Grade 1 Science, Quarter 4, Unit 4.1

Plants

Overview

Number of instructional days: 22 (1 day = 40 minutes)

Content to be learned

- Distinguish between living and nonliving things.
- Identify and sort based on similar or different external features.
- Observe and record the external features that make up plants (e.g., roots, stems, leaves, flowers).
- Observe that plants need water, air, food, and light to grow.
- Care for plants by identifying and providing for their needs.
- Experiment with a plant's growth under different conditions (e.g., light and no light).
- Observe and scientifically draw the stages in the life cycle of a familiar plant.
- Label the stages in the life cycle of a familiar plant.
- Sequence the life cycle of a plant when given a set of pictures.
- Identify the specific functions of the physical structures of a plant (e.g. roots for water) and how they allow it to survive in its habitat.

Science processes to be integrated

- Make and record observations.
- Observe, identify, and record external features of organisms.
- Sequence and compare the life cycle stages.
- Identify structures and describe the functions of structures within a system.
- Observe and identify patterns of change.
- Demonstrate safe and ethical practices during classroom investigations.
- Conduct investigations using scientific processes, including asking questions, manipulating variables, recording observations, and drawing conclusions.

Essential questions

- What are ways to distinguish between living and nonliving things?
- How do external features of plants help them survive in their environment?
- What does a plant need to survive?
- What is a life cycle?
- In what ways do plants change over time?

Written Curriculum

Grade-Span Expectations

LS1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).

LS1 (K-4) - INQ+POC –1

Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.

LS1 (K-2) –1 Students demonstrate an understanding of classification of organisms by …

1a distinguishing between living and non-living things.

1b identifying and sorting based on a similar or different external features.

lc observing and recording the external features that make up living things (e.g. roots, stems, leaves, flowers, ~~legs, antennae, tail, shell~~).

LS1 (K-4) SAE -2

Identify the basic needs of plants and animals in order to stay alive. (i.e., water, air, food, space).

LS1 (K-2)-2 Students demonstrate understanding of structure and function-survival requirements by…

2a observing that plants need water, air, food, and light to grow; ~~observing that animals need water, air, food and shelter to grow.~~

LS2 - Matter cycles and energy flows through an ecosystem.

LS2 (K-4) SAE –5

Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy.

LS2 (K-2)–5 Students demonstrate an understanding of energy flow in an ecosystem by …

5a caring for plants ~~and/or animals~~ by identifying and providing for their needs; experimenting with a plant's growth under different conditions, including light and no light.

LS1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).

LS1 (K-4) POC –3

Predict, sequence or compare the life stages of organisms – plants and animals (e.g., put images of life stages of an organism in order, predict the next stage in sequence, compare two organisms).

LS1 (K-2)–3 Students demonstrate an understanding of reproduction by …

3a observing and scientifically drawing (e.g. recording shapes, prominent features, relative proportions, organizes and differentiates significant parts observed) and labeling the stages in the life cycle of a familiar plant ~~and animal.~~

3b sequencing the life cycle of a plant ~~or animal~~ when given a set of pictures.

LS1 (K-4) FAF –4

Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire).

LS1 (K-2)–4 Students demonstrate understanding of structure and function-survival requirements by…

4a identifying the specific functions of the physical structures of a plant ~~or an animal~~ (e.g. roots for water;-webbed feet for swimming).

Clarifying the Standards

Prior Learning

Kindergarten students distinguished between living and nonliving things. They observed that plants need water, air, food, and light to grow, and they cared for plants by identifying and providing for their needs. Students also observed and labeled the life cycle of a familiar plant, and sequenced the life cycle of a plant when given a set of pictures.

Current Learning

In grade 1, students distinguish between living and nonliving things. They observe that plants need water, air, food, and light to grow, and care for plants by identifying and providing for their needs. Students observe and scientifically draw and label the stages in the life cycle o a familiar plant, and sequence the life cycle of a plant when given a set of pictures. These concepts have been addressed in kindergarten, and are taught at the reinforcement level of instruction.

At the development level of instruction, students identify and sort plants based on similar or different external features, and they observe and record the external features that make up plants. They experiment with a plant's growth under different conditions, which include light and no light, and they identify the specific functions of the physical structures of a plant.

In the classroom, students will use the criteria for living and nonliving things to categorize objects into groups. Students should be growing plants from seeds, caring for them by providing for their needs, and experimenting with their growth. They will be changing conditions, such as the amount of light, amount of water, types of soil, and no soil, in order to determine the optimum conditions for plant growth.

Students can record observations about the plants in a scientist notebook. Observations may include pictures, labels, measurements, graphs, diagrams, anecdotal notes, and conclusions. Students at this age should work with visual representations to sequence the life cycle.

The following are activities that first graders can complete in the classroom when investigating plants.

- Carnation/Celery Stalk Experiment – Cut the stem of a carnation and place the carnation into a cup of water that contains food coloring. Students observe how the food coloring creates observable changes in the color of the carnation/celery stalk. Students can then slice the celery stalk in order to closely observe the structures within the stem that moves the colored water to the leaves. This experiment gives students the opportunity to observe the how the structures found in the stem and leaves of the plant allow water and nutrients to flow to and through the leaves.
- What's Inside a Seed? – Students will dissect seeds (soaked and dry lima bean seeds) to find the embryo plant, the seed coat, and the cotyledon (food source for the embryo). Students should also compare dry seeds and soaked seeds in order to understand why water is needed for germination (softens the seed coat so that the tiny embryo can begin the growth process).
- Where Do Seeds Come From? – Students will examine a variety of fruits to find seeds (e.g., banana, apple, orange, avocado, corn, green beans, peas, and tomato). Students can compare the different types of seeds, observing and describing both the similarities and the differences among the seeds.
- Is This a Seed? – Students will sort a variety of seeds and non-seeds (beads, marbles, Styrofoam pellets, cheerios, M&Ms, pebbles) to apply the knowledge of what makes up a seed. Students should justify their thinking after sorting the objects.
- How Do Seeds Grow? – Students will plant various seeds in clear containers to observe and document plant growth. The growth can be graphed and compared.
- How Does Your Garden Grow? – Students will plant birdseed on a sponge and watch the growth. This experiment will show that soil is not always necessary for the germination of seeds, or for the initial growth of plants.
- Let's Experiment with Plants – These experiments can be done with bean plants. Students can experiment with environmental variables (e.g., no sunlight, lying on one side, hanging upside down, no water, inside shoebox, fertilizer added, inside refrigerator) to determine which are optimum conditions.

Future Learning

In grade 2, students engage in life science content with animals. Students will identify and sort based on similar or different external features, and will observe and record the external features that make up living things (animals). They will observe that animals need water, air, food, and shelter to grow, and care for animals by identifying and providing for their needs. Students will observe and scientifically draw and label the stages in the life cycle of a familiar animal, and will sequence the life cycle of an animal when given a set of pictures. They will also identify the specific functions of the physical structures of an animal.

In grade 3, students will cite evidence to distinguish between living and nonliving things, and will observe that plants need water, air, food, light, and space to grow and reproduce. They will demonstrate an understanding of classification of organisms by identifying, sorting, and comparing organisms based on similar and/or different external features. They will record and analyze observations and data about

external features, and will cite evidence to draw conclusions explaining why organisms are or are not grouped together. Students will demonstrate an understanding of reproduction by observing changes and recording data to scientifically draw and label the stages in the life cycle of a familiar plant. They will sequence, then compare, the life cycles of one or more plants when given a set of pictures or data. In addition, students will identify and explain how the physical structure/characteristic of an organism allows it to survive and defend itself, and will analyze the structures needed for survival of populations of plants and animals in a particular habitat/environment.

In grade 4, students engage in life science content with animals. Students will observe that animals need water, air, food, and shelter/space to grow and reproduce. They will demonstrate an understanding of classification of organisms by identifying, sorting, and comparing organisms based on similar and/or different external features. They will record and analyze observations and data about external features, and will cite evidence to draw conclusions explaining why organisms are or are not grouped together. Students will demonstrate an understanding of reproduction by observing changes and recording data to scientifically draw and label the stages in the life cycle of a familiar animal. They will sequence, then compare, the life cycles of one or more animals when given a set of pictures or data.

Additional Findings

During the elementary grades, children build understanding of life science concepts through direct experience with living things, their life cycles, and their habitats. These experiences emerge from the sense of wonder and the natural interest of children who ask questions such as, "How do plants get food?" and "What is the largest plant?" An understanding of the characteristics of organisms, life cycles of organisms, and of the complex interactions among all components of the natural environment begin with questions such as these. Making sense of the way organisms live in their environments will develop some understanding of the diversity of life and the ways all living organisms depend on the living and nonliving environment for survival (*National Science Education Standards*, p. 127).

Because the child's world at grades K–4 is closely associated with the home, school, and immediate environment, the study of organisms should include observations and interactions within the natural world of the child. The experiences and activities in grades K–4 provide a concrete foundation for the progressive development in the later grades of major biological concepts such as evolution, heredity, the cell, the biosphere, interdependence, the behavior of organisms, and matter and energy in living systems (*NSES,* p. 128).

All students, especially those who live in circumstances that limit their interaction with nature, must have the opportunity to observe a variety of plants in the classroom, on the school grounds, in the neighborhood, at home, in parks, around streams, and in gardens. But observing is not enough. The students should have reasons for their observations—reasons that prompt them to do something with the information they collect. The reason can be to answer the students' own questions about how plants' needs are met where they live. Students should be encouraged to ask questions for which they can find answers by looking carefully (using hand lenses when needed) at plants, and then checking their observations and answers with one another. By the end of grade 2, students should know that some plants are alike in the way they look, and others are very different from one another, and that plants and animals have features that help them live in different environments (*Benchmarks for Science Literacy,* p. 102).

When learning about plants, the basic experiences for primary students include seeing plants grow from seeds they have planted, eating the edible portions of the mature plants, and noticing what plants are eaten by animals. Comparisons can be made to see what happens if some plants don't get water or light, but carefully controlled experiments should be delayed until later, when students will know better how to

conduct scientific investigations. Some of the earliest stories to be read to and by small children can tell about life on the farm and what happens to food between the farm and the store (*Benchmarks,* p. 184).

Primary children should begin to be aware of the basic parts of the food chain: Plants need sunlight to grow, some animals eat plants, and other animals eat both plants and animals. The key step that "plants make their own food" through the process of photosynthesis is very difficult for elementary students and should be saved for middle school. By the end of second grade, children should know that plants need to take in water and light in order to survive (*Benchmarks*, p. 119).

As students investigate the life cycles of organisms, teachers might observe that young children do not understand the continuity of life from, for example, seed to seedling or larvae to pupae to adult. Young children think concretely about individual organisms. The idea that organisms depend on their environment is also not well developed in young children. In grades K–4, the focus should be on establishing the primary association of organisms with their environments (*NSES,* p. 128).

Notes About Resources and Materials

Books

- Aloian, M. *The Life Cycle of a Flower*
- Bash, B. (2002). *Tree of Life: The World of the African Baobab.* San Francisco, CA: Sierra Club Books.
- Berenstain, S. and Berenstain, J. (1991). *The Berenstain Bears Grow-It!* New York, NY: Random House.
- Bjork, C. (1988). *Linnea's Windowsill Garden.* New York, NY: R&S Books.
- Carle, E. (1970). *The Tiny Seed.* New York, NY: Little Simon.
- Cherry, L. (1990). *The Great Kapok Tree.* London, England: Sandpiper.
- Cole, H. (1997). *Jack's Garden.* New York, NY: Greenwillow Books.
- Cole, J. (1998). *The Magic School Bus: In the Rain Forest.* New York, NY: Scholastic.
- Fowler, A. (2001). *From Seed to Plant.* Danbury, CT: Children's Press.
- Gibbons, G. (1993). *From Seed to Plant.* New York, NY: Holiday House.
- Heller, R. (1984). *Plants That Never Ever Bloom.* New York, NY: Putnam.
- Hickman, P. A *Seed Grows*
- Inches, A. (2002). *Corduroy's Garden.* London, England: Puffin Books.
- Jordan, H. (1992). *How a Seed Grows.* New York, NY: Harper Collins.
- Richards, J. (2006). *A Fruit is a Suitcase for Seeds.* Minneapolis, MN: First Avenue Editions.

- Royston, A. (1999). *How Plants Grow.* Portsmouth, NH: Heinemann.

Helpful Websites

- www.woodlands-junior.kent.sch.uk/revision/science/living.htm
- www.sciencekids.co.nz/plants.html
- www.bbc.co.uk/schools/ks2bitesize/science
- www.neok12.com
- www.classroom.jc-schools.net/sci-units/plants-animals.htm
- www.havefunteaching.com
- http://www.theteachersguide.com/plantsflowers.htm

Movies

- *The Magic School Bus Plants a Seed*
- *The Magic School Bus in the Rainforest*
- *Fern Gully*

Video Clips

- Discovery Education
    - http://player.discoveryeducation.com/?blnPreviewOnly=1&guidAssetId=2bec05f8-a36d-44d7-b60b-d18362fca0c1
    - http://player.discoveryeducation.com/?blnPreviewOnly=1&guidAssetId=a345517b-e8c2-4990-b2d0-cba237f2c49e

Online Lessons

- http://sciencenetlinks.com/lessons/crops-2-what-plants-need-to-grow/
- http://sciencenetlinks.com/lessons/look-at-those-seeds-grow/
- http://sciencenetlinks.com/lessons/what-parts-are-there-to-a-plant/
- http://www.uen.org/Lessonplan/preview.cgi?LPid=28552

Worksheets (copies on following pages)

Life Cycle of a Bean Plant

- www.deltapublishing.co.uk/.../CLIL_Unit4_Lesson1A_Spread.pdf

Sprouting Bean Sequencing Cards

- http://www.communication4all.co.uk/http/growth%20and%20plants.htm