

Kindergarten Science, Quarter 4, Unit 4.1
Living and Nonliving

Overview

Number of instructional days: 2 (1 day = 30 minutes)

Content to be learned

- Distinguish between living and nonliving things.
- Sort living things using similar and different characteristics.
- Classify living things using similar and different characteristics.

Processes to be used

- Determine characteristics of living and nonliving things.
- Sort and classify organisms based on characteristics.
- Use scientific tools to conduct investigations.
- Use scientific processes to make observations and communicate results.

Essential questions

- How do we know if something is living or nonliving?
- In what ways can we sort living things?

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

1a distinguishing between living and non-living things.

Clarifying the Standards

Prior Learning

According to the Rhode Island Early Learning Standards, preschool children developed an understanding of the natural and physical world. Preschoolers used tools and their senses to describe and make simple observations of objects.

Current Learning

At a developmental level of instruction, kindergarten students begin to develop an understanding of living and nonliving organisms. They sort and classify living and nonliving things using their characteristics, and they describe how these organisms are alike or not alike.

Future Learning

First-grade students will continue to distinguish between living and nonliving things. In addition, they will observe and record the external features that make up living things.

Additional Research Findings

According to *Making Sense of Secondary Science*, Piaget observed that children tend to regard many inanimate objects as capable of sensations, emotions, and intentions. He called this view “animism.” He observed that young children said that such things as the sun, cars, wind, clocks, and fires “know where they are” and could “feel a pinprick.” When asked what is and is not alive, they judged these same objects to be alive. In addition, children ages 6–7 thought that things that are active in any way, including falling or making a noise, are deemed alive (p. 17).

Students may use commonly used words, such as living, dead, and animal, to label different concepts. Most children overextend the scientifically accepted concept of living; they considered fire, clouds, the sun, a candle, a river, and a car to be living. This usually results from the use of only one or a few critical attributes; for example, “A cloud is living because it moves.” Some children consider that an item such as a bicycle could be living at some times and nonliving at other times. Many pupils may be unsure of their categorizations (*Making Sense of Secondary Science*, pp. 18–19).

Furthermore, another study of children aged 5–16 found that almost all children recognized animal examples as living, but only 30 percent of 6-year-olds and 70–80 percent of 12- to 15-year-olds regarded particular plants as living. Almost all children attributed growth to plants, but apparently did not consider this a prerequisite of life; all 8- to 11-year-olds stated that plants grow, but only 69 percent regarded plants as living (*Making Sense of Secondary Science*, p. 19).

It has also been found that there was no significant difference with age in children’s ability to classify 16 pictures as living or nonliving. Over 99 percent of the children studied classified all the animal pictures as living, and 82 percent correctly classified the plant illustrations as living (*Making Sense of Secondary Science*, p.19). This supports the conclusion that children better understand animals as living things than they do plants. Furthermore, the research supports the critical importance of addressing misconceptions at an early age.

According to *Benchmarks for Science Literacy*, some living organisms are alike in the way they look and in the things they do, and others are very different from one another (p. 102).

The *National Education Science Standards* states that children’s ideas about the characteristics of organisms develop from basic concepts of living and nonliving things. Piaget noted, for instance, that young children give anthropomorphic explanations (human characteristics) to organisms. In lower elementary grades, many children associate life with any object that is active in any way. This view of life develops into one in which movement becomes the defining characteristic. Eventually, children incorporate other concepts, such as eating, breathing, and reproducing, to define life. As students have a variety of experiences with organisms and subsequently develop a knowledge base in the life sciences, their anthropomorphic attributions should decline (p. 128).

Notes About Resources and Materials

Materials

- Living and nonliving objects (i.e., plants, rocks, classroom objects, etc.)
- Pictures of living and nonliving things
- Sorting bins (i.e., hula hoops, yarn circles, venn-diagram pocket chart)

Trade Books

- Mazer, A. (1994). *The Salamander Room*. Edmond, OK: Dragonfly Publishing.
- Rotner, S. (1992). *Nature Spy*. New York, NY: Atheneum/Simon and Schuster.
- Weidner Zoehfeld, K. (1995). *What's Alive?* New York, NY: Harper Collins.

Resources

Houghton Mifflin Science Discovery Works Teaching guide: kindergarten “Characteristics of Living Things”

- Lesson 1... What are Living and Non-Living Things?
- Lesson 2... What are Living and Non-Living Things in Familiar Places?

Online Resources

- FirstSchoolYears.com—Science—Resources—Ourselves—Sort the living and non-living things
<<http://www.firstschoolyears.com/science/resources/games/ourselves/living/living.htm>>

This is a worksheet for children to sort, cut, and paste living and nonliving pictures into groups.

- BBC online—Schools: Science Clips—Age 5–6—Ourselves
<http://www.bbc.co.uk/schools/scienceclips/ages/5_6/ourselves.shtml>

This is an online game that allows children to identify living and nonliving things and see how they move. Directions and answers need to be read aloud to the children.

- Charles A. Dana Center—Science Toolkit—Snapshots, Assessments, and Activity Starters—K.8: Hey, Diddle, Diddle
<http://www.utdanacenter.org/sciencetoolkit/downloads/activities/k_hey_diddle.pdf>

This is a sorting lesson plan for living and nonliving things, using the nursery rhyme, “Hey, Diddle, Diddle.”

Kindergarten Science, Quarter 4, Unit 4.2

Characteristics of Plants

Overview

Number of instructional days: 8 (1 day = 30 minutes)

Content to be learned

- Observe and record external features of plants.
- Identify the needs of a plant.
- Care for plants by providing for their needs.
- Observe that plants need water, air, food, and light to grow.
- Identify the specific functions of the physical structures of a plant (leaves, stem, roots, flower).
- Sequence the life cycle of a plant using pictures.

Processes to be used

- Observe and describe the structures found in living systems.
- Identify the functions of the physical structures of systems.
- Observe and record patterns of change that occur within living systems over time.
- Use scientific processes to conduct investigations, make and record observations, sequence events, and communicate results.
- Use scientific tools to conduct investigations.

Essential questions

- What is the job of each part of a plant?
- What do plants need to grow?
- How does a plant change over time?

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 (K-2) -1 Students demonstrate an understanding of classification of organisms by ...

1c observing and recording the external features that make up living things (e.g. roots, stems, leaves, flowers, ~~legs, antennae, tail, shell~~).

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 - [See above]

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.~~

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~~).

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 ...

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

Clarifying the Standards

Prior Learning

According to the Rhode Island Early Learning Standards, preschool children learned about the natural and physical world by collecting and describing information. They used tools and their senses to make observations, investigate changes, and explore cause–effect relationships.

Current Learning

At a developmental level of instruction, kindergartners collect information by observing and recording the external features of plants. They identify the four basic parts of a plant, and describe the function of each part. Kindergarten students care for plants by identifying and providing for their needs, and they sequence the life cycle of a plant using picture cards.

Future Learning

First-grade students will continue to observe and record the external features of a plant. They will identify the needs of, and care for a plant. They will begin to experiment with different growing conditions (i.e., light and no light, different types of soil). First-graders will continue to identify the specific functions of the physical structures of a plant. They will draw a simple diagram to label the stages of a familiar plant’s life cycle. In addition, they will act out, or construct simple diagrams, in pictures or words, that show a simple food web.

Additional Research Findings

Benchmarks for Science Literacy states that students must have the opportunity to observe a variety of plants in the classroom, on the school grounds, in the neighborhood, at home, in parks, streams, gardens, and at the zoo. But observing is not enough. Students should have reasons for their observations, which then prompt them to do something with the information that they collect. Often, the reason for the investigation is simply to answer the students’ own questions about how organisms live. Students should be encouraged to ask questions for which they can find answers by looking carefully at different plants and checking their observations and answers with one another (p. 102). Emphasis should be placed on examining a variety of familiar plants and considering things and processes plants need to stay alive (p. 111).

According to the *National Science Education Standards*, 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. But teachers will notice that by second grade, most students know that children resemble their parents (p. 128). Plants have life cycles that include being born, developing into adults, reproducing, and eventually dying. Furthermore, each plant has different structures that serve different functions in growth, survival, and reproduction. Organisms have basic

needs as well. For example, plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met (p. 129).

According to *Making Sense of Secondary Science*, students have a much narrower meaning of the word “plant” than that of a biologist. Some use generalized criteria (such as *grows in the ground, has leaves, has roots, is green*) to categorize all the instances of plants. In addition, a percentage of children from all age groups do not consider a tree to be a plant, although they say “it was a plant when it was little.” Over half do not consider a seed to be a plant. Despite science teaching, the ideas of many older students are as restricted as those of younger students (p. 23).

Notes About Resources and Materials

Materials

- Magnifiers
- Plant journals
- Potting soil
- Pots/cups
- Spray bottles
- Various plants
- Various seeds

Trade Books

- Carle, E. (2009). *The Tiny Seed*. New York, NY: Little Simon.
- Gibbons, G. (1993). *From Seed to Plant*. New York, NY: Holiday House.
- Howard, E. (2007). *The Big Seed*. Fullerton, CA: Aladdin. (*Was in science kit*)
- Marzollo, J. (1996). *I Am A Seed*. New York, NY: Cartwheel Books.

Resources

Houghton Mifflin Science Discovery Works Teaching guide: kindergarten “Characteristics of Living Things”

- Lesson 3... “What are parts of plants?”
- Lesson 4... “What do plants need?”
- Lesson 5... “How do plants grow and change?”

Websites

- Jefferson County Schools—Science Online—Plants and Animals—Online Storybook—Dottie’s Garden
<<http://classroom.jc-schools.net/sci-units/plants-animals.htm>>
This story shows the life cycle of the plant from seed to plant. Although there is no sound on the story, the story is interactive and the pictures are animated.
- BBC online—Schools: Science Clips—Age 5–6—Growing Plants
<http://www.bbc.co.uk/schools/scienceclips/ages/5_6/growing_plants.shtml>
This activity allows the student to water a plant and watch it grow. It also allows the student to label a plant. There is also a quiz with audio, appropriate for K. students.
- Teacher Vision—Science—Biology—Botany—Plant Physiology—Plant Growth and Development—From Seed to Plant
<<http://www.teachervision.fen.com/plant-growth/printable/44989.html>>
This is a worksheet to sequence the life cycle of a plant.
- Teacher Vision—Science—Biology—Botany—Plant Physiology—Plant Growth and Development—What Plants Need
<<http://www.teachervision.fen.com/plant-growth/printable/32006.html>>
This is a graphic organizer to use when addressing what a plant needs.

Kindergarten Science, Quarter 4, Unit 4.3

Characteristics of Animals

Overview

Number of instructional days: 11 (1 day = 30 minutes)

Content to be learned

- Observe, identify, and record external features of animals.
- Care for animals by identifying and providing for their needs.
- Observe that animals need water, air, food, and shelter to grow.
- Identify the specific functions of the physical structures of an animal (webbed feet for swimming).
- Sequence the life cycle of an animal using pictures.

Essential questions

- How do an animal's body parts help it to survive?
- What do animals need to grow?

Processes to be used

- Observe and describe the structures of living systems.
- Identify functions of physical structures of systems.
- Observe and record patterns of change in living systems over time.
- Use scientific tools to conduct investigations.
- Use scientific processes to conduct investigations, make and record observations, sequence events, and communicate results.

- How does an animal change over time?

Written Curriculum

Grade Span Expectations

LS 4 - Humans are similar to other species in many ways, and yet are unique among Earth's life forms.

LS4 (K-4) FAF -8

Identify what the physical structures of humans do (e.g., sense organs – eyes, ears, skin, etc.) or compare physical structures of humans to similar structures of animals.

LS4 (K-2)-8 Students demonstrate an understanding of human body systems by ...

8b observing, identifying, and recording external features of ~~humans and other~~ animals.

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 (K-2) -1** Students demonstrate an understanding of classification of organisms by ...

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

1c observing and recording the external features that make up living things (~~e.g. roots, stems, leaves, flowers,~~ legs, antennae, tail, shell).

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 – [See above]

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.

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).

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 ...

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

Clarifying the Standards

Prior Learning

According to the Rhode Island Early Learning Standards, preschool children learned about the natural and physical world by collecting and describing information. They used tools and their senses to make observations, investigate changes, and explore cause–effect relationships.

Current Learning

At a developmental level of instruction, kindergartners collect information by observing, identifying, and recording the external features of humans and other animals. They identify the external features of animals, and describe the function of each feature. Kindergarten students care for animals by identifying and providing for their needs, and they sequence the life cycle of an animal using picture cards.

Future Learning

First-grade students will continue to observe, identify, and record the external features of humans and other animals. They will identify the needs of and care for animals. They will also identify the specific functions of the physical structures of animals. They will observe, draw, and label the stages of a familiar animal’s life cycle.

Additional Research Findings

According to the *National Science Education Standards*, as students investigate the life cycles of organisms, teachers might observe that young children do not understand the continuity of life from, for example, larvae to pupae to adult. But teachers will notice that by second grade, most students know that children resemble their parents. Animals have life cycles that include being born, developing into adults, reproducing, and eventually dying. Furthermore, each animal has different structures that serve different functions in growth, survival, and reproduction. Organisms have basic needs as well. For example, animals require air, water, and food. Organisms can survive only in environments in which their needs can be met (pp. 128–129).

Children’s ideas about the characteristics of organisms develop from basic concepts of living and nonliving things. Piaget noted, for instance, that young children give anthropomorphic (human) characteristics to organisms. In lower elementary grades, many children associate life with objects that are active in any way. This view of life develops into one in which movement becomes the defining characteristic. Eventually, children incorporate other concepts, such as eating, breathing, and reproducing, to define life. As students have a variety of experiences with organisms and subsequently develop a knowledge base in the life sciences, their anthropomorphic attributions should decline (*National Education Science Standards*, p. 128).

The anthropomorphism embedded in many children’s books about animals can confuse some students. One suggestion is to ignore it. While some children’s stories attribute false characteristics to animals, promoting student interest in reading at this level is more important than enforcing rigidly correct impressions about animal behavior. Students can be guided toward making distinctions between fantasy and realism when appropriate (*Benchmarks for Science Literacy*, p. 102).

Most children enter kindergarten with an interest in, and ability to distinguish among, common types of living things. For example, fish resemble other fish, frogs resemble other frogs, and fish and frogs are different. In the beginning, children can focus on any attribute—size, color, limbs, fins, or wings—but should be gradually guided to realize that, for purposes of understanding relatedness among organisms, some characteristics are more significant than others (*Benchmarks*, p. 101).

All students, especially those who have limited interaction with nature, must have the opportunity to observe a variety of animals in the classroom, on the school grounds, in the neighborhood, at home, in parks, streams, and gardens, and at the zoo. But observing is not enough. Students should have reasons for their observations, which then prompt them to do something with the information that they collect. Often, the reason for the investigation is simply to answer the students’ own questions about how organisms live or care for their young. Some students may enjoy displaying, with drawings, photographs, or even real specimens, all the living things they can find in their geographic area. The point is to encourage students to ask questions for which they can find answers by looking carefully (using hand lenses when needed) at animals and then checking their observations and answers with one another (*Benchmarks*, p. 102).

In addition, emphasis should be placed on examining a variety of familiar animals and considering what they need to stay alive (i.e., most living things need water, food, and air). Students should also investigate the habitats of many different kinds of animals, including insects, worms, and amphibians, and some of the ways in which animals depend on plants and each other (i.e., animals eat plants or other animals for food and may also use plants, or even other animals, for shelter and nesting) (*Benchmarks*, p. 111).

Notes About Resources and Materials

Materials

- Butterfly garden (classroom habitat to house caterpillars through their metamorphosis)
- Caterpillars
- Life-cycle of a butterfly sequencing picture cards (in *Discovery Works* teaching guide)
- Life-cycle worksheet (in *Discovery Works* teacher resource book)
- Magnifiers
- Nonfiction animal books and magazines
- Science journals

Resources

Houghton Mifflin Science Discovery Works Teaching guide: kindergarten “Characteristics of Living Things”

- Lesson 6 “What do animals need to live?”
- Lesson 7 “How do animals grow and change?”
- Lesson 8 “What are the life cycles of animals?”

Websites

- Science Kids—Games—Plants & Animals

<<http://www.sciencekids.co.nz/gamesactivities/plantsanimals.html>>

This online activity allows students to review living and nonliving things, as well as to match animals to their next stage in the life cycle.

- Teacher Vision—Science—Biology—Zoology—Animal Care and Welfare—What Animals Need

<<http://www.teachervision.fen.com/animal-care/printable/32001.html>>

This is a graphic organizer for an animal’s needs.

- Teacher’s Domain—Lesson Plan, Grades K–5: The Needs of Living Things

<http://www.teachersdomain.org/resource/tdc02.sci.life.colt.lp_stayalive/>

This site includes a video on what animals eat. Another video is of a beaver in its habitat, how it uses its body parts and habitat to survive.

Trade Books

- Asch, F. (1984). *Good Night Horsey*. Upper Saddle River, NJ: Prentice Hall. (*external features*)
- Martin-James, K. (1999). *Building Beavers*. Minneapolis, MN: Lerner Publications.
- Munsch, R. (1995). *Love You Forever*. Ontario, Canada: Firefly Books. (*life cycle*)
- Yorinks, A. (1989). *Hey, Al*. New York, NY: Farrar, Straus and Giroux. (*external features*)