

Sea Turtle Adaptations



National Education Standards:

HS-LS4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations. Students will discuss the adaptations of a sea turtle and how these adaptations have contributed to the animal's fitness within their environment. Comparisons between land turtles and sea turtles will aid in examination of how traits evolved differently for the two ecosystem types.

Grade Level: 9th, 10th, 11th, and 12th Grade

Subject Area: Science

Lesson Duration: Three 50 minute class periods



Teacher Information:

Organism adaptations are inherited traits that increase the chance for reproduction and survival in a particular environment. Adaptations can be a change in a species over time for the purpose of survival. Most students will have some strong background knowledge related to the concept of adaptations. A strong understanding of this concept will be helpful to the students when they study natural selection and evolution.

Because the term adaptation is used commonly, many students will have misconceptions. It will be important for students to recognize these misconceptions and correct them.

Misconceptions:

- Adaptations guarantee survival.
- Any interesting characteristic of an organism is an adaptation.
- Evolution always means that one species has turned into another species.
- A learned behavior can be an adaptation.

Materials:

- Books, printed resources, or computers with internet access
- Projector or smart board to share notes
- Sea Turtle Adaptations Research Worksheet (provided)
- Adaptations Review Quiz (provided)

Warm-up (5 minutes):

- Begin the lesson by asking the students if they have ever seen or learned about sea turtles. Allow a few volunteers to share their experiences. Where do they live? Have they seen one before? What do they eat?
- Tell students that today we are going to learn about adaptations that sea turtles have. Ask the class for a volunteer to define “adaptation.”
 - Adaptation-heritable trait that has evolved through the process of natural selection that maintains or increases the fitness of an organism under a given set of environmental conditions.

Adaptations (35 minutes)

- Write the lesson question on the board: “What adaptations do sea turtles have that allow them to survive?” Tell the students that they will eventually be able to answer the question.
- Tell the students that they will need to first understand what adaptations are before they can answer the question. Tell them that you will introduce adaptations by giving examples of other organisms that they may be a little more familiar with.
- Project or share the following notes with the students as an introduction to adaptations. Students can copy these notes or they can be discussed as a class.

Adaptations Notes:

What is an adaptation?

- A change a species makes in order to meet environmental conditions that exist.
- Adaptations are made for a PURPOSE which benefits the organism's survival. (NOTE: Adaptations do not guarantee survival.)
- An inherited trait that increases an organism's chance of survival and reproduction in a certain environment.

What is natural selection?

- The process where organisms better adapted to their environment tend to survive and produce more offspring.
- Organisms that are more adapted to their environment are more likely to survive and pass on the genes that aided their success. This process causes species to change and diverge over time.

Adaptations help organisms to survive and/or reproduce by:

- Coping with climate
- Obtaining food and water
- Attracting mates
- Escaping predators
- Dispersing seeds

Examples of adaptations for the purpose of coping with climate:

- Heavy fur
- Thick fat layer
- Deciduous plants cut chlorophyll production and drop their leaves

Examples of adaptations for the purpose of obtaining food and water:

- Giraffes have long necks to reach food in the trees
- Frog's tongue is attached in front for quick movement to catch food
- Plants have root hairs to help absorb water
- Some plants have broad leaves to help collect sunlight

Examples of adaptations for the purpose of attracting mates:

- Coloration of feathers help birds attract mates
- Plants attract pollinators through various methods (ex: bright colors and scents)
- Deer have scent glands to attract females

Examples of adaptations for the purpose of escaping predators:

- A rabbit's leg structure for good running ability
- Quills of the porcupine
- Thorns of rose bush
- A skunk's odor glands producing a smell
- Coloration that helps to camouflage the organism
- Disruptive coloration – an organism's designs that work like an optical illusion to confuse predators (ex: zebras)
- Mimicry – one species is similar in appearance to another species (ex: the Viceroy and Monarch Butterflies)

Examples of adaptations for the purpose of dispersing seeds:

- Burs have hooks that allow them to stick to fur and feathers for animals to transport the seeds
- Wings of maple seeds and parachute shape of milkweed seeds allow wind to carry them to new locations
- Seeds encased in fruits are eaten by animals and dispersed as the animal travels

Research Sea Turtle Adaptations (60-90 minutes):

- Split the class into small groups. Either give each group the entire list of research questions from the Sea Turtle Adaptations Research Worksheet or assign each group a few of the questions and allow the groups to share their findings with one another. Ask students to use the website list to aid in their research. Students will need to state what the adaptation is and why this trait aids the turtle in survival.
- Go over the adaptations research questions as a class after the students have completed their research

Conclusion (20 minutes):

- Give students the Adaptations Review Quiz to determine what they have learned.

Extensions:

- Have students choose a second animal to research and learn about that organism's adaptations. Compare these adaptations to sea turtle adaptations. Are there any similar ones? Do these adaptations help the animals achieve similar goals?
- Invite a local marine biologist or sea turtle conservationist to speak to the class in person or virtually.
- Organize a field trip to a local aquarium or sea turtle rescue center.

Assessment:

- Review the Sea Turtles Adaptation Research Worksheet to assess the research completed by the students.
- Review the Sea Turtles Adaptation quiz to assess the students understanding of adaptations.



Resources:

- **Flatback:**

- www.seeturtles.org/flatback-turtle

- **Hawksbill:**

- www.fisheries.noaa.gov/species/hawksbill-turtle
- www.seeturtles.org/hawksbill-turtles

- **Kemp's Ridley:**

- www.fisheries.noaa.gov/species/kemps-ridley-turtle
- www.seeturtles.org/kemps-ridley-turtles

- **Green**

- www.fisheries.noaa.gov/species/green-turtle
- www.seeturtles.org/green-sea-turtle
- www.seaturtlespacecoast.org/being-green/
(countershading)

- **Olive Ridley:**

- www.fisheries.noaa.gov/species/olive-ridley-turtle
- www.seeturtles.org/olive-ridley-turtles

- **Leatherback:**

- www.seeturtles.org/leatherback-turtle
- www.fisheries.noaa.gov/species/leatherback-turtle
- www.deepseanews.com/2009/04/deep-diving-adaptations-of-leatherback-turtles/ (diving)

- **Loggerhead:**

- www.seeturtles.org/loggerhead-turtles
- www.fisheries.noaa.gov/species/loggerhead-turtle

- **General:**

- www.ocean.si.edu/ocean-life/reptiles/sea-turtles
- www.conserveturtles.org/information-about-sea-turtles-an-introduction/
- www.fisheries.noaa.gov/feature-story/7-sea-turtle-facts-ocean-lover

These materials are provided by Sea Turtle Week. Sea Turtle Week is a campaign of SEE Turtles. SEE Turtles helps save sea turtles through conservation tours, supporting important nesting beaches, working to end demand for turtleshell, helping clean up plastic waste from turtle habitats, educating people about how to help these animals, and promoting inclusivity in the turtle community. For lesson plans, fundraising ideas, online presentations, and field trips, please visit www.seeturtles.org/schools. For more information, please contact Brad Nahill, SEE Turtles Director, at brad@seeturtles.org or 5800-215-0378.



Name: _____

Date: _____

Sea Turtle Adaptations Worksheet

1. What is a carapace, and how does it help sea turtles?

2. How is a sea turtle's eye adapted to seeing in both air and underwater?

3. How are sea turtle jaws, or beaks, adapted to their different diets?

Name: _____

Date: _____

4. What are some adaptations that allow sea turtles to remain underwater for lengthy time periods?

5. How do sea turtles differ from land turtles?

6. What two aspects of a sea turtle's shell help it move through the water?

Name: _____

Date: _____

7. What is countershading, and how does it help a sea turtle?

8. How are the limbs of a sea turtle an adaptation?

9. How are sea turtles about to maintain a healthy water balance in their bodies?

Name: _____

Date: _____

Sea Turtle Adaptations Worksheet

Answer Key

1. What is a carapace, and how does it help sea turtles?

The carapace is the dorsal or upper part of the shell which protects a turtle's vital organs. It is made up of bone and covered with scutes, or scale-like plates. Scutes protect the sea turtle and prevent water loss.

2. How is a sea turtle's eye adapted to seeing in both air and underwater?

Sea turtles have flat corneas and a nearly spherical lens adapted to their mostly aquatic lifestyle. The flat cornea refracts light and help them to see in air. The spherical lens allows them to see underwater. Consequently, they are a little nearsighted on land but perfectly suited to seeing under the ocean surface.

3. How are sea turtle jaws, or beaks, adapted to their different diets?

Greens have finely serrated jaws for scraping algae and tearing sea grasses and seaweeds. Hawksbills have a sharp, narrow bird-like beak for biting sponges and getting into crevices and cracks on a reef.

Loggerheads have larger, strong jaws for crushing mollusks, crustaceans and other hard-bodied animals.

Name: _____

Date: _____

4. What are some adaptations that allow sea turtles to remain underwater for lengthy time periods?

Sea turtles are able to store large amounts of oxygen in their blood and muscles. They can also adjust their metabolism which helps to limit their oxygen needs and they can slow their heart rate to conserve oxygen while diving.

5. How do sea turtles differ from land turtles?

Sea turtles have flippers which help them to glide through the water while land turtles have short stubby feet for walking. Sea turtles have a flatter shell which allows them to glide through the water while land turtles have a more dome-like shell.

6. What two aspects of a sea turtle's shell help it move through the water?

The shell of the turtle is streamlined to allow for less friction as it moves in the water. The shells are reduced in weight compared to land turtles.

Name: _____

Date: _____

7. What is countershading, and how does it help a sea turtle?

Countershading is a type of protective coloration in which an animal is darker on the upper surface of its body and lighter on the lower surface of its body. The darker carapace (upper surface) of a sea turtle helps it to blend in with the darker sea floor from predators hunting from above. The lighter plastron (lower surface) helps the turtles to blend in with the light coming from the ocean surface to protect from predators below.

8. How are the limbs of a sea turtle an adaptation?

Rather than the bulky legs of the land turtles, sea turtles have muscular, paddle-like flippers. The front flippers function to lift and thrust the sea turtle through the water, like having wings and a propeller. The rear flippers are used for steering, and for females, to dig nests.

9. How are sea turtles about to maintain a healthy water balance in their bodies?

Sea turtles have salt glands near their eyes, similar to tear ducts. This enables them to constantly shed thick “tears” which contain excess salt. The salt gland is the primary method for salt removal.

Name: _____

Date: _____

Adaptations Post Quiz

Check all statements that are true about adaptations. Correct the false statements.

An example of an adaptation is putting your coat on to go outside.

Species change in order to meet environmental conditions.

Adaptions are made for a purpose that benefits the organism.

Adaptations are inherited.

Adaptations guarantee survival.

Name: _____

Date: _____

Adaptations Post Quiz Answer Key

Check all statements that are true about adaptations. Correct the false statements.

- An example of an adaptation is putting your coat on to go outside. **FALSE**

Students can use any example from the adaptation notes.

- Species change in order to meet environmental conditions.

- Adaptions are made for a purpose that benefits the organism.

- Adaptations are inherited.

- Adaptations guarantee survival. **FALSE**

Adaptations do not guarantee survival.

Name: _____

Date: _____

Choose two of the adaptations you have learned about sea turtles. Explain what the adaptation is and how it enables the sea turtles to survive and/or reproduce.

Please refer to the sea turtle adaptations research answers.