

## Fish Focus

- Fish have sensory abilities just like people.
- The sensory abilities of fish have been adapted to fit their environment.
- Fish can feel through a modified set of scales called the lateral line.
- Fish scales can be used to determine the age of a fish.
- Fish have the ability to detect color.



### fin fact

As water warms, the oxygen comes out. That's why many types of fish and aquatic animals thrive in cold water that's rich in dissolved oxygen.

# Lesson 3: Sensory Features and Abilities

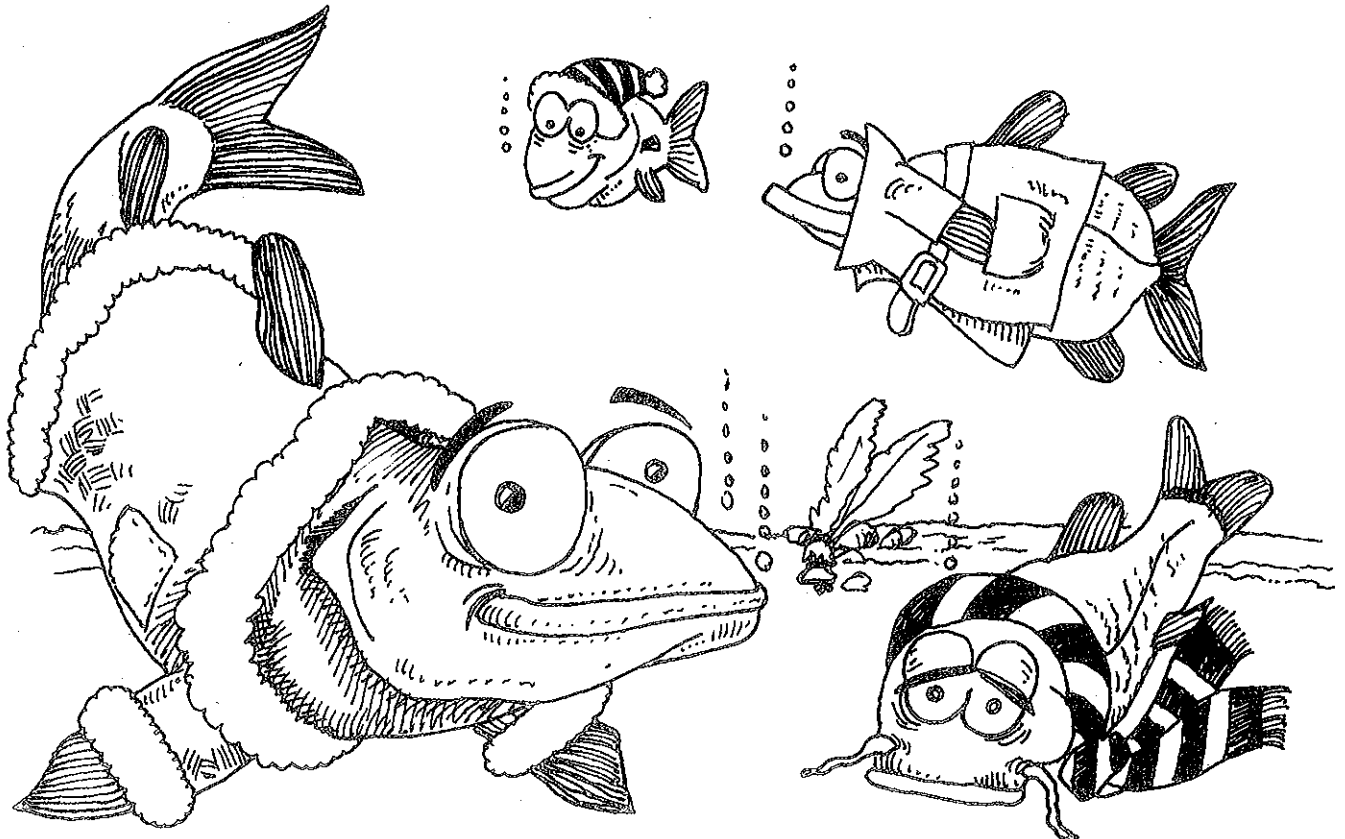
## Background

Just like humans, fish can see, smell, taste, hear and feel. But, one or another of these senses may be better developed according to the type of life the fish lead. For example, most predatory fish have very good eyesight so they can hunt and catch their prey.

The eyes of fish are similar to our own, except that fish do not need eyelids because the surface of the eye is kept clean and moist by the water. Although fish cannot close their eyes, they do sleep, often resting on the bottom or against a plant.

Some fish live in pools deep inside caves, which are so dark that the fish have lost their eyes and are blind. The skin over the body is very sensitive, so they can feel their way around.

All fish have nostrils, which are not used for breathing but for smelling. The nostrils are deep pits, lined with special skin that is sensitive to water-borne smells. Most fish have four nostrils on their snouts, but some have two.



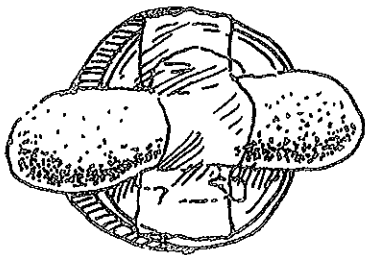
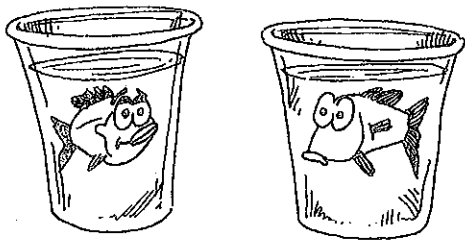
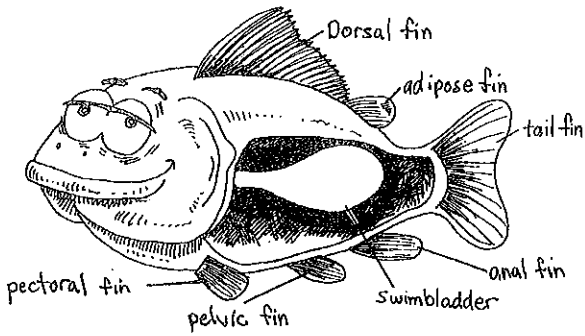
**Facts to Know**

Most fish have seven fins. These fins help them move through the water and maintain their balance.

Although like species may look alike, they do differ, just like people.

Fish are able to float with the use of a swim bladder.

Below is a picture of a goldfish with the fins and swimbladder labeled.



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

## Activity

Investigate - fish features

■ Examine your goldfish with a magnifying glass. Find each of the fins labeled on the fish pictured below. Then answer the following questions: [Hint: Your goldfish only has 7 fins]

1. What special things do you notice about your fish's fins?  
\_\_\_\_\_

2. Does your fish use all of its fins to swim?  
\_\_\_\_\_

3. Which fins do they use the most?  
\_\_\_\_\_

## Activity

Investigate: fish differences

■ Compare your goldfish with that of another group then complete the following chart.

Feature	Difference
color	_____
tail fin	_____
dorsal fin	_____
size	_____
mouth	_____
eyes	_____
scales shape	_____

## Activity

Investigate: salt water and buoyancy

■ Your instructor will explain the steps to completing this floating quarter activity.

■ After completing this activity using both fresh and salt water, answer the following questions:

1. Would a saltwater fish need a larger or smaller swimbladder compared to freshwater fishes its size? \_\_\_\_\_

2. Would it be easier or more difficult for a saltwater fish to swim in salt water? \_\_\_\_\_

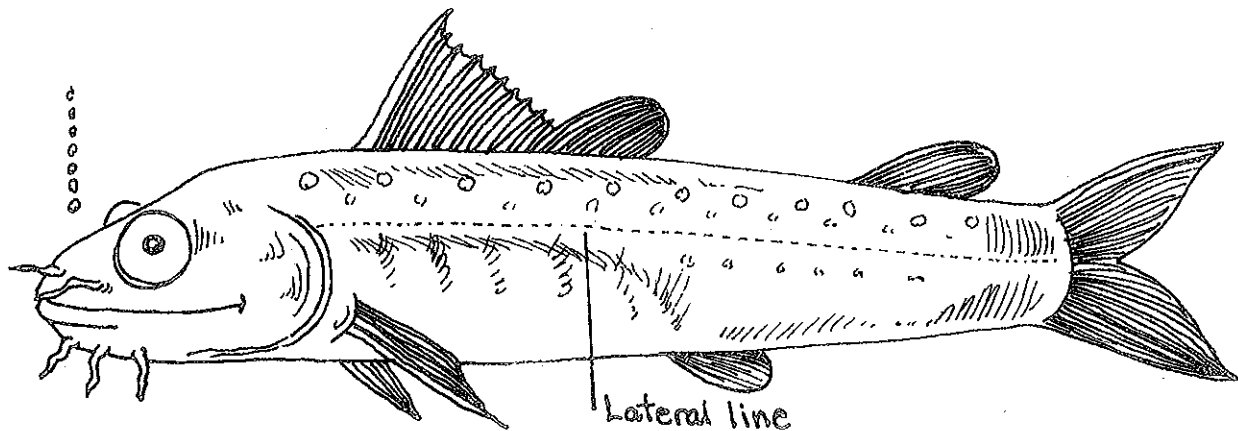
3. If easier, how could the size or shape of saltwater fishes differ from freshwater fishes? \_\_\_\_\_

Fish can sample the water and their food with taste buds. These are not just in their mouths, but may be on the outside of the head or even on the fins and body. For example, catfish have whiskers that are fitted with special taste cells. These are important when searching for food in muddy water.

Although fish do not have ears like ours, they can hear. They use internal ears to detect underwater sounds. Sound passing through a fish's head resonates in the inner ear capsules. These capsules contain liquid and several small calcified stones called otoliths. Sensitive hairs around the otoliths pick up vibrations, and a corresponding signal is sent to the fish's brain.

Goldfish, minnows, and catfish have a broader hearing range than other fishes because they have an extra hearing structure. This structure, called the Weberian ossicles, is a set of small bones that work like a human inner ear. Catfish and carp-like fish have special bones on the fronts and tops of their backbones, which improve their ability to hear.

The outside of a fish's body is covered with thin bony plates called scales. On each side of a fish's body, there is a row of scales each of which has a small hole, or pore, in the center. These pores lead to a thin tube beneath the skin called the lateral line. This has special sense cells that help the fish to feel movements in the water nearby.



## Discussion

Begin discussion by breaking the group into teams and distributing the goldfish in clear 16-ounce plastic cups filled half way with aquarium water. Explain to the group the various features of the fish that allow it to smell, taste, hear, feel and see. Distribute copies of Worksheet #3 for use during the discussion and the following activities. Using the worksheet, show the various sensory sites. Encourage the teams to locate similar features on their fish.



### fin fact

Most sounds a fish hears are the low booms, croaks, clicks, and grunts that other fishes make. It hears very well in this low-pitched range. But most fishes have less than a tenth of the hearing range of humans.



## Activity: Fishy Thoughts

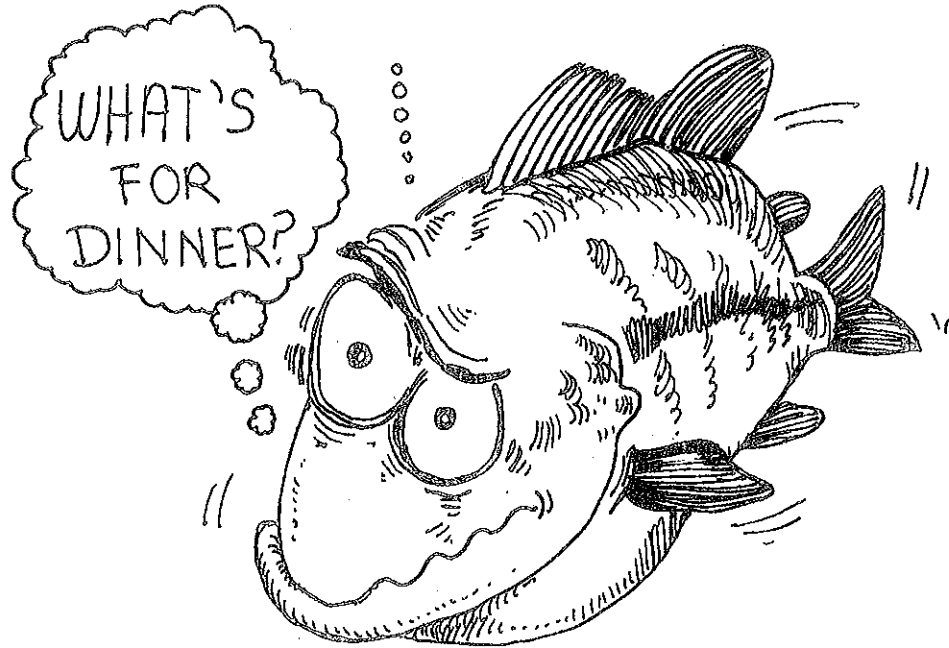
### fin fact

Fish are cold blooded animals. This means the temperature of their bodies is the same as that of the water surrounding them.



### Materials

16-ounce clear plastic cups, aquarium water, Worksheet #3



Have the group think about similarities and differences between themselves and their fish. For example, both have eyes but not eyelids. We have noses with sensory cells that allow us to taste and smell. However, because fish don't need a nose to breathe, their taste and smell sensors are located near the mouth.

Note: You can prove this by having group members hold their noses while drinking a glass of coke or eating an onion. They won't be able to taste what's in their mouths.

Fish have lateral lines with fine hairlike structures to sense movement and location. Yet, our bodies are equipped with sensory cells wherever there is skin. Give the group about 10 minutes to complete Worksheet #3 then be prepared to discuss their thoughts.

Be sure to return the fish and water to the aquarium at the conclusion of this activity.



### Materials

16-ounce clear plastic cups, aquarium water, fish, pencil, flashlight, onion, cola flavored beverage, flavored gelatin

## Guiding Questions

- Why are fish eyes so big? (*greater field of vision*)
- Do fish eyes have pupils like ours and do they get larger and smaller as the light intensity changes? (*yes, they have pupils; no, they remain constant*)
- Have students shine a flashlight in their eyes and watch the pupil of the eye get smaller. Then try this with the fish. Do they notice a change in the fishes eye? (*should be no change in fish eye*)
- What is the advantage to having the sense of taste and smell near the fishes mouth? Remember, they don't have hands to grab food. (*quicker smell/grab reaction time*)
- Why don't fish have tongues but they have very pronounced lips? (*Don't need tongue to taste or swallow*)
- Why don't goldfish have teeth? (*Have tiny barbs around mouth*)
- How are our eyelashes similar to a fishes lateral line? (*very sensitive to touch*)
- Have them lightly touch a fingertip to their eyelashes to see how their eyelid reacts.
- What happens when you tap the cup containing the fish? Is its reaction because of the sound it hears or the vibrations it feels in the water? (*probably some of both*)

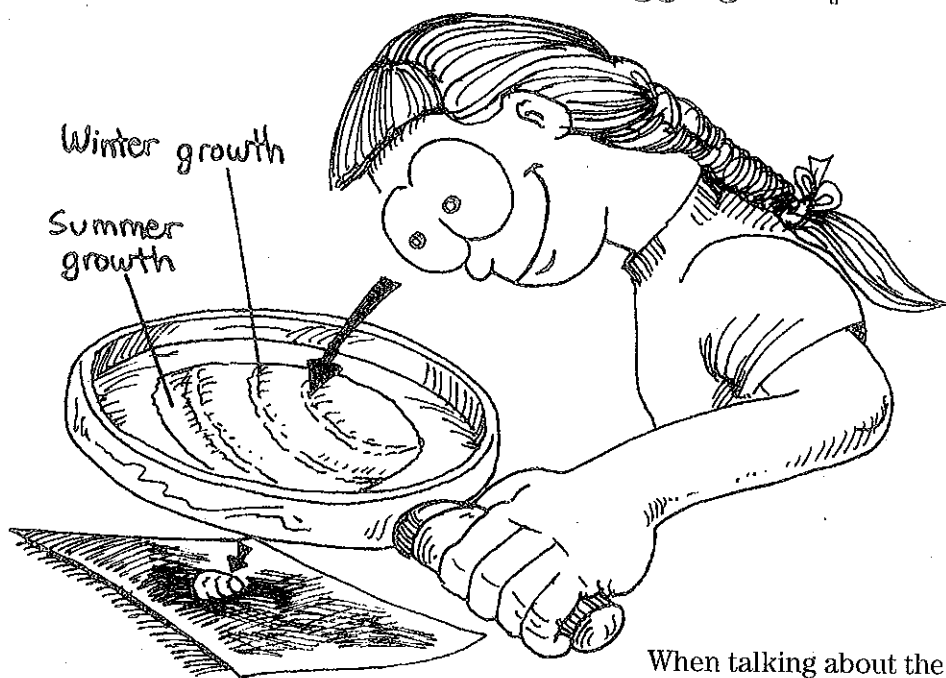
## Digging Deeper

Have group members experience what its like to be a fish. For example:

- Eating flavored gelatin without the use of hands.
- Trying to relax without closing their eyes. Does turning down the lights help?
- Sensing the presence of an object without it touching the skin.
- Sensing sound while having their fingers in their ears.



## Digging Deeper: Fish Rings



**Materials**  
fish scales, hand lens, paper  
towels

When talking about the unique scales that make up the lateral line, try this activity to familiarize your group with this important fact about fish scales.

1. Like rings on a tree trunk, fish scales form rings with each year of growth. Obtain fish scales from a fish market or a science supply house like NASCO (1-800-558-9595).
2. Explain to the group members that they will be taking a closer look at a fish's scales. You may wish to provide a picture of the fish they will be examining as well as where it is found.
3. Break the group into teams of 2 or 3 and distribute hand lenses and fish scales. See if the groups can count the wide lighter bands on the scales. By counting these bands, they can determine the age of the fish.

### Explanation

Explain that rings grow fastest in warm weather when there is an abundance of food. During this growing season, the growth band is lighter in color and much wider than during the colder months of winter. The winter growth produces dark slim bands because the growth is so very slow. The ring pattern varies in design from one species to another.

## Digging Deeper: Do fish see colors?

This activity will take several hands but if done properly will provide some interesting results.

1. Obtain or make three disks of different colors, using any waterproof materials like a tiddlywink. Red, yellow and blue work especially well. Glue each disk to a stick or wire.
2. Turn off the air pump and wait until the water and fish settle down. Then immerse all three disks simultaneously in the water at different locations around the tank. As the disks are being submerged, choose one color and location where food will always be introduced.
3. Repeat this procedure three times a day for three days, always placing the food in the same location near the same colored disk.
4. On the fourth day, switch the location of the colored disks but don't introduce any food. Do the fish seem to go to their usual colored disk in anticipation of food, or do they go to the location where food is normally introduced?

## Guiding Questions

If done right, the fish will be attracted to the colored disk for food.

- What does this suggest about a fish's ability to see color? (*somewhat color sensitive*)
- Do they think a similar experiment can be conducted to see if fish can associate certain smells with food? (*yes, but difficult*)



### Materials

colored disks, wire, tape, fish food, aquarium, fish

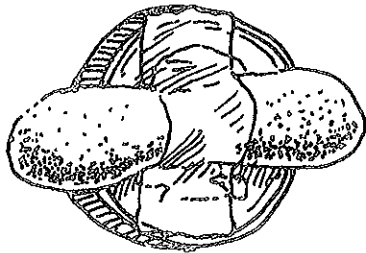
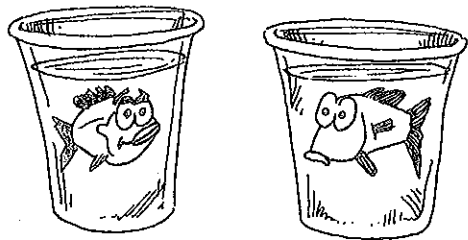
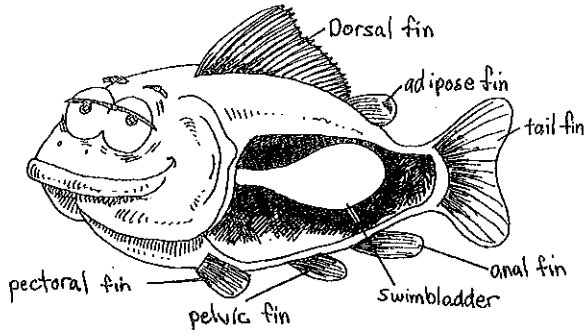
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