

LESSON 1

How do Polyps Build Reefs?

What happens when a coral polyp is under environmental stress, such as a rise in sea temperature?
What is the symbiotic relationship between coral polyps and algae?

LESSON 2

Sea Surface Temperature and Coral Reef Bleaching

What types of adaptations do fish that live in the coral reef have to make in order to survive?
By observing fish, how can you tell where they might live and what they might eat?

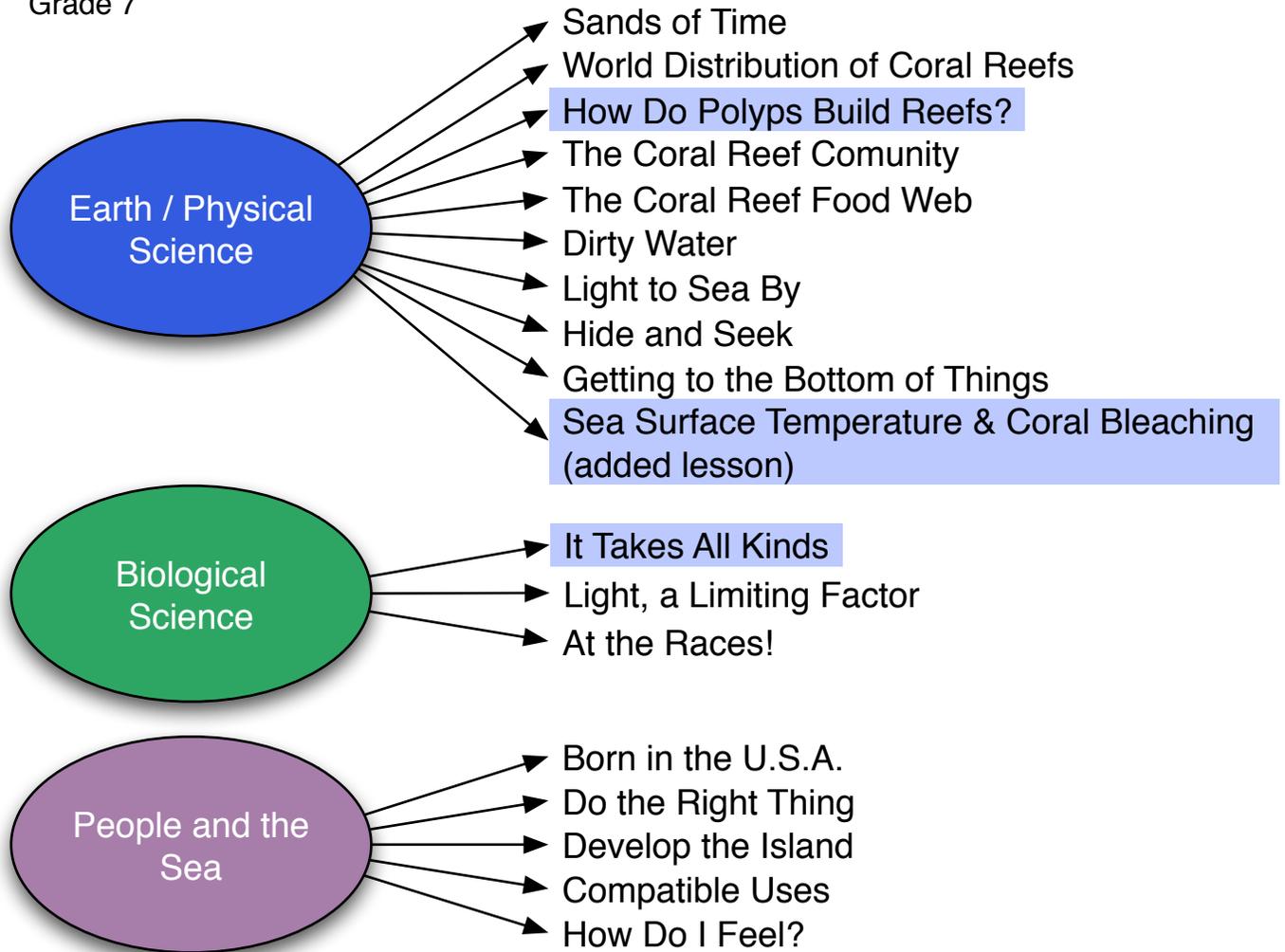
LESSON 3

It Takes All Kinds

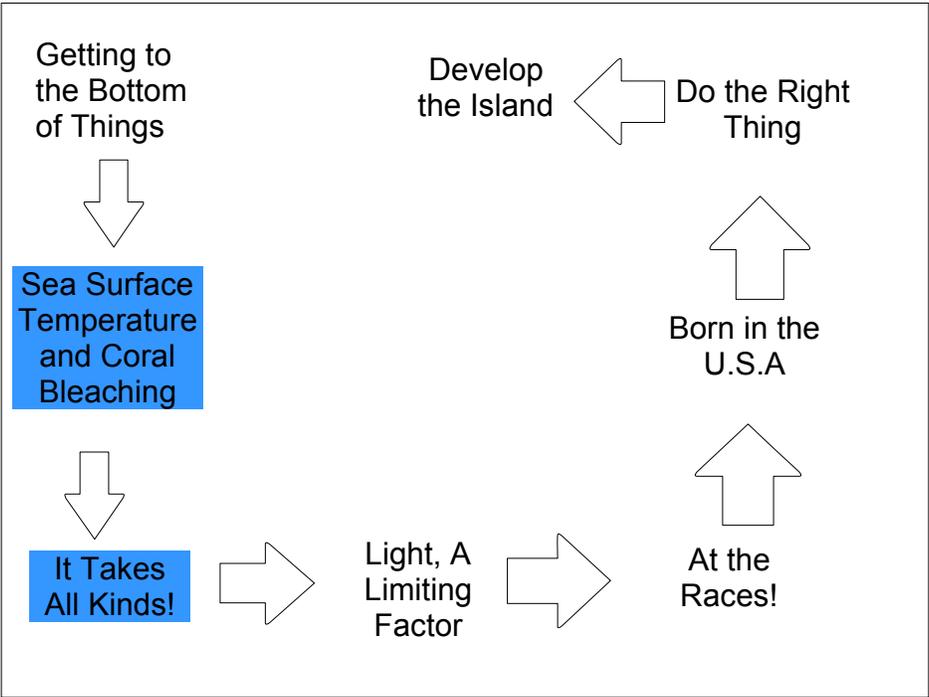
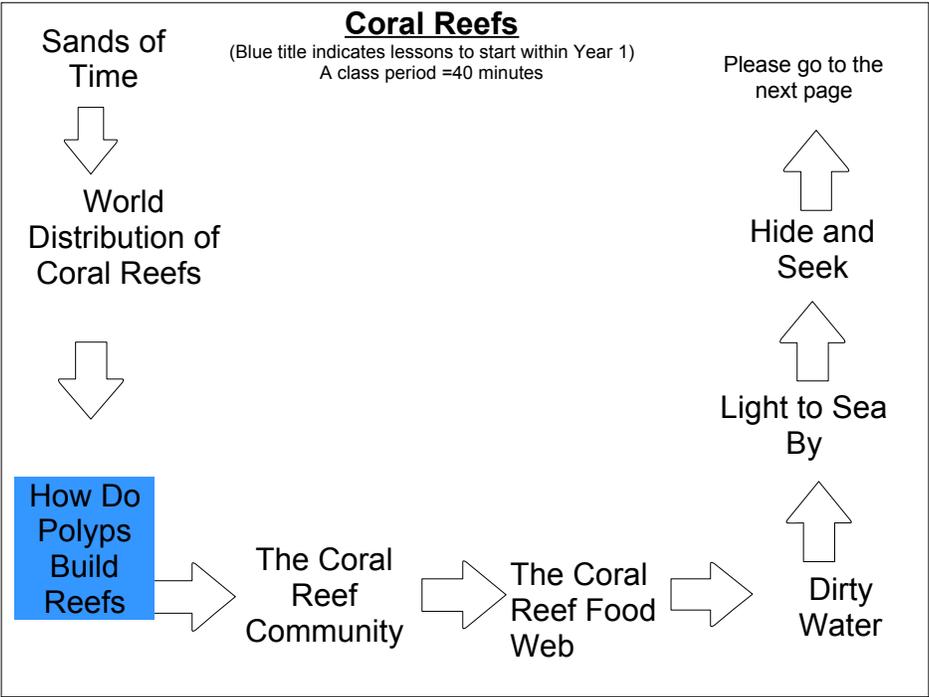
CORAL REEFS

Grade 7

CONCEPT MAP



Highlighted text denotes recommended first year lessons



HOW DO POLYPS BUILD REEFS?

Coral Reefs (Grade 7)

Lesson Overview

Students will simulate the process that occurs when a coral polyp forms its skeleton. The demonstration will help students understand where polyps get the limestone they need to build their skeletons and the reefs.

Lesson Rationale

A coral reef is the only marine biological community, which resists waves and continually grows and aids in maintaining the shoreline. As the reefs are built many small environments are formed.

Teacher's Notes

This activity uses a chemistry demonstration by the teacher to demonstrate the production of coral skeletons.

My Notes

Key Concept:

The source of coral rock, calcium carbonate, originates from its dissolved form in seawater.

Time Required:

Two 45-minute class periods, on day apart.

Subject Area	Interdisciplinary Connection	Resources	Going Further	NJCCCS
Science	<ul style="list-style-type: none"> Discover that ocean water bears enormous amounts of dissolved limestone (calcium carbonate) and sodium chloride. Recognize that calcium carbonate is relatively insoluble in water, so it forms a solid and precipitates out. Describe how a single polyp builds a cup-shaped skeleton around its soft body. Describe the two processes that occur in the formation of a coral reef. Define the terms: solid, liquid, gas. 	Chalk 250 ml Vinegar Balloon 6 Tablespoons of baking soda Coral reef coloring book pages 5-6 Small paper bag Hammer Markers	Use the Coral Reef coloring book to identify different types of coral.	STANDARD 5.1 (Scientific Processes) 5.1.A.2 5.1.B.1 5.1.B.3 5.1.C.2 STANDARD 5.5 (Characteristics of Life) 5.5.B.1 5.5.B.3 5.5.C.1 STANDARD 5.6 (Chemistry) 5.6.A.4 5.6.B.1
Language Arts Literacy	<ul style="list-style-type: none"> Reading-students will read page 5 to see how baby polyps grow from mature polyps. Science journal- (Before the lesson) students will speculate where coral reef rock comes from. Science journal- (After the lesson) Students will write two or three paragraphs summarizing what they saw in the demonstration and how the demonstration resembles the skeleton-building process of corals. 	Science journal	<p>Literature Connection: <i>Escape from Fear</i> by Gloria Skurzynski (2002) The Landons, while on vacation in St. John’s Park in the Virgin Islands for a seminar on coral reefs, help a wealthy thirteen-year-old find his birth mother.</p> <ul style="list-style-type: none"> Students can use this book for character analysis, Speculate about text by generating literal and inferential questions. Read critically by identifying, analyzing, and applying knowledge of the theme, structure, style, and literary elements of fiction and providing support from the text as evidence of understanding. Respond critically to text ideas and the author’s craft by using textual evidence to support interpretations. <p>Writing: Produce written and oral work that demonstrates comprehension of informational materials. Analyze a work of literature, showing how it reflects the heritage, traditions, attitudes, and beliefs of its authors.</p>	STANDARD 3.2 (Writing) 3.3.B.1 3.2.B.3 3.2.D.9

Subject Area	Interdisciplinary Connection	Resources	Going Further	NJCCCS
Mathematics			Students will research different types of coral polyps. They will gather measurement of each type and create a chart listing the types and measurement. They can also illustrate each type and make a poster demonstration.	
Social Studies	Investigate where limestone can be found in the world. Discuss the uses of limestone.		Using maps and globes, students will locate various coral reefs around the world	
Visual Arts			Art activity-Students will use clay, Craft Magic, paper mache, etc. to build their own model of different types of coral.	
Technology			http://www.reefed.edu.au/ http://www.hawaiiireef.net/links/other_sites.shtml http://www.coral.noaa.gov/cleo/education.shtml	
World Language	Investigate uses of limestone in cultures around the world.			STANDARD 7.2 (Culture) 7.2.A.1, A.2
Career Education & Consumer, Family & Life Skills	Teamwork Group discussions Safety during experiments			STANDARD 9.2 (Consumer, Family, and Life Skills) 9.2.A.1 9.2.C.1 9.2.F.1, F.2
Physical Education				

IT TAKES ALL KINDS

Coral Reefs (Grade 7)

Lesson Overview

Students observe color and shape adaptations in diverse fish and use this information to predict their habitat and lifestyle.

Lesson Rationale

A great diversity of fishes inhabits the coral reefs. The tremendous diversity of fish is a result of numerous adaptations since fish first evolved 500 million years ago. Close observation of these adaptations can lead to predictions about their behavior and choice of habitat.

Teacher's Notes

This activity requires students watch a video of various types of fish as a lead-in for small discussion groups. Students use Tea Party and Think Pair Share as strategies for brainstorming.

My Notes

Key Concept:

Fish come in a great array of forms, colors, and shapes, which can be used to predict the habitat and lifestyle to which they are adapted.

Time Required:

Two 45-minute class periods

Subject Area	Interdisciplinary Connection	Resources	Going Further	NJCCCS
Science	<ul style="list-style-type: none"> Students will discover why the great variety of habitats on the reef contributes to high fish diversity. Students will communicate how the mouth of a fish determines how it will capture its food. Students will describe the adaptations that the fish have in common. Students will develop a hypothesis about a fishes adaptations and how that determines where it lives in the ocean. 	Small pictures of fish Chart paper Overhead projector Video tape of fish Drawing paper Paper plates Fish Adaptation charts Fish Feature worksheet Fresh fish Trays	<ul style="list-style-type: none"> Fish dissection-use the fish in the activity to compare internal anatomy. Classroom aquarium-Students can keep observe and keep daily logs on behaviors, patterns of movement, individual variations in feeding, growth, and breathing patterns. Compare fish and whales. How are they similar? What adaptations do they both have in common? In what ways are they different? 	STANDARD 5.5 (Characteristics of Life) 5.5.B.1, B.3
Language Arts Literacy	<ul style="list-style-type: none"> Students will use the Think Pair Share strategy to orally share information about fish adaptations. Class discussion to follow as group's responses are listed on chart paper. Students will create a mini-book with information learned about fish adaptations. 	Chart paper Fish Feature worksheet Paper for mini-book Quilt squares	<p>Literature Connection: <i>Sign of the Seahorse: A Tale of Greed and High Adventure in Two Acts</i>, by Graeme Base (1998) The story is about the inhabitants of the coral reef are threatened when a shady real estate deal started by the greedy groper floods their area with poisonous waste.</p> <p>Activities:</p> <ul style="list-style-type: none"> Write a persuasive letter to the editor of the Coral Seas Tribune stating your opinion about the current state of the reef. Look at local real estate ads. Create an ad for your property in the reef. Use descriptive language. Participate in an informal debate taking the positions of the reef inhabitants and the groper. <p>Consequence charts-Students will work in cooperative groups to complete charts in which they describe consequences over a given time for the scenario listed on page 8 of the lesson.</p>	STANDARD 3.2 (Writing) 3.2.B.3 3.3.D.1 STANDARD 3.3 (Speaking) 3.3.A.2, A.7 3.3.B.3, B.4

Subject Area	Interdisciplinary Connection	Resources	Going Further	NJCCCS
Mathematics			Students can measure the different types of fish in metric units. Using the real estate examples, calculate the percentages that the seller and the real estate agent would make on the sale of reef property.	
Social Studies			Discuss the sources, purposes, and functions of law and the importance of the rule of law for the preservation of individual rights and the common good. Describe representative government and explain how it works to protect the majority and the minority.	
Visual Arts	<ul style="list-style-type: none"> Students will draw in detail pictures of fish for their mini-book. Students will create a quilt square depicting a fish in its habitat. Students will arrange quilt pieces to make a Fish and Habitat quilt. 	Drawing paper Quilt squares Markers, crayons	Students will pick adaptations from the chart and design their own unique fish. Gyotaku (fish printing)	STANDARD 1.2 (Creation and Performance) 1.2.D.1, D.2, D.3
Technology			http://www.nwoca.org/~hol_www/OceanAnimals.html Pictures and descriptions of a variety of fish	
World Language	Students will identify several types of fish that are unique to specific global areas of the world.	Internet access Fish Field Guide		STANDARD 7.2 (Culture) 7.2.A.1, A.2, C.1
Career Education & Consumer, Family & Life Skills	Team work Group discussions Safety during experiments		Investigate how real estate deals are handled in local communities: What are the steps that must be followed, local ordinances, people who must be contacted.	STANDARD 9.2 (Consumer, Family, and Life Skills) 9.2.A.1 9.2.B.2 9.2.C.1, C.2, C.3 9.2.F.1

Subject Area	Interdisciplinary Connection	Resources	Going Further	NJCCCS
Physical Education				

SEA SURFACE TEMPERATURE & CORAL BLEACHING

Coral Reefs (Grade 7)

Lesson Overview

Students simulate field research by using NOAA maps to determine areas in the world that are likely to be affected by coral bleaching because of sea surface temperature rises.

Lesson Rationale

Coral reefs are a fragile ecosystem. Scientists monitor ocean temperature since it is linked to coral bleaching episodes. In the face of numerous threats, coral is often vulnerable and die from the bleaching process. Ocean temperatures have risen 1°C over the past 10 years. What does this mean for our coral reefs?

Teacher's Notes

The teacher will model a coral bleaching demonstration. The students will use cooperative groups as they use internet sites to make predictions about coral bleaching sites found on ocean maps.

My Notes

Key Concept:

Coral bleaching is the process in which a coral polyp, under environmental stress, expels its symbiotic zooxanthellae from its body. Sea surface temperature increase is one cause of coral bleaching.

Time Required:

One class period-45 minutes

Preparation the day before of frozen rubber glove

Subject Area	Interdisciplinary Connection	Resources	Going Further	NJCCCS
Science	<ul style="list-style-type: none"> Determine the anatomy of coral bleaching by drawing conclusions from “Coral Bleaching” demonstration. Identify temperature increase as one cause of coral bleaching. Predict general areas likely to be affected by coral bleaching by interpreting sea surface temperature data. 	Computer lab Thick rubber gloves Freezer Bowl Whipped cream Green, blue, or red sprinkles Copies of “What Happened to the Coral?” Copies of “Predicting Peril” Copies of blank US map	Lesson from NOAA-Coral Bleaching: “What’s the Role of Water Temperature?” Students will be dividing into three groups: Gulf of Mexico, Atlantic Ocean, and Pacific Ocean. Students will use the information found on the AMS Datastreme Atmosphere website to create maps of current sea temperatures.	STANDARD 5.1 (Scientific Processes) 5.1.A.1, A.2, B.1, B.2, C.1, C.2 STANDARD 5.3 (Mathematical Applications) 5.3.D.1, D.2 STANDARD 5.5 (Characteristics of Life) 5.5.A.2, B.1, B.2 STANDARD 5.8 (Earth Science) 5.8.D.1 STANDARD 5.10 (Environmental Studies) 5.10.B.1
Language Arts Literacy	Small group discussions: Students will discuss the results of the “Coral Bleaching” demonstration. Students will read and discuss the “What Happened to the Coral?” handouts. Science Journal-Students will make predictions of coral bleaching events in the Caribbean.	“What Happened to the Coral” handouts Science journals	Literature Connection: <i>Great Barrier Reef</i> by Krista Hanson (2005) Students can read the book to find out facts on the Great Barrier Reef. Students will take notes on problems facing the reef. Students will use these facts to: <ul style="list-style-type: none"> Write a persuasive essay about “Saving Our Coral Reefs.” Create a media campaign focusing on the problems facing our reefs. Write reports based on research and include citations, quotations, and works consulted page. Rutgers MARE binder: See other books listed in the Literature Connections section for Coral Reefs	STANDARD 3.1 (Reading) 3.1.E.1 3.1.F.1 3.1.G.1, G.2 3.1.H.1 STANDARD 3.2 (Writing) 3.2.B.3 3.2.D.1 STANDARD 3.3 (Speaking) 3.3.A.7 3.3.B.3, B.4

Subject Area	Interdisciplinary Connection	Resources	Going Further	NJCCCS
Mathematics	<ul style="list-style-type: none"> Graphing-Students will graph temperature changes for their selected location for two weeks Students will compile information into a table to show number of days above, below, or at 32°C. 	Graph paper Internet access		STANDARD 4.4 (Data analysis, probability) 4.4.A.2
Social Studies			<ul style="list-style-type: none"> Students can research and investigate incidents of ship sinking due to coral reefs. Track the routes of explorers who traveled around the Great Barrier Reef. Develop a presentation discussing the problems of imports and exports for Barrier Reef countries. 	
Visual Arts	Create coral bleaching model. (See teacher demonstration directions)	Rubber gloves Bowl Whipped cream Green sprinkles		STANDARD 1.2 (CREATION AND PERFORMANCE) 1.2.D.1, D.2
Technology	http://www.ametsoc.org/amsedu/dstreme/ http://reefgis.reefbase.org/default.aspx Use network resources and real time data to locate areas around the world where coral bleaching is taking place.	Computer lab	http://www.reefed.edu.au/home/students http://coralreefwatch.noaa.gov/satellite/...education/reef_remote_sensing.html	STANDARD 8.1 (Computer and information literacy) 8.1.A.10 8.1.B.4, B.6, B.8
World Language				
Career Education & Consumer, Family & Life Skills	Team work Group discussions Safety during experiments		<ul style="list-style-type: none"> Students can apply research skills to career exploration for ocean employment opportunities. Research scientists who are investigating Coral Bleaching. 	STANDARD 9.2 (Consumer, Family, and Life Skills) 9.2.A.1, B.2, C.1, C.2, C.3, F.1
Physical Education				