

First Grade: Adaptations

Standards Bundle

Standards are listed within the bundle. Bundles are created with potential instructional use in mind, based upon potential for related phenomena that can be used throughout a unit.

1-LS1-1 Design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. (SEP: 6; DCI: LS1.A, LSI.D; CCC: Structure/Function, Technology) **[Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]**

Content Overview

This section provides a generic overview of the content or disciplinary core ideas as an entry point to the standards.

Plants and animals have external parts that help them survive. Their different parts help them to grow, move, and protect themselves in nature. Humans can mimic these external parts to solve a problem or meet a specific human need.

Phenomena

Phenomena can be used at varying levels of instruction. One could be used to anchor an entire unit, while another might be more supplemental for anchoring just a unit. Please remember that phenomena should allow students to engage in the SEP and use the CCC/DCI to understand and explain the phenomenon.

- Wild ducks survive in the winter.
- Humans use down feathers for blankets and coats.
- Velcro, which is used in many types of clothing and other items for securing them, was designed after observing how a cocklebur stuck to an animal's fur.
- Cacti live in the desert, sometimes surviving for months, sometimes years without rain.
- Humans use fiber optics to communicate.
- The Cape Ground Squirrel takes shade everywhere he goes.
- Nocturnal animals like owls and cats have night vision.
- The Venus Fly Trap plant uses trigger hairs on its adapted flower leaves that cause the open leaves close on its prey insect.

Storyline

This section aims to decode not only the DCI connections, but also the SEP and CCC in a detailed account of how they possibly fit together in a progression for student learning, including both rationale and context for the bundle.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Use materials to design a device that solves a specific problem or a solution to a specific problem 	<p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. <p>LS1.D: Information Processing</p> <ul style="list-style-type: none"> Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. 	<p>Structure and Function</p> <ul style="list-style-type: none"> The shape and stability of structures of natural and designed objects are related to their function(s).

All organisms have adaptations that help them survive and thrive. Some adaptations are structural. Structural adaptations are physical features of an organism like the bill on a bird, the large ears on a fox, camouflage for a chameleon, or the spines on a cactus. Other adaptations are behavioral. Behavioral adaptations are the things organisms do to survive. For example, a bird's mating dance or the hibernation of a bear are behavioral adaptations.

The external parts of a plant or animal are the structural features that help them get food, water, air, and other nutrients. They also use these external parts to help them move from place to place, protect themselves as well as allow them to survive in the particular climate and ecosystem in which they live. In addition, certain plants and animals have specialized behaviors that they use to help them survive in harsh conditions, avoid prey, find a mate, ensure seed dispersal, etc. Plants and animals process information that they receive from their surroundings and respond using certain behaviors that ensure their survival. The process of adaptation of new external parts and behaviors in plants and animals happens over generations. Those organisms that survive then pass those adapted traits on to the next generations. Nature's selection of the organisms that are best able to survive is its own problem solving mechanism. Humans have solved problems by mimicking plants and animals that have adapted in particular ways in order to survive.

In this performance expectation, students are expected to design a solution to a human problem by mimicking the structures of plants and animals. In order to do this, students should be given the opportunity to observe a variety of plants and animals and be prompted to identify their external parts. As students observe these external parts, they will notice that some plants and animals have similar external parts and some have different. This can lead to students questioning why they have similar or different parts and how those external parts might help the plant or animal survive. Students should be encouraged to explain how the different external structures help protect plants and animals, help them to grow, and help them respond to things around them. Although the explanation may be simple, it provides a basis for students to then think about how those structures might also solve a human problem (e.g. fastening structures (hook and loop) that mimic burrs, clothing or equipment mimicking turtle shells, acorn shells, and animal scales). Students can also be prompted to consider how external parts serve to help plants or animals take in information so they can respond to situations (cat eyes helping cats see at night to hunt). Students can then work in small groups to design a solution to a human problem by mimicking a plant or animal's structure.

Formative Assessment

Formative assessment is crucial because all learners benefit from timely and focused feedback from others. It promotes self-reflection, self-explanation, and social learning. It can also make learning more relevant. Each of the questions below might be used throughout the formative assessment process. Specific prompts may focus on individual practices, core ideas, or crosscutting concepts, but, together, the components need to support inferences about students' three-dimensional science learning as described in a given bundle, standard or lesson-level performance expectation.

SEP Constructing Explanations and Designing Solutions

- Design a jacket, using various materials, that keeps something warm.

CCC Structure and Function

- Design a tool that is able to suck-up the most liquid, leaving the least amount of liquid behind.

Performance Outcomes

These are statements of how students use knowledge and are similar to the standards in how they blend DCI, SEP, and CCC, but at a smaller grain-size. These are potential outcomes for instruction as it plays out in lessons and activities in the classroom. It is important to also think of these as smaller outcomes that build toward the larger goal of mastering the standards.

- **Observe** a variety of external *structures* of plants and animals and *describe the function of those structures*.
- **Observe** *patterns* between plants that have similar and different external parts.
- **Make a claim** about how animals use their body parts in ways that help them *grow and survive*.
- **Make a claim** about how plants use their parts in ways that help them *grow and survive*.
- **Develop and use models to explain** that plants and animals *capture and respond to stimuli* in the environment in which they live.
- **Raise questions** about how animals and plants use their external parts for *growth and survival*.
- **Communicate from observation** how animals and plants use their parts to *respond to things* around them.
- **Solve a human problem** by mimicking the *function* of an external part of a plant or animal.

