

**Grade Level: K-2**

**Time Estimate: 1-3 days**

# SHARK ANATOMY / INSTRUCTOR INFO

## Summary

Sharks are amazing apex predators. Different parts of their body are designed to have different functions, just like humans. From their gills to their caudal fin, each part has an important role to play that will ensure the survival of the species. When students study the anatomy of a shark, they are one step closer to understanding shark behavior, their habitat, and gaining understanding of the role sharks play in the health of the ocean.

**Part 1.** All Sharks Are Fish

**Part 2.** External Shark Anatomy

**Part 3.** Internal Shark Anatomy

**Activity 1.** Anatomy of a Shark

**Handout 1.** Anatomy of a Shark

## Goals & Objectives

### The students will:

- Identify basic shark anatomy;
- Compare and contrast basic shark and human anatomy;
- Develop research skills using the OCEARCH Global Shark Tracker™;
- And describe ways that sharks differ from other fish.

## // STANDARDS

### **This lesson aligns with the following TEKS:**

Kindergarten Science: 2A, 2B, 2D, 3B, 3C, 4A, 4B, 9B, 10A

Grade 1 Science: 2A, 2B, 2D, 3C, 4A, 10A

Grade 2 Science: 2A, 2D, 2F, 3A, 3C, 4A, 10A

### **STEM**

Sharks are amazing apex predators. Different parts of their body are designed to have different functions, just like humans. From their gills to their caudal fin, each part has an important role to play that will ensure the survival of the species. When students study the anatomy of a shark, they are one step closer to understanding shark behavior, their habitat, and gaining understanding of the role sharks play in the health of the ocean.

### **This lesson aligns with the following Next Generation Science Standards:**

#### **2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.**

[Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.]

[Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

#### **Science and Engineering Practices**

##### *Planning and Carrying out Investigations*

- Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. Make observations (firsthand or from media) to collect data that can be used to make comparisons. (2-LS4-1)

#### **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.]

#### **Science and Engineering Practices**

##### *Analyzing and Interpreting Data*

- Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)

### **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 M/V OCEARCH Expedition Leader, Chris Fischer? Email [in-fo@OCEARCH.org](mailto:in-fo@OCEARCH.org) to schedule a Skype session and let your students/child talk directly to Chris and the M/V OCEARCH crew!
7. Email all questions about this lesson to [info@OCEARCH.org](mailto:info@OCEARCH.org).

## Vocabulary

**Ampullae of Lorenzini:** Small electroreceptors used to detect electrical impulses in the water; helps the shark swim in dark, murky water.

**Anal Fin:** Located on underside of shark; provides balance while swimming.

**Caudal Fin:** The fin at the end of the shark's tail; propels the shark through water.

**Dermal Denticles:** Teeth-like structures on a shark's skin; literally translates to "skin teeth".

**Dorsal Fin:** The fin located on the shark's back; helps to keep it balanced and upright while swimming.

**Eye:** The external part of the shark that allows it to see.

**Gills:** The organ sharks use for breathing in the water.

**Lateral Line:** A series of specialized pores used in the detection of pressure changes and vibrations in the water.

**Nares:** The openings on a shark's snout that enable it to smell.

**Pectoral Fin:** The fins located on both sides of shark; provides steering, lift, and brakes while swimming.

**Pelvic Fin:** Fin located on the underside of shark, near the tail; assists with balance.

**Snout:** The nose of the shark.

**Teeth:** Helps a shark bite and tear its food.

# SHARK ANATOMY / LESSON PLAN

## INTRODUCTION 3-5 mins

Just like humans and other animals, sharks depend on their bodies to help them survive in their habitats. What are some body parts that sharks have in common with humans? (Example: eyes, heads, skin, mouths, etc.) What are some differences? (Example: fins, tail, sharp teeth, etc.)

*Ask the students where in the world sharks can be found? Does the size of the shark or the part of the ocean it lives in change what the shark's body parts might look like?*

We are going to look at different shark body parts and how each part has an important role in helping them swim, eat, and survive in the ocean!

## PART 1. ALL SHARKS ARE FISH 5-10 mins

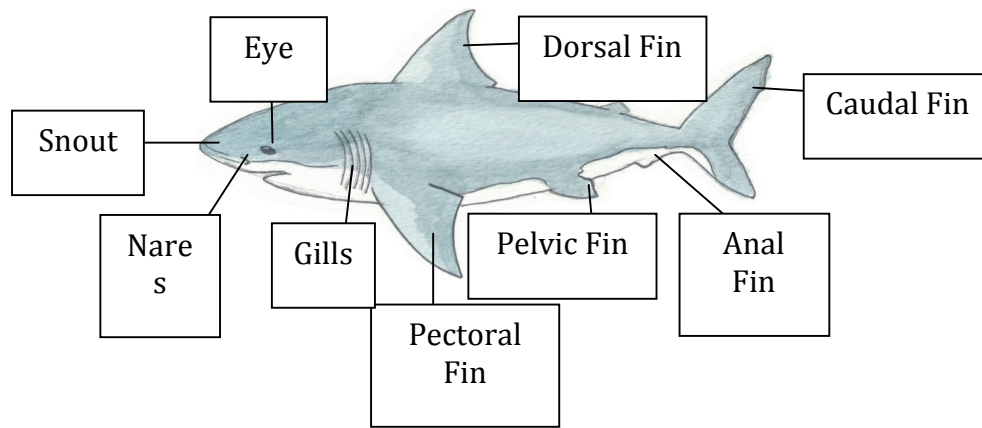
When you think about what a fish looks like, you probably do not think of a shark as being a type of fish. While all sharks are fish, not all fish are sharks. However, the bodies of sharks and the bodies of other fish have a lot in common.

*Ask the students to give some examples of body parts that sharks and other fish have in common. Write several students' answers on the board. Examples: fins, gills, eyes, mouth, etc.*

Both sharks and other fish have gills. This is a special organ that allows them to breathe underwater. They also both have fins for swimming! Sharks are unique though, so let's take a closer look at shark anatomy.

## PART 2. EXTERNAL SHARK ANATOMY 15-20 mins

First, let's explore the external anatomy of a shark - the body parts on the outside of a shark. *Use a picture, photo, or drawing on the board to label the parts of the shark as the lesson progresses.*



**Figure 1. External Anatomy of a Shark**

Illustration Credit: Sarah Rich – Landry’s Downtown Aquarium

### **Fins**

Sharks have many fins, each with a special purpose to help a shark swim! The caudal fin is located on the tail of the shark. Using powerful muscles, the shark moves its caudal fin side to side to push itself through the water. The pectoral fins of a shark stick out like the wings on an airplane. They use these fins for steering and braking while swimming. The dorsal fin, pelvic fin, and anal fin are important for helping the shark to stay upright and balanced in the water. Without these fins, the shark could lose balance and wobble or spin instead of swimming straight through the water.

### **Organs**

Along with fins to help them move, sharks have special organs to help them live and hunt in the ocean. Without gills, sharks would be unable to breathe underwater! On the nose, or snout of a shark, there are two nares, which allow the shark to smell. Sharks also have two eyes that allow them to see.

### **Skin and Teeth**

A shark’s skin is very different from human skin. Their skin is actually covered in tiny teeth called dermal denticles! These dermal denticles all point towards the tail end of the shark and act like armor (Figure 2). Feeling a shark’s skin from head to tail would feel very smooth but going from tail to head would feel extremely rough like sandpaper!



**Figure 2. Close up view of dermal denticles.**

Illustration Credit: Sarah Rich – Landry’s Downtown Aquarium

Not only do sharks have skin that is covered in teeth, but they also have many rows of sharp teeth in their mouths. Sharks constantly grow new teeth to replace any that are lost. One shark can go through over 10,000 teeth in their lifetime!

Different types of sharks will have different shaped teeth depending on what they eat. The whale shark eats only plankton, so its teeth are very small and short. By contrast, a white shark has large triangular teeth with ridges called serrations for tearing through their food.

## **PART 3. INTERNAL SHARK ANATOMY 5-10 mins**

Not all of a shark's amazing adaptations are located externally. Let's look at a shark's internal anatomy to learn other ways sharks survive so well in the ocean.

### **Cartilage**

Sharks have very special bones made of cartilage. Cartilage is the soft rubbery tissue that your ears and nose are made of. Have the students feel their ears and nose. Since a shark's entire skeleton is made of this soft cartilage, their bodies are very flexible. This helps them to swim and turn quickly.

### **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**

To help sharks hunt and navigate, they have special organs that give them senses humans don't even have! 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. How else can sharks navigate the vast ocean so effortlessly?

# ACTIVITY 1. ANATOMY OF A SHARK 3 days; take-home or in-class

## Introduction

This activity provides an excellent opportunity for students to learn shark anatomy by incorporating real-life shark research. This activity is meant to be taken home but can be a classroom project if preferred.

The students will use the OCEARCH Global Shark Tracker™ to obtain information and pictures of a tagged shark of their choosing. Students will use the information and pictures to create a labeled diagram of their shark. The handout provided can be used as supplemental instruction or as a separate activity.

## Materials

- Computer(s) with internet access
- Printers
- Poster board or white art paper
- Markers, pens, pencils
- Journal or paper to record information
- Handout 1. Anatomy of a Shark (provided)

## Instructions

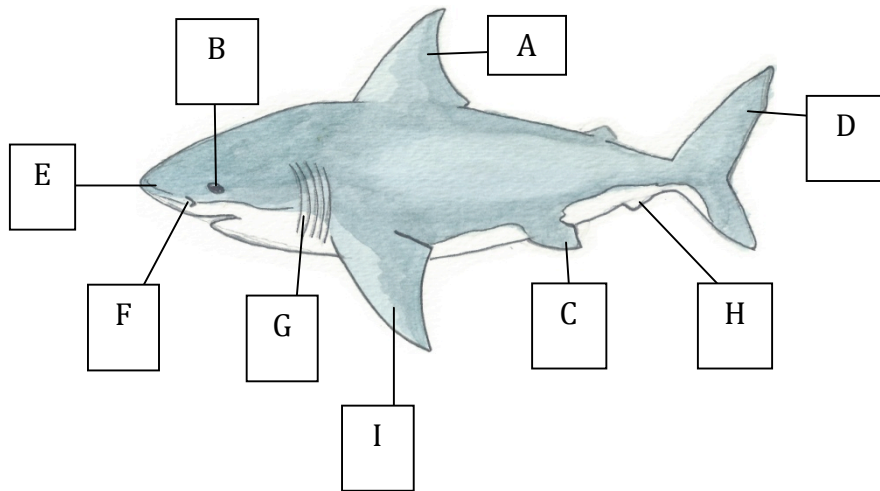
1. The students should begin by going over basic shark anatomy and filling in the information on the supplemental handout.
2. Students should be familiarized with the OCEARCH Global Shark Tracker™ in class and able to navigate the website to find information on individual sharks.
3. Once familiar, students will choose a tagged shark from the tracker and write down information about the shark in their journals or notebooks.
  - a. What is the name of the shark?
  - b. Is it male or female?
  - c. What date was it tagged?
  - d. What is the species of the shark? (great white shark, tiger shark, etc.)
4. Students will draw or print a picture of their shark (or that species of shark if a clear picture is not available on the shark tracker) and glue to a poster board or white art paper.
5. The basic anatomy of the shark should be labeled and the information (name, gender, species, and tag date) should be clearly presented on the poster as well.
6. After completion, students can present their shark to the class.

# Handout 1. Anatomy of a Shark

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Match the letter to the body part to label the diagram.



- A. Pectoral Fin
- B. Dorsal Fin
- C. Eye
- D. Anal Fin
- E. Pelvic Fin
- F. Gills
- G. Caudal Fin
- H. Snout
- I. Nares