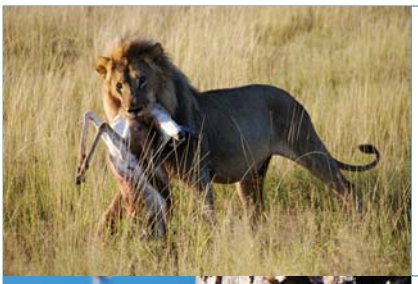
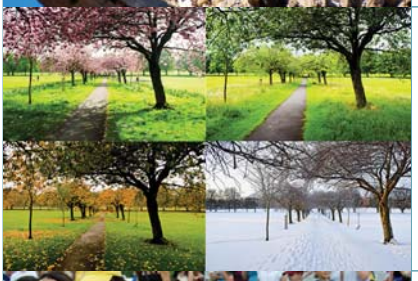
Table 3-2. Overview of Instructional Segments for Kindergarten

	**1 Plant and Animal Needs** Students observe plants and animals directly and through books and media to discover patterns in what they need to survive. They distinguish between plants and animals based on these needs. They describe how organisms meet their needs using resources from their surroundings.
	**2 Plants and Animals Change Their Environment** Students gather evidence about how organisms can directly change their environment. They focus especially on human impacts by gathering information about ways to reduce those impacts. They communicate their solutions.
	**3 Weather Patterns** Students observe the weather to spot patterns in the rhythm of the seasons and of the day. They investigate the effects of the Sun on the Earth and design a shelter for shade.
	**4 Pushes and Pulls** Students explore how pushes and pulls speed objects up, slow them down, or change their direction. They design solutions to schoolyard challenges such as moving heavy boxes and protecting a block structure from an oncoming ball.

Sources: Labuda 2014; Nightingale 2009; Hodan n.d.; Virginia State Parks 2011

IS1 Kindergarten Instructional Segment 1: Plant and Animal Needs

When children come to kindergarten, they recognize that living things differ from nonliving ones, that plants differ from animals, and that certain plants and animals belong in certain places on Earth. When pressed to describe or explain these differences, however, their responses are often inconsistent and not aligned with scientific ideas. Kindergarten science instruction helps children make sense of these categories by employing their keen eye for detail and passionate desire to observe. While observing the bodies and behaviors of plants and animals, children notice patterns in what living things need to survive and grow. During the instructional segment, they develop the language tools to articulate what they see and collaboratively refine what they know.

KINDERGARTEN INSTRUCTIONAL SEGMENT 1: PLANT AND ANIMAL NEEDS

Guiding Questions

- How do we know that something is alive?
- What do animals and plants need to survive?
- Does what they need affect where they live?

Performance Expectations

Students who demonstrate understanding can do the following:

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.]

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.]

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.* [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a practice or disciplinary core idea.

The bundle of performance expectations above focuses on the following elements from the NRC document *A Framework for K–12 Science Education*:

Highlighted Science and Engineering Practices	Highlighted Disciplinary Core Ideas	Highlighted Crosscutting Concepts
[SEP-2] Developing and Using Models [SEP-4] Analyzing and Interpreting Data [SEP-8] Obtaining, Evaluating, and Communicating Information	LS1.C: Organization for Matter and Energy Flow in Organisms ESS3.A: Natural Resources	[CCC-1] Patterns [CCC-4] Systems and System Models

Highlighted California Environmental Principles and Concepts:

Principle I The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.

Principle II The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.

KINDERGARTEN INSTRUCTIONAL SEGMENT 1: PLANT AND ANIMAL NEEDS

Principle IV The exchange of matter between natural systems and human societies affects the long-term functioning of both.

CA CCSS Math Connections: MP. 2, 4, K.CC.1–3, K.MD.2–3

CA CCSS for ELA/Literacy Connections: MP. 2, 4, K.CC.1–3, K.MD.2–3

CA ELD Standards Connections: ELD.PI.K.3

The DCIs for this segment are developmentally appropriate for kindergarten. Students learn that plants need water and light to live and grow and that animals need food. Animals obtain food from plants or other animals. Students also learn that organisms survive and thrive in places that have the resources they need. Simply knowing these core ideas is not sufficient for meeting the performance expectation; K-LS1-1 requires that students identify **patterns [CCC-1]** in the needs of different organisms. It is not possible to identify a pattern unless students observe and compare multiple observations of living things. The process of integrating multiple observations and looking for patterns constitutes **analyzing data [SEP-4]** in the K–2 grade band.

Students can observe living things directly in the classroom, on the schoolyard, and through media. Media (including books, print articles, and digital resources) expose students to a wide variety of organisms. Classroom pets such as birds, rodents, reptiles, fish, or even ant farms allow students to notice consistent patterns over time (i.e., the fish needs to be fed every day or the rodent spends most of its waking time eating). With pets, teachers must be mindful of district policies and allergies. Students can observe plants, insects, and other critters on their schoolyard. They can also grow their own seeds in cups or in an outdoor garden space.

Opportunities for ELA/ELD Connections

After students observe plants and animals in a variety of settings (e.g., ant farms, fish in an aquarium, plants growing, insects in a jar), the teacher asks them to share their thoughts about what the plants and animals need using expressions like, "I think..." and "I agree with...." To help summarize **patterns [CCC-1]** in the needs of plants and animals, teachers can list all of the needs the class has discussed on the board using words and pictures/symbols (e.g., sun, water, food). Students, individually or with a partner, draw a picture of a plant on one half of a piece of paper, and an animal on the other half. Then they draw and/or write the needs of the plant and of the animal next to each picture. Students can verbally complete the sentence frame, "Plants are different from animals because _____." This concept is important because scientists distinguish plants from animals based on what they need: animals need to consume food while plants do not, although plants do need nutrients. Students can represent this idea with a Venn diagram.

CA CCSS for ELA/Literacy Standards: W.K.2, 8; SL.K.1, 4, 5; L.K.5c
CA ELD Standards: ELD.PI.K.3

Once students have identified patterns about what plants need to survive, they can test out their idea by taking several identical plants that have already sprouted and deprive them of water, light, both, or neither. Based on their **model [SEP-2]** of what plants need, which do they predict will survive? Students will plan their own investigation of this question in grade two (2-LS2-1).

Mathematics Connections

Kindergarten students use attributes to sort objects (CA CCSSM K.MD.3). For example, a large portion of IS1 involves sorting plants and animals based on patterns in their needs. Students can sort organisms based on whether they are a plant or an animal, whether they live on water or land, and whether an animal eats only plants, only animals, or both.

CA CCSSM: MP. 2, K.CC.1-3, K.MD.2-3

While all plants and all animals share common features, there are also important differences between types of organisms. Different plants require different amounts of water (such as a fern that requires lots of water versus a cactus that requires very little). Different animals prefer different types of foods. For example, some animals only eat plants while others only eat animals, and others eat both. Students can use their background knowledge and observations from media to match specific animals to the food sources that they eat. Teachers can then ask questions such as, What will happen if a deer that eats only grass tries to live in a desert where cacti are the main plants?

Kindergarten Snapshot 3.1: Matching Environment and Needs

Anchoring phenomenon: Rivers have a wide variety of plants and animals that live near them (observed on a virtual field trip from videos and photographs).

Mrs. J took her students on a virtual field trip of California's notable river and lake habitats using videos and photographs. Mrs. J guided the students in a collaborative discussion about what they already know about rivers and lakes and recorded their comments. The class then observed features of these habitats on alphabet cards called *R is for River and L is for Lake* from the California Education and the Environment Initiative (EEI) curriculum unit *The World Around Me*.

Students imagined they were explorers traveling down a river and observing a variety of plants, animals, and human activities on their River and Lake information cards (1–10). Working in pairs, they **obtained and evaluated information [SEP-8]** about the animals and plants, as well as the places they live. Students then **communicated [SEP-8]** their findings with the whole class. Mrs. J asked follow-up questions: What do the animals and plants need to survive? If it is an animal, does it eat plants or other animals? Where does it live? (e.g., in a river, lake, or on the land nearby.) Why do you think it lives in that spot? Would it be able to survive somewhere else? She ensured that each student could **explain [SEP-6]** how the place a plant or animal lives is related to its specific needs for survival (K-ESS3-1). After all students shared, Mrs. J asked students to describe **patterns [CCC-1]** in the needs (K-LS1-1). Is there any need that every single one of the plants and animals shared? Students recognized water as a common link, and that the plants and animals can all get it by living near the river or lake. Mrs. J inquired, "Do people need water?" Even though the children do not live near a river or lake, Mrs. J described that they rely on water from natural systems to survive (California's Environmental Principles and Concepts [EP&C I]). Mrs. J had students draw pictures showing that our faucets take water from rivers or lakes to meet our needs, and that our drains and toilets eventually return that water back to natural systems after it is cleaned in a water treatment plant (EP&C IV).

Mrs. J asked two follow-up questions: When we traveled down the river did you see any places that were changed by people's activities? Do you think that those changes affect the animals and plants that live there? She explained that many things people do affect the places where plants and animals get what they need to survive (EP&C II).

Resources:

California Education and the Environment Initiative. 2013. *The World Around Me*. Sacramento: Office of Education and the Environment. http://www.cde.ca.gov/ci/sc/cf/ch3.asp#link1

This snapshot is part of a multi-day lesson sequence available online at: California Education and the Environment Initiative. 2016. "Kindergarten Vignette: Needs of Animals and Plants and their Environment." Sacramento: Office of Education and the Environment. http://www.cde.ca.gov/ci/sc/cf/ch3.asp#link2

Students should begin to group plants and animals together based upon their similar environmental needs (water, sunlight) and the availability of their preferred food sources. For example, students might read a story about the grasslands of Africa where a gazelle eats grass and then a lion eats the gazelle. Students should be able to **explain [SEP-6]** why each animal lives in that particular spot in Africa. Their answers should identify a specific need that is met by that location (either an environmental condition such as the grass lives there because it gets the sunlight and water that it needs, or a food source such as the lion lives there because it eats the gazelles there). Once students master the relationships of simple groups of organisms like the African grassland, teachers can focus on living things close to their school. What plants grow well in the weather in their city? What animals will eat those plants, and what animals will eat those animals? Teachers and students can decorate the four corners of their classrooms to look like the landscape of regional environments. They can read stories (fictional and informational) set in those environments. They can modify the decorations as the seasons change (connecting to IS3).

Students will build on their model of the relationship between the needs of organisms and their environmental conditions in grade three when they explore what happens when the environment changes (3-LS4-4) and in grade five when they examine the specific flow of energy and matter (5-LS2-1).

Kindergarten Instructional Segment 2: Animals and Plants Can Change Their Environment

Even though all organisms rely on the environment to get the things they need, many organisms also have the power to change their environment to make it even better at meeting their needs. Since everything is connected in systems, changes by one organism affect all the others. The content in this segment flows from IS1, but is split apart as a separate segment partly to emphasize humans as an agent of change (ESS3.C).