

Grade 3 Science, Quarter 4, Unit 4.1

Characteristics of Plants

Overview

Number of instructional days: 10 (1 day = 45 minutes)

Content to be learned

- Identify, sort, and compare similar and/or different external features.
- Cite evidence to draw conclusions, explaining why organisms are or are not grouped together.
- Identify and explain how the physical structure/characteristics of an organism allow it to survive and defend itself.
- Observe that plants need water, food, air, light, and space to grow and reproduce.
- Given a set of data/pictures, sequence the life cycle of a plant.
- Given a set of data/set of pictures, compare the life cycles of two plants.

Essential questions

- How do external features vary among different plants?
- How do external features help a plant to survive and defend itself?
- What characteristics can be used to group/not group a variety of plants together?

Processes to be used

- Identify, compare, and sort organisms based on external features.
- Sequence events using data or pictures.
- Organize, compare, and analyze data.
- Use scientific processes to conduct investigations, make observations, collect data, cite evidence, and draw conclusions.

- What do plants need in order to survive and reproduce?
- Do all plants go through similar life cycles? Use pictures and words to explain your thinking.

Written Curriculum

Grade Span Expectations

LS1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & 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 (3-4) –1 Students demonstrate an understanding of classification of organisms by ...

1b identifying, sorting and comparing based on similar and/or different external features.

1d citing evidence (e.g., prior knowledge, data) to draw conclusions explaining why organisms are grouped/not grouped together (e.g. ~~mammal, bird, and fish~~).

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 (3-4)–4 Students demonstrate understanding of structure and function-survival requirements by...

4a identifying and explaining how the physical structure/characteristic of an organism allows it to survive and defend itself (e.g. ~~of a characteristic the coloring of a fiddler crab allows it to camouflage itself in the sand and grasses of its environment so that it will be protected from predators~~).

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 (3-4)-2 Students demonstrate understanding of structure and function-survival requirements by...

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

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 (3-4)–3 Students demonstrate an understanding of reproduction by ...

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

3c comparing the life cycles of 2 plants or 2 animals when given a set of data/pictures.

Clarifying the Standards

Prior Learning

Students in kindergarten through grade 2 observed and recorded external features of living things, and they identified the functions of the external structures of plants and animals. Primary students experimented with the growth of plants under different conditions, such as light and no light, and they labeled the stages in the life cycle of a plant.

Current Learning

At the developmental through reinforcement to drill-and-practice level of instruction, third-graders compare similar and/or different external features of living organisms. Students cite evidence to draw conclusions and explain why organisms are or are not grouped together.

At the reinforcement to drill-and-practice level of instruction, students identify and explain how an organism uses its physical structures to survive and defend itself, and they observe that plants need water, air, food, light, and space to grow and reproduce. Students use data to compare the life cycle of two plants. They sequence the life cycle of a plant using data, and compare the life cycle of two plants given a set of pictures.

Future Learning

Students in grade 4 will analyze observational data about external features. They will analyze the structures needed for survival of populations of plants in a particular habitat/environment. Students will observe changes and record data to scientifically draw and label the stages in the life cycle of a familiar plant, and will compare the life cycles of two plants when given a set of data or pictures.

Additional Research Findings

According to *Making Sense of Secondary Science*, distinguishing between living and nonliving things can be difficult for young students. For example, students tend to identify things such as fire, clouds, the sun, a candle, a river, and a car as living because they move (p. 19).

Other possible student misconceptions regarding plants include ideas such as leaves take in water; sunlight helps plants grow by warming the plant; grass, weeds, trees, and vegetables are not plants; and plants need “plant food” in order to survive (*Beyond Penguins and Polar Bears: An Online Magazine for K–4, Teachers*

<<http://beyondpenguins.nsd.org/issue/column.php?date=April2009&departmentid=professional&columnid=professional!misconceptions>>).

In order to avoid misconceptions, students need to be exposed to a variety of attributes—such as the need for food, water, space, and air; eating/drinking; moving, breathing, and growing—that classify an organism as living (*Making Sense*, p. 19). When teaching about plants, words such as “breathing” and “eating” should be changed to “takes in energy” and “takes in nutrients” (*Making Sense*, p. 23). Providing students with the opportunity to observe a variety of plant life will help overcome the misconception that trees, grass, weeds, and vegetables are not plants.

Students need to understand that the kinds of plants that grow in an area depend on the climate and soil. People living in places too cold or too dry to grow certain crops can obtain food from places with more suitable climates. Much of the food eaten by Americans comes from other parts of the country and other places in the world (*Benchmarks for Science Literacy*, p. 184–185). Since students must understand that

sunlight, water, air, and space are necessary for plant life, students can design experiments to see the effects of changing the amount of water, light, air, and/or space on plants.

Acquiring a wide enough variety of plants to give students a broad view of plant life may be challenging. In addition to proper materials, students also need adequate time to observe changes in plant growth and to observe and compare the features of different plants. In grade 3, teachers should avoid having students group plants simply by attributes such as “has leaves,” “has roots,” “grows in the ground,” and “are green.” Students at this level need to observe plants with different types of leaves, petals, and stems.

Notes About Resources and Materials

Discovery Works Science, Houghton Mifflin

- Hiding Out and Other Defenses, pp. E48–E53
- How Do Plants Change During Their Life Cycles? pp. A54–A57
- Life Cycle of Plants, pp. A34–A47
- Plant Adaptations, p. E73 and p. E76
- Science Notebook Activity: Life Cycle of Plants, p. 21
- Science Notebook, Investigation 1 (use with p. A41 in book) Life cycles and Adaptations
- Science Notebook, It’s a Flower! It’s a Factory! pp. 26–27 (use with pp. A42–A43 in book)
- Vocabulary: petals, leaves, pistil, stamen, life cycle, pollination, adaptation, p. A47
- Where Are You Growing? pp. A58–A60

Video

Magic School Bus Gets Planted (1994)

Websites

- BBC online—Schools—KS2 Bite Size—Science—Living Things
<http://www.bbc.co.uk/schools/ks2bitesize/science/living_things/>

Grade 3 Science, Quarter 4, Unit 4.2
Ecosystems and Change Over Time

Overview

Number of instructional days: 10 (1 day = 45 minutes)

Content to be learned

- Identify sources of energy necessary for the survival of organisms.
- Use a food web to demonstrate that all animals' food begins with the sun.
- Explain how plants and animals within a habitat depend on each other.
- Use information about organisms to design a habitat.
- Explain what plants or animals might do if their habitat changes.

Processes to be used

- Identify the flow of energy within a system.
- Describe and explain how the components within a system interact.
- Construct models in order to understand how structures and processes interact within a system.
- Explain how a change in a system affects the structures and processes within the system.

Essential questions

- Where do animals get the energy they need in order to survive?
- How do the organisms within a habitat depend on one another?
- What will happen to the organisms if the habitat changes? For example, a forest fire will cause deer to move because they can no longer find food or shelter. Floods may cause people to leave their homes, and animals may lose their habitats.

Written Curriculum

Grade Span Expectations

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 (3-4) –5 Students demonstrate an understanding of energy flow in an ecosystem by ...

5a identifying sources of energy for survival of organisms (i.e. light or food).

LS2 (K-4) SAE –6

Describe ways plants and animals depend on each other (e.g., shelter, nesting, food).

LS2 (3-4)–6 Students demonstrate an understanding of food webs in an ecosystem by ...

6a demonstrating in a food web that all animals' food begins with the sun.

6c explaining the way that plants and animals in that habitat depend on each other.

6b using information about organisms to design a habitat and explain how the habitat provides for the needs of the organisms that live there.

LS3 - Groups of organisms show evidence of change over time (structures, behaviors, and biochemistry).

LS3 (K-4) SAE –7

Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).

LS3 (3-4) –7 Students demonstrate an understanding of equilibrium in an ecosystem by ...

7a explaining what plants or animals might do if their environment changes (e.g., changing food supply or habitat due to fire, human impact, sudden weather-related changes).

Clarifying the Standards

Prior Learning

In the primary grades, students identified the physical structures of plants and their specific functions. Students cared for plants by identifying and providing for their needs. They experimented with a plant's growth under different conditions, including light and no light. Students demonstrated an understanding of food webs in an ecosystem by acting out or constructing simple diagrams that showed a simple food web. They also used information about a simple food web to determine how basic needs (e.g., shelter and water) are met by the habitat/environment.

Current Learning

At a developmental to reinforcement level of instruction, students identify sources of energy for survival of organisms (light or food). They use food webs to demonstrate that all animals' food begins with the sun. Students explain the way that plants and animals in that habitat depend on each other, and using information about organisms, they design a habitat. In addition, students explain what plants or animals might do if their environment changes.

Future Learning

In grade 4, students will identify sources of energy necessary for the survival of organisms. Students will explain how plants and animals in a habitat depend on each other; they will use information about organisms to design a habitat; and they will explain how the habitat provides for the needs of the organisms that live there. They will also explain what plants or animals might do if their environment changes, and how the balance of the ecosystem can be disturbed.

Additional Research Findings

Students think that ecosystems change little overtime, when in fact, ecosystems change constantly as a result of natural hazards, environmental changes, and human activity (*Beyond Penguins and Polar Bears: An Online Magazine for K-5 Teachers*, <<http://beyondpenguins.nsd.org/issue/column.php?date=April2009&departmentid=professional&columnid=professional!misconceptions>>).

Many children, however, seem unable to think of organisms and their environments without human involvement. For example, many younger children think all organisms are fed by people. Younger children also seem to think in terms of the needs of individual organisms rather than populations of organisms (*Making Sense of Secondary Science*, p. 63). To address these misconceptions, students need to explore and draw a variety of food webs showing the interdependence among the organisms within an ecosystem. In addition, students should show the direct and indirect impact of one change to the food web, illustrating how one change can potentially affect the entire population of living things. Having students identify how an animal can be both predator and prey is also helpful.

Organisms interact with each other in a variety of ways, other than as a source of food. Many plants depend on animals to carry their pollen to other plants or to disperse their seeds. Changes in an organisms' habitat are sometimes beneficial and sometimes not. Teachers should expose students to a variety of nature films to see a great diversity of life in different habitats (*Benchmarks for Science Literacy*, p. 116).

Although students of all ages identify food as necessary to promote growth and health, many students do not recognize that food is the source of material, which becomes either part of an organism's body in growth and repair, or the source of energy. When students do relate food to energy, they may consider that food is converted directly into "goodness" or "energy," and that it vanishes completely in the process. A universal and persistent misconception among children and adults is that plants get their food from the soil. Even when students have accepted taught ideas about photosynthesis; they still believe that plants obtain some food from the environment (*Making Sense*, p. 60).

Students are often not comfortable with the arrow notation used to show the flow of energy in food webs. They fail to understand the relationship between the components within food chains and food webs. Students were better able to answer problems about the flow of energy in ecosystems if lines, rather than arrows, were used to link populations in food chains and food webs (*Making Sense*, p. 61). However, students must be able to identify the direction of the flow of energy. This detail cannot be ignored. Once

students understand the relationship between the components within food chains and food webs, arrows can be added to graphics to indicate the flow of energy.

Notes About Resources and Materials

Science Textbook

Discovery Works Houghton Mifflin

- A Perfect Place To Live, E10–E13
Science Notebook p. 199
- Making a Food Chain Mobile, E22–E23
Science Notebook p. 204
- You Can't Live Without It, B28
- Who Eats Whom? E26–E29

Online Resources

- Salmon: A Link in the Food Chain
www.readingatoz.com
- How plants and animals survive in a desert ecosystem
National Geographic Kids—Explorer—Quick Flicks
<<http://magma.nationalgeographic.com/ngexplorer/0403/quickflicks/>>
- Creating food webs
Harcourt School—Activity—Fun with Food Webs
<http://www.harcourtschool.com/activity/food/food_menu.html>
- Food Chain Song
Totally 3rd Grade—Food Chain
<http://www.totally3rdgrade.com/food_chain.html>
- Food Chain Puzzle
Teacher Vision—Science—Biology—Ecology—Food Web
<http://www.teachervision.fen.com/tv/printables/TCR/1557342725_41.pdf>
- Great Food Chain Game
EcoKids—Games and Activities—Wildlife—Chain Reaction—Build the Food Chain
<http://www.ecokids.ca/pub/eco_info/topics/frogs/chain_reaction/play_chainreaction.cfm>
- Excellent information regarding common student misconceptions
Beyond Penguins and Polar Bears—Tundra: Life in the Polar Extremes (April 2009)—Professional Learning—Misconceptions
<<http://beyondpenguins.nsd.org/issue/column.php?date=April2009&departmentid=professional&columnid=professional!misconceptions>>