

## Grade 4 Science, Quarter 4, Unit 4.1

# Characteristics of Animals

### Overview

**Number of instructional days:** 11 (1 day = 45 minutes)

#### Content to be learned

- Record and analyze observations and data about external features of animals.
- Sort and classify animals, including humans, based on external features.
- Cite evidence about why animals are alike or not alike.
- Compare and analyze the external features and characteristics of humans and other animals.
- Identify that some behaviors are learned and some behaviors are instinctual.
- Analyze the structures needed for survival of populations of animals in a particular habitat or environment.
- Show connections between external and internal body structures and how they aid in survival.
- Observe changes, record data, and scientifically draw and label the stages in the life cycle of a familiar animal.
- Given a set of data or pictures, predict, sequence, and compare the life cycles of two animals.

#### Processes to be used

- Record and analyze observations and data.
- Sort and classify using physical characteristics.
- Scientifically draw and label organisms.
- Identify and describe the structures found in a system.
- Describe the functions of the structures found in a system.
- Observe and describe patterns of change within a system.
- Use scientific processes, including making and recording observations, citing evidence, comparing, collecting and analyzing data, and drawing conclusions.

#### Essential questions

- How do the physical characteristics of humans and animals compare?
- In what ways are learned behaviors different from instinctual behaviors?
- What kinds of structures help populations of animals survive in a habitat or environment?
- How do the external and internal features of animals help them survive in their environments?
- How do animals change over time?
- What are some similarities and differences between the life cycles of animals?

## 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 ...**

**1c** recording and analyzing observations/data about external features (e.g., within a grouping, which characteristics are the same and which are different).

**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 (3-4)-8 Students demonstrate an understanding of human body systems by ...**

**8b** comparing and analyzing external features and characteristics of humans and other animals.

***LS4 (K-4) POC -9***

*Distinguish between characteristics of humans that are inherited from parents (i.e., hair color, height, skin color, eye color) and others that are learned (e.g., riding a bike, singing a song, playing a game, reading)*

**LS4 (3-4) –9 Students demonstrate an understanding of human heredity by ...**

**9b** identifying that some behaviors are learned and some behaviors are instinct

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

***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...**

**4b** analyzing the structures needed for survival of populations of plants and animals in a particular habitat/environment (e.g. populations of ~~desert plants and~~ animals require structures that enable them to obtain/conserves/ retain water).

**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 (3-4)-8 Students demonstrate an understanding of human body systems by ...**

**8a** showing connections between external and internal body structures (i.e., organs and systems) and how they help humans survive.

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

**3a** observing changes and recording data to scientifically draw and label the stages in the life cycle of a familiar ~~plant and~~ animal.

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

**Clarifying the Standards**

*Prior Learning*

In grades K–2, students recorded observations of the external features of animals. They identified and sorted these features based on similarities and differences.

In grade 3, students used prior knowledge to distinguish between living organisms and nonliving objects. Students identified, sorted, and compared characteristics of animals based on external features, and they identified and explained how the physical structures/characteristics of organisms help them to survive and defend themselves in their environment.

*Current Learning*

At the reinforcement level of instruction, students in fourth grade record and analyze observations and data about the external features of animals, and they analyze the structures needed for survival of animal populations in a particular habitat. Fourth-graders observe changes and record data to scientifically draw and label the stages in the life cycle of familiar animals. They also compare the life cycles of two animals when given a set of data or pictures.

At the developmental level of instruction, students in grade 4 analyze the information collected in previous lessons and activities. Students are also introduced to comparing and analyzing external features and characteristics of humans and other animals. They identify that some behaviors are learned while others are instinctive. Students show connections between external and internal body structures and how these structures help humans survive.

### *Future Learning*

In grade 5, students will demonstrate an understanding of biodiversity by recognizing that organisms have different features and behaviors for meeting their survival needs. They will continue to investigate the function-survival requirements by describing structures or behaviors that help organisms survive in their environment. Students will learn how animals defend themselves, obtain nutrients, reproduce, and eliminate waste, and they will investigate and compare a variety of plant and animal life cycles. Students will demonstrate understanding of differentiation by identifying cells as the building blocks of organisms.

### **Additional Research Findings**

According to the *National Science Education Standards*, children need direct experience with living things, their life cycles and their habitats. They need to understand that all living organisms depend on the living and nonliving environment for survival. In K–4, the focus should be on establishing the primary association of organisms with their environment. Investigations should include observations and interactions in the natural world. In addition, because the child’s world in grade K–4 is so 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 (pp. 127–128). Teachers need to provide hands-on experiences for students, which could include field trips or outdoor excursions. Teachers can also bring resources into classrooms to give students experiences with organisms from the local environment. Knowing time and resources are scarce, teachers should work with their grade-level teams to develop creative ways to provide these types of experiences for students.

The *Atlas of Science Literacy* states that children in K–4 do not truly understand the concept of energy until later in their development. Teachers should continue to provide instruction and experiences with the flow of energy for all living things. Students associate energy with humans and movement. They see it is a fuel-like quantity, which is used up, or as something that makes things happen and is expended in the process. Students rarely think energy is measurable and quantifiable. The simple notion of energy as “something that makes things go or grow” is adequate at this stage and can contribute to their later, more advanced understanding of energy (*Volume 1*, p. 78).

Children have a natural sense of wonder. Teachers can foster this through exploration and observations first, then classification and theories. Students should also be exposed to both familiar and exotic animals. When conducting hands-on activities, use of hand lenses should be routine for investigations. (*Benchmarks for Science Literacy*, pp. 100,103)

*Benchmarks for Science Literacy* states that children have a natural sense of wonder, which we need to build upon. We first foster this through exploration and observations, then through classification and theories. Students should also be exposed to both familiar and exotic animals. When conducting hands-on activities, use of hand lenses should be routine for investigations and microscopes should be introduced (pp. 100, 103).

## Notes About Resources and Materials

### Textbook

*Houghton Mifflin Science Discovery Works*, Grade 4

- Unit C – Classifying Living Things
- Chapter 1: Investigations 1, 2, and 3
- Chapter 2: Investigations 1 and 2
- Teacher Resource: Pages 93–94, 97–98, 101, 103, 113–114
- Transparencies: C1 and C2
- Vocabulary Book: C1 and C2

*Houghton Mifflin Science, Discovery Works*, Grade 3

- Unit A – Life Cycles

*Houghton Mifflin Science, Discovery Works*, Grade 5

- Unit A – Systems in Living Things

### Websites

- [www.cybersleuth-kids.com](http://www.cybersleuth-kids.com)
- [www.proteacher.com](http://www.proteacher.com)
- Teacher Vision—Science—Biology—Ecology—Ecological Adaptation  
<<http://www.teachervision.fen.com/ecological-adaptation/animals/6989.html>>
- [www.studyjams.scholastic.com](http://www.studyjams.scholastic.com)
- [www.teachersdomian.org](http://www.teachersdomian.org)

Search for the following topics: Animal coverings, Biome buddies, Becoming a mosquito, and Animals making a living

### Trade Books

- Cole, J., White, N., and Spiers, J. (2001). *The Magic School Bus Explores the World of Animals*. New York, NY: Cartwheel Books.
- Kalman, B. and Walker, N. (2000). *How Do Animals Adapt?* New York, NY: Crabtree Books.
- Legg, G. (1996). *From Caterpillar to Butterfly*. New York, NY: Harper Collins.
- Stevenson, N. and Relf, P. (1995). *The Magic School Bus Hops Home*. New York, NY: Scholastic.
- Yates, I. (2003). *From Birth to Death*. Mankato, MN: Chrysalis Education.

### Video

- EyeWitness animal videos

- Nye, B. (2005). *Bill Nye: Invertebrates*. Disney Educational.

### **Field Trips/Presentations**

- Audubon Society, Verts Program
- Biomes, located in North Kingstown
- Roger Williams Park Zoo—Education  
[www.rogerwilliamsparkzoo.org/education.cfm](http://www.rogerwilliamsparkzoo.org/education.cfm)
- URI—Learning Landscape

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

**Overview**

**Number of instructional days:** 7 (1 day = 45 minutes)

**Content to be learned**

- Identify sources of energy for survival of organisms.
- Recognize that energy is needed for all organisms to grow and survive.
- Explain and describe how plants and animals within a habitat depend on each other.
- Use information about organisms to design a habitat and explain how the habitat provides for the needs of the organisms that live there.
- Explain what plants and animals might do if their environment changes.
- Explain how the balance of an ecosystem can be disturbed.
- Use information (data or scenario) to explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).

**Processes to be used**

- Conduct safe and ethical investigations with living organisms.
- Explain and describe the relationships among organisms within a system.
- Build explanations about the flow of energy among the living components within a system.
- Use information and observations to describe, and explain changes that can interfere with the balance within a system and the processes that lead to equilibrium.
- Use scientific processes, including making and recording observations, citing evidence, comparing, collecting and analyzing data, and drawing conclusions.

**Essential questions**

- How do ecosystems change over time?
- What happens within an ecosystem when changes occur?
- How are the living organisms within an ecosystem interdependent?
- How are an animal's needs met within its environment?

## 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 ...**

**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).

**7b** explaining how the balance of the ecosystem can be disturbed (e.g., how does overpopulation of a species affect the rest of the ecosystem).

### Clarifying the Standards

#### *Prior Learning*

In K–2, students demonstrated energy flow in an ecosystem by identifying and providing for the needs of plants and animals. Students experimented with a plant’s growth under different conditions including light and no light. They used a simple food web to determine how basic needs (food, shelter) have been met by their habitat.

In grade 3, students identified sources of energy for survival of organisms, and they used food webs to demonstrate that the energy that flows through an ecosystem begins with the sun. In addition, students explained what living things might do if their environment changes.

### *Current Learning*

At the reinforcement level of instruction, grade 4 students identify sources of energy needed for the survival of organisms (e.g., light and food). They explain how plants and animals within a habitat depend on each other. Students also explain what living things might do if their environment changes, including the impact that fire, weather, or humans have on an ecosystem. Students continue to design habitats, and explain how the habitat provides for the needs of the organisms that live there.

At the introductory level of instruction, students explain how the balance of the ecosystem can be disturbed (e.g., overpopulation).

### *Future Learning*

In fifth grade, students will use data and observations to identify and define an ecosystem and the variety of relationships within it. Students will trace the flow of energy through an ecosystem—beginning with the sun, through organisms in the food web, and into the environment. They will describe the basic processes and recognize the substances involved in photosynthesis and respiration.

### **Additional Research Findings**

Students should become acquainted with many examples of ecosystems, starting with those nearby. In grades 3–5, students should explore how various organisms satisfy their needs in the environments in which they are typically found. They can examine the survival needs of different organisms and consider how the conditions in particular habitats can limit what kinds of living things can survive. Their studies of interactions between organisms and the environment should begin with direct observation of nearby surroundings. Then, through viewing nature films, students' observations should expand to include a greater diversity of life in different habitats. Students should know that for any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all, organisms interact with one another in various ways besides providing food, and changes in an organism's habitat are sometimes beneficial to it and sometimes harmful (*Benchmarks for Science Literacy*, pp. 115-116).

Organisms are linked to one another and to their physical setting by the transfer and transformation of matter and energy. Energy transfer in biological systems is less obvious than in physical systems. The study of food webs can start in elementary grades with the transfer of matter, then continue in the middle grades with the flow of energy through organisms. Students should know that almost all kinds of animals' food can be traced back to plants, and that some source of energy is needed for all organisms to grow and survive (*Benchmarks*, p. 118).

Young children tend to think of animals only in terms of individual organisms which people keep and which need humans for their survival. Older students extend their thinking to wild organisms, although some may think that these are fed and cared for by people. It is not until much later that students think in terms of populations of organisms in the wild competing for scarce resources (*Making Sense of Secondary Science*, p. 59).

Many children associate the word "food" only with what they identify as being edible. Few associate substances such as starch with food. Although students of all ages identify food as necessary to promote growth and health, many do not recognize that it is the source of material that becomes either part of their bodies in growth and repair, or sources of energy. A universal and very persistent misconception among children and adults is that plants get their food from the soil. Many pupils think that "food" for plants is anything taken in from the environment. They believe that plants have multiple sources of food, and few

pupils have the understanding that photosynthesis makes food that provides energy and body material for the plant (*Making Sense*, p. 60).

As stated in previous units, students need time to have multiple, hands-on, real-world experiences and exposure to living organisms in their surrounding environments. Teachers need to provide field trips to the school grounds, local parks, area zoos, and wildlife parks, and in-class investigations to increase students' understanding of concepts. Providing classroom terrariums, class pets, and/or projects (e.g., dioramas) will also aid in student learning.

## Notes About Resources and Materials

### Textbook

*Houghton Mifflin Science, Discovery Works*, Grade 4

- Unit C – p. C40–C61

### Trade Books

- Burns, K. and Kalman, B. (2006). *Wetland Food Chains*. New York, NY: Crabtree Publishing.
- Chinery, M. (2008). *Wild Animal Planet: Animal Habitats*. London, England: Southwater.
- Corwin, J. (2009). *Animals and Habitats of the United States*. London, England: Puffin.
- Lauber, P. and Keller, H. (1994). *Who Eats What? Food Chains and Food Webs*. New York, NY: Harper Collins.
- Stetson, E. (2004). *Kids Easy to Create Wildlife Habitats: For Small Spaces, City-Suburbs-Country*. Nashville, TN: Williamson Books.

### Websites

- [www.enchantedlearning.com](http://www.enchantedlearning.com)
- [www.mysciencebox.org/foodchain](http://www.mysciencebox.org/foodchain)
- [www.mysciencebox.org/ecoorg](http://www.mysciencebox.org/ecoorg)
- [www.teachersdomain.org](http://www.teachersdomain.org)  
Search for: Garden spiders, Kelp forests, Value of wetlands

### Field Trips/Presentations

- Audubon Society, Verts Program
- Biomes, located in North Kingstown
- Roger Williams Park Zoo—Education  
[www.rogerwilliamsparkzoo.org/education.cfm](http://www.rogerwilliamsparkzoo.org/education.cfm)
- URI—Learning Landscape