

Kindergarten Science, Unit 2

Plants

Overview

Unit abstract

In this unit of study, students are expected to develop an understanding of what plants need to survive and the relationship between their needs and where they live. The crosscutting concepts of patterns and systems and system models are called out as organizing concepts for these disciplinary core ideas. In the kindergarten performance expectations, students are expected to demonstrate grade-appropriate proficiency in developing and using models, analyzing and interpreting data, and engaging in argument from evidence. Students are expected to use these practices to demonstrate understanding of the core ideas.

Essential question

- Where do organisms live and why do they live there?

Written Curriculum

Next Generation Science Standards

| K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment | | |
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| Students who demonstrate understanding can: | | |
| K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive. [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water.] | | |
| The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> : | | |
| <p style="text-align: center;">Science and Engineering Practices</p> <p>Analyzing and Interpreting Data Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</p> <ul style="list-style-type: none"> ▪ Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1) <p style="text-align: center;">-----</p> <p style="text-align: center;">Connections to Nature of Science</p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> ▪ Scientists look for patterns and order when making observations about the world. (K-LS1-1) | <p style="text-align: center;">Disciplinary Core Ideas</p> <p>LS1.C: Organization for Matter and Energy Flow in Organisms</p> <ul style="list-style-type: none"> ▪ All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1) | <p style="text-align: center;">Crosscutting Concepts</p> <p>Patterns</p> <ul style="list-style-type: none"> ▪ Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1) |
| <i>Connections to other DCIs in kindergarten:</i> N/A | | |
| <i>Articulation of DCIs across grade-levels:</i> 1.LS1.A (K-LS1-1); 2.LS2.A (K-LS1-1); 3.LS2.C (K-LS1-1); 3.LS4.B (K-LS1-1); 5.LS1.C (K-LS1-1); 5.LS2.A (K-LS1-1) | | |
| <i>Common Core State Standards Connections:</i> | | |
| <i>ELA/Literacy –</i> | | |
| W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1) | | |
| <i>Mathematics –</i> | | |
| K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. (K-LS1-1) | | |

| K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment | | |
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| <p>Students who demonstrate understanding can:</p> <p>K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas, and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]</p> | | |
| <p>The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i>:</p> | | |
| <p>Science and Engineering Practices</p> | <p>Disciplinary Core Ideas</p> | <p>Crosscutting Concepts</p> |
| <p>Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.</p> <ul style="list-style-type: none"> ▪ Use a model to represent relationships in the natural world. (K-ESS3-1) | <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> ▪ Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1) | <p>Systems and System Models</p> <ul style="list-style-type: none"> ▪ Systems in the natural and designed world have parts that work together. (K-ESS3-1) |
| <p><i>Connections to other DCIs in kindergarten:</i> N/A</p> | | |
| <p><i>Articulation of DCIs across grade-levels:</i> 1.LS1.A (K-ESS3-1); 5.LS2.A (K-ESS3-1); 5.ESS2.A (K-ESS3-1)</p> | | |
| <p><i>Common Core State Standards Connections:</i></p> <p><i>ELA/Literacy –</i> SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS3-1)</p> <p><i>Mathematics –</i> MP.2 Reason abstractly and quantitatively. (K-ESS3-1) MP.4 Model with mathematics. (K-ESS3-1) K.CC Counting and Cardinality (K-ESS3-1)</p> | | |

| K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment | | |
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| <p>Students who demonstrate understanding can:</p> <p>K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. [Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]</p> | | |
| <p>The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i>:</p> | | |
| <p style="text-align: center;">Science and Engineering Practices</p> <p>Engaging in Argument from Evidence</p> <p>Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).</p> <ul style="list-style-type: none"> Construct an argument with evidence to support a claim. (K-ESS2-2) | <p style="text-align: center;">Disciplinary Core Ideas</p> <p>ESS2.E: Biogeology</p> <ul style="list-style-type: none"> Plants and animals can change their environment. (K-ESS2-2) <p>ESS3.C: Human Impacts on Earth Systems</p> <ul style="list-style-type: none"> Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (<i>secondary to K-ESS2-2</i>) | <p style="text-align: center;">Crosscutting Concepts</p> <p>Systems and System Models</p> <ul style="list-style-type: none"> Systems in the natural and designed world have parts that work together. (K-ESS2-2) |
| <p><i>Connections to other DCIs in kindergarten:</i> N/A</p> | | |
| <p><i>Articulation of DCIs across grade-levels:</i> 4.ESS2.E (K-ESS2-2); 5.ESS2.A (K-ESS2-2)</p> | | |
| <p><i>Common Core State Standards Connections:</i></p> <p><i>ELA/Literacy –</i></p> <p>RI.K.1 With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2)</p> <p>W.K.1 Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book. (K-ESS2-2)</p> <p>W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (<i>K-ESS2-2</i>)</p> | | |

Clarifying the standards

Prior learning

There are no disciplinary core ideas that are considered prior learning for the concepts in this unit of study.

Progression of current learning

Driving question 1

What do plants need to survive?

Concepts

- Scientists look for patterns and order when making observations about the world.
- Patterns in the natural and human-designed world can be observed and used as evidence.
- Plants need water and light to live and grow.

Practices

- Observe and use patterns in the natural world as evidence.
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.
- Use observations to describe patterns in what plants need to survive. Examples of patterns could include:
 - Plants do not need to take in food.
 - All plants require light.
 - All living things need water.

Driving question 2

What is the relationship between the needs of different plants and the places they live?

Concepts

- Systems in the natural and designed world have parts that work together.
- Living things need water, air, and resources from the land, and they live in places that have the things they need.

Practices

- Observe that systems in the natural and designed world have parts that work together.
- Use a model to represent relationships between the needs of different plants and the places they live in the natural world. (Plants, animals, and their surroundings make up a system.)
 - Examples of relationships could include that grasses need sunlight, so they often grow in meadows..
 - Examples of models include diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards.

Driving question 3

How can plants change their environment to meet their needs?

Concepts

- Systems in the natural and designed world have parts that work together.
- Plants can change their environments.
- Things that people do to live comfortably can affect the world around them. People can make choices that reduce their impacts on the land, water, air, and other living things. *(The focus of this unit is on plants. Even though this particular concept is part of K-ESS2-2, it will not be addressed in this unit of study, but will instead be addressed in Unit 4, The Human Factor.)*

Practices

- Observe systems in the natural and designed world that have parts that work together.
- Construct an argument with evidence to support a claim.
- Construct an argument with evidence to support a claim for how plants can change their environment to meet their needs. Examples of plants changing their environment could include that tree roots can break concrete.

Integration of content, practices, and crosscutting concepts

In this unit of study, students develop an understanding of what plants need to survive and the relationship between their needs and where they live. Throughout this unit, students collect and analyze data, look for patterns, develop and use system models, and engage in argument from evidence.

In this unit's progression of learning, students first learn that scientists look for patterns and order when making observations about the world and that patterns in the natural world can be observed and used as evidence. Students conduct firsthand and media-based observations of a variety of plants and use their observations as evidence to support the concept that plants do not need to take in food, but do need water and light to live and grow.

After determining what plants need to survive, kindergarteners learn that plants are systems, with parts, or structures, that work together, enabling plants to meet their needs in a variety of environments. The vast majority of plants have similar structures, such as roots, stems, and leaves, but the structures may look different depending on the type or variety of plant. Although there are many varieties of plants, their structures function in similar ways, allowing the plants to obtain the water and light they need to survive. In other words, each variety of plant has structures that are well-suited to the environment in which it lives. As students learn about different types of plants and the environments in which they live, they use models, such as diagrams, drawings, physical replicas, or dioramas, to represent the relationships between the needs of plants and the places they live in the natural world. For example, grasses need sunlight, so they often grow in meadows. Cacti, which live in places subject to drought, have thick, wide stems and modified leaves (spines) that keep water within the plant during long periods without rain.

The final portion of the learning progression focuses on the understanding that plants are a system with parts, or structures, that work together. Students use what they have learned about plants to make further observations to determine ways in which plants change their environment to meet their needs. For example, tree roots can break rocks and concrete in order to continue to grow, plants will expand their root systems in search of water that might be found deeper in the earth, and plants can be found growing around and through man-made structures in search of light. Students need opportunities make observations; then, with adult guidance, they can use their observations as evidence to support a claim about how a plant can change its environment to meet its needs.

Integration of DCI from other units within this grade level

In Unit 3, Animals, student learning will include the same disciplinary core ideas as in this unit, with the focus on animals.

Integration of English language arts and mathematics

English language arts

Kindergarteners will make connections to the CCSS for English Language Arts when using trade books (read-alouds and big books) to learn about plants. With prompting and support strategies, such as Think-Pair-Share, students can discuss what they have learned and read and answer questions using key details from text.

As students learn about different types of plants and the environments in which they live, they will use models, such as diagrams, drawings, physical replicas, or dioramas, to represent the relationships between the needs of plants and the places they live in the natural world. Using models in this way gives students an opportunity to use simple informative writing to provide additional detail that will enhance their visual displays.

Mathematics

During this unit of study, students will make connections to the CCSS for mathematics by learning to use simple measurements to describe various attributes of plants. Kindergarteners can use simple, nonstandard units to measure the height of plants or the amount of water given to plants. For example, they might use Unifix cubes to measure height or count the number of scoops of water given to a plant on a daily or weekly basis. Students should work in groups to measure and record their data.

With adult guidance and questioning, students can then learn to analyze their data. As students use data to compare the amount of growth that occurs in plants that get varying amounts of water or sunlight, they are given the opportunity to reason abstractly and quantitatively. For example, students can measure and compare the height of a sunflower grown in the shade compared to the height of a sunflower grown in the sun, or they can count and compare the number of leaves on bean plants that receive different amounts of water daily. These investigations will give students evidence to support claims about the needs of plants. Students should also have opportunities to solve one-step addition/subtraction word problems based on their collected data.

Future Learning

The following disciplinary core ideas are future learning related to the concepts in this unit of study.

In Grade 1, students will know that:

- All organisms (plants) have external parts. Plants have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

In Grade 2, students will know that:

- Plants depend on water and light to grow.
- Plants depend on animals for pollination or to move their seeds around.

In Grade 3, students will know that:

- When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.
- Sometimes the differences in characteristics among individuals of the same species provide advantages in surviving, finding mates, and reproducing.

In Grade 4, students will know that:

- Living things affect the physical characteristics of their regions.

In Grade 5, students will know that:

- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.
- Plants acquire their material for growth chiefly from air and water.
- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or their parts and animals) and therefore operate as *decomposers*. Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.
- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

Number of Instructional Days

Recommended number of instructional days: 14 (1 day = approximately 20-30 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.