Name_____ Period _____Date_____

Scales, Fins, and Shape:
Modeling Structures and Functions

Objective

The learner will observe and model the structure and function of scales and fins of GloFish® fluorescent fish.

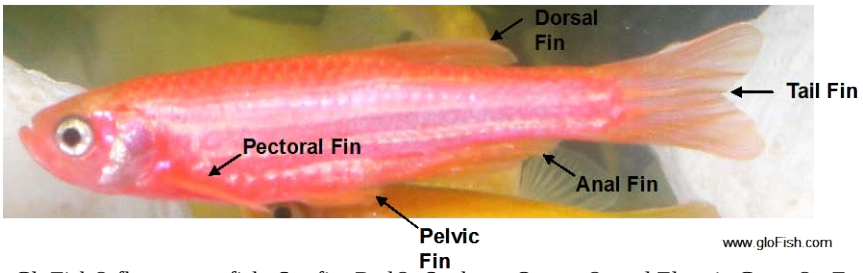
Introduction

Is a GloFish's shape important? How do GloFish scales and fins help fish adapt to their environment? The body shape of a fish can tell you a lot about its environment. Fish that live near the top of the water usually have flat backs. Trim, torpedo shaped fish are usually found in moving water. Fish with round, flatter, elongated bodies usually live in slow moving water. Bottom dwellers usually have a flattened, disc shape.

Scales cover the outer layer of skin or epidermis. Scales are imbedded in a deeper layer of skin called the dermis and grow out overlapping each other. Scales grow toward the tail of the fish and continue to grow as the fish grows. You can actually tell the age of a fish by the growth rings on its scales. The scales grow toward the tail to help reduce friction (the rubbing of two objects against each other) as the fish swims through water. Most fish have a slimy mucus layer over the scales that acts as a protective covering.

Fins are made of a special type of tissue and bone and are used for movement, steering, and balance. Like other fish, GloFish have five types of fins:

1. The tail fin (also known as the caudal fin) helps propel or push the GloFish through the water.
2. The anal fin is located on the underside (or ventral side) close to the tail (or posterior end); it helps the GloFish move forward, balance, and steer.
3. The pelvic fin is also found on the ventral side, but is located closer to the head (or anterior end); it also helps the GloFish balance, stop, and turn.
4. The pectoral fins are located on the sides (or laterally) behind the gills, and they too help the GloFish balance, stop, and turn.
5. The dorsal fin is found on the top side (or dorsal side) along the backbone of the fish. The dorsal fin helps the GloFish stay upright and balanced.



National Standards

Science as Inquiry A—Abilities necessary to do scientific inquiry
Life Science B—Diversity and adaptations on organisms
Life Science C—Characteristics of organisms
Life Science C—Structure and function in living systems

Materials Per Group

Modeling clay
Container or tub of water
Long pencils or skewers
Hand lens
One GloFish® in a clear plastic cup containing aquarium water

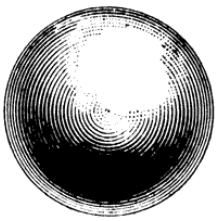
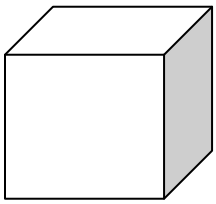
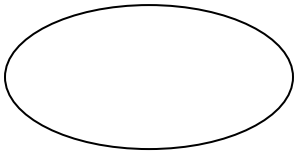
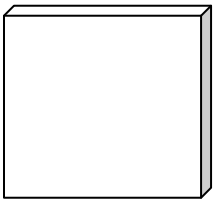
Safety Precautions

Demonstrate the proper procedure for carrying and handling the cup containing the fish. Instruct learners to wash their hands thoroughly after handling living organisms.

Procedures

Part A: Describing How Shape Impacts Movement

1. Use about a one inch ball of clay to form each of the following shapes: Round, square, oval, flat and human.


2. Insert a pencil or skewer into the middle of the back of each shape. You will use the pencil or skewer to hold the object as your move it through water.

3. Move each shape, one at a time, through the tub of water. Watch the ripples made as the shape moves through the water. Write a description of the ripples created by each shape in *Data Table 4.1*.

4. Move each shape through the water again. Describe whether it took a small amount of force or large amount of force to move the shape through the water. Record your descriptions in *Data Table 4.1*.

5. Move each shape through the water a third time. Describe how the shape actually moved through the water. Record your descriptions in *Data Table 4.1*

Part B: Observing External Features of GloFish®

1. Place a GloFish in a plastic cup containing aquarium water.

2. Use the magnifying lens to carefully observe the five GloFish fins. Draw and label the fish in the space provided on the answer page.

3. Look closely at the body of the GloFish. Observe the scales. Find any areas that are not covered with scales.

Data Table 4.1 - Observations of Shapes in Water

Shape	Observable Ripples	Force Required	Description of Movement
Round			
Square			
Oval			
Flat			
Human			

Labeled Drawing of GloFish®

Discussion Questions:

1. Which shape made the fewest ripples in the water? Which made the most?

2. Which shape required the most force to move it through the water? Which required the least?

3. Which shape moved the quickest? Which shape moved the slowest?

4. Compare the way the GloFish shape moves through the water to the human shape moving through the water.

5. Illustrate the scale pattern found on a GloFish.

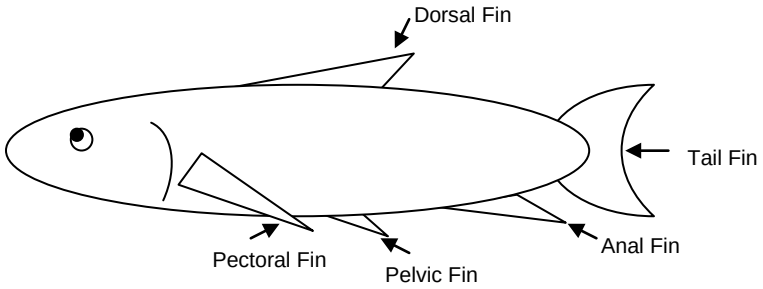
6. Where did you see scales on a GloFish? Where were there none?

7. Describe the scale pattern of a GloFish.

8. What covering on you is most like that of a scale?

Elaborations and Extensions

Students could make clay models with fins and write about their observations when placed in water. Students could also place different coverings on a clay model and make observations. Brainstorm about materials that could be used to simulate scales.



Scales, Fins, and Shape:
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Answer Sheet

Intended Grade Level
2nd, 3rd, 4th

Teacher Information

Read the introduction section to your learners. Procedure steps are provided for older learners. Younger learners will need oral instruction regarding procedures. It is always helpful to have students working in pairs and the teacher walking around facilitating learning. When students insert the pencil or skewer into the clay model they should make sure the clay is secure to avoid dropping the shape into the water. Encourage students to move the objects just under the water's surface rather than at or near the bottom of the container of water.

Instruct students in the proper procedure for carrying and handling the cup containing the fish to avoid spills and unnecessary agitation of the fish. Students should wash their hands thoroughly after any lab activity.

Discussion Questions and Possible Answers

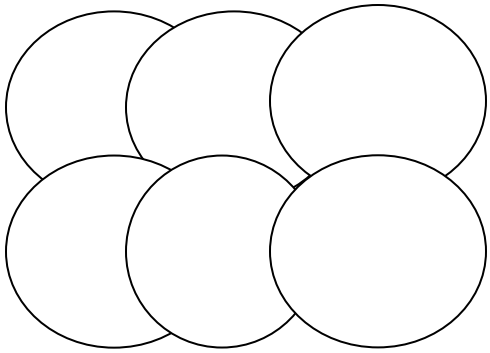
1. Which shape made the fewest ripples in the water? Which made the most?
Depending on students' models: fewest ripples should be oval shape, most - human

2. Which shape required the most force to move it through the water? Which required the least?
Depending on students' models: least force should be oval shape, most - human

3. Which shape moved the quickest? Which shape moved the slowest?
Depending on students' models: quickest should be oval shape, slowest – human

4. Compare the way the GloFish® shape moves through the water to a human shape moving through the water.
The GloFish shape is much more streamlined than the human shape and allows for smoother movement as it goes through the water.

5. Illustrate the scale pattern found on a GloFish.
They overlap in rows or curves and are not completely round (see illustration on next page).



6. Where did you see scales on a GloFish®? Where were there none?
   Scales are found everywhere; except for the eyes, fins, and lips

7. Describe the scale pattern of a GloFish.
   They overlap in rows or curves and are not completely round.

8. What covering on you is most like that of a scale?
   Your nails