Grade 3 Science, Unit 6

Organisms and the Environment

Overview

Unit abstract

In this unit of study, third graders are expected to develop an understanding of the idea that when the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. The crosscutting concepts of cause and effect and the interdependence of science, engineering, and technology are called out as organizing concepts for these disciplinary core ideas. In the third grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in engaging in argument from evidence. Students are expected to use this practice to demonstrate understanding of the core ideas.

Essential question

- What happens to organisms when their environment changes?

Bristol–Warren, Central Falls, Cranston, Tiverton, and Woonsocket, with process support from The Charles A. Dana Center at the University of Texas at Austin

Written Curriculum

Next Generation Science Standards

3. Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

3-LS2-1. Construct an argument that some animals form groups that help members survive.

The performance expectations above were developed using the following elements from the NRC document: *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds. ▪ Construct an argument with evidence, data, and/or a model. (3-LS2-1)	**LS2.D: Social Interactions and Group Behavior** ▪ Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. *(Note: Moved from K–2)* (3-LS2-1)	**Cause and Effect** ▪ Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1)

Connections to other DCIs in third grade: N/A

Articulation of DCIs across grade-levels: **1.LS1.B** (3-LS2-1); **MS.LS2.A** (3-LS2-1)

Common Core State Standards Connections:

ELA/Literacy –

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. *(3-LS2-1)*

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. *(3-LS2-1)*

W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1)

Mathematics –

MP.4 Model with mathematics. (3-LS2-1)

3.NBT Number and Operations in Base Ten (3-LS2-1)

3. Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds.

- Construct an argument with evidence. (3-LS4-3)

Disciplinary Core Ideas

LS4.C: Adaptation

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (3-LS4-3)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

- Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4-3)

Connections to other DCIs in third grade: **3.ESS2.D** (3-LS4-3)

Articulation of DCIs across grade-levels: **K.ESS3.A** (3-LS4-3); **2.LS2.A** (3-LS4-3); **2.LS4.D** (3-LS4-3); **MS.LS2.A** (3-LS4-3); **MS.LS4.B** (3-LS4-3); **MS.LS4.C** (3-LS4-3); **MS.ESS1.C** (3-LS4-3)

Common Core State Standards Connections:

ELA/Literacy –

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. *(3-LS4-3)*

RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS4-3)*

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. *(3-LS4-3)*

W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-3)

W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. *(3-LS4-3)*

SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. *(3-LS4-3)*

Mathematics –

MP.2 Reason abstractly and quantitatively. *(3-LS4-3)*

MP.4 Model with mathematics. *(3-LS4-3)*

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *(3-LS4-3)*

Clarifying the standards

Prior learning

The following disciplinary core ideas are prior learning for the concepts in this unit of study.

By the end of kindergarten, students know that:

- Living things need water, air, and resources from the land, and they live in places that have things they need. Humans use natural resources for everything they do.

By the end of Grade 1, students know that:

- Adult plants and animals can have young. In many kinds of animals, parents and their offspring themselves engage in behaviors that help the offspring to survive.

By the end of Grade 2, students know that:

- Plants depend on water and light to grow.
- Plants depend on animals or pollination or to move their seeds around.
- There are many different kinds of living things in any area, and they exist in different places on land and in water.

Progression of current learning

Driving question 1 Why do some animals form groups?	
Concepts • Cause-and-effect relationships are routinely identified and used to explain change. • Being part of a group helps animals obtain food, defend themselves, and cope with changes. • Groups may serve different functions and vary dramatically in size.	Practices • Identify cause-and-effect relationships in order to explain change. • Construct an argument with evidence, data, and/or a model. • Construct an argument that some animals form groups that help members survive.

Driving question 2
In a particular habitat, why do some organisms survive well, some survive less well, and some not survive at all?

Concepts	Practices
• Cause-and-effect relationships are routinely identified and used to explain change. • Knowledge of relevant scientific concepts and research findings is important in engineering. • For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. • Organisms and their habitat make up a system in which the parts depend on each other.	• Identify cause-and-effect relationships in order to explain change. • Construct an argument with evidence. • Construct an argument with evidence (e.g., needs and characteristics of the organisms and habitats involved) that in a particular habitat, some organisms can survive well, some can survive less well, and some cannot survive at all.

Integration of content, practices, and crosscutting concepts

Organisms and their habitats make up a system in which they are interdependent. Environmental factors affect the growth and survival of every type of organism, and organisms in turn affect the environment. The focus of this unit of study is identifying cause-and-effect relationships between the environment and organisms' ability to survive and reproduce.

In this unit, students first learn that all organisms have a variety of behaviors and traits that enable them to survive. One of these behaviors includes forming groups. Groups serve different functions and can vary dramatically in size. Animals may form groups to obtain food, to defend themselves, and/or to cope with changes in their environment. Students should have opportunities to conduct research on animals that form groups in order to understand how being part of a group is beneficial to survival and reproduction. Students might begin with studying animals that are indigenous to the local environment (e.g., squirrels, coyotes, deer, birds, or fish), and then investigate other animals of interest, such as (but not limited to) lions, sea turtles, or penguins. For each animal that is studied, students should identify the social structure of the group and how this structure supports individuals in their need to obtain food, defend themselves, and reproduce.

Topics to focus on might be the roles of males and females within a group as well as the interactions between parents and offspring. For example, within some groups of animals, the offspring leave the nest or pack early while others remain for longer periods of time. Those that stay within the group for longer periods of time may do so because of the benefits provided by the group structure. As students compare group structures of different animals and the functions that define each, they should also think about how the size of the group and the roles of individuals within the group affect the animals' overall ability to obtain food, defend themselves, and reproduce. Students will construct arguments with evidence, using cause-and-effect relationships to show why some animals form groups and how this is advantageous to survival and reproduction.

In this unit, students also learn that for any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. As students explore the components of a given environment, they learn that each environment has a particular climate as well as finite sources of water and space. Each environment will support organisms (both plants and animals) with structures and behaviors that

are best suited to the climate and resources available. Students will need opportunities to investigate the organisms (plants and animals) that live in certain environments and determine what traits and behaviors allow these organisms to survive and reproduce in that environment. In addition, students should identify some examples of organisms that would survive less well, or not at all, in that environment, and give evidence to support their thinking. Students construct arguments with evidence, using cause-and-effect relationships, to show how the needs and characteristics of the organisms are not well suited for the given environment.

Integration of DCI from prior units within this grade level

In Unit 1,Weather and Climate, the following connected disciplinary core ideas were addressed:

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

In this unit, students use their understanding of weather and climate to determine how the climate of any given environment can affect an organism's ability to survive in that environment.

Integration of English language arts and mathematics

English language arts

In order to integrate the CCSS for English language arts, students will need opportunities use informational text and other resources to gather information about organisms and the environments in which they live. Students should be able to ask and answer questions to demonstrate understanding of content-specific text and be able to cite evidence from the text to support their thinking. For example, after reading an article about wolves, students ask and answer questions such as:

- How does being a member of a pack help wolves survive?
- What characteristics do wolves have that enable them to survive in their environment?
- What characteristics and resources does the environment have that allow wolves to survive and reproduce in that environment?

Students should be able to refer specifically to the text when answering questions, articulating the main idea and describing key details in their explanations. Students also need opportunities to write informative/explanatory texts and opinion pieces with supporting evidence to convey their ideas and understanding of cause-and-effect relationships between the environment and an organism's ability to survive and reproduce. For example, after reading text about a given animal, students should be expected to use key details and appropriate facts about that animal to compose an informative piece of writing that describes the animal's characteristics and behaviors that aid in its survival. Students should also have the opportunity to orally report on a given topic, sharing relevant facts and details while speaking clearly and at a reasonable pace.

Mathematics

This unit also connects to the CCSS for mathematics. Students can model with mathematics by graphing the average number of organisms that make up a group among a variety of species. For example, some species live in small groups of six to eight members, while others live in groups that include thousands of organisms. Students will also reason abstractly and quantitatively as they describe and compare these groups and their ability to survive and reproduce in a given environment.

Future learning

The following disciplinary core ideas are future learning for the concepts in this unit of study. By the end of middle school, students know that:

- Organisms and populations of organisms are dependent on their environmental interactions both with other living things and with nonliving factors.
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.
- Growth of organisms and population increases are limited by access to resources.
- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.
- Natural selection leads to the predominance of certain traits in a population and the suppression of others.
- In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring.
- Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common and those that do not become less common. Thus, the distribution of traits in a population changes.
- The geological timescale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.
- Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches.

Number of Instructional Days

Recommended number of instructional days: 10 (1 day = approximately 45–60 minutes)

Note—The recommended number of days is an estimate based on the information available at this time. Teachers are strongly encouraged to review the entire unit of study carefully and collaboratively to determine whether adjustments to this estimate need to be made.