

STUDENT ACTIVITY: DESIGN A FISH

GRADE LEVEL

4th to 6th

NATIONAL SCIENCE EDUCATION STANDARDS

Content Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Content Standard C: Life Science

Grades K-4

- Characteristics of organisms
- Organisms and environments

Grades 5-8

- Structure and function in living organisms
- Diversity and adaptations of organisms

OCEAN LITERACY OBJECTIVES

(www.coexploration.org/oceanliteracy)

- Students will understand that the ocean supports a great diversity of life and ecosystems (Essential Principle 5); and
- Students will understand that ocean biology provides many unique examples of life cycles, adaptations, and important relationships among organisms (symbiosis, predator-prey dynamics, and energy transfer) that do not occur on land (Fundamental Concept 5d).

OVERVIEW

The individual features of a fish help to determine where it lives and how it survives. Fish come in many different sizes and shapes. The dwarf Pygmy goby found in the Philippines is less than one-half inch (about eight millimeters) long and weighs about 1/1000 of an ounce (four to five milligrams). The ocean sunfish (mola) can grow up to 13 feet (almost four meters) long and weigh up to 3,307 pounds (about 1,500 kilograms). The shape of the fish provides clues about where they might live and how they move. Many reef fish are compressed (flattened from side-to-side). When seen head on, these fish seem to disappear. Some fish have a fusiform or football shape, rounded, and tapering at both ends. This shape reduces drag and allows the fish to swim fast. In this lesson, students will explore fish morphology, or the form and function of a fish.

ACTIVITIES

1. **Parts of a Fish.** Start this lesson by having the students draw a fish from memory. Encourage them to think about the shape they are giving the fish and the type of fins and tail. Then give students the "Fish Basics" information sheet and go over the information with them.
2. **Design a Fish.** Using the information on the "Fish Basics" sheet, students are to create a fish. They need to be able to justify why the fish has a particular body part or adaptation. Students are to write a paragraph explaining where their fish lives and what adaptation the fish has that helps it survive in the chosen habitat. You may want to give them the following scenarios:
 - A powerful fish that swims long distances.
 - A fish that hangs out on the bottom of the ocean floor.
 - A fish that can easily hide itself.
3. This is a great lesson to encourage some creative writing. Have the students create a habitat for their fish, and then write a story about the life and adventures of the fish.

MATERIALS NEEDED

- "Fish Basics" worksheet
- Paper and colored pens or materials for creating a fish

FOR MORE INFORMATION

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CREDIT



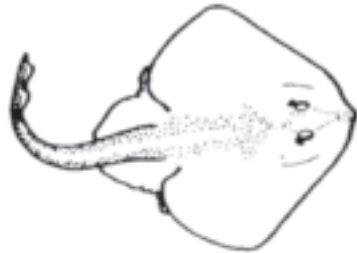
This lesson is based on a lesson of the same title in the *FishQuest* curriculum by the Western Pacific Fishery Management Council in partnership with Pacific Resources in Education and Learning, the Hawaii Department of Education, and Hawaii Public Television. It was modified by the Western Pacific Fishery Management Council with the gracious assistance of Craig Strang, Lawrence Hall of Science, University of California; Mellie Lewis, College of Exploration; and Gary Karr.

STUDENT WORKSHEET: FISH BASICS

Compressed



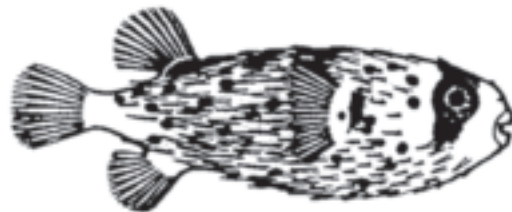
Depressed



Fusiform



Sphere



Rod



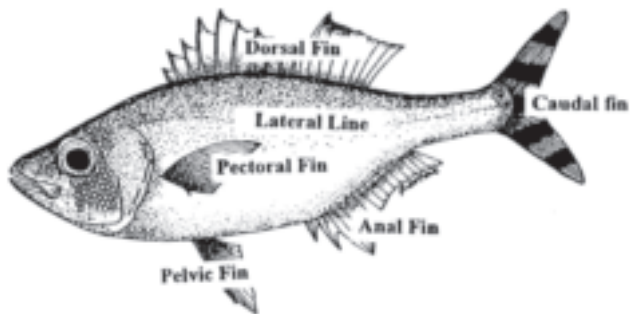
Ribbon



IMPORTANCE OF BODY SHAPE

The shape of a fish's body gives us clues about where it lives and how it moves throughout the ocean or reef. There are six basic fish shapes.

- **Compressed:** The body is flattened from side-to-side. The advantage of this shape is that when it is viewed head on it is very difficult to see. The flattened body makes it easy to turn quickly and move through a coral reef or rock structure. The disadvantage is they usually do not swim rapidly (some schooling fish are an exception).
- **Depressed:** These fish are flattened from top to bottom. They burrow themselves down into the sand and use camouflage to protect themselves. An example is stingrays.
- **Fusiform:** These fish have a long oval shape with tapered ends, like a cigar or a football. This streamlined shape reduces drag and allows them to swim fast. They usually live in open water and include fish like the barracuda or jack.
- **Sphere:** These fish have the ability to puff themselves out. They fill their bodies with air so they are too big to be swallowed.
- **Rod:** These fish have a long arrow-like body. They are often ambush hunters; they can lunge quickly and move fast.
- **Ribbon:** These fish have a snake-like body. They tend to move slowly and can move quickly through rocks and corals. The electric eel and moray eels are good examples of fish with this body shape.



FISH FINS

All fish have fins. The fins come in different sizes and shapes. Where a fish lives and how it moves helps determine the type of fins a fish has. Fins help stabilize and propel fish. Fins can be stiff and spiny or soft and flexible.

Pectoral Fins

- Paired pectoral fins are responsible for turning.
- Pectoral fins can be used to help support a fish as it sits on the bottom of the ocean or on the reef.
- Pectoral fins can also be used for propelling the fish forward.

Pelvic Fins

- Pelvic fins can give the fish stability.
- Some pelvic fins also have modified sucking devices on them.

Dorsal Fins

- The dorsal fin may be a single fin or separated into several fins.
- The dorsal fin acts as a keel and helps keep the fish stable in the water.

Anal Fins

- Anal fins are used to provide stability while swimming.

Caudal Fins

- Caudal fins are responsible for propulsion through the water.

IMPORTANCE OF CAUDAL FIN SHAPE

The shape of a fish's tail (caudal fins) gives us clues about what type of a swimmer it is and how it moves throughout the ocean or reef.

Rounded



- **Rounded:** Fish with a rounded tail are generally slow moving, but are capable of short, accurate bursts of speed.

Truncate



- **Truncate:** These fish are generally strong, slow swimmers.

Forked



- **Forked:** Fish with forked tails, like the striped bass, are also fast swimmers, though they may not swim fast all of the time. The deeper the fork, the faster the fish can swim.

Lunate



- **Lunate or Crescent:** These fish are fast, strong swimmers that are continuously on the move, like swordfish.

IMPORTANCE OF MOUTH SIZE AND LOCATION

The size and location of the mouth can be a good indicator of diet, method of eating, and where the fish lives.

- **Large:** Fish with large mouths generally eat large food items like other fish.
- **Small:** Fish with small mouths eat small food items, like small crustaceans or mollusks.
- **Tiny:** Fish with tiny mouths eat tiny things like zooplankton.



Terminal

- **Terminal:** A terminal mouth is located on the end of the head. Fish with terminal mouths, like the tuna, may chase and capture things or, like the butterfly fish, may pick at things.



Up-Pointing

- **Up-Pointing:** A fish with an up-pointing mouth has a long lower jaw. The mouth opening is toward the top of the head. The tarpon has this kind of mouth. It feeds near the surface.



Sub-Terminal

- **Sub-Terminal:** A sub-terminal mouth is on the underside of the head. Fish with this type of mouth usually feed on the bottom. The bonefish has a sub-terminal mouth.