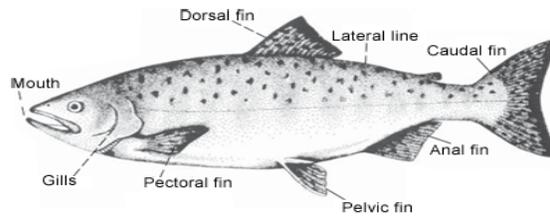


What is a Fish?



Topics

Fish, Adaptations

Grades

PreK-2

Site

Indoors

Duration

60 minutes, in two parts

Materials

For each group:

- Local and sustainable whole fresh market fish
- Dish soap
- Newspaper
- Tweezers
- Hand lenses

Vocabulary

adaptations, anatomy, vertebrates

Next Generation Science Standards

Practices

Constructing explanations

Core Ideas

LS1.A Structure and function

Crosscutting Concepts

Patterns

Performance Expectations

See page 4

Focus Question

What makes a fish a fish?

Overview

What makes a fish different from other animals? What physical features do fish have for survival? Students examine the external parts of a store-bought fish. They use anatomical clues and nonfiction resources to decipher where their fish lives and what its lifestyle might be. Then they compare and contrast their fishes and come up with a definition of “fish” as a class.

Objectives

Students will be able to:

- Describe at least two characteristics that distinguish a fish from other animals.
- Create a scientific illustration of a fish and label its major body parts.
- Develop a shared explanation of what makes a fish a fish.
- Infer a fish’s habitat and lifestyle by observing its anatomy.

Background

There are over 30,000 species of fish. They are the most numerous and diverse of the major vertebrate groups. All fish are classified into one of three groups: jawless, bony or cartilaginous (e.g., sharks and rays). What makes a fish a fish? Fish have many characteristics and **adaptations** to help them survive in water. Fish are **vertebrates**, animals with backbones. Most are cold-blooded animals that live in either fresh or sea water. They have fins and breathe using gills. Many have scales. Studying the **anatomy** of a fish can give clues to how it moves, feeds, and protects itself as well as where it lives.

- **Body Shape:** The shape of a fish helps it hunt for prey, avoid predators and move through its habitat. A torpedo-shaped body increases a fish’s swimming speed. Most fish with this body shape live in open water and are excellent swimmers. Elongated fish may hide under or wrap around rocks or coral. Flatfish have flattened bodies. They lie on their sides on the seafloor with only their eyes protruding from the sand, hiding until their prey swim nearby.

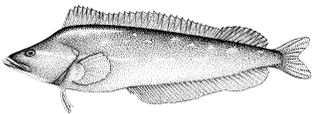


VOCABULARY

adaptations: the various physical structures and behaviors that help an animal survive in its habitat

anatomy: structural makeup of an organism

vertebrates: animals with backbones



- **Fins:** The location, size and shape of fins is often associated with different body shapes. Fins serve many functions. Pectoral and pelvic fins are used for steering, balance and braking. Dorsal fins (located on the back) keep fish from rolling over in the water. The tail or *caudal* fin helps fish move in their habitats. Fast-swimming fish have narrow-forked tails that provide the thrust needed to speed through the water. Slower-swimming fish have a wide, square-shaped tail that helps them swim around rocks or reefs and catch prey.
- **Scales:** Scales protect a fish and increase swimming efficiency. The type, size and number of scales can tell much about a fish's lifestyle. Fast swimmers typically have fine scales (e.g., trout). Fish that don't swim a lot and live in quiet water have more coarse scales (e.g., perch and ocean sunfish). Fish that are slow moving and bottom dwelling may have armor-like bony plates (e.g., seahorses, sturgeons, some catfishes).
- **Mouth:** The design and location of a fish's mouth indicates how it obtains food. If the mouth is on the underside of its body, it feeds on the bottom in sand or mud. When a fish's upturned mouth is slanted toward the top of its body, it's a surface feeder. If it has a big, wide mouth, it gulps its food. Fish with tiny teeth may nibble, while some shark species have rows of sharp teeth that bite and tear.
- **Gill openings:** Instead of lungs, fish have gills for breathing. As water passes over the gills, oxygen from the water is absorbed into the fish's blood stream. Cartilaginous and jawless fish typically have multiple gill openings. Most bony fishes have two operculi, which are thin and flexible coverings over the gill. The gill openings and covers don't vary as much with individual fish as other structures, but they tend to be smaller on less active fish.
- **Eyes:** Eye size depends on how and where a fish captures food. The position of a fish's eyes identifies where it spends most of its time. When a fish has one eye on each side of its body, it usually swims in the water column and above the seafloor. If both eyes are on top or on one side of its body, it stays on or near the bottom. The eyes of some species look upward while others look downward. This helps them find prey or sense predators above or below their body.
- **Lateral line:** Most fishes have a line of specialized cells along their bodies. Sometimes the line appears like a series of tiny holes. This system is called a "lateral line" and it helps a fish to sense movement and vibration. This allows a fish to judge water depth, navigate through obstacles, orient itself in the water column and even detect prey and predators. Schooling fish use the lateral line to group themselves and maintain a school formation.
- **Colors and patterns:** Stripes, spots and coloration provide fish camouflage that helps make them less noticeable to predators and prey. Some colors, such as yellow or orange, are a warning that the animal is poisonous. In addition, certain colors are invisible in the ocean depths, allowing the fish to blend in with its surroundings. False eyespots located on a fish's body might confuse potential predators. Fish with countershading are dark on the top or dorsal side of their bodies and lighter underneath on the ventral side. This makes them more difficult for predators to see when looking down on them from the surface or looking up from the ocean depths.

Teacher Preparation

1. Visit seafoodwatch.org to get a list of sustainable fish species. Buy sustainable whole fish species at the market. You'll need one fish per student group. If possible, buy two different types of fish so students can compare them.
2. Wash the fish with soapy water to remove fishy smell. Pat it dry with paper towels.
3. Cover the desks or tables with newspaper. Gather enough tweezers, metric rulers and hand lenses for each group.

Procedure

Part One: Investigate a fish

1. INTRODUCE THE FOCUS QUESTION TO THE CLASS.

Engage students' prior knowledge with a discussion of, *"What makes a fish a fish?"* Solicit their ideas and write them on the board. Ask them to tell you where they've seen fish before. Tell them they will be examining a real fish to find out.

2. INVESTIGATE A FISH.

Divide students up into small groups. Pass out a fish, tweezers and hand lenses to each group. Ask students to put on their disposable gloves and gently explore their fish. What do they notice about it? As they work, you can ask some of these questions:

- *How many fins does your fish have?*
- *Which fins are in pairs?*
- *What is the shape of the paired (pectoral, pelvic) fins?*
- *What is the shape of the tail (caudal) fin?*
- *What is the body shape? Flat? Torpedo? Disc? Long?*
- *What is the mouth shape? Big and wide? Small?*
- *Where is the mouth located?*
- *Does your fish have a tongue? Teeth?*
- *What shape and size are the eyes? Where are they located?*
- *Lift the gill cover (operculum). What do you notice?*

3. EXAMINE FISH SCALES WITH A HAND LENS.

Students can pull a scale from their fish by grasping it with tweezers or fingers and pulling toward the tail of the fish. Growth lines can be observed on each scale. Scales grow with the fish like skin grows with humans. Fish biologists can estimate the age of a fish by counting the lines.

4. ILLUSTRATE AND MEASURE THE FISH AND LABEL ITS BODY PARTS.

After making observations, challenge students to draw their fish and label its body parts in science notebooks. Have them record additional observations from their exploration time. Identify as many body parts as possible and accurately include their size, shape and location.



TEACHER TIP

Reuse the unsold catch of the day! If you ask at your local market, often the butcher will donate the fish that did not sell and are past their best-by date.

Smaller bait fish will also work for this activity if you can't purchase market fish.



ELL TIPS

Before doing this activity, help your language learners by starting with the familiar. Have students compare the parts of their own body and how they use each part. Where are their eyes? How do they eat? What else do they do with their hands? How do they move?



CONSERVATION TIPS

Consult the Seafood Watch Card when choosing a fish at a grocery store or restaurant. Ask your server for fish that are on the green list! Avoid the red!



**THE MISSION OF THE
MONTEREY BAY
AQUARIUM
IS TO INSPIRE
CONSERVATION OF THE
OCEANS.**

Part Two: Finding patterns in fish

5. INVESTIGATE THE FISH'S HABITAT AND LIFESTYLE.

Read a book about fish. Highlight the same body parts students identified in the hands-on activity. Show students the Open Sea and Kelp Forest web cams at montereybayaquarium.org and have them find fish in the exhibit. Then, using their observations, the background information provided and books or websites, engage in a science talk or discussion and have students try to determine where their fish lives and how it finds food and protection. Ask them to think about how their fish's anatomy helps it to survive in its habitat.

6. STUDENTS COMPARE THEIR FISHES.

Have student groups with different fishes compare and contrast their fishes using their scientific illustrations and notes from Part One. You may want them to use the Box & T chart (see page 5) or copy the chart into their notebooks. *How are the fin shapes the same or different? How are the habitats the same or different? How do the colors compare?*

7. RETURN TO THE FOCUS QUESTION.

Discuss students' findings as a class. Ask groups what all the fish had in common. (gills, scales, fins) Now that they've examined a fish and discussed their findings, return to the focus question. Together, develop a shared definition of a fish. Depending on the age level of your class, you can modify this definition: *A fish is a vertebrate that has fins, breathes with gills and spends its entire life in water.*

Resources

Websites

Monterey Bay Aquarium www.montereybayaquarium.org

Observe fish in the Kelp Forest and Open Sea exhibits on the live web cams. Research fish and other animals included in the online animal guide.

Seafood Watch www.seafoodwatch.org

Standards

Next Generation Science Standards www.nextgenscience.org

Performance Expectations

Relates to K-LS1: Use observations to describe patterns of what plants and animals (including humans) need to survive

Relates to 2-LS4: Make observations of plants and animals to compare the diversity of life in different habitats

California Transitional Kindergarten Standards

Relates to PreK-48-LS1.1: Identify characteristics of a variety of animals and plants, including appearance (inside and outside) and behavior, and begin to categorize them

Relates to PreK-60-LS1.1: Identify characteristics of a greater variety of animals and plants, and demonstrate an increased ability to categorize them.

