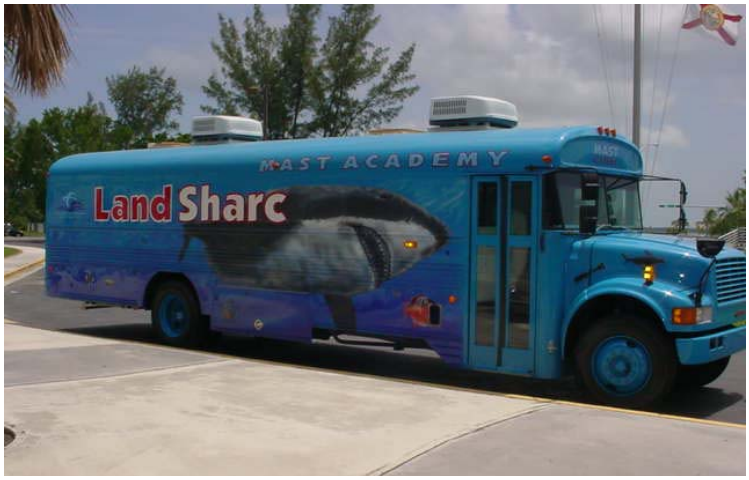
MAST ACADEMY OUTREACH

MIDDLE SCHOOL PROGRAM

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

Teacher Instructions/Answer Keys



MAST Academy

Maritime and Science Technology High School

Miami-Dade County Public Schools

Miami, Florida

MAST ACADEMY OUTREACH

LAND SHARC

MIDDLE SCHOOL TEACHER'S INSTRUCTIONS/ANSWER KEY

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The "thinking" symbol appears beside all critical thinking questions. Teamwork will be required to answer these questions.

Land SHARC On-Site Package
Teacher Instructions

If you have not already done so, show the Land SHARC Pre-site DVD to your students. Make a copy of the on-site package for each of your students. Distribute one package to each student the day of the Weather on Wheels visit. They will also need pencils or pens. Pencils will be provided only in an emergency.

Since there are ten lessons, divide the class into ten teams of equal size, and assign each team a number from 1-10. IF ESOL, ESE or other inclusion students are assigned to your class, make sure they are grouped with at least one student at grade-level reading ability. This grade-level student should be designated the team leader.

To save your student's photographs from lesson 6, you will need to provide **one** flash drive (USB drive).

Students are not to carry books, book bags, etc. to the Land SHARC. These will get in the way. Clipboards will be provided for all students.

When your students arrive at Land SHARC, a brief introduction will be given. Each team will then begin at the lesson with their assigned number. **THE TEACHER MUST HELP SUPERVISE STUDENTS WORKING AT THE STATIONS SET UP OUTSIDE WEATHER ON WHEELS.**

After the Land SHARC visit, grade the on-site activities, using the answer key provided in this packet. Total the points. This grade will be used to award certificates to students who score 80% or higher. A Certificate of Achievement Request Form, along with a Program Evaluation Form, will be sent to you following the Land SHARC visit.

Discuss the correct answers with your students. All questions that address "critical thinking skills" are preceded by the icon to the left.

WET LAB DOCK
COMMUNICATIONS SPECIALIST

"EVERY PICTURE TELLS A STORY" 10 points – 5 for each 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 Stories will vary.

SECOND PHOTOGRAPH

This is a photograph of Stories will vary.

WET LAB DOCK
CHEMICAL OCEANOGRAPHER
"WATERY WANDERINGS"
20 points – 4 for each question

Refractometer: The normal salinity of sea water ranges from 30 - 35 0/00 (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? **32- 35 0/00 (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.)

B. South Florida sand

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

It comes from the shells left from snails, clams, etc. that were once living.

WET LAB DOCK
MARINE BIOLOGIST

"SPONGES" 18 points – 3 for each question

Sponges have needle-like spicules throughout their bodies that are composed of hard substances like calcium carbonate or silica. Different types of sponges have different types of spicules. Observe the sponge spicules using the compound microscope. Compare what you see to the spicule drawings below.

1. Circle the drawing that is similar to the spicules you see in the microscope.

a. 

b. 

c. 

d. 

2. Spicules help to provide support for the sponge. How would the weight of the water affect the shape of the sponge if the sponge had no spicules? The sponge would collapse.

Sponges are in the phylum called Porifera. This is because they all have pores that create a lot of empty space inside. This allows sponges to hold large amounts of water in comparison to their size. Follow the directions to find out just how much water a sponge can hold.

3. Place a small piece of dry sponge on the scoop that is on the scale and find its weight. Directions for using the scale are on the laminated poster on the table.

How many grams does it weigh? Answers will vary.

4. Place the piece of sponge in the beaker of water. Remove the wet sponge from the beaker and squeeze out extra water. Place the wet sponge on the scale and find its weight.

What does the wet sponge weigh? Answers will vary.

5. Subtract the weight of the wet sponge from the weight of the dry sponge to find out the weight of the water inside the sponge.

Weight of wet sponge	**Answers will vary.**
Weight of dry sponge	**Answers will vary.**
Weight of water	**Answers will vary.**

6. To find the percentage of water the sponge is holding in comparison to its weight, divide the weight of the water by the weight of the dry sponge**.** **(Answers below will vary.)**

weight of water (divided by) = _____ (multiply by 100) = _____%
weight of dry sponge

WET LAB DOCK
MARINE BIOLOGIST

"TURTLE GRASS COMMUNITY"

20 points – 2 for each drawing, 2 for each Phylum, 2 for each reason, 2 for each question

Choose any 3 of the marine organisms (living things) and complete the chart below. Refer to the information on the poster 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?**
Turtlegrass	Tracheophyta	It's a plant.
Fiddler crab	Arthropoda	It has jointed legs and/or a hard, external skeleton
Pencil urchin	Echinodermata	It has spiny skin and/or radial symmetry.
Barnacle	Arthropoda	It has a hard, external skeleton.
Hermit crab	Arthropoda	It has jointed legs and/or a hard, external skeleton
Brittlestar	Echinodermata	It has external plates and/or radial symmetry.
Sea biscuit	Echinodermata	It has external plates and/or radial symmetry.
Horseshoe crab	Arthropoda	It has jointed legs and/or a hard, external skeleton
Sponge	Porifera	It has pores.
Starfish	Echinodermata	It has spiny skin and/or radial symmetry.

Refer to the poster on seagrasses 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.
They maintain water clarity. Their roots stabilize the bottom. They provide a habitat for other organisms. They are food for other organisms. They are a nursery for young organisms.

2. Name two reasons why Florida's valuable sea grasses are disappearing at an alarming rate.
Dredge and fill projects and decrease of water quality due to the stress of urbanization have caused a decline in seagrass populations.

COMPUTER DOCK
MARINE BIOLOGIST

"CORAL REEFS: LIVING COMMUNITIES" 20 points – 2 for each question

Before you is the command deck of your coral reef exploring submarine. Here will learn about the environmental conditions needed for coral reefs to survive.

1. Turn on the headphones and place them on your head.
2. Click on "Living Communities," the third icon from the left in the middle of the screen.
3. Click on the globe at the upper left-hand side of the screen to see a video about coral reefs. Answer the following question.

Question 1 – There are few seasonal changes in water around coral reefs. **(True)** **False**

Question 2 - Water around coral reefs must be clear for sunlight to penetrate. **(True)** **False**

Queston 3 - There is little species diversity in a coral reef. **True** **(False)**

4. After viewing the video, click twice on the black arrow in the bottom right-hand side of the screen.
5. You will see a map with shaded areas representing locations of coral reefs around the world. Answer the following questions.

Question 4 – Coral reefs are primarily located between what 2 latitude lines? **Tropic of Cancer and Tropic of Capricorn**

Question 5 – Locate and name the state in the continental U.S. where coral reefs are found. **Florida**

6. Click on "Temperature" at the top of the screen.

Question 6 – Most coral reefs need temperatures above 22 ^{0}C or 71.6 ^{0}F in order to survive.

7. Click on "Salinity."

Question 7 – Which two salinity ranges do most coral reefs fall within? 34-35ppt, 35-36ppt

8. Click "Living Communities," in the lower left corner of the screen to go back to the lab.
9. Click on the sub icon at the lower left of the screen to go back to the sub.
10. Click on "Change and Evolution," the 6th icon from the left.
11. Click on the aquarium at the top left of the screen to view a video about coral reefs. Answer the following questions.

Question 8 – Where are most stressed reefs located? close to human activity

Question 9 - Name one natural phenomena that causes coral stress. rising temperatures

Question 10 – Name one human produced stress of corals. nutrient enrichment

12. When you are finished, click on "Change and Evolution," the icon at the lower left of the screen to go back to the lab.
13. Click on the sub icon at the lower left of the screen to go back to the sub.
14. Turn off headphones and return them to the pegs.

WET LAB DOCK
MARINE BIOLOGIST

"TRACKING MANATEE MOVEMENT"

12 points – 3 for the table; 3 for each question

Scientists study manatees using radio telemetry. A tracking device that transmits radio signals allows scientists to track the movements of manatees. In this activity, you will track 3 manatees to see their location during one month. Pay attention to the landmarks such as the power plant, marina and farm.

1. Click on Mighty Mo on the left.
2. Look at **the Monthly Tracking Chart on the table.** Select a month not yet checked off, and write this month here**. (months will vary.)**
3. **Check off the month you selected on The Monthly Tracking Chart.**
4. Look to the right of the screen and click on the month shown.
5. Select the month you wrote down in step 2.
6. Look at the box that says Signal Strength.
7. Notice when you click on the black, curved arrows on the sides of the compass that the signal strength changes.
8. Click on the black, curved arrows until you get the highest signal strength.
9. Click on plot.
10. Click and drag the boat to another location in the middle of the open ocean. Do not drag the boat close to land.
11. Repeat steps 8 and 9.
12. The location of the manatee is where the 2 lines intersect. In the table below, check the landmark closest to the manatee.
13. Click on Pee Wee and find his location as you did for Mighty Mo.
14. Repeat these steps to find Big Dave's location.

Manatee	**Open Bay (unshaded area in water)**	**Seagrass** (shaded area in water)	**Marina**	**Power Plant**	**Farm**
Mighty Mo	(Answers will vary.)				
Pee Wee					
Big Dave					

Manatees need water temperatures of at least 68 degrees to survive so they spend winters near natural springs, where temperatures stay near 70 degrees. They also spend winters near power plants because water near power plants is above 68 degrees. This is because, as water is used to cool the power plants, it becomes warmer as it circulates through the plant. However, as coal-fired power plants age, they are either being closed down or upgraded to use cooling methods that don't require water.

1. During the month you selected, were any of the manatees near the power plant?(Answers will vary.)
2. a. If yes, what do you think attracted them to the power plant? Warm water temperatures.

   b. If no, during what months would you expect the manatees to be near the power plant? Winter months.

   Why?The heat from the power plants warms the water which attracts the manatees during the winter.

3. What do you think could happen to manatees if too many aging power plants are closed and/or upgraded? Water would not be warmed near the power plants. Manatees would have to look for an alternate location to keep warm in the winter. In cold winters, manatees who fail to find a place to keep warm my die.

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Title VII of the Civil Rights Act of 1964, as amended - prohibits discrimination in employment on the basis of race, color, religion, gender, or national origin.

Title IX of the Education Amendments of 1972 - prohibits discrimination on the basis of gender.

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