

Pedagogy Option 6: Field Trip Lesson Plan

Lily Rutledge-Ellison

The Denver Aquarium has a set path for exploring several different aquatic habitats. There are plaques on the walls along the way that give visitors information about the species. My students would take part in the 2-hour self paced tour with chaperones.



Me, absolutely GEEKED about a mini submersible.

Lesson Title: Denver Aquarium Bingo!

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Topic: marine life, adaptations, prey and predator, balance in systems

Targeted Grade Level: 4th grade, but it could be adapted for 3-5

Time Needed: 3-4 days

Subject Integration: Science, Literacy

NGSS Performance Expectations

5. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how individual organisms are configured and how these structures function to support life, growth, behavior and reproduction.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts:
<p><i>Constructing explanations (for science)</i></p> <p><i>Obtaining, evaluating, and communicating information</i></p>	<p><i>LS1:A Structure and Function: Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior and reproduction.</i></p> <p><i>LS1:D Information Processing: Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.</i></p>	<p><i>Systems and System Models: A system can be described in terms of its components and their interactions.</i></p>

Common Core State Standards:

ELA: Reading for All purposes

-GLE 2: Apply strategies to comprehend and interpret informational texts.

EO d.i: By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range. (CCSS: RI.4.10)

-GLE 3: Apply knowledge of spelling patterns (orthography) and word meanings (morphology) to decode multisyllable words and determine the meaning of unknown words.

Other Standards (as needed)

Principle 5- The ocean supports a great diversity of life and ecosystems

B. The ocean provides most of Earth's living space and supports a great diversity of life from the surface, through the water column, and down to the sea floor.

B.1 The great diversity of ecosystems in the ocean provides opportunities for organisms to develop a great diversity of adaptations, many of which are unique to organisms living in the ocean

B. 5 Organisms in the ocean exhibit an amazing variety of life cycles. Some undergo metamorphosis and have planktonic phases, some lay eggs, and others nurse their young.

Principle 4- The ocean makes Earth habitable

B.1 Some organisms on land and in the ocean use carbon dioxide, water, and sunlight to make their own food. This process is called photosynthesis, and it releases oxygen.

The student **will**: describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. (4-LS1-2) (Clarification Statement: Emphasis is on systems information transfer)(for example, explain how an animal responds to danger by running away, becoming very still, or preparing to fight).

The student could: Investigate how specific structures and behaviors developed by prey can be negated by specific structures and behaviors developed by predators (for example, use examples of predators and prey adapting to an environment together, such as prey developing a defense such as poison or camouflage and predators developing an immunity to the poison or better eyesight).

5E Model

5E Objectives

Engage

Introduce the lesson with an anchoring phenomenon. Facilitate student questions, discussion, etc. as appropriate. Learn about what students already know and want to know.

Procedure: The teacher should prepare the class to engage with the video by asking them to write down two questions and one statement. (questions and statements should have been clarified earlier, but can be reviewed now).

The teacher should play **Video 1 on mute**. Anything the kids have to say can be written down. Give the students a few minutes after the video to finish their written questions and statements. Those who are finished should draw a little sketch of what they saw. When the teacher has formatively assessed that all students have reflected in some written way, students may turn and talk to share with a partner.

Protocol: Two questions and a statement---Draw what you see---Share

This protocol allows teachers enough time to support students who struggle with written thoughts, and the sharing allows students to hear other ideas if they were feeling stuck.

Using our class knowledge about adaptations and structures from the Ocean Adaptation lesson “Construction Function,” the teacher would start a chart of adaptations. Students can raise their hands to have their adaptation written on the chart.

After writing down the students thoughts, the teacher should assess if all of the adaptations were physical, behavioral, or something else.

In front of students, the teacher should make note of what category of adaptation is being seen. Maybe circle them in separate colors, or if they are in a list, you could place a “P” or “B” next to them. It is unexpected that students will think of reproductive adaptations independently as 4th graders, but if they do make a note of that category as well.

Next, the class should watch the video again, but this time **with sound**. They will actively be thinking about adaptations, and may be encouraged to write one down if they hear a new one come up.

The teacher should ask the class about any other adaptations seen in the mudfish. Adaptations that are revealed **with sound** could be “fighting for territory,” “Jumping high above the mud”(which are both reproductive adaptations), “digging holes in the mud,” “breathing air,” “fins to walk on land,” “eyes perched on top of their head to keep a look-out,” “rolling in the mud to keep the skin cool and moist.” If the class struggles to identify these adaptations, try watching the second video with sound.

Standards Addressed Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior and reproduction.

Formative Assessments Students will be formatively assessed for effort and engagement as the teacher circles the room during the jot protocol. Additional assessment occurs with students sharing adaptations for the chart.

Video 1 On Mute the first

time: https://www.youtube.com/watch?v=CAQuoH_fOWM&ab_channel=BBCEarth



Additional video if brainstorming adaptations is difficult:

https://www.youtube.com/watch?v=Z-4uWKyzRvk&ab_channel=TerraMater



Explore

Plan for students to engage in hands-on activities that are designed to facilitate conceptual change.

Procedure: Students are given a packet of bingo cards (larger versions are viewable in the appendix). As a class, each tile should be read, and clarified. For example, some boxes need names of fish, some boxes need you to fill in the blanks, and some boxes are looking for specific adaptations.

Students should be encouraged to try and get a BINGO (3 or 4 in a row) on one (or all three) of the sheets. The teacher can make the judgement about readiness and skill level. Students could even try to get a “black out” (all boxes filled) on a card. There can be incentives that the teacher deems appropriate.

Students will be on a 2 hour self-paced tour of the aquarium in groups of 4-5 with an adult chaperone. They must hunt for the answers to their bingo cards. All of the answers link up word for word with plaques at the Denver Aquarium.



Modifications: Students at different reading levels will be paired as teams with chaperones. Chaperones can support students in finding answers. Spanish speaking students and Chaperones will be paired with paras and staff that can help translate. The whole exhibit is accessible to wheelchairs.

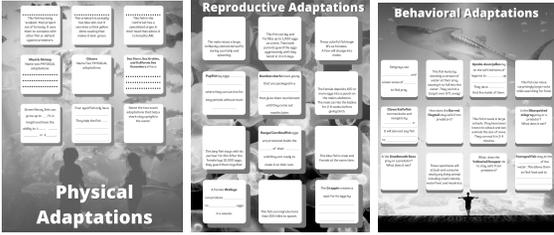
The physical adaptation BINGO card is much easier to complete. This way all students should be able to get at least one BINGO.

The teacher may pair themselves with students who need more phonetic support in decoding the plaques.

Standards Addressed

<p>LS1:A Structure and Function: Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior and reproduction.</p>	<p>LS1:D Information Processing: Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions</p>	<p>GLE 2: Apply strategies to comprehend and interpret informational texts.</p>	<p>EO d.i: By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range. (CCSS: RI.4.10)</p>	<p>-GLE 3: Apply knowledge of spelling patterns (orthography) and word meanings (morphology) to decode multisyllable words and determine the meaning of unknown words.</p>
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Practice: Obtaining, evaluating, and communicating information

	<p>Formative Assessment: Students will be assessed on engagement and participation. The teacher should check in with groups in passing, seeing if anyone has gotten a BINGO yet.</p> <p>Resources</p>  <p>Groups could have all three bingo cards, or the teacher could separate the cards so that everyone in a group has a different card. Alternatively, groups could each have a specialization, so everyone in the group has the same card.</p>
<p>Explain</p> <p><i>Facilitate opportunities for students to explain their understanding of concepts and processes and make sense of new concepts.</i></p>	<p>Procedure:</p> <p><i>Most likely the next class day, students should reflect on all of the great adaptations they were exposed to!</i></p> <p><i>The teacher may choose to model the reflection sheet with an “I Do” “We Do” “You Do” gradual release model.</i></p> <p><i>Students will answer:</i></p> <ol style="list-style-type: none"> 1.Choose ANY 2 adaptations from the Aquarium BINGO. How do these adaptations help the creature survive? 2.If you were a fish, what adaptation would you want and why? <p>and/or</p> <p>If you could have one of these adaptations as a human which one would you want and why?</p> <p>After about 25 minutes of working either independently or in groups- Students who would like to share their answers outloud may raise hands to share with the whole group.</p> <p>Modifications: Students who finish their written portion early are HIGHLY encouraged to draw themselves with different fish adaptations. ELL students can choose to use a sentence frame version of the reflection.</p> <p>Standards Addressed (If the students do not bring up adaptations that touch on these standards, the teacher should)</p> <p>Some students may touch on - LS1:D Information Processing: Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.</p> <p>Some students may touch on- B.1 Some organisms on land and in the ocean use carbon dioxide, water, and sunlight to make their own food. This process is called photosynthesis, and it releases oxygen.</p>

Formative Can the student explain how animals have internal and external structures that function to support survival, growth, behavior and reproduction? (4-LS1-1)

Resources

Explain

Choose ANY 2 adaptations from the Aquarium BINGO. How do these adaptations help the creature survive?



If you were a fish, what adaptation would you want and why?
and/or
If you could have one of these adaptations as a human which one would you want and why?

Explain

Choose ANY 2 adaptations from the Aquarium BINGO. How do these adaptations help the creature survive?

The first adaptation I chose was _____ This adaptation helps the _____ survive by _____

The second adaptation I chose was _____ This adaptation helps the _____ survive by _____



If you were a fish, what adaptation would you want and why?
and/or
If you could have one of these adaptations as a human which one would you want and why?

I would choose the adaptation _____ as a fish/human.

This adaptation would help me _____

Elaborate

Provide applications of concepts and opportunities to challenge and deep ideas; build on or extend understanding and skills.

Procedure:

The whole class will prepare to watch both youtube videos. The first video is about sea urchins, and the second is about Wrasse. Students should be on the lookout for different types of adaptations. After each video the students should share some of what they saw.

The teacher should pass out the first page with the large picture of the Wrasse and Sea urchin.

This part requires explicit teaching. The teacher should stress how some adaptations “negate” others. This happens in many systems. As humans, we often negate problems with engineering adaptations.

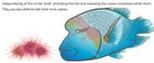
The students are now encouraged to look through their bingo cards and find adaptations that “negate” one-another. If students think of a non-marine example, they are encouraged to write that down as well.

Modifications The teacher should roam to support some students with the questions. The group work should support their efforts as well.

Standards Addressed *Students will:* Investigate how specific structures and behaviors developed by prey can be negated by specific structures and behaviors developed by predators (for example, use examples of predators and prey adapting to an environment together, such as prey developing a defense such as poison or camouflage and predators developing an immunity to the poison or better eyesight).

Resources

Investigate deeper...



What do you know about the fish's digestive system? How does it work? How do you think the fish's digestive system is adapted to its environment? How do you think the fish's digestive system is adapted to its environment?

The digestive system of a fish is very different from the digestive system of a human. The digestive system of a fish is adapted to its environment. The digestive system of a fish is adapted to its environment.

https://www.youtube.com/watch?v=RGy5-xi3ER0&ab_channel=TheAge%26SydneyMorningHerald



<https://youtu.be/KudP0nvHe2w>



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<p>Evaluate</p> <p><i>Assess students knowledge, skills and abilities.</i></p>	<p>Procedure: After about 25 minutes of group investigation- students should be given the second sheet to write down their final 'predator prey' answer. Then they will need to think divergently about how fish could adapt to the dangers of humans.</p> <p>Modifications After about 25 minutes of group investigation- students should be given the second sheet to write down their final 'predator prey' answer. Then they will need to think divergently about how fish could adapt to the dangers of humans.</p> <p>Summative Assessments This performance task is based on the facet of perspective. While engaging in this thought experiment, students will have to call on their knowledge of adaptations so far. This will also serve as a formative assessment to judge their knowledge base for the next topic- conservation.</p> <p>Resources</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Which predator and prey did you find? How have they adapted to each other? What marine ecosystem are they a part of?</p> </div> <div style="text-align: center;">  <p>Which predator and prey did you find? How have they adapted to each other? What marine ecosystem are they a part of?</p> </div> <div style="text-align: center;">  <p>Which predator and prey did you find? How have they adapted to each other? What marine ecosystem are they a part of?</p> </div> <div style="text-align: center;">  <p>Which predator and prey did you find? How have they adapted to each other? What marine ecosystem are they a part of?</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="background-color: #f0f0f0; padding: 5px; border: 1px solid #ccc;"> <p>Overfishing, pollution, industry, weapons testing, and climate change all affect the systems that marine life count on to survive. What adaptations would help marine life survive humans?</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> </div> <div style="background-color: #f0f0f0; padding: 5px; border: 1px solid #ccc;"> <p>Overfishing, pollution, industry, weapons testing, and climate change all affect the systems that marine life count on to survive. What adaptations would help marine life survive humans?</p> <p>One human danger to fish is _____</p> <p>Over time, fish could adapt to survive this danger by _____</p> <p>_____</p> <p>Another adaptation that would help fish survive is _____</p> <p>_____</p> </div> </div>
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Teacher Background:

All of the adaptations are 99% word-for-word what is available on the signs at the aquarium.

Reproductive adaptations-

Crappie- nest builders and dig rather large pits or beds in which to lay their eggs

Walleye- a female walleye can produce 40,000 to 250,000 eggs in a season

Sturgeon life span-60 years, hunted for meat and eggs

Rio Grande Cichlid- can lay and fertilize up to 1,000 eggs at a time, both parents guard the eggs aggressively until they hatch in 3 to 5 days

Pikeminnow- can migrate more than 200 miles to spawn

Arctic Grayling- male raises a large, brilliantly colored dorsal fin during courtship and spawning.

Pupfish- females lay eggs in the mud where they can survive for long periods without much water, hatching when better water conditions return

Rainbow wrasses- all begin life as females, and a few will actually change sex and become a male

Scissortail Chromis- male and female will form a breeding pair and produce a small clump of eggs. The males will then guard the eggs from predators and keep water moving over the eggs to avoid any fungal growth until they hatch.

Cortez Hogfish- during breeding, the males will gather and compete for females and defend small territories called leks.

Bamboo shark- young are packaged in leathery egg case that nourish them until they emerge months later.

A female seahorse deposits 100 or more eggs into the pouch on the male's abdomen, then the male release sperm into the pouch to fertilize the eggs. Two to six weeks later, he gives birth to tiny seahorses, some less than a half an inch long. Once the male gives birth, he quickly becomes pregnant again.

Anemonefish (clownfish) hatch out of eggs that the females attach to rocks and guard
All anemone fish are born male and one transitions into the dominant female

Bangai Cardinalfish- eggs are protected inside the mouth of their father until they are ready to make it on their own

Blue Hamlet- are both male and female at the same time

Wolf Eel- mate for life, after the female lays 10,000 eggs- they guard them together

Physical adaptation:

Humpback Chub- uses its large fins to glide through slow-moving areas, feeding on insects that become trapped in water pockets

Otters- 4 adaptations that support (2 layers of fur, bullet shaped head, webbed toes, tail as a rudder)

Greenback Cutthroat Trout- broad fins, strong tails, torpedo-shaped bodies, trout can move quickly and precisely

The Mosasaur was a predator of fish, squid, water birds, shellfish, sharks and even other mosasaurs in the Cretaceous period. Students should be able to judge its teeth.

Creole Fish- red coloring serves as camouflage since it makes them hard to see in deep water. Red light does not penetrate deep in the ocean.

Doctorfish (surgeonfish)- they have bony "scalpels" that project out of a sheath on the narrow part of the body just before the tail fin. These scalpels are used when competing with other fish and to defend against predators.

Green Moray Eel- Green moray eels can grow up to 8 feet in length and have the ability to tie their bodies in knots to gain leverage when tearing food. These eels are actually blue-skinned, but secrete a thick yellow slime coating that gives them the appearance of being green. Morays' tube like nostrils provide an excellent sense of smell.

Lumpfish- Their fins form a large sucker underneath that helps them attach to rocks

Sea anemones- are stingers, equipped with microscopic artillery called nematocysts. When a stinger senses prey is near, it deploys hundreds of barbed, whip-like nematocysts to penetrate the flesh and inject toxin. The sting immobilizes the victim as it is moved to the mouth for digestion. The sting of anemones is strong enough to paralyze zooplankton or small shrimp. Some, like the fish-eating anemone, can take down even larger prey.

Sea stars. Sea urchins. And California sea cucumber - have tube feet that adhere tightly to rocks for protection from waves and currents

African Cichlids- sexual dimorphism (different appearances)

Giant Gourami- All gouramis have a specialized organ in their head which enables them to breathe air- thus they can live in poorly oxygenated bodies of water.

Mantis shrimp- stalked eyes, powerful claws are specialized to either spear fish or small shells, the punch of its claw is as fast as a bullet from a .22 caliber gun, this punch stuns the prey without a direct hit

Cuttlefish- chromatophores allow it to change color and pattern quickly

Four-eyed fish- really only has two eyes, each of which are divided into an upper half, that works well in air, and a lower half, that works well in water.

Archerfish are laterally compressed. Fish shaped this way can move more easily between underwater plants, and are usually found in slow moving water.

Shark- skeletons are made of cartilage, not bone. The torpedo shape of a shark's body makes it able to travel well through the water. The shark's side fins support its body in the water the same way an airplane's wings give it lift through the air. The dorsal fin on its back and ventral fins on its underside keep it upright.

Giant Clams- have a symbiotic algae in their fleshy mantle. This colorful algae gets a protected place to live, and in return it gives the clams the products of the algae's photosynthesis. (Solar powered)

Napoleon Wrasse- have heavy plates in their throat that can crush large snails, and thick, fleshy lips that can absorb the toxic spines of the sea urchins

Stingrays- large flat tooth plates on both jaws help them brush hard-shelled prey such as clams, shrimp, and crabs. They spit out the hard parts and eat the soft body parts.

Venomous spines at the base of the tail are used only for defense if the ray is stepped on or threatened.

Wolf Eel- crushing jaws and massive molar teeth that are used for crushing hard-shelled animals such as snails, clams, crabs and sea urchins.

Behavior

Musky & Pike- larger specimens will attack and consume nearly any living animal, including small rodents, waterfowl and muskrats

Smallmouth Bass- highly predatory, feeding on small fish, insects and crayfish

Gizzard Shad- schooling to avoid predators, primarily feed on small shrimp-like animals called zooplankton

Cortez Hogfish- At night, they sleep out of sight of predators by hiding in cracks and crevices in the reef.

Barred Flagtail- gathers in tight schools during the daytime in shallow water along the edges of reefs and shorelines. At night, they stop schooling and disperse to feed on small shrimp-like animals.

Bluespotted stingray- feed on small crabs and shrimp

Yellowtail Snapper- usually found in large schools well above the reef

Passer Angel- feed primarily on algae and sponges, they have been seen cleaning parasites from the bodies of sharks and other large fish

Piranha- large schools of these carnivorous fish have been known to attack and eat animals the size of cattle (3-4 minutes)

Clown Knifefish- communicates and navigates by producing a weak electric current
Predatory, and feeds on any fish small enough to fit in its mouth

Upside-down jellies- lay on soft bottoms in quiet lagoons to soak up sunlight. They actually have single-cell algae that live inside them, which is called a symbiosis. These microscopic plants help provide nutrients that the Jelly needs to grow.

Four-eyed fish- are always at the surface. This allows them to find food and to avoid predators that attack from either above or below.

Archer fish- hunt by shooting a stream of water at their intended prey causing it to fall into the water. Archerfish make a tube with their tongues and the roof of their mouths and force water through the tube by contracting their gill covers. Archer fish can change their trajectory after missing a target. (can hit a target over six feet away)

Rockmover Wrasse- Can move surprisingly large rocks while searching for food

Sea Apples- feed on plankton with the sticky tentacles surrounding their mouth. If attacked, sea apples can defend themselves from predators by releasing a toxic substance called holothurin. They are able to move by crawling on their small yellow tube feet, or they can inflate their bodies and ride the ocean current for a short distance.

Stingrays- at night they graze the sandy floor, using electro-receptors and a keen sense of smell to find prey. They have a symbiotic relationship with bluehead wrasses and Spanish hogfish, who eat parasites and mucus from their bodies.

LS1.A: STRUCTURE AND FUNCTION

How do the structures of organisms enable life's functions?

A central feature of life is that organisms grow, reproduce, and die. They have characteristic structures (anatomy and morphology), functions (molecular-scale processes to organism-level physiology), and behaviors (neurobiology and, for some animal species, psychology). Organisms and their parts are made of cells, which are the structural units of life and which themselves have molecular substructures that support their functioning. Organisms range in composition from a single cell (unicellular microorganisms) to multicellular organisms, in which different groups of large numbers of cells work together to form systems of tissues and organs (e.g., circulatory, respiratory, nervous, musculoskeletal), that are specialized for particular functions.

Special structures within cells are also responsible for specific cellular functions. The essential functions of a cell involve chemical reactions between many types of molecules, including water, proteins, carbohydrates, lipids, and nucleic acids. All cells contain genetic information, in the form of DNA. Genes are specific regions within the extremely large DNA molecules that form the chromosomes. Genes contain the instructions that code for the formation of molecules called proteins, which carry out most of the work of cells to perform the essential functions of life. That is, proteins provide structural components, serve as signaling devices, regulate cell activities, and determine the performance of cells through their enzymatic actions.

Grade Band Endpoints for LS1.A

By the end of grade 2. All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive, grow, and produce more plants.

By the end of grade 5. Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (Boundary: Stress at this grade level is on understanding the macroscale systems and their function, not microscopic processes.)

By the end of grade 8. All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). Unicellular organisms (microorganisms), like multicellular organisms, need food, water, a way to dispose of waste, and an environment in which they can live.

Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues or organs that are specialized for particular body functions. (Boundary: At this grade level, only a few major cell structures should be introduced.)

Appendix of Worksheets Below

.....
 This fish has bony "scalpels" that project out of its body. It uses them to compete with other fish or defend against predators.

.....
 This creature is actually has blue skin, but it secretes a thick yellow slime coating that makes it look green.

.....
 This fish in the rainforest has a specialized organ in their head that allows it to breathe AIR.

Mantis Shrimp
 Name two PHYSICAL adaptations:

.....

Otters
 Name four PHYSICAL adaptations:

Sea Stars, Sea Urchins, and California Sea Cucumbers all have

.....

Green Moray Eels can grow up to ___ ft. in length and have the ability to t_____ _____ in k_____.

Four eyed fish only have _____.
 They help the fish _____

Name the two exact adaptations that help a shark stay upright in the water.

Physical Adaptations

Reproductive Adaptations

The male raises a large, brilliantly colored dorsal fin during courtship and spawning.

This fish can lay and fertilize up to 1,000 eggs at a time. Then both parents guard the eggs aggressively until they hatch in 3 to 5 days.

These colorful fish begin life as females. A few will change into males.

Pupfish lay eggs _____

_____ where they can survive for long periods without much _____.

Bamboo sharks have young

that are packaged in a

_____ that gives them nourishment until they come out _____ months later.

The female deposits 100 or more eggs into a pouch on the male's abdomen. The male carries the babies for 2-6 weeks before giving birth.

This long fish stays with its partner for life! After the female lays 10,000 eggs, they guard them together.

Bangai Cardinalfish eggs

are protected inside the

_____ of their _____

until they are ready to make it on their own.

This blue fish is male and female at the same time.

A female **Walleye** can produce _____ to _____ eggs in a season.

This fish can migrate more than 200 miles to spawn.

The **Crappie** creates a spot for its eggs by

_____.

Behavioral Adaptations

Stingrays use

_____ and
a keen sense of _____
to find prey.

This fish hunts by shooting a stream of water at their prey causing it to fall into the water. They can hit a target over 6 ft. away!

Upside-down jellies lay on the soft bottoms of lagoons to _____ up _____.

They have _____ that live inside of them.

This fish can move surprisingly large rocks while searching for food.

Clown Knifefish communicate and navigate by _____ a _____.

It will also eat any fish to _____.

How does the **Barred Flagtail** stay safe from predators?

This fish travels in large schools. They have been known to attack and eat animals the size of cows. They can eat it in 3-4 minutes.

Is the **Bluespotted stingray** prey or a predator?
What does it eat?

Is the **Smallmouth Bass** prey or a predator?
What does it eat?

These specimens will attack and consume nearly any living animal including small rodents, waterfowl, and muskrats.

What does the **Yellowtail Snapper** do to stay safe from predators?

Foureyed fish stay at the _____ of the water. This allows them to find food and to _____



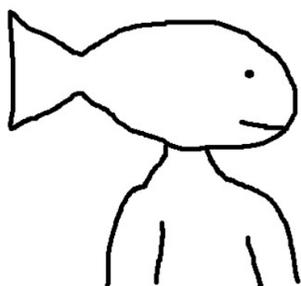


Explain



Choose ANY 2 adaptations from the Aquarium BINGO.

How do these adaptations help the creature survive?



If you were a fish, what adaptation would you want and why?

and/or

If you could have one of these adaptations as a human which one would you want and why?



Explain



Choose ANY 2 adaptations from the Aquarium BINGO.

How do these adaptations help the creature survive?

The first adaptation I chose was _____ . This adaptation

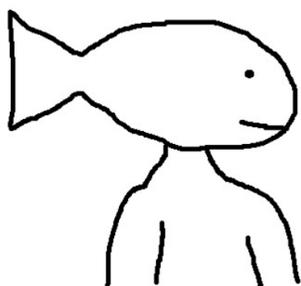
helps the _____ survive by _____

_____ .

The second adaptation I chose was _____ . This adaptation

helps the _____ survive by _____

_____ .



If you were a fish, what adaptation would you want and why?

and/or

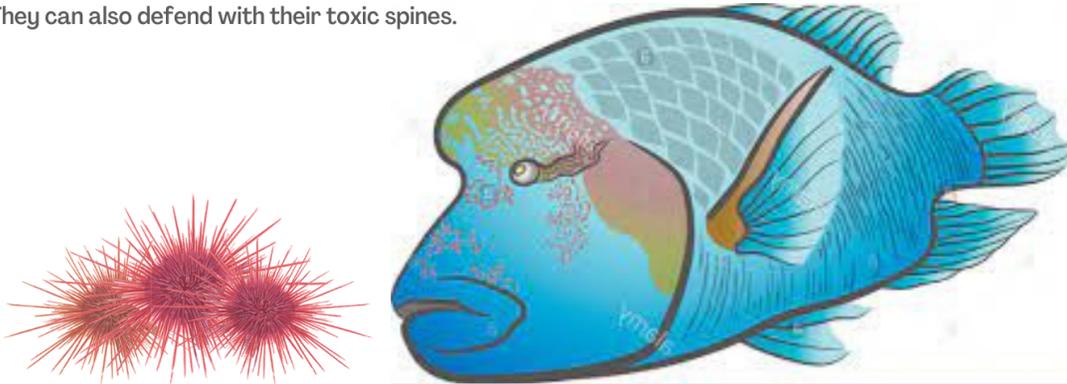
If you could have one of these adaptations as a human which one would you want and why?

I would choose the adaptation _____ as a fish/ human.

This adaptation would help me _____

Investigate deeper...

When attacked by predatory fish, sea urchins release a hostile cloud of tiny jaws that act independently of the urchin itself, attacking the fish and releasing the venom contained within them. They can also defend with their toxic spines.



Napoleon Wrasse ("rass")- have thick, fleshy lips that can absorb the toxic spines of the sea urchins

The structure and function of their body parts are very purposeful.

Ecosystems are full of plants and animals adapting to "one-up" the other adaptations.

Today, you will need to investigate marine ecosystems to find other examples of prey and predator changing to survive.

Use this space to jot quick notes:



Which predator and prey did you find?

How have they adapted to each other?

What marine ecosystem are they a part of?



Overfishing, pollution, industry, weapons testing, and climate change all affect the systems that marine life count on to survive. What adaptations would help marine life survive humans?

One human danger to fish is _____.

Over time, fish could adapt to survive this danger by _____

Another adaptation that would help fish survive is _____
