



Welcome!

Enclosed is a packet of classroom activities to complement the *Flexi the Flounder* program, which has been scheduled for your class. This information will help prepare you and your students for our visit and reinforce concepts, which will be covered during the program.

The Lloyd Center is a not-for-profit membership organization located in Dartmouth, Massachusetts, which serves the region of southern New England. The Lloyd Center's mission is to help create the next generation of environmental stewards through education and research; seeking to instill in students of all ages an understanding and appreciation of our coastal environment, its unique and fragile nature and our special relationship and responsibility to it.

We are committed to providing quality, hands-on science programs for students in kindergarten through college. The focus of our efforts is in the interdisciplinary study of coastal environments and watersheds. All of our programs are linked to the current Massachusetts Curriculum Frameworks in Science and Technology/Engineering.



Flexi the Flounder Overview

Flexi the Flounder is a hands-on classroom experience designed to introduce students to the diversity of local fish and their adaptations to survive in a marine environment. Biological, physical and behavioral aspects of fish will be incorporated into this one-hour program. Designed as an introduction to the world of fish, the program's main focus is a six-foot fabric summer flounder.

Flexi is a larger than life, anatomically correct cloth replica of a summer flounder. Students learn about comparative anatomy, adaptation, camouflage, and the function of internal organs by “dissecting” Flexi. A dynamic hands-on guided tour through the insides of this seven-foot flounder, Flexi enables students to learn complex concepts in an easy to understand interactive way.



Important Teacher Information

To insure that your program runs as smoothly as possible, we ask that you read the following information prior to our arrival.

1. Expect the Lloyd Center instructors to arrive in your class approximately 15 minutes prior to the scheduled start time, in order to set up.
2. After a brief introduction, the class will be divided into two groups. We ask that you have them assigned to two groups before the program starts. This saves time during the program and allows you to separate students into different groups if necessary. Each group will participate in hands-on age appropriate activities and will switch activities half-way through the program.
3. The Lloyd Center will visit your class as interpreters not disciplinarians. Please be prepared to handle any disciplinary problems as they arise.



Background Information



Background Information

Who is Flexi?

Flexi is the Lloyd Center's seven-foot summer flounder made out of fabric. Although Flexi lives at the Lloyd Center she enjoys visiting classrooms to help students discover diversity of local fish and how they are adapted to survive in the marine environment. She even lets students "dissect" her and pass around her internal organs, so they can learn more about the anatomy and physiology of fish.

What's so Special About Flexi?

Flexi is very different from other fish that students may have seen before. She has a flat body, with a darker topside, she can use special cells in her skin to change her color to match the environment, and both of her eyes are on the same side of her head. Students will find out about all of these adaptations and why they are so important to flatfish.

Flexi's Parts

Students will have the opportunity to examine Flexi's outer parts, such as her scales, eyes and fins. Then we will "dissect" or unzip Flexi and pull back her skin and muscle to take a look at what's inside – the brain, heart, liver, stomach, intestines, egg sac, spleen and kidney. Students will even get a chance to open Flexi's stomach and discover what she had to eat.

Flounder Facts

- Flounder reach a maximum weight of 15 pounds and a maximum length of 3 feet.
- Flounder live most of their lives on the bottom of the ocean floor, preferably a muddy or sandy bottom.
- Flounder eat smaller fish, squid, crabs, shrimp, small mollusks and worms.
- A female flounder can lay up to a half million eggs at one time.



Common Coastal Fish Of New England



Activities



Activities

What Animal Am I?

Objective: Students will investigate and discover the adaptations organisms have developed to help them survive in their habitat.

Materials:

- Large index cards
- Crayons/markers

Procedure:

1. Write the following questions on the chalkboard or a poster:
What color is the organism? Is it camouflaged?
How does it eat?
Does it have any specialized mouthparts to help it eat or catch its food?
How does it move? (does it swim, fly, run, etc.)
Does it have specially adapted legs, claws, feet?
How does it breathe?
2. On the index cards, write the name of an organism the students have seen or heard of. You may also use the organisms from the identification sheets found in the background information section of this packet.
3. Introduce the concept of adaptations. Ask the students to describe some animals with adaptations (elephant's trunk, a giraffe's long neck, etc.). How do these adaptations help the organism survive in its environment?
4. Divide the class into groups of 4 or 5 students. Give one student in each group an index card with an organism's name written on it. Tell that student not to let the rest of the group see the name of the organism. Through charades, the student with the organism card is to act out the part of the named organism. Once the group has successfully named the organism, they can draw the organism and the habitat it lives in on a large sheet of paper.
5. Each team shares with the rest of the class their organism, the habitat it lives in and the answers to the questions originally written on the board.



Invent a Fish

Objective: Students will learn about the importance of fish adaptations and will increase their own creative ability by constructing a fish with certain adaptations.

Materials:

- Paper
- Crayons/markers
- List of fish adaptations (included in this packet)

Procedure:

1. Introduce the concept of adaptations to students. Adaptations are special characteristics or features which plants and animals have to help improve their chances of reproduction and survival. Describe some animal adaptations (elephants' trunk, giraffes' long neck, etc.). Ask students if they know of other adaptations.
2. Explain to students that they will be inventing a fish based on certain adaptations which you will give to them. Students will also need to draw a habitat for their fish, such as a sandy bottom, rocky bottom, eelgrass, etc.
3. For older students, the adaptation descriptions can be written on strips of paper and randomly passed out to students. You could also pass out more than one adaptation to each student and have them design a fish has multiple adaptations! For younger students, you could have them work in small groups and read a different adaptation to each group. Students could draw their own fish based on that adaptation. Have the students name their fish.
4. After the pictures have been completed, have each student show the class their drawing and describe the adaptations their fish has. Students should describe their fish, the habitat the fish lives in, what it eats, the name of their fish and any other interesting things regarding their fish. You could also make a bulletin board with all of the drawings.

Supplemental Activity:

Students could look through fish books for pictures of real fish which match their adaptations.



Adaptation Descriptions

- Invent a fish which is adapted for living on the bottom in sand or mud. The fish should be able to hide by burrowing under the sand or mud.
- Invent a fish whose appearance is so gruesome that other fish would be frightened by it. This fish should be ugly, yet able to swim and live on the bottom of the ocean
- Invent a fish which is adapted to swim very fast. This fish should be small and skinny so that it can be quick and will eat microscopic organisms.
- Invent a fish that would eat other fish. Remember that this fish must catch another fish before it can eat.
- Invent a fish that would live between rocks on a reef. The fish would eat whatever it could catch and would be able to move around the rock crevices.
- Invent a fish that would eat clams, crabs, or other organisms with hard shells.
- Invent a fish that lives in very deep water and must withstand great pressure. This fish would eat other fish but not have much light to see by.
- Invent a fish that is large and slow moving, so that it must be able to camouflage itself to escape from predators.
- Invent a fish that is adapted to trick prey by appearing to be something other than a fish.
- Invent a fish that has a special mouth for eating worms and other organisms which live in the sand. This fish lives in eelgrass beds.
- Invent a fish which lives in very muddy waters and has small eyes. This fish must be able to feel for its food since its vision is very poor.
- Invent a fish which uses a special trick to fool predators and make its escape.



Fish Puzzle

Objective: Students will learn about the external anatomy of fish and will enhance their problem solving techniques by constructing a fish puzzle.

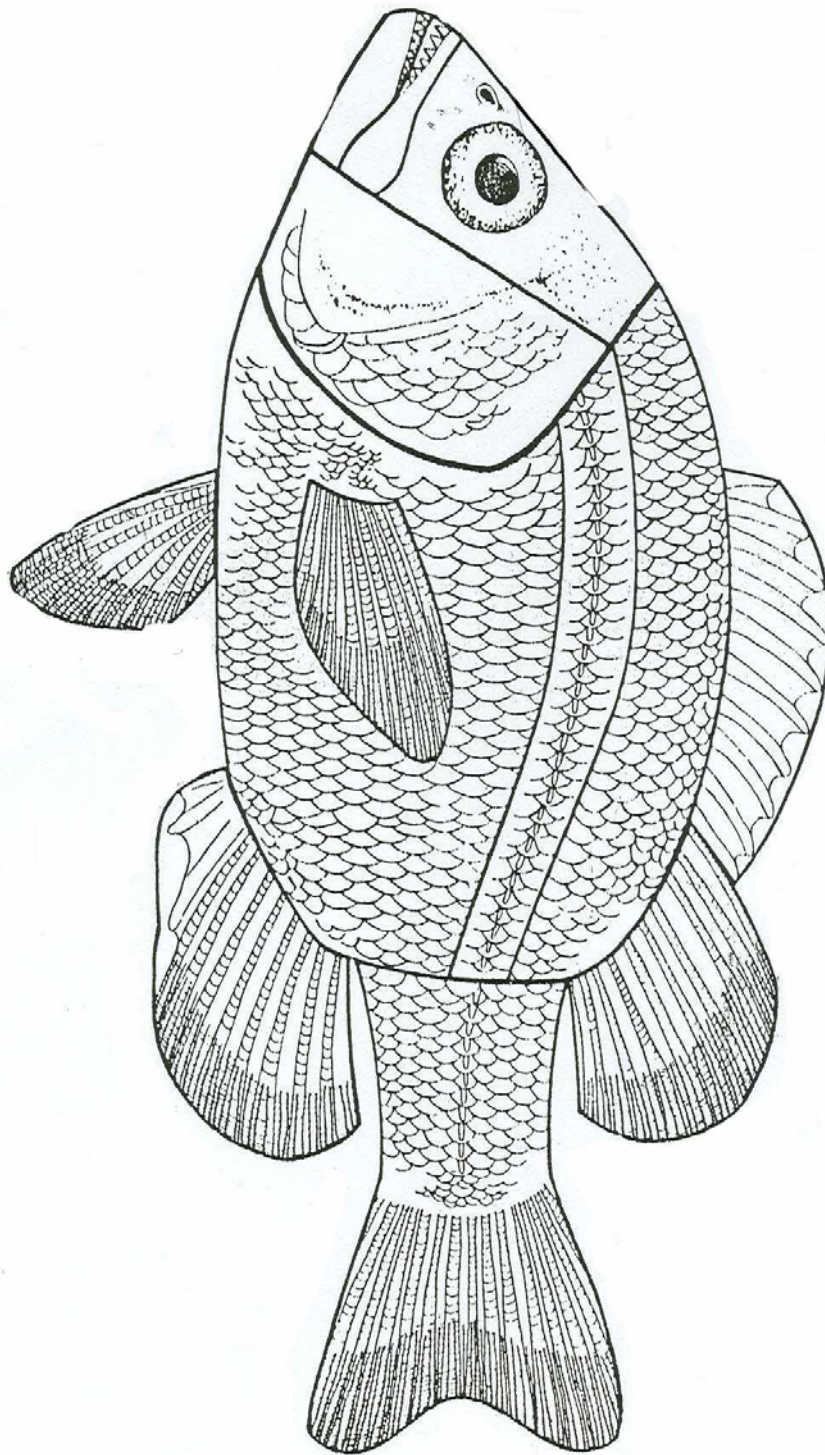
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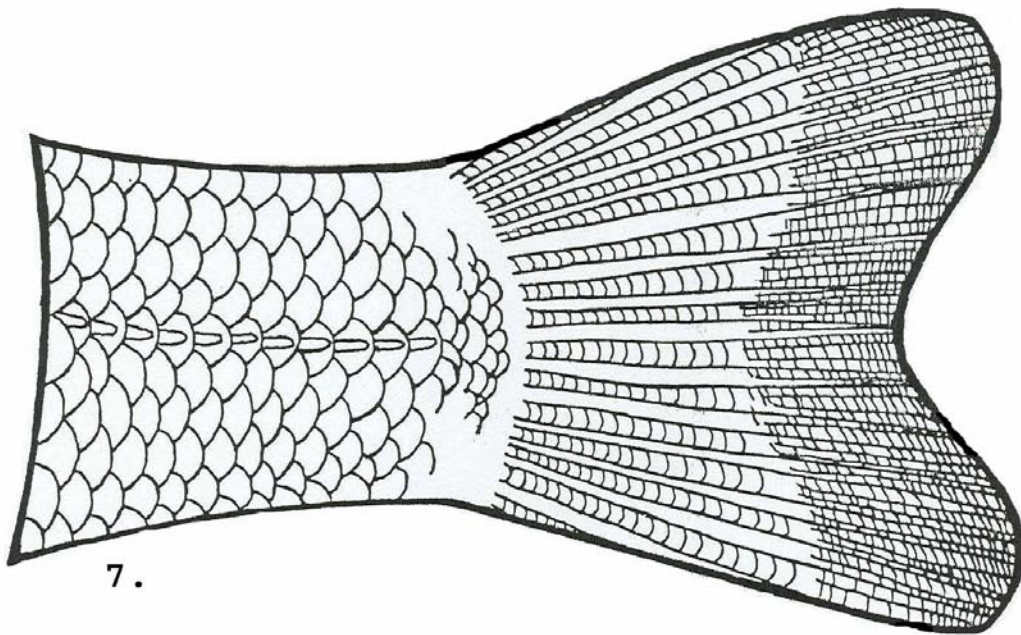
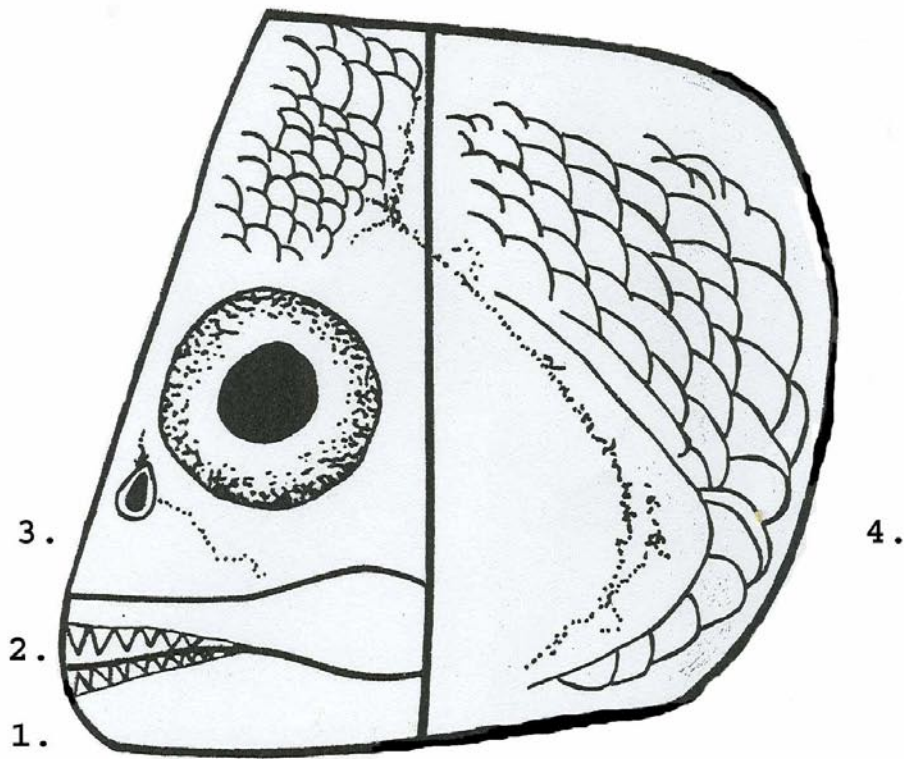
- 1 copy of the fish puzzle parts sheet per student or group of students.
- Posterboard
- Crayons/markers
- Scissors
- Glue

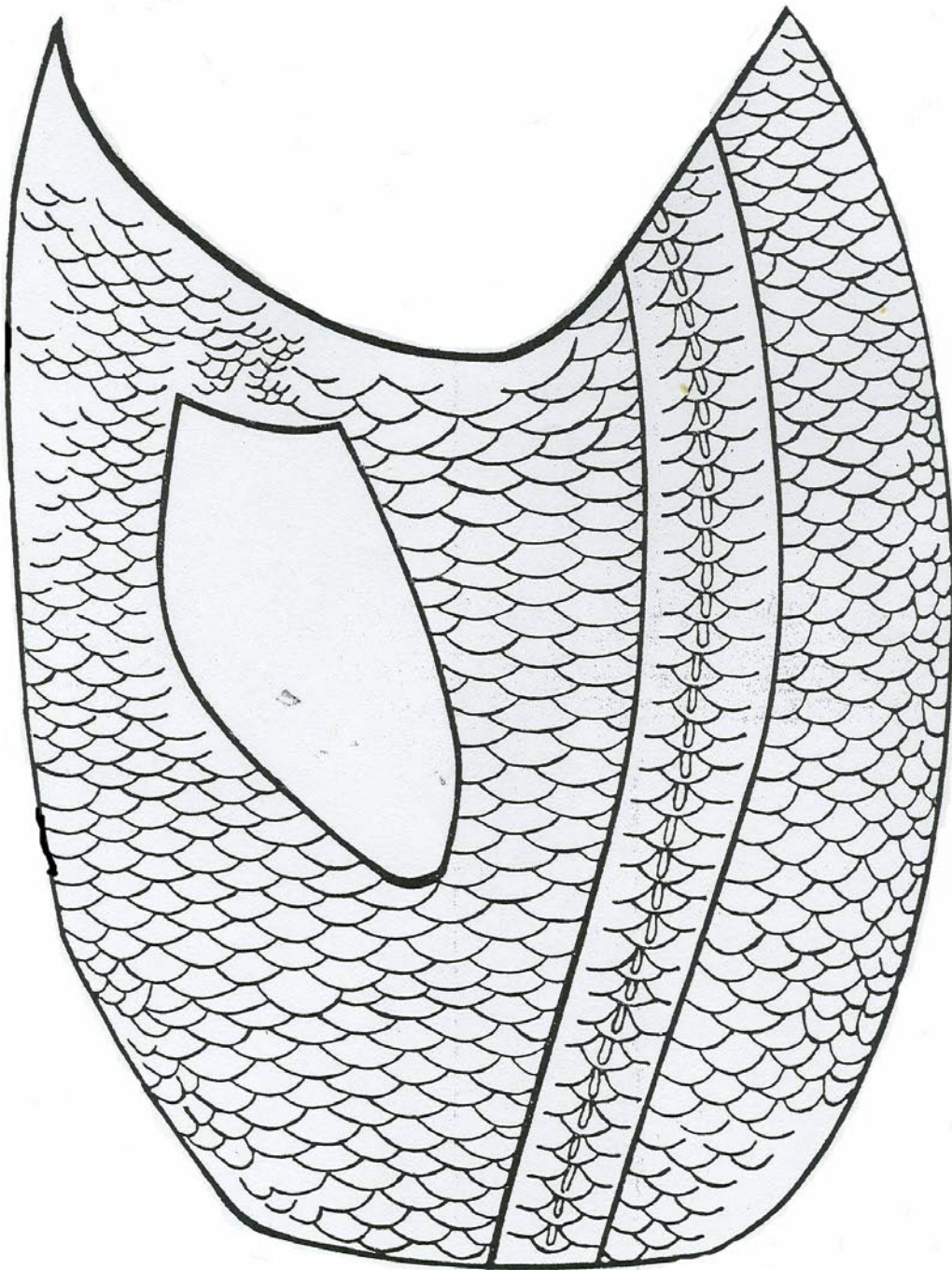
Procedure:

1. Ask the students what they know about the external parts of a fish. Do fish have teeth, legs, hair, etc. Have students describe what they think fish look like on the outside.
2. Tell students they will be assembling a fish puzzle which will show the external parts of fish. Point out that not all fish look the same. Some fish, such as Flexi the Flounder, have special body shapes (adaptations) to help them survive.
3. Pass out the fish puzzle pieces, posterboard or large sheet of paper, scissors, glue and crayons/markers.
4. Have the students cut out the fish puzzle pieces (for younger students pre-cut the fish puzzle pieces). You may wish to have the students sit in a circle on the floor while you guide them through the assembly of the fish. Use a puzzle you have cut out ahead of time. As you assemble the fish explain each part of the fish and what its function is. (see fish puzzle fact sheet).
5. Have students try to assemble the fish puzzle on their own. When completed they can glue the puzzle onto posterboard and color it if desired.

Completed Jigsaw Puzzle



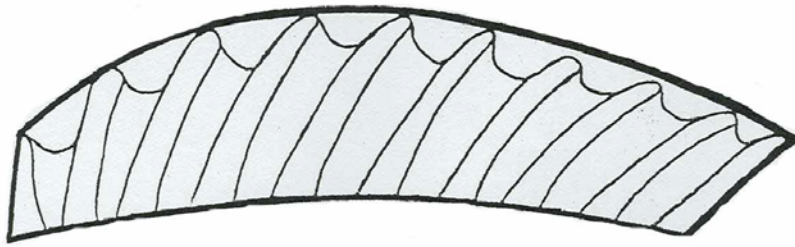




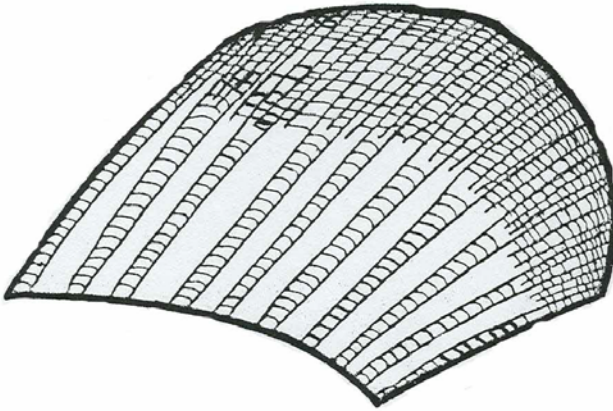
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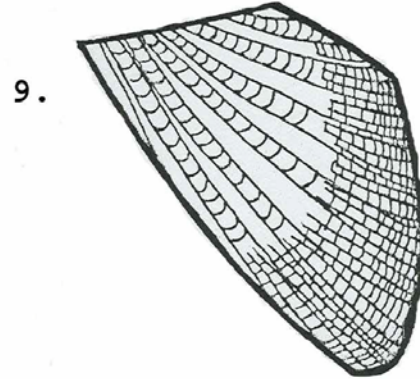
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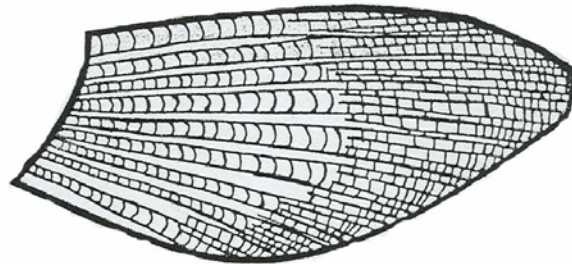
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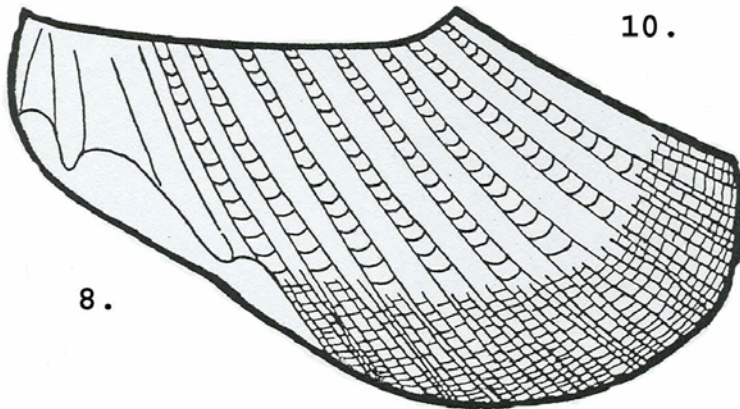
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Fish Puzzle Fact Sheet

1. **Teeth:** Fish don't really chew, they just grab onto their prey and swallow it whole. Fish species have a wide variety of teeth; some have big, sharp teeth to catch and hold prey; some have bristly teeth to scrape algae; and others have flat or heavy teeth for crushing hard-shelled animals.
2. **Mouth:** Fish can have big mouths, tubular mouths, flexible mouths, mouths that point up and mouths that point down. All of these different mouth designs have special functions for that fish depending on its environment, the food it eats, and how it protects itself.
3. **Nostrils:** Fish have noses which are used for smelling chemicals in the water, not for breathing! **Eyes:** The size and color of the eyes varies from fish species to fish species. Most fish lack eyelids since their eyes are constantly bathed in water. Fish lack sharp vision and are nearsighted, so that they must rely on other means to find food. Cave fish, which live in the dark all of the time, lack eyes completely.
4. **Gill Cover:** Known as the operculum, this flap covers and protects the delicate red gills found underneath. Fish get their oxygen from air dissolved in the water. This can be compared with mammals such as dolphins and whales which have lungs and must surface periodically to breathe.
5. **Dorsal fins:** Some fish have one dorsal fin, while others have two and some fish have none at all. There is great variety in the size and shape of fins. Some fish, such as sharks, have a sharp spine which projects from the dorsal fin for protection.
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7. **Caudal fin:** This is the fish's tail. Some fish move their bodies by thrusting the tail back and forth. For other fish, the tail serves as a rudder or stabilizer, with propulsion coming from body movements and other fin movements.
8. **Anal fin:** This fin is sometimes armed with sharp projections. When these supporting rods in fins are soft, they are called rays and when they are hard and stiff, they are called spines.
9. **Pelvic fins:** These fins are used primarily for fine adjustment of the fish's movements but may be modified for special functions, such as crawling along the bottom, holding or grasping.
10. **Pectoral fins:** These are used for fine movements. They may be modified for special functions or may be absent in some fish.



- 11. Scales:** Although most fish have scales, certain fish either lack them or have such small scales that they are not noticeable, (moray eels and catfish are examples). Scales are modified skin cells which help protect fish from abrasions and diseases.
- 12. Lateral line:** The water fish live in is sometimes cloudy and often dark. Therefore, fish cannot depend on sight to find its way around and find food. Instead, it uses a special sense organ known as the lateral line. This is a series of pits in the skin that looks like a dotted line. The nerve cells in these pits are sensitive to changes in water pressure and tell the fish how deep it is and what sounds are present. The lateral line is also sensitive to chemicals dissolved in the water.



What's In a Name?

Objective: Students will combine their artistic creativity with science by drawing fishes based on their common names. Students are also introduced to some local fish species.

Materials:

- Pictures of fish (some are provided in this packet), you may also use a picture book or field guide showing pictures of fish, such as Peterson's Guide to the Fishes
- Paper
- Crayons or markers

Procedure:

1. Tell students they will be discovering some local fish by first drawing their interpretation of what they think the fish looks like.
2. Pass out drawing paper and crayons/markers to each student (pre-folded into quarters).
3. Read aloud the common name of a fish and ask students to draw what they think each fish looks like based on its name. Students should draw one of the following in each quarter of their paper.

Blue fish

Lumpfish

Mummichog

Pipefish

Pufferfish

Sea Robin

Seahorse

Stickleback

4. After students have drawn their pictures, show them the actual pictures of the fish. Ask the students the following questions:
Why did they draw the fish the way they did?
Why do they think these were named the way they were?
Can they give other examples of fish that are named because of the way they look?
5. Read some information about each fish to the children. Older students could research interesting facts about the fish.
6. You could make a bulletin board to display the students' artwork.

Glossary



Glossary

Adaptation: a special feature that helps an animal survive in its habitat. For example: flounder can change color to blend in with the bottom of the ocean.

Camouflage: a type of adaptation that allows animals to blend in with their surroundings.

Egg: reproductive body consisting of an embryo encased in a soft or hard shell.

Egg Sac: a thin membrane which encases the eggs.

Estuary: a semi-enclosed body of water where fresh and saltwater mix.

Fin: an appendage used for movement and propulsion in fish.

Fish: a cold-blooded animal which lives in water, has a backbone, fins and gills for breathing.

Flounder: a bottom-dwelling flatfish.

Gill: the breathing organ of fish and shellfish.

Habitat: the living place of an organism, which meets the four requirements for survival: food, water, shelter, and space.

Intestine: tubular organ through which food is absorbed and wastes are transported to the anus.

Kidney: organ which separates waste products from the blood.

Liver: a large organ which stores energy converted from food.

Predator: an organism which hunts and consumes other organisms (prey).

Prey: an animal which is hunted and eaten by another organism.

Spleen: the organ which stores blood and destroys old blood cells.

Stomach: saclike digestive organ into which food passes from the esophagus.