

Living Coast Discovery Center Virtual Field Trip Resource Packet

Squid Dissection

In this packet you will find lessons and resources related to your Living Coast virtual field trip. The first two activities are intended to bookend your virtual trip, followed by additional resources.

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Buoyancy Experiment

Lesson Objectives:

- Students will be able to define adaptation
- Students will be able to describe how buoyancy can make heavy objects float

Standards:

- **4-LS1-1** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Materials:

- Picture of a whale, large boat, and giant squid projected on the screen
- Clear buckets or tubs with water
- Air-tight jar with lid (spaghetti sauce jar or baby food jar for example)
- Rocks of various sizes

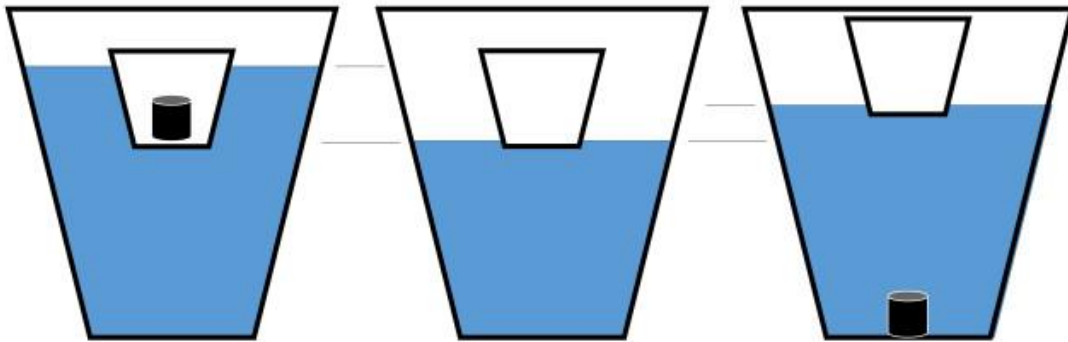
Outline:

For their field trip, students are going to get to watch a squid dissection. Before we can do that, we're going to learn about one survival technique (buoyancy) and the adaptation squid and other marine life have in order to control buoyancy. **Buoyancy** is the ability to float in water, air, or some other fluid.

An **adaptation** is something an animal has on/in its body or something it does that helps it to survive. While there are many animals that live in the ocean, not all of them swim in the water. A squid has fins, a siphon (tube), and a mantel (body cavity) to help it move and float in the water. Students will learn about these parts in greater detail as part of their dissection.

Experiment:

- Guiding Question: Think about large objects found in the ocean (show images of boat, squid, whale). How do large things, such as a giant squid, stay afloat in the ocean without sinking to the bottom?
- Set Up: Show kids bucket/tub of water and rocks. Have students make predictions about what will happen when each rock is placed in the water. Did they sink/float? Discuss the findings.
- Experiment: Now show the kids the jar with the lid on tight. Make predictions again and set the air-tight jar in the bucket. Did it sink/float? Discuss the findings?
- Further Experiment: Next, place the smallest rock inside, close the lid, and set the jar-rock into the water. Are students surprised? Keep adding rocks and experimenting with the buoyancy of the jar. Can the students make it sink? How many rocks does it take?
- Wrapping it up: Ask the students what this has to do with animals or other objects in the ocean? Introduce the concept of adaptations and explain that animals have structures inside or on their bodies to help them with buoyancy. Review the definition of buoyancy. Have students try to think of structures (adaptations) that help fish, whales, and squid float in the water.



Virtual Adaptation:

- Send home this experiment with students and have them try at home with any household supplies. This can be done outside, in the kitchen, or a bathtub.
- Perform this experiment as part of Zoom lesson. Then assign partners to work together to create a list of different adaptations they know from previous experience seeing, reading about, or watching t.v. on fish, whales, and/or squid.

Communicating with Chromatophores

Lesson Objectives:

- Students will be able to explain how chromatophores (structure) help a squid to communicate (function) to other squid.
- Students will discover the importance of processing external cues quickly.

Standards:

- **4-LS1-2** Use a model to 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.

Materials:

- Video of cuttlefish chromatophores changing color
 - <https://youtu.be/Fw7rebr5aJA?t=16>
- Three pieces of paper of different colors, cut into squares for each assigned leader (see game play)
- Space to run around and play a movement game

Outline:

Review the structures and functions that students learned about on the field trip. Then explain that today students will explore the structure: **chromatophores**. Function: Chromatophores are specialized cells on the squid's body that signal different things by changing color using pigments. Lead a discussion on what sorts of things a squid might need to signal to other squids in the area? (Examples: danger/predators, food/prey, friends/mate)

Show the video as part of your introduction and review.

Activity:

- Game Set Up:
 - Depending on your class size, you may need to break your class in half, with half participating and half watching. Create 3-5 pair groups. Amongst the pairs, have one student be the "leader" and one student be the "follower".
 - Show all students the 3 colored papers. Let them know that Color A = Predator, Color B = Prey, and Color C = Friend/Mate

- Also, let all the students know, but especially make sure the “followers” understand: they will want to avoid being tagged by predators, want to high five friends/mates, and want to tag prey (on shoulders or head where appropriate)
- Ask the “followers” to leave the room while you assign roles to other students.
- While the “followers” are outside, pick 3-12 students and assign them the following roles: predator, prey, friend
- Predators get to stand in one place, prey will sit on the floor, and friends will sit on a chair. All are scattered around the room.
- Game Play:
 - Ask “followers” to come back in the room. Explain they must look to their partner “leader” who will not speak, but must communicate via signals (i.e. the colored paper) to navigate them through the water.
 - “Followers” will approach one of the placed students and depending on the signal will avoid being tagged (if predator), will high five (if friend), or will tag (if prey).
 - “Followers” should try and navigate through all 3-12 assigned students.
 - Non-participating students can help keep track of how well “leaders” and “followers” are communicating to one-another
- Additional Rounds:
 - If you need to play additional rounds, randomly assign predator/prey/friends to be in a different position (stand/sit/chair) so that it is unknown to the new set of “followers”.

Wrap Up:

After the game, gather students and discuss the importance of signaling to one another. Review what function chromatophores serve for a squid.

Virtual Adaptation:

This game can be modified for a virtual classroom setting in the following way:

- Send “Followers” to a breakout room while assigning predators/prey/friends or ask the students to turn down their volume.
- Have other students in the class, choose their role and then hold up the appropriate color to signal what they are.
- Instead of high fives and tags, the follower can give thumbs up (friend or prey) and thumbs down (predator) to indicate they have “receive the signal and interpreted it correctly”

Jet Propulsion Activity

Lesson Objectives:

- Students will be able to explain how the siphon (structure) helps the squid move through the water (function) using jet propulsion.
- Students will be able to explain how matter is being exchanged with the environment.

Standards:

- **4-LS1-1** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- **5-LS2-1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment

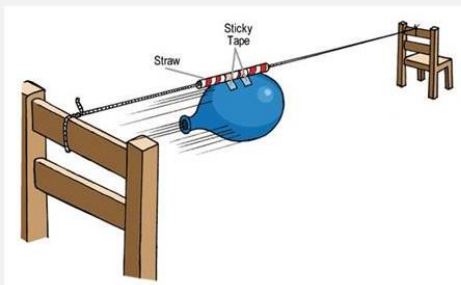
Materials:

- String
- (2) Chairs
- Balloon
- Straw
- Scotch or masking tape

Activity Directions:

JET PROPULSION ACTIVITY

Squid use the water from their environment to move. They fill their mantles and then contract to squirt water out of their siphon.



Set Up

1. String a piece of string through the straw.
2. Tie the string between two chairs approximately 5-6 feet apart (about the height of an adult)
3. Carefully blow up the balloon and tape to straw while pinching the end so the air doesn't escape.
4. Let it go to complete the activity.

Worksheet:

Name _____

Date: _____

Jet Propulsion Activity Exchange of Matter (External)

Instructions: Answer the questions after watching the experiment or conducting it yourself. (This can be done in your home or class with the assistance of a trusted adult, parent, guardian, or teacher.)

1. Which direction did the squid move?

My squid moved _____

2. How did you get your squid to move more slowly?

I/We did the following _____

3. How did you get your squid to move more quickly?

I/We did the following _____

4. How is this movement exchanging matter with its environment?

Ink Release Activity

Lesson Objectives:

- Students will be able to explain how the ink sack and siphon (structures) help the squid defend itself in the water (function) against predators.
- Students will be able to explain how matter is being exchanged with the environment.

Standards:

- **4-LS1-1** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- **5-LS2-1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment

Materials:

- Large clear plastic tub or bathtub filled with water
- 1-Liter bottle filled with water
- Balloon
- Food coloring
- Elmer's glue bottle cap

Activity Directions:

INK RELEASE ACTIVITY

Squid use the ink they make to confuse predators and also disguise themselves when hunting.



Set Up

1. Fill 1-Liter bottle with water by putting it into a tub full of water.
2. Place 5 drops of food coloring in a deflated balloon.
3. Carefully attach balloon to 1-Liter bottle without spilling food coloring into the bottle.
4. Place setup under water and squeeze the 1-Liter bottle to fill the balloon (not too much)
5. Pinch the balloon closed and carefully remove from 1-Liter bottle.
6. Lift the balloon out of the water and have someone help you to get a closed glue bottle cap on the balloon.

You are set up for your experiment!

- Once set up, have students carefully place contraption in tub full of water, open the glue bottle cap, and observe what happens. **Adjustments may need to be made.*

Worksheet:

Name _____

Date: _____

Ink Release Activity Exchange of Matter (Internal)

Instructions: Answer the questions after watching the experiment or conducting it yourself. (This can be done in your home or class with the assistance of a trusted adult, parent, guardian, or teacher.)

1. What happened to your balloon when you released the glue bottle cap?

I observed _____

2. Which direction did the “squid” (balloon) move?

The balloon moved _____

3. Why do squid release ink?

Squid release ink _____

4. How is this movement exchanging matter with its environment?

Useful Links

Marine Animal Facts

<https://www.fisheries.noaa.gov/national/outreach-and-education/fun-facts-about-sea-life>

Virtual Dives in marine sanctuaries

<https://sanctuaries.noaa.gov/vr/>

Natural Selection Interactive

Interactive game about how adaptations help animal survive through natural selection

<https://www.nationalgeographic.org/interactive/defender-natural-selection/>

Floating and Sinking

STEM lesson that encourages critical thinking as students have contrasting ideas of scientific views on floating and sinking.

<https://www.science-sparks.com/sinking-and-floating/>

Squid Experiments

More squid experiments to continue exploring the various adaptations of squid.

<http://teacher.scholastic.com/activities/explorations/squid/backyard.htm>