

Change is Good!

Strand	Living Systems
Topic	Investigating ecosystems
Primary SOL	4.5 The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include a) plant and animal adaptations.
Related SOL	4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) distinctions are made among observations, conclusions, inferences, and predictions.

Background Information

Organisms have structures uniquely adapted for their particular needs. These structural adaptations affect the entire species of organisms and usually occur gradually over many generations. Although we generally use animals as examples for adaptations, all organisms have adaptations that aid their survival.

Structural adaptations, such as teeth, beaks, claws, and body covering and coloring, are physical or functional characteristics that help animals meet their needs. These adaptations allow animals to find and eat food, hide from predators, surprise prey, flee, and maintain body heat. Plant structural adaptations include thorns, bark, leaf shape and size, root type, tendrils, and the size and shape of seeds. Small leaves have less surface area, reducing the amount of moisture loss. Some leaves have pointed tips which allow water to funnel off of them. Cacti have shallow roots which allow them to quickly absorb water when it rains. Tendrils provide vines with the ability to support themselves as they climb. Seeds are adapted to disperse in various ways including wind, water, and by animals.

Behavioral adaptations help individual animals, groups of animals, and some plants meet their needs. These adaptations are the things that organisms do to survive, such as migrate, hibernate, and hunt in packs. Plant behavioral adaptations include many desert plants which only bloom at night while pollinators are active. The leaves on mimosas are very sensitive to moisture loss and will close when touched. Vines in the rainforest climb up trees to reach sunlight.

Living things adapt to a specific environment over a long period of time and many generations. If the environment changes, living things must change to survive or migrate or move to an environment similar to their original one. Some individuals in a species can make behavioral changes that allow them to survive when conditions in the environment changes. Some species may have the ability to adapt their behavior whereas other species may not have been able to make the necessary adaptations and populations have dwindled.

Materials

- Picture of a familiar animal
- Transparency of the attached Change is Good worksheet
- Copies of the attached Change is Good worksheet
- Clipboards for each student
- Copies of the attached Field Investigation sheet

Vocabulary

structural adaptation, behavioral adaptation, predators, prey, migrate, hibernate, nocturnal

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Introduction

1. Show the class a picture of familiar plants and animals, and ask students to think of structural or physical features that help the animal survive. Allow the students a few minutes to discuss these features and the ways the features help the animal.
2. Introduce the term *adaptation* by explaining that all species have changed or adapted in the way they look and the way they behave in order to survive. These changes take place in the whole species and usually occur over a long period of time.
3. Introduce the terms *structural adaptation* and *behavioral adaptation* by using the transparency. Ask students to give examples of both types of adaptations.

Procedure

1. Divide the class into four groups, and assign each group one of the organisms shown on the transparency. Hand out the copies of the attached Change is Good worksheet.
2. Instruct each group to record at least two structural adaptations and two behavioral adaptations for their organism under the appropriate heading.
3. Give the students a few minutes to discuss their observations with their group.
4. Hand out the attached Field Investigation sheet.
5. Take students outside to a spot where wildlife is predominant, such as a school pond or by a row of trees. Examples of wildlife could be spiders spinning webs, ants in a colony, butterflies on flowers, squirrels in the trees, or birds at a feeder. Have students remain seated for about three minutes before recording to let the wildlife get used to their presence and then have the students record what they observe on their Field Investigation sheet.
6. When students have finished observing, return to the classroom.

Conclusion

1. Have the students share their observations with the class and explain how each adaptation helps the organism succeed in its environment.
2. Discuss with students the differences between the two types of adaptations by asking questions like the ones following:
 - How are the two types of adaptations different?
 - How are the two similar?

- Can organisms have both?
- Do they have to have both?
- What structural adaptations do humans have?

Assessment

- **Questions**
 - What is a structural adaptation?
 - What is a behavioral adaptation?
 - How do adaptations help living things?
- **Journal/writing prompts**
 - Imagine that you are a brand new animal flown in from outer space. What structural and behavioral adaptations would you need to survive?
- **Other**
 - Have students label each of the following as a structural or behavioral adaptation:
 - The color of an earthworm
 - The thorns on a rose stem
 - The owl's nocturnal hunting
 - The giraffe's long neck
 - A human wearing a coat when he/she is cold
 - A dog's response when called
 - Bears' practice of hibernating in the winter
 - Birds' migration
 - Fish's gills
 - Vines' use of other plants or objects for support to climb and grow upward

Extensions and Connections (for all students)

- Use pictures of organisms taken from various sources (e.g., magazines, Internet) to assemble a library of organisms that can be used when studying the differences between adaptations.
- Have students create an original organism, using craft supplies. They might make a supporting habitat from a box, as well as provide the organism with a name, describe its structural and behavioral adaptations, and list its predators.
- Give each student a sheet of paper on which three different sized large circles (or any arrangement of shapes) have been drawn. Tell students they have been given an opportunity to create a "classroom critter" that will live in your classroom habitat. Students must decide where in the room it will live, but the "critter" must be out in the open at all times. Students must use the adaptation of camouflage to hide the "critters"; for example, a "critter" may be colored to blend with the colors on the bulletin board, or a critter may live on the side of a desk if colored the same as the desk. After students have camouflaged and cut out their critters, have one student (the predator) leave the room while several of the students attach their critters to their habitat. When the predator comes in, have him/her try to detect his/her prey in the room. This may be repeated for other groups.

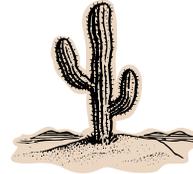
Strategies for Differentiation

- Have students develop a set of "why do" questions about animals and plants and do research to find the answers. For example: *Why do zebras have stripes? Why do roses have thorns?*
- Direct students to complete a concept map that includes the role of adaptations of common plants, including dormancy, response to light, and response to moisture.
- Provide animals or plants (e.g., earthworm, rose stem, fish, or vines) for students to observe and discuss.
- Talk about the story of the "Three Little Pigs" and how their behaviors (building different types of houses) affected their survival. Then have your students write their own animal tale that features adaptation.

Change Is Good

Name: _____

Date: _____



ADAPTATIONS

can

be

STRUCTURAL ADAPTATIONS are ways the body of an organism looks or functions.

BEHAVIORAL ADAPTATIONS are ways an organism acts.

1.

1.

2.

2.

Change is Good — Some Possible Answers



Ant

Structural: antenna, camouflage coloring, long legs, size, shape, exoskeleton

Behavioral: lives in a colony; touches antenna with other ants to get information; has specific jobs in the colony; some sting when threatened.

Hawk

Structural: sharp beak, claws for grasping prey, superior eyesight, coloring of body

Behavioral: nests in out of the way places; glides in the air looking for prey; grabs prey from the air

Cactus

It is easy to overlook plants when considering adaptations, but just as with animals, adaptations are essential for the survival of a plant species.

Structural: spines, ability to store water, shallow root system that quickly absorbs infrequent rains, ability to survive in poor soil

Behavioral: many bloom at night when pollinators are active

Blue crab

Structural: exoskeleton, pinching claws, stalk eyes, camouflage coloring, gills for breathing

Behavioral: lives in sand burrows above the water line; runs from predators with upraised pinching claws; is most often active at night

Field Investigation Sheet

Name: _____ Date: _____

Time of Day: _____ Weather: _____

Location: _____

Research Team Members: _____

Animal observed: _____

Plants associated with this animal: _____

Investigative question: What behavioral and structural adaptations were observed?

Behavioral observations: Include any feeding behavior, if and how long the animal took to get use to your presence, any interactions with other animals of the same species or of a different species.

Structural adaptations: How does the animal move? What structures does it have to help it build its home? What adaptations make this animal different from similar species?

What else would you like to know about this animal?