Growth and Change

Lesson #1: Plant Growth and Life Cycles – Part 1

Book(s): Unit 3 – Seeds

Time Frame: 1 session of 20-30 minutes (may take longer)

Learning Standards:

Science

Life Science: Characteristics of Living Things

1) Recognize that animals (including humans) and plants are living things that grow, reproduce, and need food, air, and water.

2) Recognize that plants and animals have life cycles, and that life cycles vary for different living things.

Skills of Inquiry

- Ask questions about objects, organisms, and events in the environment.
- Tell about why and what would happen if?
- Make predictions based on observed patterns.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Explain that plants need soil, water, light, and air to grow.

2) Observe and describe the life cycle and changes and growth of a plant.

Note: For this activity to go smoothly it is important to have all of the materials organized, labeled (if applicable), and ready to go before the students enter the room. Also, introductory activities should be brief to allow plenty of time for the students to plant the seeds and make predictions. The plant activities will occur over 3 consecutive weeks to please plan accordingly. Over school breaks there is no one at the school to care for the plants.

Anticipatory Set: Ask students if they have grown plants in gardens or in their homes. Explain that over the next few weeks students will experiment to determine what plants need to grow and observe how plants come from seeds.

Activity:

1) Show a picture of a plant (or use a potted plant) and ask the students what the plant needs to grow. Record the student responses on the board. Plants need soil, water, light, and air.

2) Give the planting materials to each table including small containers with holes in the bottom, soil, spoons, water, and markers. Tell each student that they will plant a seed and watch it grow. Give each student a small
container and label it with their name and the date. Remind the students that plants need soil to grow, add soil to each container, and then have the students plant a few seeds in their container. Have the students (either individually or as a group) take a picture or make a drawing of the seed before it is planted. Ask the students to make predictions about what they think will happen to the seed and record the predictions. Students may also make drawings of their predictions.

3) As a table, plant two containers with seeds and set them aside. These will be part of later experiments. Also, plant two seeds in a Ziploc bag so that the students can observe what is happening to the seed when it is underground.

4) Put some water on the table. Remind the students that plants need water to grow. Have the students add water to their seeds but remind them not to add too much water. Water the seeds over the next two weeks whenever the soil feels dry. Take out one of the extra containers with seeds and label it with a picture showing that it will not get any water. Tell the students that these seeds will not get any water. Ask the students to make predictions about what they think will happen to these seeds and record the predictions. Students may also make drawings of their predictions.

5) Ask the students to put their seeds in a sunny window. Ask the students why the seeds need to be in the sun and remind them that plants need sunlight to grow. Take the other extra container with seeds and label it with a picture showing that it will not get any sunlight. Place these seeds in a dark closet (but make sure they get water). Ask the students to make predictions about what they think will happen to these seeds and record the predictions. Students may also make drawings of their predictions.

**Closure:** Remind the students that a plant is a living thing just like they are and also needs air in order to live. Review the four things that a plant needs to live including soil, water, sunlight, and air. If time permits, ask different groups to share their predictions about what will happen to the seeds under the different conditions.

**Assessment:** Participation in class discussions and activities, photos or drawings of the seeds, predictions

**Resources and Materials:** Picture of a plant (or an actual plant), containers to plant seeds with drainage holes, soil, cups, spoons, watering cans, bean seeds, cameras or paper with markers and colored pencils (for recording initial observations about the seeds), Ziploc bags, permanent markers (for instructor use – to label)
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Lesson #2: Plant Growth and Life Cycles – Part 2

Book(s): Unit 3 – Seeds

Time Frame: 1 session of 20-30 minutes

Learning Standards:

Science
Life Science: Characteristics of Living Things
1) Recognize that animals (including humans) and plants are living things that grow, reproduce, and need food, air, and water.
2) Recognize that plants and animals have life cycles, and that life cycles vary for different living things.
3) Describe ways in which many plants and animals closely resemble their parents in observed appearance.

Skills of Inquiry
• Ask questions about objects, organisms, and events in the environment.
• Tell about why and what would happen if?
• Name and use simple equipment and tools (e.g., rulers, meter sticks, thermometers, hand lenses, and balances) to gather data and extend the senses.
• Record observations and data with pictures, numbers, or written statements.
• Discuss observations with others.

Student will be able to:
1) Explain and observe how plants grow from seeds.
2) Observe and describe the life cycle and changes and growth of a plant.

Anticipatory Set: Ask students where baby plants come from. Discuss seeds and how adult plants produce seeds and how seeds grow (given the right conditions) to make another plant.

Activity:
1) Get out the plants growing in the sunlight that are getting water (the control group). Give the students time to make observations, water the plants (as needed), and take a picture or make a drawing of anything that they can observe at this time (save this drawing with the initial drawing of the seed). Also, look at the Ziploc bag with the seeds planted in the soil and observe what is happening to the seeds. Discuss the observations as a class.
2) Give each student a bean seed that has soaked in water overnight. Ask each student to slip the seed out of its covering. Explain that this is called a
coat and it helps protect the seed. Then ask the students to carefully open the seed and look closely, possibly using a magnifying glass. Ask students if they can see the baby plant and help students as necessary to observe the seed. Explain that there is a baby plant in every seed and when the seed sprouts the little plant begins to grow. If time permits students can look at other types of seeds that have soaked overnight to compare and contrast.

3) Ask the students what might make a seed start to grow? Discuss the importance of water, sunlight, soil, and air (review from the last class).

**Closure:** What grows from an apple seed? What grows from a sunflower seed? What grows from a bean seed? Can a pumpkin grow from an acorn seed? Why or why not? Discuss that parent plants make seeds that produce plants that are the same type as the parent plants.

**Assessment:** Participation in class discussions and activities, photos or drawings of the seeds.

**Resources and Materials:** Planted seeds from the last class, watering cans, bean seeds soaked in water overnight (other types of seeds soaked in water overnight), cameras or paper with markers and colored pencils (for recording observations).
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Lesson #3: Plant Growth and Life Cycles – Part 3

Book(s): Unit 3 – Seeds

Time Frame: 1 session of 20-30 minutes

Learning Standards:

Science

Life Science: Characteristics of Living Things
1) Recognize that animals (including humans) and plants are living things that grow, reproduce, and need food, air, and water.
2) Recognize that plants and animals have life cycles, and that life cycles vary for different living things.

Skills of Inquiry
• Ask questions about objects, organisms, and events in the environment.
• Tell about why and what would happen if?
• Make predictions based on observed patterns.
• Record observations and data with pictures, numbers, or written statements.
• Discuss observations with others.

Student will be able to:
1) Explain that plants need soil, water, light, and air to grow.
2) Observe and describe the life cycle and changes and growth of a plant.

Anticipatory Set: Ask the students to review their predictions with the class about what happened to the seeds with no water, the seeds with no soil, and the seeds with no sunlight. Discuss the predictions as a class.

Activity:
1) Place the plants that had water, sunlight, and soil (controls) on each table. Have the students take a picture or make a drawing of the bean plants. Assemble the drawings or pictures into a series that shows the development of the bean seed over time. Discuss the life cycle of a bean plant with the class. Explain that their bean plant will eventually make more seeds and the cycle will start again.
2) Show the students the seeds that had no soil and discuss the results. Compare the results to the initial predictions made by the students. Show the students the seeds that had no water and discuss the results. Compare the results to the initial predictions made by the students. Show the students the seeds that had no sunlight and discuss the results. Compare the results to the initial predictions made by the students.
3) Discuss the results of the experiments as a class and review the importance of water, soil, sunlight, and air for a seed or a plant to grow and survive.

4) As a final plant activity have the students get down on the floor and curl up like a seed. Tell them that they are seeds deep underground in the soil. Inside of you is a baby plant waiting to grow. Wiggle one arm to show me your baby plant. You wait a long, long time and then you feel warm sun and trickle of water. The plant inside of you begins to grow. Slowly raise your arm and begin to stretch up as your plant gets taller and taller. Put out your arms as the leaves begin to grow and raise your face up to the sun and fresh air. Your face is a beautiful flower. The seed has turned into a new plant. Tell me about your parts. Your feet are the roots, planted in the soil and taking in water and minerals, your body is the stem for carrying water and food and supporting the plant, and your arms are the leaves for making food. Your face is a flower that will make seeds. The seeds drop to the ground to make new plants. Drop back to the ground as a little seed, curl up tight, and slowly repeat the cycle. This is the life cycle of a plant.

**Closure:** Discuss the motion activity and review the life cycle of a plant using the student photos or drawings and discussing how a seed becomes a plant and a plant makes more seeds.

**Assessment:** Participation in class discussions and activities, photos or drawings of the seeds, plant life cycle motion activity

**Resources and Materials:** Planted seeds in different conditions, cameras or paper with markers and colored pencils (for recording observations)
Unit 5: Growth and Change

Lesson #4 Parts of a Plant - Whose garden is it?

Book(s): Whose Garden Is It?; Mary Ann Hoberman

Time Frame: 1 session of 30 minutes

Learning Standards:

Skills of Inquiry
- Ask questions about objects, organisms, and events in the environment.
- Tell about why and what would happen if?
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Earth and Space Science

1) Recognize that water, rocks, soil, and living organisms are found on the earth’s surface.
2) Recognize that the sun supplies heat and light to the earth and is necessary for life.

Life Science

1) Recognize that animals (including humans) and plants are living things that grow, reproduce, and need food, air, and water.
2) Identify the ways in which an organism's habitat provides for its basic needs (plants require air, water, nutrients, and light; animals require food, water, air, and shelter).

Student will be able to:

1) Name the parts of a plant
2) Name some things a plant needs

Background Information: At this level the children should be able to recognize the five basic parts of plants; roots, stems, leaves, flowers, seeds. In future years they will learn the basic jobs for each of the parts of a plant. Roots take in water and nutrients, stem transports water and nutrients and food around the plant, the leaf is the food factory, the flower produces the seeds, and the seed reproduces the plant. Plants need sun, water air nutrients and space to grow successfully. The story introduces some of these elements.

Anticipatory Set: Ask the children to tell you one thing about plants. Discuss their offerings. If there is time, write their offerings on the board.
Activity:

1) Read the book, *Whose Garden Is It?*
2) Have the children discuss who they think owns the garden.
3) From the story, identify the things a plant needs to grow.
4) Create a junk model plant and discuss with individuals what they are thinking about when they make the parts of the plant. Emphasize that you are more interested in what they are thinking about than how the plants look.

Closure: Have children take a mental picture, pretend to take a picture, of the plant they made. Go over the different parts of their plant. Draw them on the board.

Assessment: Children will be able to name the 5 parts of a plant.

Resources and Materials: Bags of junk; *Whose Garden Is It?*; Mary Ann Hoberman; whiteboard and markers
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Lesson #5: Animal Growth and Life Cycles

Book(s): Unit 3 – Farfallina and Marcel, Little Panda, See How We Grow

Time Frame: 2 sessions of 20-30 minutes

Learning Standards: 

Science
Life Science: Characteristics of Living Things
1) Recognize that animals (including humans) and plants are living things that grow, reproduce, and need food, air, and water.
2) Recognize that plants and animals have life cycles, and that life cycles vary for different living things.
3) Describe ways in which many plants and animals closely resemble their parents in observed appearance.

Skills of Inquiry
• Ask questions about objects, organisms, and events in the environment.
• Tell about why and what would happen if?

Student will be able to:
1) Explain that animals need food, water, and air to grow.
2) Describe and explain the life cycle and changes and growth of butterflies, pandas, and humans.

Anticipatory Set: Review with the students the life cycle of a plant and explain that today they will learn about the life cycles of animals. Ask students what they know about butterflies and what baby butterflies look like.

Activity:
1) Give each table or small group of students a series of pictures (mixed up) showing the stages of a butterfly life cycle. Ask the students to tape the pictures to a piece of paper and draw in arrows showing how the butterfly starts as an egg and then turns into a butterfly. Provide terminology and guidance as appropriate. Students should be introduced to the terms egg, larva (caterpillar) and pupa (chrysalis, not a cocoon if it is a butterfly).
2) Give each table an opportunity to share their life cycle with the class and discuss any differences between the groups. Go over the terminology again as a class and relate this life cycle to the events that occur in the book, Farfallina and Marcel. Ask the students to talk about what parts of the butterfly life cycle are missing from the book and what parts are present.
3) Give each table or small group of students a series of pictures (mixed up) showing the stages of a panda life cycle. Ask the students to tape the pictures to a piece of paper and draw in arrows showing how the baby panda grows into an adult panda. Provide guidance as appropriate.

4) Give each table an opportunity to share their life cycle with the class and discuss any differences between the groups. Relate this life cycle to the events that occur in the book, Little Panda.

5) Ask the students if humans are animals. Explain that we are animals and that humans also have life cycles. Relate the idea of a human life cycle to the book, See How We Grow. Ask students to work individually to make a human life cycle (with arrows, going in a circle, similar to the panda and butterfly life cycle). Encourage students to think about growth and to draw things paying attention to the relative size of a baby and an adult. Help the students label the drawings as time permits – labels might include baby, toddler, child, teenager, and adult.

**Closure:** What do all animals need to grow? What did the butterflies, pandas, and humans need to change and grow? (All animals need food, water, and shelter.) How were the animal life cycles different? How were the animal life cycles similar?

**Assessment:** Participation in class discussions and activities, construction of animal life cycles, drawings of a human life cycle

**Resources and Materials:** Color pictures of butterfly life cycle and the panda life cycle, paper, markers, crayons, colored pencils
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Lesson #6: Seasonal Observations - Winter

Book(s): Unit 2 – A Bed for the Winter, Bear Snores On

Time Frame: 20-30 minutes

Learning Standards:

Science

Earth and Space Science: Weather
1) Describe the weather changes from day to day and over the seasons.

Earth and Space Science: Periodic Phenomena
1) Identify some events around us that have repeating patterns, including the seasons of the year, day and night.

Life Science: Living Things and Their Environment
1) Recognize changes in appearance that animals and plants go through as the seasons change.

Skills of Inquiry
• Ask questions about objects, organisms, and events in the environment.
• Make predictions based on observed patterns.
• Record observations and data with pictures, numbers, or written statements.
• Discuss observations with others.

Student will be able to:
1) Make observations about a set area outside and predict how this area will change with the seasons.

Anticipatory Set: Tell the students that the current season is called winter. Ask them what happens in the winter. What season comes next? Remind the students of the cycle of seasons.

Activity:
1) Organize the science groups (2 students) to go outside. Direct them to make observations using their five senses about a specific area near the school that is roped off. The adults should act as scribes and write down as many observations as possible. Remind the students to make observations about living things and non-living things like dirt, wind, and rocks. Bring a thermometer outside to record the temperature and discuss the weather conditions. Look for active squirrels and relate this to the squirrel game played in class. (If it is never warm enough to do an outside lesson then students can make observations from inside and you can print out pictures of winter for the students to observe.)
2) Then, students should sit in a circle and each student should make a drawing of the square in the space labeled winter. If it is too cold, do this activity inside the classroom.

3) Return to the classroom and write all of the observations on a large piece of paper on the board (also labeled winter). Invite students to share their drawings with the class. Review the predictions made in the fall about what would happen in the winter and compare the predictions to the student observations and drawings.

4) Talk about what happens to animals and plants in winter. Discuss how some animals hibernate, some migrate, and some stay active. Relate these ideas to the books (listed above).

**Closure:** As a class, make predictions about how this area will be different in the spring. Write down the predictions on another piece of paper labeled spring predictions. Make predictions about the weather, temperature, living things, and non-living things. Note: Save all of the student drawings, observations and predictions to discuss during the next seasonal observation.

**Assessment:** Participation in class discussions and activities, drawings of winter

**Resources and Materials:** Large length of rope, student worksheet for the seasons, large pieces of paper