

# **MAST ACADEMY OUTREACH**

## **MIDDLE SCHOOL PROGRAM**

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

#### **Pre-Site Package**



**MAST Academy**

**Maritime and Science Technology High School**

**Miami-Dade County Public Schools**

**Miami, Florida**

**MAST ACADEMY OUTREACH  
LAND SHARC PRE-SITE PACKAGE  
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**LAND SHARC**  
**SUNSHINE STATE STANDARDS FCAT BENCHMARKS – GRADE 8**

**SCIENCE**  
**SUNSHINE STATE STANDARDS BENCHMARKS ASSESSED AT GRADE 8**

**STRAND A: THE NATURE OF MATTER**

SC.A.1.3.1 The student identifies various ways in which substances differ (e.g., mass, volume, shape, density, texture, and reaction to temperature and light).

SC.A.1.3.2 The student understands the difference between weight and mass.

SC.A.1.3.5 The student knows the difference between a physical change in a substance (i.e., altering the shape, form, volume, or density) and a chemical change (i.e., producing new substances with different characteristics).

**STRAND D: PROCESSES THAT SHAPE THE EARTH**

SC.D1.3.2 The student knows the over the whole Earth, organisms are growing, dying, and decaying as new organisms are produced by the old ones.

SC.D.2.3.2 The student knows the positive and negative consequences of human action on the Earth's systems.

**STRAND G: HOW LIVING THINGS INTERACT WITH THEIR ENVIRONMENT**

SC.G.1.3.2 The student knows that biological adaptations include changes in structures, behaviors, or physiology that enhance reproductive success in a particular environment.

SC.G.1.3.3 The student understands that the classification of living things is based on a given set of criteria and is a tool for understanding biodiversity and interrelationships.

SC.G.1.3.4 The student knows that the interactions of organisms with each other and with the nonliving parts of their environments result in the flow of energy and the cycling of matter throughout the system.

SC.G.1.3.5 The student that life is maintained by a continuous input of energy from the sun and by the recycling of the atoms that make up the molecules of living organisms.

SC.G.2.3.2 The student knows that all biotic and abiotic factors are interrelated and that if one factor is changed or removed, it impacts the availability of other resources within the system.

SC.G.2.3.3 The student knows that a brief change in the limited resources of an ecosystem may alter the size of a population or the average size of individual organisms and that long-term change may result in the elimination of animal and plant populations inhabiting the Earth.

SC.G.2.3.4 The student understands that humans are a part of an ecosystem and their activities may deliberately or inadvertently alter the equilibrium in ecosystems.

**STRAND H: THE NATURE OF SCIENCE**

SC.H.1.3.1 The student knows that scientific knowledge is subject to modifications as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.

SC.H.1.3.6 The student recognizes the scientific contributions that are made by individuals of diverse backgrounds, interests, talents, and motivations.

SC.H.2.3.1 The student recognizes that patterns exist within and across systems.

SC.H.3.3.1 The student knows that science ethics demand that scientists must not knowingly subject coworkers, students, the neighborhood, or the community to health or property risks.

SC.H.3.3.7 The student knows that computers speed up and extend people's ability to collect, sort, and analyze data; prepare research reports; and share data and ideas with others.

<b>MATHEMATICS</b>	
<b>SUNSHINE STATE STANDARDS BENCHMARKS ASSESSED AT GRADE 8</b>	
<b>Big Idea I: Analyze and represent linear functions and solve linear equations and systems of linear equations.</b>	
MA.8.A.1.1	Create and interpret tables, graphs, and models to represent, analyze, and solve problems related to linear equations, including analysis of domain, range and the difference between discrete and continuous data.
MA.8.A.1.3	Use tables, graphs, and models to represent, analyze, and solve real-world problems related to systems of linear equations.
MA.8.A.1.5	Translate among verbal, tabular, graphical and algebraic representations of linear functions.
<b>Big Idea 3: Analyze and summarize data sets.</b>	
MA.8.S.3.1	Select, organize and construct appropriate data displays, including box and whisker plots, scatter plots, and lines of best fit to convey information and make conjectures about possible relationships.
<b>READING</b>	
<b>SUNSHINE STATE STANDARDS BENCHMARKS ASSESSED AT GRADE 8</b>	
LA.A.1.3.2	Uses a variety of strategies to analyze words and text, draw conclusions, use context and word structure clues, and recognize organizational patterns.
LA.A.2.3.1	Determines the main idea or essential message in a text and identifies relevant details and facts and patterns of organization.
LA.A.2.3.5	Locates, organizes, and interprets written information for a variety of purposes, including classroom research, collaborative decision-making, and performing a school or real-world task.

<b>WRITING</b>	
<b>SUNSHINE STATE STANDARDS BENCHMARKS ASSESSED AT GRADE 8</b>	
LA.B.1.3.1	The student organizes information before writing according to the type and purpose of writing
LA.B.1.3.2	Clarification 1.3.2.1 The student demonstrates knowledge of effective ways to focus on a central idea or topic.
LA.B.2.3.1	The student writes text, notes, outlines, comments, and observations that demonstrate comprehension of content and experiences from a variety of media.
LA.B.2.3.4	The student uses electronic technology, including databases and software, to gather information and communicate new knowledge.

**TEACHER INSTRUCTIONS**  
**Land SHARC Pre-Site Package**

**\*Show the Land SHARC Pre-site DVD for instructions to prepare you and your students for this experience. Please return the video to MAST Academy, Location 7161 after viewing it.**

1. Review the pre-site activities and choose those that are appropriate for your class(es) to complete. Make class copies of those pre-site activities. **OMIT THE ANSWER KEYS.** Have students complete each one. Some of the activities require materials other than pen or pencil. Below is a list of materials you will for those activities.

Turtlegrass Community and Marine Food Chains: markers or colored pencils

Sponges: samples of natural and artificial sponges

Determining Salinity by Evaporation: (This can be done as a demonstration.)

beakers	graduated cylinders	balances
safety goggles	sea water	beaker tongs
hot plate		

The Effect of Salinity on Living Tissue: (This can be done as a demonstration.)

test tubes	test tube racks	balances
sea water	graduated cylinders	fresh water
labels	potato cores	

2. Grade each activity. Answer keys are provided. The grade for the pre-site package will be incorporated into a total grade of pre-, on-, and post-site activities to be used to award Certificates of Recognition.
3. Aboard the Land SHARC, teams of students will rotate through six lessons. Before the Land SHARC arrives, divide your class into six equal teams and assign each team a number 1 – 6. This number indicates where each team will start their Land SHARC adventure.

## SCIENTIFIC CLASSIFICATION

As many as five million different kinds of organisms are found on Earth. People have been classifying these organisms for centuries. The classification of living things as producers or consumers is but one way to categorize marine life. Another way is phylogenetically. Phylogenetic classification reflects evolutionary relationships between organisms rather than food relationships.

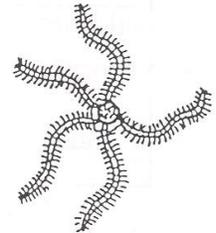
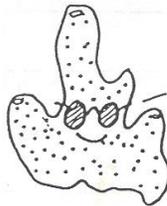
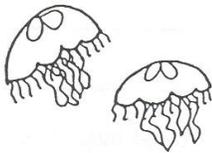
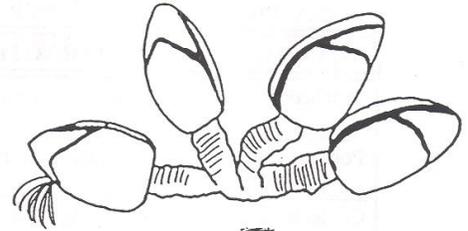
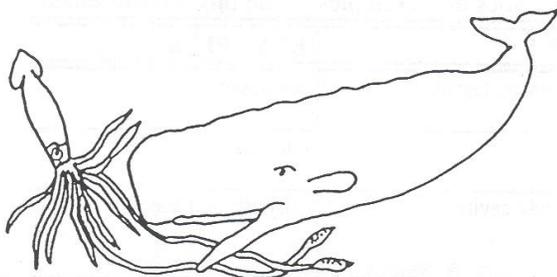
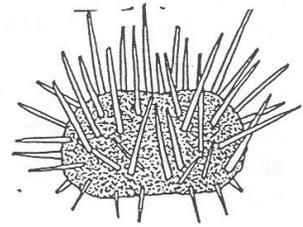
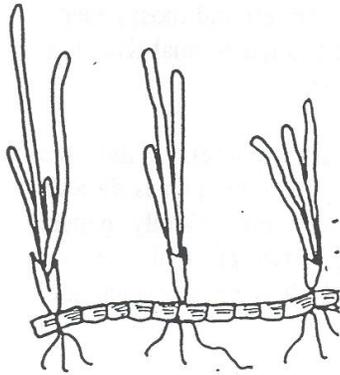
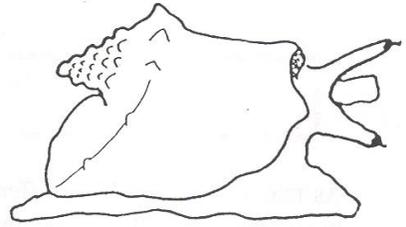
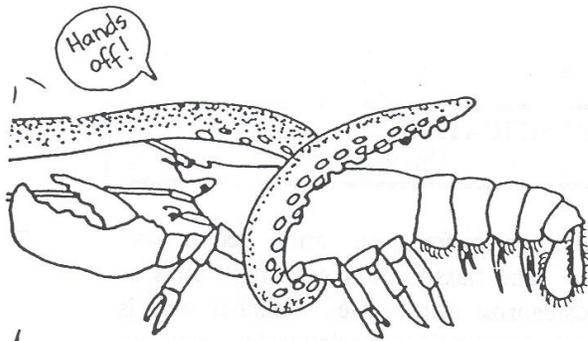
In phylogenetic classification, those organisms with a common evolutionary descent and similar fundamental characteristics are grouped together. The largest and most general phylogenetic subdivision is the kingdom. The Plant Kingdom and the Animal Kingdom are the most familiar.

Members of a kingdom are further divided into phyla (singular: phylum). Within the Animal Kingdom there are approximately twenty-nine phyla. Each phylum is divided into classes. These in turn are followed by other lower divisions: order, family, genus, and species. Each organism has a scientific name consisting of two parts: the generic name, which is always capitalized, and the species name, which is never capitalized. Thus Callinectes sapidus is the Blue Crab.

On the Land SHARC you will observe organisms that live in a turtle grass community. You will be asked to classify each organism by phylum. The following list of phylum names will familiarize you with characteristics and examples of the phyla represented.

PHYLUM	CHARACTERISTICS	EXAMPLES
Tracheophyta	plants with true roots, stems, leaves	seagrasses
Porifera	animals with pores	sponges
Coelenterata Cnidaria	stinging cells, simple body cavity	Jellyfish, sea anemone, coral, sea fan
Mollusca	soft-bodied animals	Clam, snail, octopus
Echinodermata	spiny-skinned animals	starfish, sea urchin, sea cucumber, sea biscuit
Arthropoda	Joint-legged animals with an exoskeleton	crab, shrimp, lobster
Chordata	Animals with a notochord	Fish, birds, reptiles, amphibians, mammals

**On the next page are pictures of organisms from each of the phyla listed above. Try to identify each organism by its common name. Then, write the name of the phylum to which it belongs on the line underneath each picture. Next, make each organism a cartoon character by adding traits to the picture (note #10.) Color the pictures using markers or colored pencils**



## TURTLEGRASS COMMUNITY

Turtle grass, scientifically known as Thalassia testudinum, forms tropical marine meadows in waters of moderate depth. The grass begins growth in bedrock depressions and has a tendency to trap and stabilize sediment. The leaves originate from short vertical shoots and the roots penetrate outward and downward.

Turtle grass is very important in oxygen production. A turtle grass bed can sometimes be heard hissing from the rapid bubbling of oxygen off the leaves. The oxygen is produced from photosynthesis carried on by the turtle grass. Since turtle grass makes its own food, it is considered a producer in the food chain.

With the decline of the green sea turtle, there is very little direct grazing on turtle grass leaves. However, when leaves are sloughed off, they decay rapidly and enter the food chain with 90% or more of the original energy eventually used by animals.

In addition to providing oxygen and energy, turtle grass is an environment for many plants and animals. Small anemones, hydroids, marine worms, and many other animals may frequently be seen growing on the grass. Snails, hermit crabs, brittle stars and small crustaceans called amphipods crawl about on the blades. Mud shrimp and worms make their burrows in bedrock depressions on the sides of the grass beds, and a variety of fish hide in and about the leaves.

**ON THE FOLLOWING PAGE IS A DRAWING OF A TURTLE GRASS COMMUNITY. STUDY THE DRAWING AND ANSWER THE QUESTIONS. COLOR THE PICTURE.**

**ON THE LAND SHARC YOU WILL OBSERVE EXAMPLES OF ORGANISMS LIVING IN TURTLE GRASS COMMUNITIES.**

1. How many different kinds of organisms can you find? \_\_\_\_\_

2. How many Echinoderms can you find? \_\_\_\_\_

Put the number 2 next to or on each one.

3. How many Mollusks can you find? \_\_\_\_\_

Put the number 3 next to or on each one.

4. Name and label one Chordate in the picture. \_\_\_\_\_

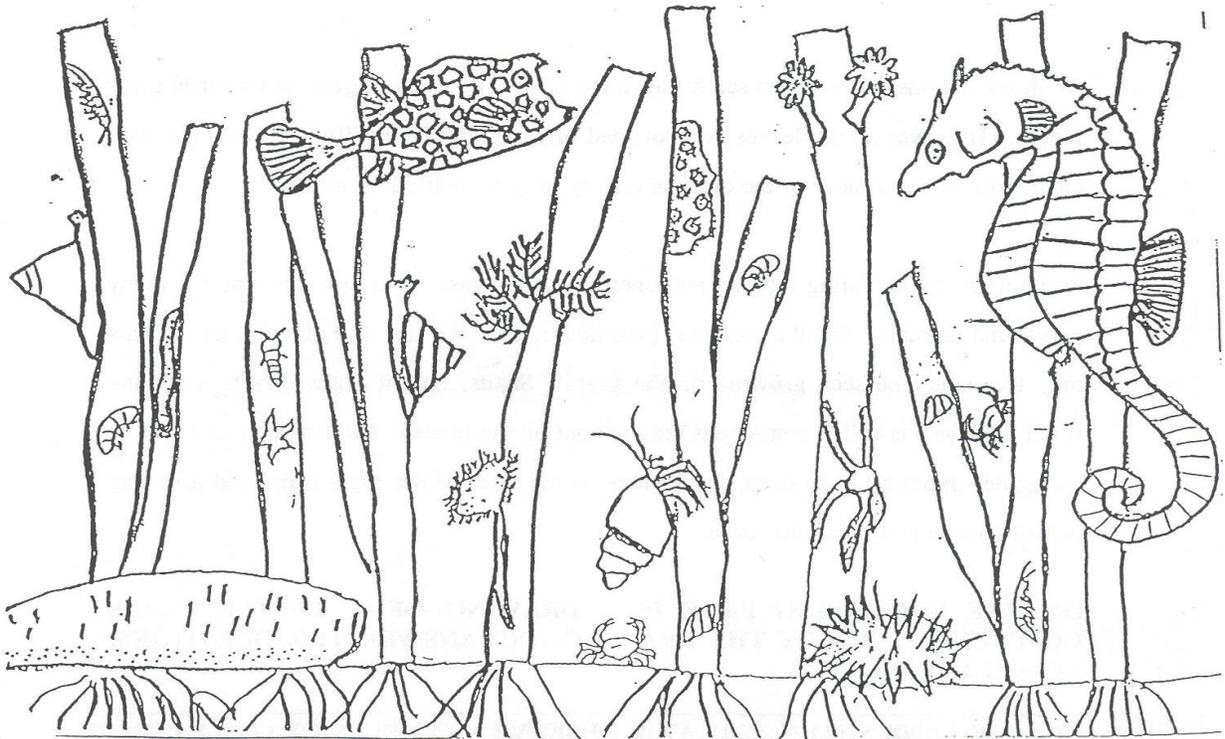
5. How many Arthropods can you find? \_\_\_\_\_

Put the number 5 next to or on each one.

6. Name and label one Coelenterate in the picture. \_\_\_\_\_

7. Why is turtle grass important to the marine environment? \_\_\_\_\_

\_\_\_\_\_



Picture from: The Seaside Naturalist. Deborah A. Coulombe, Prentice Hall, Inc. N.J. 1984.

## SPONGES

Why study sponges? They are important for two reasons. First, they offer a large number of hiding and living places for smaller animals. They also pump seawater in and out as a means of removing food and oxygen for themselves. In doing this, sponges filter and help cleanse the water.

A sponge doesn't look like an animal. They don't run, see, or hear. They have no organs, arms, or spines. Yet, it is an animal. Sponges probably evolved from one-celled animals that lived in colonies millions of years ago. The cells became dependent upon each other and lived together for mutual benefit.

A sponge is the most primitive animal on Earth. There are about 10,000 different kinds. They live only in water in both tropical and polar seas. The vast majority live in saltwater. While most prefer shallow water, some can be found in water as deep as 3.5 miles. They are sessile animals, living attached to rocks, coral, shells, boats, piers, etc. They range in size from microscopic to 6 feet in diameter.

The single most important characteristic of a sponge is that it is a system of holes, pores, chambers, and compartments. Water is circulated through these openings into an internal cavity, the spongocoel, where food and oxygen are extracted. The water then exits through a large excurrent pore, the osculum. Some sponges are supported internally by a network of flexible spongin fibers. The commercial bath "sponge" is actually the spongin skeleton with all of the living material removed. Other sponges have skeletons composed of spongin and hard mineralized spicules. The spicules are either calcareous or siliceous in chemical composition.

### **Comparing Natural and Synthetic Sponges**

For this activity you will need examples of commercial sponges and natural sponges. Natural sponges can be obtained at shell shops or you can go beachcombing and gather sponges.

Examine the sponges. Observe them with a magnifier.

1. Name 2 similarities between natural and synthetic sponges.

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2. Name 2 differences between natural and synthetic sponges.

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## CORALS

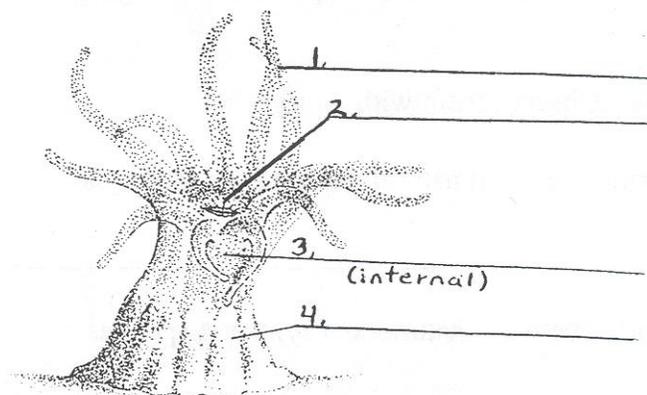
The world's oceans create a variety of habitats for flora and fauna, but none is more interesting and beautiful than the coral reefs of South Florida. These complex ecosystems, flourishing with marine life, develop from one minute creature - the coral.

Corals are animals, but they are many times mistaken for plants since they often look like bushes covered with tiny, delicately colored flowers. The objects we find dried and bleached are not, of course, the whole animals, but merely the limy skeletons that the animals secrete around their bodies. The living tissue, which is often brightly colored, is confined to a thin outer layer that scarcely conceals the form of the skeleton. Most coral skeletons are constructed by colonies of hundreds of individuals working together to produce a highly organized and complex structure.

A mature coral **polyp** lives permanently attached to the ocean bottom, and is essentially a tube made out of a jelly-like substance. At one end of the tube is an opening or **mouth** that is used to take in food and to expel waste material. This opening is surrounded by a number of hollow, flexible **tentacles**, which serve to carry food into the polyp's body. Inside the body is a cavity, called the **gastrocoel**, where food is digested.

The coral polyp is surrounded by an external skeleton that is produced by the polyp. This **limestone** exoskeleton, continually secreted by the coral, is made from calcium and carbonate taken from sea water. After extracting **calcium carbonate** from the sea, a polyp deposits layers of the material around the lower half of its body so that it forms a kind of cup. A polyp can pull its whole body, including its tentacles, inside the limestone cup, or **corallite**. The hard material provides a **shelter** for the soft animal.

Use the information in the above reading to identify and label the structures of the coral polyp drawing below. Write the appropriate word on each line.

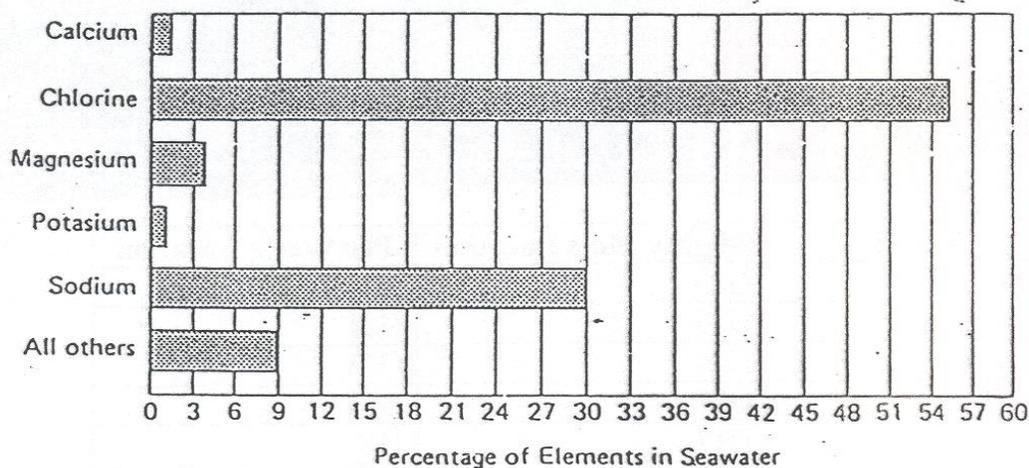


## EXPERIMENT DETERMINING SALINITY BY EVAPORATION

### Introduction

Seawater contains a mixture of minerals, mostly salts. If you evaporate a sample of sea water, you end up with most of the elements known to man. Yet more than 99 percent of sea salts are made up of only six elements: chlorine, sodium, magnesium, sulfur, calcium, and potassium. These salts are necessary for animal and plant growth.

Common salt, or sodium chloride, is made up of the elements sodium and chlorine. What other elements are found in seawater? The bar graph, or histogram, below shows the main elements dissolved in seawater. The graph shows the percentage of the total mass of dissolved substances that each element makes up. Study this graph. Then answer the questions below.



- In the spaces below, list the percentages of the elements found in seawater.

calcium\_\_\_\_\_ chlorine\_\_\_\_\_ magnesium\_\_\_\_\_

potassium\_\_\_\_\_ sodium\_\_\_\_\_ all others\_\_\_\_\_

- Which two elements are the most abundant in sea water? What familiar substance is made up of these elements?

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But just how salty is seawater? In the following experiment, you will determine this.

**PURPOSE:**

To calculate the percent of salt as well as the salinity of the sample of seawater.

**MATERIALS**

- |                        |                     |
|------------------------|---------------------|
| Beaker (150 or 250 ml) | Balance and weights |
| Safety Goggles         | Graduated cylinder  |
| Seawater               | Hot plate           |
| Beaker tongs           |                     |
| Tray - heat resistant  |                     |

**PROCEDURE:** Fill in the tables under **Data** as you complete each step.

1. Weigh empty beaker using the balance. Record the weight.
2. Measure 50 ml seawater using a graduated cylinder and pour into the beaker.
3. Weigh beaker with the seawater in it and record.
4. To determine weight of seawater, subtract #1 from #3.
5. Place beaker with seawater on hot plate and evaporate all the water. Wear safety goggles.
6. Remove beaker from hot plate using tongs and place on tray until beaker cools.
7. Weigh beaker with dry salt residue left in it.
8. To find the weight of salt, subtract the weight of the beaker from the weight of the beaker with salt residue.
8. The percent of salt is found by multiplying the weight of residue by 100 and then dividing by the weight of seawater used.
9. The salinity of ocean water is commonly expressed by so many parts of salt material per 1000 parts of water. We use the symbol 0/00 to express parts per thousand. To determine parts per thousand take the per cent of salt and multiply by 10.

**DATA:**

Steps 1 - 4
Weight of beaker and water = _____ grams
Weight of empty beaker = _____ grams
Weight of water = _____ grams

Steps 7 - 9
Weight of beaker and dry salt = _____ grams
Weight of empty beaker = _____ grams
Weight of salt = _____ grams
To calculate percent of salt in sample: Weight of salt _____ grams X 100 = _____ weight of water
Percent of salt = _____ %
To calculate salinity: Percent of salt _____ X 10 = _____ 0/00

QUESTIONS:

1. The salinity of seawater usually ranges from 25 parts per thousand to 35 parts per thousand. Does your sample fall in that range?

\_\_\_\_\_

2. Compare the salinity of seawater that you obtained with the results of other groups. Do they differ? If so, what might have caused the differences?

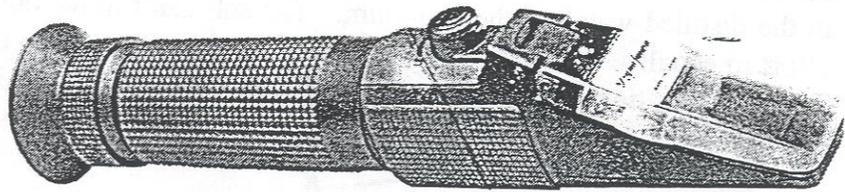
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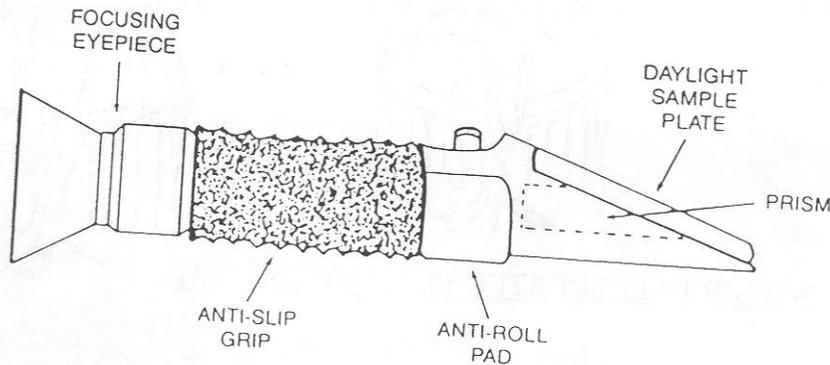
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\_\_\_\_\_

# Salinity Refractometer



## COMPONENTS



**On the Land SHARC, you will use a refractometer to determine the salinity of sea water. Because of the salt particles in sea water, light waves refract or are bent more in sea water than in fresh water. The refractometer measures this degree of refraction to measure salinity.**

<b>EXPERIMENT</b> <b>THE EFFECT OF SALINITY ON LIVING TISSUE</b>
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Most marine plants and animals have to deal with small changes in the salinity of the waters in which they live. A few marine fish are anadromous, they spend part of their lives in freshwater and part in salt water. Salmon for instance, are born in freshwater streams, migrate to the sea where they mature, and return to the freshwater stream where they hatched to reproduce and die. How do these changes in salinity affect the plants and animals? How do plants and animals adapt to these changes? Perhaps we can learn something about the process by observing the effect of different salinities on living tissue.

Purpose

To determine the effects of salinity changes on living tissue.

Materials:

test tubes (2)	fresh water
centimeter ruler	sea water
balance	test tube rack
graduated cylinder	potato cores (2)
labels	

Procedure:

1. Obtain two empty test tubes. Label one "salt water" and the other "fresh water".
2. Fill one test tube with salt water and one with fresh water. Place the tubes in a test tube rack.
3. Obtain two potato cores. Use a centimeter ruler to measure length and width; use a graduated cylinder to find volume of water displaced and use a balance to find the weight. Record your data in the data table below.

	Potato core 1 (salt water)	Potato core 2 (fresh water)
<b>length</b>		
<b>width</b>		
<b>volume of water displaced</b>		
<b>weight</b>		

4. Place potato core 1 in the tube of salt water.
5. Place potato core 2 in the tube of freshwater.
6. Place the two tubes aside and let them stand for at least 1/2 hour.
7. When the time has elapsed, remove the potato cores and describe:
8. Find the length, width, volume and weight of the 2 cores again and record in the data table on the next page.

	Potato core 1 (salt water)	Potato core 2 (fresh water)
Color		
Weight		
volume of water displaced		
Length		
Width		

Analysis and Interpretation:

1. Calculate the percentage change in weight and the percentage change in volume of water displaced by each potato core. This is easy, here's how:

$$\frac{\text{Weight of core before soaking}}{\text{Weight of core after soaking}} \times 100 = \text{percentage change}$$

$$\frac{\text{Volume of core before soaking}}{\text{Volume of core after soaking}} \times 100 = \text{percentage change}$$

2. Which potato core had the greatest change? \_\_\_\_\_

3. What most likely happened to cause any change in weight or volume?

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4. Use the diagram below and use arrows to show whether the water moved into or out of the potato.



5. a. Danny Devious wants to change the surroundings of his pet sea cucumber. Danny has put his pet into a tank of fresh water. What is going to happen to the living tissue of the sea cucumber?

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- b. Danny notices something wrong. "Aha! I forgot the salt." Quickly, he adds a pound of table salt. The resulting salt solution is about twice the concentration of sea water. Assume that Danny's pet was still living, what is now going to happen to the living tissue of the sea cucumber?

---

---

The movement of water into and out of living cells is called osmosis. Plants and animals living in aquatic environments have developed many specialized structures and behaviors to help them deal with the inflow and outflow of water.

3. What is the problem fish have to deal with in water saltier than their tissue fluids? \_\_\_\_\_

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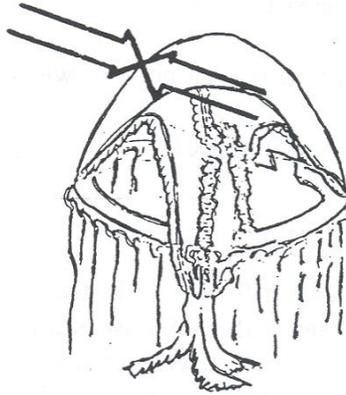
4. What is the problem fish have to deal with in water less salty than their tissue fluids? \_\_\_\_\_

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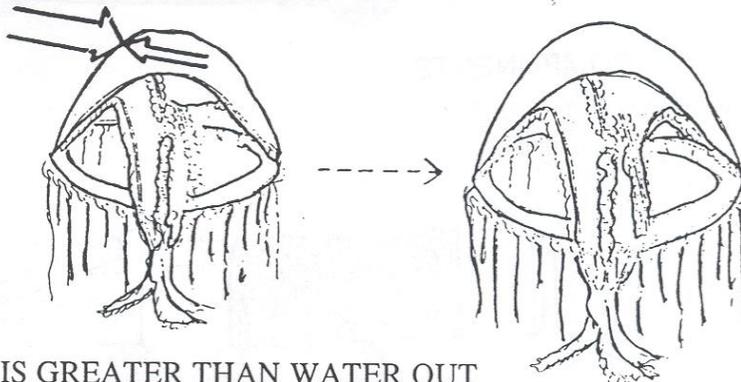
## HOW SALINITY AFFECTS LIVING THINGS

Living cells are largely water with a few dissolved salts and other materials. The materials inside the cell, for the most part, stay there. Water, however, can move into and out of the cell. How is this important? In living cells the water tends to move into or out of the cell until the concentration of salts "salinity" inside the cell equals the concentration of salts outside the cell. What does this mean? Let's look at a jellyfish and see. Our jellyfish is floating peacefully in the sea. The salt concentration within its cells is equal to the salt concentration in the water around it. The same amount of water enters its cells as leaves them.



WATER IN = WATER OUT

But what would happen if you put the jellyfish in a freshwater aquarium? The salt concentration within the cells of the jellyfish is now greater than the salt concentration in the distilled water of the aquarium. The salt can't move out of the jellyfish. In an effort to equalize the concentrations, water begins to move into the cells of the jellyfish. The concentration of salts in the cells is reduced but it's still higher than in the water. More water moves into the jellyfish and the jellyfish begins to swell.



WATER IN IS GREATER THAN WATER OUT

1. Will the concentration on the outside ever equal the concentration on the inside of the jellyfish?

---

2. What will eventually happen to our jellyfish?

---

You panic! Thinking quickly, you grab the jellyfish and move it into a tank of salt water. Unfortunately for our jellyfish, the salt concentration is 70 0/00 about twice what it's used to. Again, the salt can't move out of the jellyfish.

5. What will happen to make the inside and outside concentrations of salt more equal?

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6. What will happen to our poor jellyfish?

---

7. Draw what you think will happen below.

### WATER IN IS LESS THAN WATER OUT

The movement of water into and out of cells is called osmosis. In real animals the situation is more complex than shown above. Animals and plants have developed mechanisms to handle the small changes in salinity that normally occur where they live. Drastic changes in salinity however, cannot be dealt with and the cells of the animal or plant behave like those of our imaginary jellyfish.

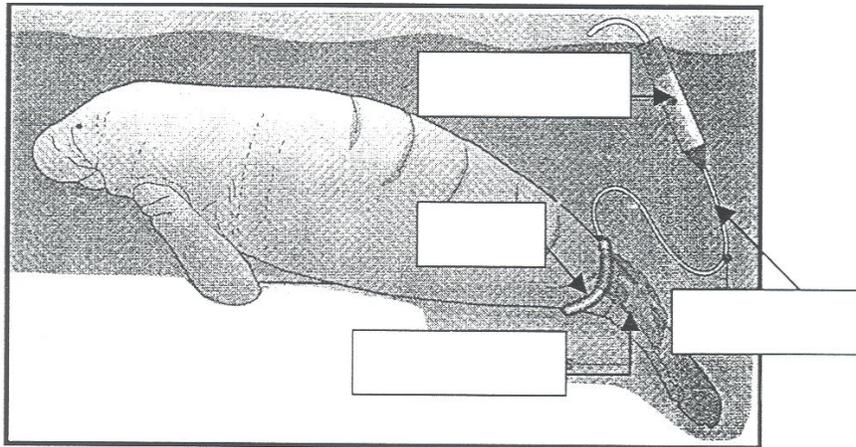
In the following experiment you will have a chance to perform one technique commonly used for the determination of salinity.

## TRACKING MANATEE MOVEMENT

**Directions:** As you read the following paragraph, place the bold, underlined words in the correct boxes in the diagram below and then answer the questions.

In December of 2002, scientists captured 13 manatees at Apollo Beach, Florida and fitted them with the most-up-to-date radio and satellite tracking equipment the state has ever used. When the new satellite gear is coupled with radio telemetry devices the manatees will be wearing, scientists will get the most information they have ever had about manatee movement.

The heart of the new telemetry system is a Telonics Global Positioning Satellite Tag. The radio and satellite tag assembly allows researchers to follow individual manatees without causing them harm or discomfort and the assembly is designed to come off if it gets entangled in an object. The **tracking device** is a transmitter encased in a floating tube. The tag assembly consists of a **belt** that fits around the base of the tail and a **four-foot nylon tether** is attached to the tracking device. A **one by one foot tracking flag** helps the observer to see the manatee.



When the manatee surfaces, the buoys send information to a satellite operated by the National Oceanic and Atmospheric Administration (NOAA), which compiles it for the Florida Fish and Wildlife Conservation Commission. Manatees are also being fitted with a depth, time and temperature recorder. This information will be integrated with the satellite tracking information. In the past, researchers received four positions a day. Now they can receive readings every 20 minutes for many hours each day. This new technology is just the beginning of learning more about manatees so that we can better protect them and adopt meaningful regulations.

1. What new information will scientists learn about manatees with depth, time and temperature recordings attached to them? \_\_\_\_\_

2. What new information will scientists learn about manatees now that they can track them every 20 minutes? \_\_\_\_\_

## **ANSWER KEYS (100 total points)**

### **Scientific Classification (24 total points – 2 for each picture)**

1. octopus - Mollusca
2. lobster - Arthropoda
3. snail - Mollusca
4. turtle grass - Tracheophyta
5. sea urchin - Echinodermata
6. squid - Mollusca
7. whale - Chordata
8. barnacle - Arthropoda
9. jellyfish - Coelenterata
10. sponge - Porifera
11. sea fan - Coelenterata
12. brittlestar - Echinodermata

### **Turtle Grass Community (14 total points - 2 for each question)**

1. 17
2. 4 (sea urchin, sea cucumber, starfish, brittlestar)
3. 2 (snails)
4. fish or seahorse
5. 8 (shrimp, amphipods, crabs, hermit crabs)
6. sea anemone
7. nursery for marine larvae, roots keep sandy bottom stable

### **Sponges (4 points – 2 for each question)**

1. and 2. Answers will vary.

### **Corals (8 total points – 2 for each label)**

1. tentacles
2. mouth
3. gastrocoel or stomach
4. limestone cup or corallite

### **Experiment: Determining Salinity by Evaporation (14 points total – see point values below)**

1. (6 points)
  - calcium = 1.5%
  - chlorine = 55%
  - magnesium = 4%
  - potassium = 1%
  - sodium = 30 %
  - all others = 8.5%
2. (2 points)
  - chlorine and sodium
  - salt

Data Tables - 2 points for each correct data table.

1. and 2. answers will vary (1 point for each question)

**Experiment: The Effect of Salinity on Living Tissue (14 total points – 2 for each question)**

1. answers will vary
2. answers will vary
3. Potato core in salt water shrunk because water moved out of its cells.  
Potato core in fresh water swelled because water moved into its cells.
4. Diagrams:  
Fresh water show arrow pointing into core.  
Salt water show arrow pointing out of core.
5. a. The sea cucumber will swell.  
b. The sea cucumber will shrink.
6. Water will move out of the cells of the fish and they will shrink.
7. Water will move into the cells of the fish and they will swell.

**How Salinity Affects Living Things (10 total points – 2 for each question)**

1. yes
2. The jellyfish may eventually burst.
1. Water will move out of the jellyfish.
2. Jellyfish will shrink.
3. Drawing will show jellyfish shrinking.

**Tracking Manatee Movement (12 total points- 2 for each label, 2 for each question.)**

Labels in order from top to bottom: tracking device, belt, one by one foot tracking flag, four-foot nylon tether

1. They will learn what depth manatees like at certain times and temperatures. They will learn what temperatures manatees prefer and they will learn where they go at specific times.
2. They will learn how fast they can travel and their exact location at different times during the day and at night.

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