optional: yarn or string, 1 meter long

Preparation:

- Drill a $\frac{3}{4}$ -inch hole in the top of soda bottle cap.
- Drill a $\frac{3}{4}$ -inch hole in the bottom of a film can.
- Optional: drill two $\frac{1}{8}$ -inch holes in the side of the film can; approximately $\frac{1}{4}$ inch from the top of film can and $\frac{1}{4}$ inch apart for inserting string for a necklace.

Construction:

- Drop the lens into the film can.
- Set the bottle cap with the hole facing down into the open end of the film can.
- Set the film can on a table; place a wood dowel into the bottle cap push the bottle cap down firmly until it sandwiches the lens into the bottom of the film can.
- You can thread a string through two small holes made in the film can and wear the film can hand lens as a necklace.

Appendix D

Plants Needs Assessment

Read the following paragraphs to the students as a group or individually and then ask the following questions orally. Their answers should reflect what they've learned about plants so far.

1. Where do plants grow best? Get two clean plastic containers. Fill both with soil and plant marigold seeds in each. Place one of the containers in the refrigerator and one in the sunshine. Keep the soil damp by watering the plants when needed. Check the growing process each day.

* What do you think will happen to the marigold growing in the refrigerator?

(It will not grow because it is too cold.)

* What do you think will happen to the marigold growing in the warm sunshine?

(It will grow because it is warm.)

* Where do plants grow best?

(Plants grow best in a warm place.)

2. Do growing plants need light? Get two small bean plants. Put one plant by the window, and cover the other plant with a brown paper bag. Keep the soil of both plants moist. Check the plants every few days.

* What do you think the plant with the paper bag on it will look like?

(The leaves will be brown; it will look unhealthy.)

* What do you think the plant placed by the window will look like?

(It will be green and healthy.)

* Do growing plants need light? Why?

(Yes, the plant uses the light to help it make food.)

3. Do plants need air to be healthy? Get a plant with many green leaves. Coat both sides of some of the leaves with Vaseline. Keep the plants watered. Check the plants every few days.

* What do you think will happen to the leaves that are covered with Vaseline?

(They will wilt and lose their green color. They may even fall off the plant.)

* What do you think will happen to the leaves not covered with Vaseline?

(They will be healthy and green.)

* Why does putting Vaseline on plants' leaves make them turn brown?

(It makes them turn brown because it covers the pores up so that air or carbon dioxide can't get into the plant for it to make food. Oxygen also can't get out of the leaves.)

* Do plants need air to be healthy? Why?

(Yes, plants need air to be able to make food.)

4. Do plants need water to survive? Get two blooming rose bushes. Water one of the plants with the soil feels dry, but do not water the other rose bush at all. Check the rose bushes each day.

* What do you think will happen to the rose bush that you kept watered?

(It will be green and healthy.)

* What do you think will happen to the rose bush that you didn't water?

(It will lose its leaves and roses and eventually die.)

* Do plants need water to live? What are all the things plants need to survive?

(Yes. Plants need soil, water, air, and a warm place to survive.)

Appendix E

Plant Parts Song

(sung to the tune of “The Farmer in the Dell”)

A seed grows little roots.
A seed grows little roots.
The roots grow down into the soil.
A seed grows little roots.

A seed grows a long stem.
A seed grows a long stem.
The stem grows way up toward the sun.
A seed grows a long stem.

A plant grows many leaves.
A plant grows many leaves.
The leaves grow out quite green and strong.
A plant grows many leaves.

A plant can grow a flower.
A plant can grow a flower.
The flower grows and holds the seeds.
A plant can grow a flower.

Appendix F

Plants Parts Assessment

Paste.

cut.

Seeds

leaves

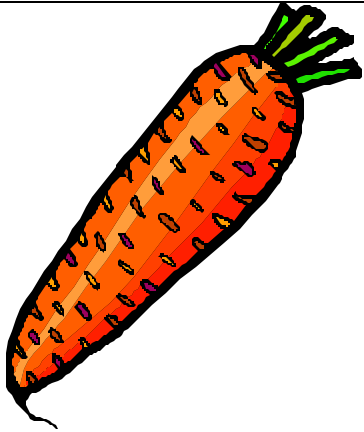

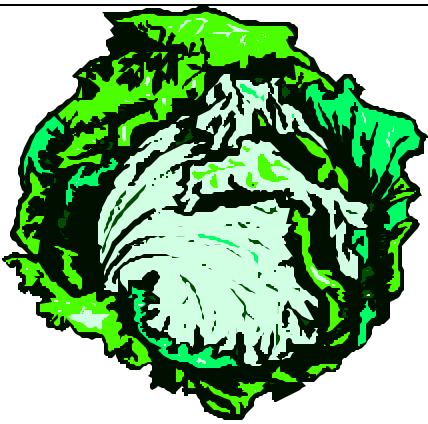

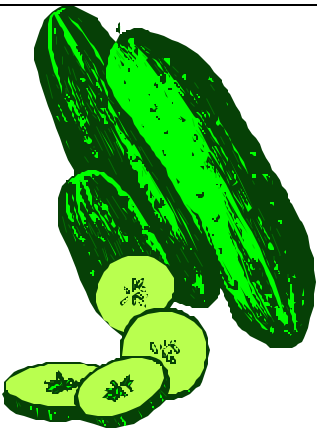

flowers

stem

roots

Appendix G

Tossed Salad Cards

 <p>carrot</p>	 <p>celery</p>
 <p>lettuce</p>	 <p>tomato</p>
 <p>cucumber</p>	 <p>broccoli</p>

Appendix H

Edible Plants Assessment

Roots

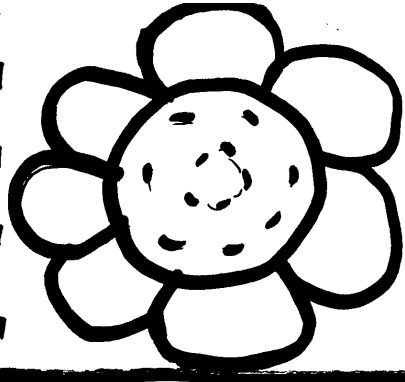
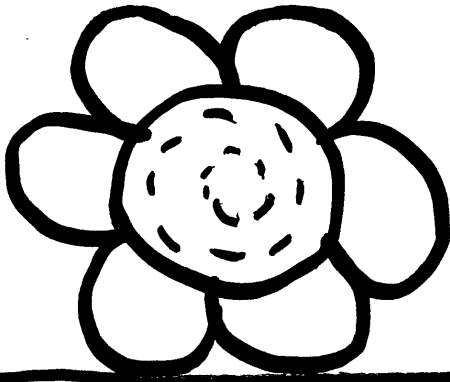
Stems

Leaves

Flowers

Appendix I

Flower Accordion Books



Fold.

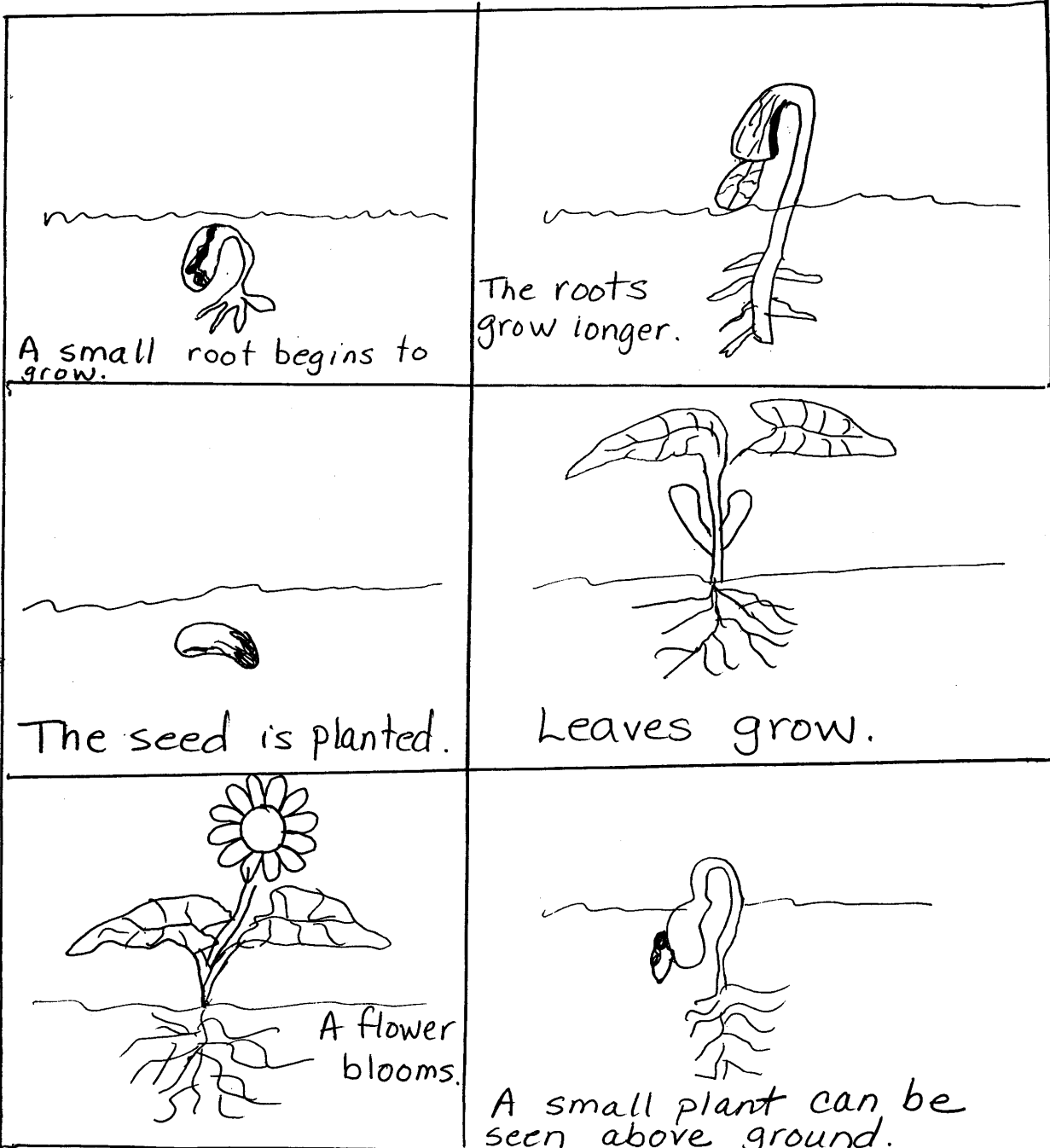
Fold.

Fold.

Cuts

Appendix J
Plant Life Cycle Assessment

Cut out squares. Glue in order on another piece of paper.



Appendix K

Plant Growing Tips

Air

Plants breathe through leaves and roots. That's why it's important to pour away any excess water that remains in the saucer when you water the plant, about ten minutes after watering. And no plant can tolerate standing in a constant draft.

Water

All plants should be watered, including cacti. A plant that sits in the light where it's dry needs more water than one that sits in the dark. Plants should be watered when the soil feels dry. Test the soil with a finger, and get into the habit of keeping an eye on your plants. Too much water "drowns" the plant.

Soil

The plant soil that you buy at supermarkets is the easiest to use. Garden soil that isn't too stony or clayey can also be used, but sterilize it first: Put the soil in a roasting pan lined with aluminum foil. Set that oven at 250 degrees F and bake the soil for an hour. Let the soil cool before sowing or planting in it.

Fertilizing

Plants grow faster and get bigger when they are fertilized. Liquid fertilizer is difficult to use. Try fertilizer sticks. Simply put the stick in the soil so the plant can take what fertilizer it needs by itself. Follow the directions on the packet. Sprouts should never be fertilized. Wait until the plant has