Coral Reefs

Concepts
Fish come in all shapes, sizes, and colors. Fish vary widely in appearance and physical characteristics due to the variety of adaptations they may have which make it necessary for them to survive in their aquatic habitat.

HCPS III Benchmarks
SC 4.1.1
SC 4.3.2
SC 4.5.2
SC 4.5.3

Duration
2 - 1 hour sessions

Source Material
MARE
PRISM

Fun with Fish Forms

Summary

This lesson continues to build on the concept of fish adaptations and anatomy. This activity will provide the students with the opportunity to recall what they have learned about general fish anatomy. Their knowledge will be further utilized to explore the adaptive details of different fish that allow them to survive in the water.

Objectives

- Students will identify a variety of fish adaptations pertaining to color, tail shape, body shape, and teeth or jaws.
- Student will determine why and how fish are adapted to life in the water.

Materials

Activity 1: per class
Videotape of fish
Colored markers
6 sheets of chart paper
Anticipatory Guide About Fish (1 on chart paper & 1 per group)

Activity 2: per class
30 or more pictures of a variety of fish
Posters of various fish displayed around the room
(Hawaiian fish posters are available from the Department of Land and Natural Resources)

Activity 3:
Fish Adaptation Charts (4) for body shape, tail shape, mouth/teeth/gill rakers, and coloration pattern
Blank Piece of Paper (1 per student)
Pencil (1 per student)

Making Connections

Students will recall what they learned about fish in the previous lesson – they all share similar types of parts that allow them to live in their water environment such as fins, scales, and gills. Now, they will begin to understand that while fish share many of the same type of parts, each part can be very different from one fish to the next. For example, while a streamlined fish is a very fast swimmer, a sphere or round shaped fish is much slower. Therefore, body shape is one aspect of fish anatomy that can be very significant in their ability to live and survive in their habitat.

Teacher Prep for Activity

1. Photocopy one "Fish Adaptations Chart" for each student.
2. Photocopy one "Anticipatory Guide About Fish" for each group of students.
3. Gather pictures and other visual fish images such as posters and books that will show the variation in their size, shape, color, and habitat. Display posters around the room in easy to see locations. Select a video (you will only show about 10 minutes) on fish and preview/cue it in advance to the segment that highlights the highest level of diversity of among fishes. You could also use a poster or picture of a coral reef ecosystem with lots of fish in it.
4. Make a class Anticipatory Guide About Fish on large chart paper. *NOTE: The statements on the chart refer to footage often seen in most fish videos. However, you may need to make adjustments depending on which video (or poster/picture) you select and the content of it.*
5. Draw the 4 Fish Adaptation Charts on individual pieces of chart paper.

Background

See introduction and supplemental materials.

Vocabulary

Refer to Fish Adaptations Charts

Procedure

Session 1

Activity 1: 30 minutes

1. Separate the class into groups of 4-6. Distribute one copy of the "Anticipatory Guide About Fish" to each group.
2. Explain to the students that they will be working together and discussing each of the statements on the worksheet. One person in the group should be the recorder and write down the number of students in their group and who answered true, false, or don't know for each statement under the before video column.
3. The large class "Anticipatory Guide About Fish" should be taped in front of the class either on the board or some other easily visible location.
4. After each group has finished tallying and recording their answers on their own group chart, then turn on the video and turn the sound off completely. Explain to the students that this is an observation activity so they do not sound and that they should quietly discuss within their group what they observe for each of the statements.
5. Show only about 10 minutes of the video, then turn it off and give each group a chance to review the statements on the anticipatory guide sheet. Explain that each group should now record their answers to each statement under the column that says after the video.
6. Once all the groups have completed their sheet and recorded their responses, lead a class/group discussion working through each statement together and be sure to record the students' ideas on the class chart. If any of the statements on the chart are left unresolved, then ask the students how they might be able to figure out if the statement is true or false.
7. On a separate piece of chart paper, make a list of any questions the students still have about fish. Explain that in the next lesson they will have the opportunity to observe a real fish, which may help them uncover some clues or answers to the questions they still have.

Transition into next activity – Ask the students to stand and line up QUIETLY outside the classroom. You will call them back into the room in just a moment.

Activity 2: 30 minutes

8. Distribute 6 or more pictures of different kinds of fish to each group area and spread them out on the desks.
9. Meet the students outside in the hall. Ask the students to close their eyes and imagine that they are going on a field trip to an aquarium where they will be able to see and observe fishes with their very own eyes. Explain that when they enter the classroom, they should look for pictures of fish that have been laid out or hung on the walls. They are to walk silently around the room (just like they would if they were visiting a real aquarium). After a few minutes, you will instruct them to pair-up and they should stop where they are and find the nearest neighbor to be partners with.

Allow the student to enter the classroom and observe for 5 minutes or so. Then, ask them to pair-up and find a seat (either at desks or on the floor) for a group discussion.

10. Ask the first question from the list below, give the partners a chance to discuss it and then ask for volunteers to share the answer. Repeat steps 2 & 3 until all the questions have been answered.
    a. Select a fish picture from those closest to you and show it to your partner. What feature of this fish stands out to you? Describe the features of this fish to your partner and what you find interesting, different or strange about it.
    b. Choose a different fish picture from those closest to you. How do you think this fish captures its food? What do you think it eats?
    c. Look at the mouths of all the fish pictures around you. How are they different from one another? How many different mouths can you see?
    d. Describe the body shape of one of the fish. How many fish with that body shape do you see in the pictures near you?
    e. Describe the fins that you see. How many fins come in pairs? Look at the different tails fins – how many different shapes can you find?
11. When the discussion is finished, ask the students to return to their desks and sit with the their group from the first activity.

<u>Session 2</u>

Activity 3: 1 hour

12. Put up the 4 fish adaptation charts on the board or in front of the class.
13. Describe each chart one at a time and be sure to give the topic (body shape, tail shape, etc.) for each as you work your way through. As you introduce each color or shape description and other new vocabulary on the charts, have the students find a picture of a fish that possesses that adaptation and hold it up in the air. Ask one volunteer from each group to share their picture and findings with the class.

14. As they hold up their pictures, have them also hypothesize about the fish's habitat and what it might eat. Ask for a different volunteer to share their hypothesis and explain how they came to that conclusion.
15. When the discussion is finished, remind the students again that they will have a chance to work with real fish in the next session. They will need to make predictions and work to discover what they can about the lifestyle and habitat of several fish.
16. To end the session and get the students thinking like real scientists, pass out a piece of blank paper and ask them to think about one of the hypotheses they made earlier about a fish's habitat and eating behavior. Then, ask them to write out or draw a picture of how they would test that hypothesis or what kind of experiment they could design to find out. Be sure they write their hypothesis out on the top of the page.

If there is still time at the end, have the student share their ideas for experiments or hypothesis testing.

Assessments

Session 1:

Completion of Anticipatory Guide About Fish
Active Participation in Questions & Answer Session/Group Discussion

Session 2:

Active participation in the group discussion
Completion of writing piece or drawing on testing hypothesis

Student Name(s) _____

Anticipatory Guide About Fish

Statements About Fish Record and Tally your answers as True, False, or Don't Know	Before Video	After Video
1. Fish all have the same tail shape.		
2. Fish with squared tails swim the fastest.		
3. Some fish hide by lying flat on the bottom		
4. The body shape of fish tells us about where they live.		
5. Long, skinny fish are usually found swimming in the open ocean.		
6. Slow fish don't have any protection against predators.		
7. There are ways to predict what a fish eats without watching it catch its prey.		

Body Shape Adaptation Chart

	Description	Example
Fusiform	Streamlined and cylindrical; very fast and can swim continuously for long distances	Marlin, tuna, anchovy
Depressed	Flattened from back to belly like a pancake; use short bursts of speed to ambush prey; burrow in the sand	Rays
Sphere	Rounded; slow swimmers; use light and lures to attract their prey	Puffer fish, porcupine fish
Ribbon	Snake-like; slow swimmers but move easily through small space like cracks and crevices where they hide to ambush prey	Eels
Compressed	Flattened from side to side; make sharp, quick turns; very maneuverable	Flounder

Tail Shape Adaptation Chart

	Description	Example
Lunate (fastest)	Fastest swimmers, maximum speed with minimum effort over long distances	Marlin, swordfish
Forked	Moderately fast, continuous swimmers	Anchovy
Squared	Very maneuverable, capable of bursts of speed for short distances	Rockfish
Rounded	Very maneuverable, capable of bursts of speed for short distances	Goby
Tapered (slowest)	Slow swimmers, use body undulations to swim	Moray eel

Color Patterns Adaptation Chart

	Description	Example
Camouflage	Match surroundings to blend in and hide	Halibut
Disruptive	Spots, stripes, and patches of color breakup and diffuse the actual outline	Sergeant-major
Counter-shading	Dark back and lighter belly hides fish form predators as sunlight penetrates from above	Anchovy
Advertising	1. Warning to stay away from poisons or spines 2. Attract mates, defend territories 3. Clean other fish	Hawaiian cleaner wrasse
Deceiving	1. False eyespots confuse predators into attacking the wrong end or miscalculating the size/shape of fish 2. Resembles objects of no interest to enemies 3. Fish mimics something that is helpful or dangerous	Butterfly fishes

Mouth, Teeth and Gill Rakers Adaptation Chart

	Description	Example
Mouth Orientation	1. Oriented upwards denotes surface feeder 2. Downwards suggests bottom-feeder	1. Stonefish 2. Sturgeon
Mouth Size and Shape	1. Large jaws engulf prey 2. Protruding jaws suck in prey 3. Elongate jaws reach into crevices 4. Elongate lower jaw feeds on prey above	1. Grouper 2. Rockfish 3. Butterfly fishes 4. Halfbeak
Teeth Size and Shape	1. Fish eaters have pointed, knife-like 2. Snail and clam eaters have plate-like grinders and crushers 3. Choppers on plants and corals have fused, beak-like	1. Barracuda 2. Bat ray 3. Parrotfish
Gill Rakers Size and Shape	1. Comb-like gill rakers filter food 2. Large, coarse gill rakers protect gills when they eat from large prey items	1. Anchovy 2. Lingcod