

MAST ACADEMY OUTREACH

MIDDLE SCHOOL PROGRAM

Adventures Aboard The Land SHARC (Science Hands-On And Related Careers)

On-Site Package



MAST Academy

Maritime and Science Technology High School

Miami-Dade County Public Schools

Miami, Florida

MAST ACADEMY OUTREACH
LAND SHARC MIDDLE SCHOOL ON-SITE PACKET
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The “thinking” symbol appears beside all critical thinking questions.
Teamwork will be required to answer these questions.

“UNDER PRESSURE”

**WET LAB DOCK
MARINE BIOLOGIST**

Pressure affects creatures that live in the deepest parts of the ocean by pressing against their bodies. The pressure of water changes with depth. To observe the effect of depth on water pressure, follow the directions on the poster on the table and answer the following questions.

1. From which hole does the water come out the farthest? a. top hole b. bottom hole
2. Is the water pressure greater at the top of the pitcher or the bottom of the pitcher? Explain your answer. _____
3. If a fish that was not adapted to deep water were to swim down to a deep part of the ocean, they would die. What would the water pressure do to them that would kill them? _____



Read the following information and then answer the questions that follow.

Fish in the deepest parts of the ocean live in total darkness and give off light (bioluminescence.) Bioluminescence helps them attract prey. However, these fish may also attract predators. Therefore, bioluminescence is an advantage when attracting prey and a disadvantage when attracting predators.

4. What two things can be attracted to a fish that is bioluminescent? _____

Marine biologists must make careful observations of animals when they study them in the ocean. Pretend you are a marine biologist. Look at the plastic models of deep-water fish in the aquarium. They are labeled A – F. Read the following descriptions and write the letter of the fish that matches the description in the table below.

Description	Letter
The Dragonfish has a long scaleless body, strong jaws and needle-like teeth. The female has a long, slender, sensory barbel on her chin.	
The Gulper Eel is a distant relative of the river eel. It has tiny eyes and teeth and a large umbrella shaped mouth.	
The Hatchetfish has light, luminescent skin on the bottom and darker skin on top. It has large, bulging eyes and an upward-slanting mouth.	
The Viperfish has a long body and extremely large teeth, especially the front two on the bottom of its mouth.	
The Anglerfish lures prey with a long, slender lure between its eyes.	
Loose jaws lives in the murky depths of all oceans. There are three rows of green, luminescent (glowing) spots running along its body.	



5. What unusual body parts do you see on the fish that would help them to adapt to deep water? _____

(When finished, go to page 2, the “Plankton” Dock.)

“PLANKTON”

Introduction: Phytoplankton are tiny plants that must float to remain near the ocean’s surface for sunlight. Phytoplankton can have spines and bristles to keep them afloat. Having a round shape or being a long chain also helps them float because it increases surface area. Zooplankton do not have to stay near the surface so they have appendages (arms or legs) to help them swim. At night, they search for food in the light zone when they are less likely to be seen by predators. During the day, they swim to darker, deeper zones to escape from predators.

Look at the plankton models on the table. You are going to do an experiment to find out which plankton models sink or float and, if they sink, which one sinks the fastest. First, state your hypothesis by completing the sentence below.

My hypothesis is that (circle one) Plankton A, Plankton B, Plankton C or Plankton D will sink the fastest.

1. Place Plankton A in the graduated cylinder. Use the stopwatch to time how long it takes to sink and record (in seconds) in the data table below. If it does not sink, record 0 seconds.
2. If it does not sink, reach in and remove it before testing the next model. If it does sink, pour the water from the graduated cylinder into the pitcher and remove the model. Then pour the water back into the graduated cylinder to test the next model.
3. Repeat steps 1 and 2 for Plankton B, Plankton C, and Plankton D.
4. When you have completed steps 1 - 3, empty the water into the pitcher and remove the plankton model from the graduated cylinder. Pour the water from the pitcher back into the graduated cylinder for the next team.

Plankton	Time it takes to sink (seconds)
A	
B	
C	
D	

My hypothesis was (circle one) supported or not supported by the experiment.

Questions



1. Did any of the plankton models float? (circle all that apply) **A B C D**
2. Do you think these models represent (circle one) **phytoplankton** or **zooplankton**?
3. Explain your answer to #2 by using information from the Introduction.



4. Which plankton models sank ? (circle all that apply) **A B C D**
 5. Do you think these plankton model represent (circle one) **phytoplankton** or **zooplankton**?
 6. Explain your answer to #5 by using information from the Introduction.
7. Which plankton model is best equipped for escaping prey? Explain why. (Hint: Look at “Time it takes to sink.”)

Look at the laptop computer screen. There is a large circle showing different types of plankton. To the lower right there is a box with a small red circle. Click on the red circle to move to another area of the large circle to see more plankton types. Select one plankton and find it on the poster that is on the table. If it is there, draw it in the box below and identify it as phytoplankton or zooplankton. If it is not on the poster, keep selecting plankton from the circle until you find one that is also on the poster.

Circle one: **Phytoplankton** or **Zooplankton**

Explain your answer.

(When finished, turn to page 3, the “Sponges” Dock.)

"TURTLE GRASS COMMUNITY"

Choose any 3 of the marine organisms (living things) and complete the chart below. Refer to the information on the poster located on the table to answer the questions in the last 2 columns.



Drawing of Organism

What phylum is it in?

What does your organism have in common with other organisms in the same phylum?

Read the information about seagrasses on the poster located on the table to answer the following questions.



1. Turtle grass (and other sea grasses) provide many things for the organisms that live in their community. Name two (2) reasons that sea grasses are so important and should be protected.



2. Name two reasons why Florida's valuable sea grasses are disappearing at an alarming rate.

(When finished, go to page 5, the "Watery Wanderings" Dock.)

"WATERY WANDERINGS"

Refractometer: The normal salinity of sea water ranges from 30 - 35 ‰ (30 - 35 grams of dissolved substances in 1000 grams of water.) Brackish water is a mixture of freshwater and seawater and tends to have a much lower salinity. Pure water has a salinity of zero.

Follow the directions on the table to use the refractometer to measure the salinity of the water in the beaker and then answer the following questions.

1. What is the salinity of the water you tested? _____ ‰ (parts per thousand)
2. Is the water you tested seawater, brackish water, or pure water? _____

Hydrochloric Acid Test: Read the information about calcium carbonate before doing the next test. Calcium carbonate is found in many living things or parts of once living things such as shells from snails, clams, etc. It has the chemical formula CaCO_3 . **Hydrochloric acid is used as a test for CaCO_3 .** The chemical formula for hydrochloric acid is HCl. **If hydrochloric acid is put on a substance with calcium carbonate in it, you will see bubbling.** You are going to test two samples of sand to see if calcium carbonate is present. One sample is from South Florida which has many shell pieces in it. The other sample is quartz sand and has no shell pieces in it.

Follow the directions for the hydrochloric acid test and answer the following questions.

PUT ON GOGGLES FOR SAFETY!

3. In which test tube do you see bubbling? (Circle your answer.)
(A) quartz sand OR (B) South Florida sand



4. Which sand has CaCO_3 in it? (Reread the paragraph above about the Hydrochloric Acid Test.)
-



5. Where does the CaCO_3 in South Florida sand come from?
-

(When finished, go to page 6, the "Every Picture Tells a Story" Dock.)

“EVERY PICTURE TELLS A STORY”

1. You will document your experience aboard the Land SHARC by using the digital camera to take two photos of any of the Land SHARC docks.
2. Look around and find something you want to photograph.
3. Write a story about each photograph. Use complete sentences in your story. Think about who or what is in your picture. If a person is in your photograph, what is he or she doing? If a computer is in your photograph, what is on the screen? If a piece of equipment or an instrument is in your photograph, what is it used for?

FIRST PHOTOGRAPH

This is a photograph of _____

SECOND PHOTOGRAPH

This is a photograph of _____

(When finished, go to page 7, the “Coral Reefs: Living Communities” Dock.)

“SHARKS!!”

1. Click on “Video Gallery.”
2. You are going to view a movie called, “Jaws: Then and Now.” Click on the shark picture at the bottom center of the screen to see the video. Answer the following questions.

Question 1 – What effect did the movie “Jaws” have on the hunting and slaughtering of sharks?

- a. It increased. b. It decreased c. It stayed the same.**

Question 2 – From what TV show did the Land SHARC get its name?

- a. Flipper b. Gilligan’s Island c. Saturday Night Live**

Question 3 – What effect did the book “White Shark” have on shark populations?

- a. shark protection increased b. shark protection decreased c. no effect**

3. After watching the video, click on “Main Menu.”
4. Click on “Ask the Experts.”
5. Click on the question, “What’s our biggest misconception of sharks?”
6. Click on each scientist and listen to his/her comments. Use a line to connect each expert with the misconception that best matches their response to the question.

Question 4. Dr. Samuel Gruber

a. Going in shark infested water is more dangerous than crossing the street.

Question 5. Dr. Jose Castro

b. Sharks eat everything they come in contact with.

Question 6. Dr. Eugenia Clark

c. Sharks make their living eating people.

Question 7. Dr. Charles Manire

d. Sharks have many variations in size, shape, behavior, etc.

7. Click on the question, “What’s most fascinating about sharks?”
8. Listen to each scientist and match each expert with his/her answer.

Question 8. Dr. Samuel Gruber

a. Sharks can learn and remember months later.

Question 9. Dr. Jose Castro

b. We know very little about shark behavior and physiology.

Question 10. Dr. Eugenia Clark

c. Sharks have the ability to “home.”

Question 11. Dr. Charles Manire

d. The myth of the shark’s being a mindless eating machine is wild.



Question 12 – How has the information presented in this lesson changed your opinion of sharks? ____

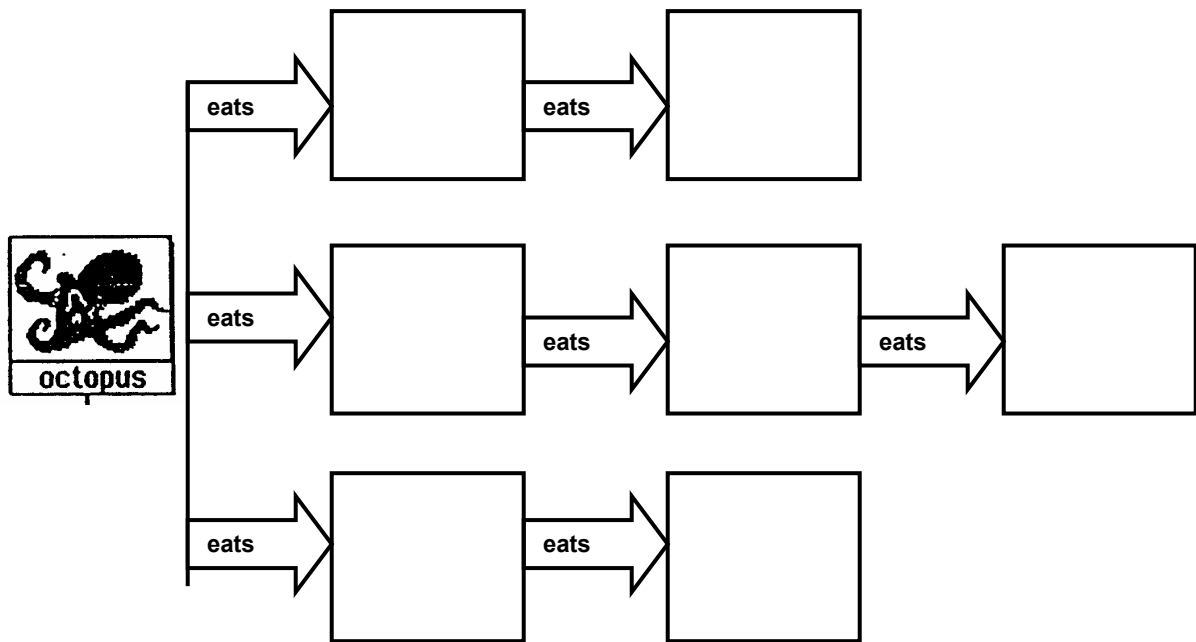
Click on “Back” to return to the main screen.

(When finished, go to page 9, the “Marine Food Chains” Dock.)

“MARINE FOOD CHAINS”

The red octopus has a varied diet. Thus, there are several different food chains that begin with the red octopus. In this lesson, you will create three food chains for the red octopus.

1. At the top of the screen, click on the words “Food Chain.”
2. Select red octopus. Follow the directions in the lower right hand corner of the screen to create the first food chain.
3. When the food chain is complete, click once to see a diagram of it.
4. Using page 11 of your packet, cut out the pictures of the marine organisms in the food chain and paste them in the appropriate places in the diagram below using the glue sticks. If the first food chain consists of two organisms plus the octopus, paste them in the first row. If the first food chain consists of three organisms plus the octopus, paste them in the second row.



5. Click on the red octopus to create a second food chain beginning with the red octopus and repeat steps 3 – 4.
6. Click again on the red octopus to create a third food chain beginning with red octopus and repeat steps 3 – 4.
7. Return scissors and glue sticks to the small basket and dispose of scrap paper in the waste basket.



8. What organisms in the food chain would be affected if the topsnail became extinct? How would they be affected? _____

Click on the small picture in the lower left hand corner to return to the beginning.

(When finished, go to page 10, the “Where Can You See Whales?” Dock.)

“WHERE CAN YOU SEE WHALES?”

In this lesson you will learn about where you can see whales during different months of the year.

1. Turn on the headphones and place them on your head. Click on the picture of the boat.
2. Click on R-RUN to watch the movie and answer the questions below.

Question 1 - What is the best time to watch whales in Baja? _____

Question 2- What type of whale can you see here? _____

4. Click on the movie when it stops. Turn off the headphones and return them to the pegs on the wall.
5. Click on the map under the movie to enlarge it.
6. Click on the words, “Key to Whale Species” in the lower right corner of the screen.
7. When you click on a month in the lower left side of the screen, pictures of whales appear on the map in the locations in North America where they are seen during that month. Use the “Key to Whale Species” to identify the whales. Complete the following table by clicking on the appropriate months and checking off the types of whales sighted in North America during each month.

Month	Gray	Right	Bow-head	Beluga	Blue	Hump-back	Minke	Fin	Pilot	Sperm	Killer
January											
March											
May											
June											
September											

Answer the following questions.



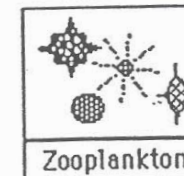
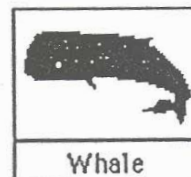
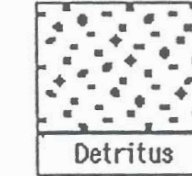
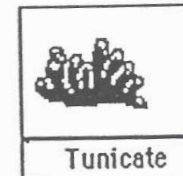
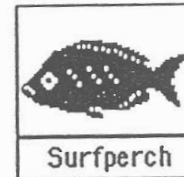
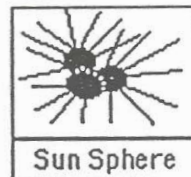
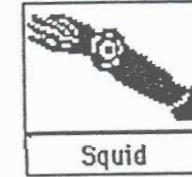
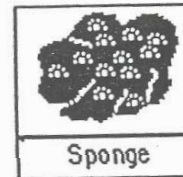
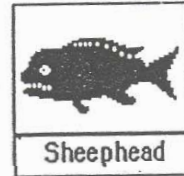
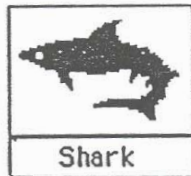
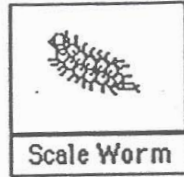
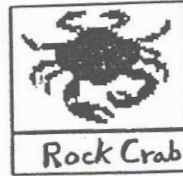
Question 5 – What month would you go whale watching to see sperm whales? (Hint: Look at the months not in the chart above.) _____



Question 6 – Where would you go to see sperm whales? _____

(When finished, click on the map to return to the main screen. Go to page 1, the “Under Pressure” dock.

Organism Pictures



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