Grade Level: 3-5
Time Estimate: 1-3 days

ANIMAL ADAPTATIONS / INSTRUCTOR INFO

Summary

This lesson includes vocabulary, content, examples, and activities to help students learn and understand animal adaptations. Students will learn about different types of adaptations including adaptations based on environmental needs. Using data collected from the OCEARCH Global Shark Tracker, students will be able to recognize different shark adaptations based on species.

Part 1. Introduction to Adaptations
Part 2. Types of Adaptations
Part 3. Adaptations in Different Environments
Part 4. Shark Adaptations
Activity 1. Create Your Own Shark
Activity 2. Shark Stories

Goals & Objectives

The students will:
- Define adaptation;
- Understand that organisms have needs for survival;
- Explore how an animal's adaptations allow it to survive in a particular environment
- Develop skills in creative writing.

Helpful Tips

1. The content in this lesson is based on the conservation work of OCEARCH™ and the Global Shark Tracker™. Spend a few minutes getting familiar with the website and the tracker if you have not done so already. The Global Shark Tracker™ is also available as an app for iPhone and Android
2. This lesson plan is designed to be adaptable to suit your specific needs. Use the entire lesson plan or just parts of it. This material can be expanded to be an entire unit or condensed for just one day in the classroom.
3. Vocabulary words will be underlined as they first appear in the lesson plan. A complete list of vocabulary words is included as well.
4. Answers to questions and prompts for discussions will appear in italics.
5. Optional activities and content (side notes) will appear in a box. Use these to enhance your lesson and adapt it to suit your needs!
6. Have questions for OCEARCH Expedition Leader, Chris Fischer? Email info@OCEARCH.org to schedule a Skype session and let your students/child talk directly to Chris and the OCEARCH crew!
7. Email all questions about this lesson to info@OCEARCH.org.

// STANDARDS

STEM
This lesson plan aims to assist teachers in implementing a STEM-based program into their classroom while inspiring the next generation of explorers, scientists, and stewards of the ocean. Based on real science and the Global Shark Tracker™, "Animal Adaptations" is intended to promote environmental awareness and to prepare students for STEM careers.

This lesson aligns with the following TEKS:
Grade 3 Science: 2F, 3A, 4A, 9A, 9B, 9C, 10B
Grade 4 Science: 2F, 3A, 4A, 9A, 10A, 10B
Grade 5 Science: 2D, 2F, 3A, 4A, 9B, 10A, 10B

This lesson aligns with the following Next Generation Science Standards:

Construct an argument that some animals form groups that help members survive. 3-LS2-1

Science and Engineering Practice
Engaging in Argument from Evidence
• Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Construct an argument with evidence, data, and/or a model. (3-LS2-1)

Disciplinary Core Ideas
LS2.D: Social Interactions and Group Behavior
• Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). (3-LS2-1)

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. 3-LS4-2
• [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. 3-LS4-3
• [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

Disciplinary Core Ideas
LS2.C: Ecosystem Dynamics, Functioning, and Resilience
• 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.(secondary to 3-LS4-4)
LS4.C: Adaptation
•For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

ANIMAL ADAPTATIONS /VOCABULARY

Adaptation – A trait with a current functional role in the life of an organism.

Behavioral Adaptation – An adaptation with an action component that enhances the organism's survival in its habitat.

Camouflage – An animal's ability to disguise or hide itself within its habitat.

Diet – The kinds of food that an animal eats to survive.

Habitat – The natural home or environment of an animal, plant, or other organism.

Physical Adaptation – An adaptation with a structural component that enhances an organism's survival in its habitat.

Predator – An animal that preys on other animals,

Prey – An animal that is eaten by predators.

Grade Level: 3-5
Time Estimate: 5-15 mins

ANIMAL ADAPTATIONS / PRE-LESSON ASSESSMENT

Use the following true/false and multiple-choice questions as an introduction/warm-up to the lesson topics. You can do this in a verbal or written format, as a game, individually, or as a whole class! A handout is provided if you wish to hand the questions out in a quiz format.

The questions do not need to be graded. They are intended to give the students an idea of what they will be learning and to see what they already know.

1. True or False
An animal is not born with adaptations, it must learn them.
Answer: False

2. True or False
Animals that are hunted by predators are called prey.
Answer: True

3. True or False
Animals have different adaptations depending on the habitat they live in.
Answer: True

4. An opossum playing dead is an example of a _____ adaptation.
- **a.** camouflage
- **b.** migration
- **c.** behavioral
- **d.** physical

Answer: c

5. Which of these is NOT a physical adaptation for a shark?
- ***a.*** Hunting prey by ambush.
- **b.** Skin covered in tough dermal denticles.
- **c.** A long caudal fin for swimming.
- **d.** Re-growing teeth as they fall out.
- **e.** None of the above.

Answer: a

Student handout provided on next page.

Name: _____

Date: _____

PRE-LESSON ASSESSMENT: ANIMAL ADAPTATIONS

Select the correct answer(s) to each of the following questions.

1) True or False

An animal is not born with adaptations, it must learn them.

2) True or False

Animals that are hunted by predators are called prey.

3) True or False

Animals have different adaptations depending on the habitat they live in.

4) An opossum playing dead is an example of a _____ adaptation.

a. camouflage

b. migration

c. behavioral

d. physical

5) Which of these is NOT a physical adaptation for a shark?

a. Hunting prey by ambush.

b. Skin covered in tough dermal denticles.

c. A long caudal fin for swimming.

d. Re-growing teeth as they fall out.

e. None of the above.

Grade Level: 3-5

ANIMAL ADAPTATIONS / LESSON PLAN

PART 1. INTRODUCTION TO ADAPTATIONS **10-15 mins**

Every plant and animal in the world has adaptations to help them survive in their habitat. *Ask the class if anyone can give the definition or an example of an adaptation.*

An adaptation is a trait or characteristic that helps the animal to succeed in day to day activities like finding food, shelter, or a mate. Even humans have adaptations!

Ask the class what kinds of adaptations humans might have to help them survive. Write several students' answers on the board. (Examples: thumbs, walking upright, capable brains, teeth, eyelashes, etc.)

If you stop and think about it, almost everything about your body is an adaptation to help you live your life. Animals are no exception! A fish is adapted to live in water by having gills and fins! Animals are born with adaptations that they inherited from their parents, and their parents before them. There are several types of adaptations depending on the function or the end result the animal is trying to achieve..

PART 2. TYPES OF ADAPTATIONS **10-15 mins**

Physical Adaptations

A physical adaptation is a structural component that affects an animal's daily life. This could be a specialized body part, like the long tail of a thresher shark or the pinching claws on a crab. Another type of physical adaptation is camouflage.

Ask the students what camouflage means. What is the purpose of it?

An animal with camouflage has the ability to hide or disguise within the environment they live in. Different types of animals will have different or similar camouflage depending on where they live.

Ask the students to think of some animals with excellent camouflage. Write several students' answers on the board.

Many physical adaptations are directly related to an animal's diet. This means that different adaptations will help animals to find and eat different kinds of food. A sea turtle has a hard beak-like mouth for eating foods like algae and jellyfish. A lobster has thick claws to pinch its food.

Behavioral Adaptations

Behavioral adaptations are sometimes harder to see because it is not a physical body part that has adapted. Behavioral adaptations are special in that they have an action component to help the animal to survive. An excellent example of a behavioral adaptation would be bats using echolocation to find their way! Behavioral adaptations can also be seen when an animal is trying to ward off danger, for example when an opossum plays dead instead of running away or fighting.

Ask the students if they can think of any other examples of behavioral adaptations. Examples include migrating birds, living in large groups, mating dances for tropical birds, and reptiles lying in the sun to warm up.

PART 3. ADAPTATIONS AND THE ENVIRONMENT **10-15 mins**

An animal's habitat, or natural home or environment greatly affects the type of adaptations an animal has. *Ask the students if they can think of different types of environments where animals may have special adaptations.*

Write the following types of environments on the board:

Desert ***Arctic*** ***Rainforest*** ***Savanna*** ***Ocean***

Have the students come up with animals that have special adaptations for each of these environments.

In this lesson we will be looking at the different habitats in the ocean and how the animals have adapted to live there.

In areas of world where the ocean meets the land, the tides will raise and lower the water level twice every day. Ocean animals that live in this tidal zone must have adaptations for being able to survive in and out of water. For example, barnacles will cling to rocks along areas where the tide goes in and out. Instead of the barnacles drying out, they can close up within their hard shell until the tide returns.

Around coral reefs, you will find many plants and animals with special adaptations to help them survive. The brightly colored corals are adapted to harness sunlight as food to live and grow. Many fish in coral reefs have brightly colored scales to match the corals around them. Eels have no scales so they can easily wind themselves around corals and rocks without getting stuck.

Even animals like sharks have incredible adaptations. Let's look at some different adaptations for sharks.

PART 4. SHARK ADAPTATIONS **10-15 mins**

Sharks can be found in all five oceans around the world, from the tropical shallow waters of coral reefs, to the deep depths of the ocean abyss. And with nearly 400 known species of shark in the world, you can imagine that sharks have many unique adaptations!

Counter Shading

One adaptation that almost all sharks, including the great white shark possess is a special kind of camouflage called counter shading. Counter-shading means that the shark has dark coloration on its back and light coloration on its underside. This type of camouflage means that a shark is safe from larger predators below and hidden from prey above.

Can you think of any other ocean animals with counter-shading? (Penguins, dolphins, whales, etc.)

Teeth

Sharks also have different sized and shaped teeth depending on their diets. This type of adaptation will help ensure that sharks are not competing for the same food. The massive whale shark only eats plankton or krill. Their teeth are very small and short. The mako shark and great white shark hunt larger prey like seals and have large, wide teeth with ridged edges called serrations. This helps them to tear through their food.

Fin Shapes

Even the shape of a shark's tail is specially adapted for the environment it lives in. The great white shark has a tail that is almost perfectly even on the top and the bottom. This helps them to swim in long straight lines with bursts of speed for hunting.

Sharks that live near the seafloor have tails where the top part of the fin is much longer and wider than on the bottom. This adaptation helps the shark to rest comfortably on the seafloor but still be able to lift themselves off the bottom in a burst of speed.

Has anyone ever head that all sharks have to keep swimming all the time to stay alive? This is only true for some sharks! Thanks to special adaptations, many species of sharks can lay completely still on the ocean floor without worry.

Oily Liver

Sharks have a large, oily liver unlike any other animal on the planet. This special organ serves two purposes. Just like other animals, its liver helps with digestion. But that's where the similarities end. A shark's liver is filled with an oily substance, called squalene that helps with buoyancy – or floating. How does this work?

A shark's body is naturally denser than water, so it should sink. Sharks do not have an air bladder like other fish to keep them buoyant. Instead the oil in the liver, which is less dense than water, keeps the shark from sinking to the ocean floor. *Have you ever tried pouring cooking oil in water? What does it do? Answer: It floats!*

Ampullae of Lorenzini

Sharks have the incredible ability detect the electrical impulses that are emitted by every living animal. Sharks have specialized pores located on their head and snout called ampullae of Lorenzini. These pores receive the electrical impulses emitted by other animals and then send a signal to the brain.
The brain is able to process where the impulses are coming from, allowing the shark to hunt its prey without even seeing it.

Biologists also believe that sharks use their ampullae of Lorenzini to detect Earth's magnetic fields which can be used for navigation.

Grade Level: 3-5

Time Estimate: 45-60 minutes; or take home

ANIMAL ADAPTIONS / ACTIVITY 1. CREATE A SHARK

INTRODUCTION

Students will use their knowledge of adaptations to create their own original shark to present to the class. Each student will choose either real world adaptations, or come up with their own to create a shark that is uniquely suited to their chosen environment. After completing their shark poster, they will write a story about their shark detailing where it lives and how it uses its special adaptations. An optional handout is provided for this activity.

MATERIALS

- Poster board
- Notebook paper
- Pencil, colored pencils, crayons, or markers
- Tape or glue

INSTRUCTIONS

1. Using the provided handout or notebook paper, students will decide the type of ocean habitat their shark will live in (coral reef, open ocean, shoreline, deep sea, etc.).
2. After deciding on a habitat, choose three or more special adaptations that will help the shark to survive.
3. Using markers, pencils, crayons, or colored pencils, draw your shark in the center of the poster board.
4. Include some surrounding habitat for the shark on the poster board.
5. The three or more special adaptations should be written clearly on the poster.
6. Once the poster is completed, the student should write a brief story about their shark on notebook paper including:
    a. the name of the shark,
    b. where the shark lives,
    c. what it eats,
    d. and how it uses its special adaptations to live day to day.

   Students may use the handout on the following page to organize information about their shark.
7. Glue the completed story to the back of the poster.
8. Students can take turns presenting their shark poster and reading their shark story to the class.

CONCLUSION

Students should gain understanding of animal adaptations and how each adaptation has a function in the life of an animal, like a shark. Not only engaging their imagination when creating an original shark, Students will also develop their writing and presenting skills.

Name: _____

Date: _____

ACTIVITY 1. CREATE A SHARK

Use your knowledge of adaptations to answer the following questions about your original shark.

1. What part of the ocean does your shark live in?

2. What kinds of food does your shark eat?

3. Does your shark have special shaped teeth for eating its food? If so, draw one of your shark's teeth below.

4. How large is your shark when it is fully grown?

5. What three special adaptations does your shark have?

   1.

   2.

   3.

6. What does your shark like to do every day?

7. How does it use its special adaptations to survive?