Oceans

TABLE OF CONTENTS

About **Oceans**

DeltaScienceModules, THIRD EDITION

Students investigate our watery planet with a graphic model that compares water to land, salt water to fresh water, oceans to seas, and the Atlantic to the Pacific Ocean. Then, they get their hands wet investigating several ocean phenomena: saltiness, wave action, and currents. Students use ocean depth data to create a 3-D model of the ocean floor, make hydrometers to measure water density, and assemble a tidal dial to explore the ocean's rise and fall. Students model adaptive features of fish and marine mammals and use sea specimens to study an assortment of mollusks and other creatures of the intertidal zone.

In the Delta Science Reader *Oceans*, students explore the ocean, the great body of salt water that covers nearly three-fourths of Earth's surface. They learn about the composition of ocean water, features of the ocean floor, how ocean waters move, and how oceans affect weather and climate. They find out about the many resources the ocean provides. They also read about marine biologist Dr. Sylvia Earle and undersea explorer Jacques-Yves Cousteau. Finally, students learn about deep-ocean exploration.

Overview Chart for Hands-on Activities

Hands-on Activity	Student Objectives
1 **The Water Planet** *page 13*	• use a paper ruler as a bar graph to represent the ratio of land to water on Earth • record on the ruler the ratio of salt water to fresh water on Earth • identify the four oceans that make up the world ocean • compare the relative sizes of the four oceans, and record the data on the ruler
2 **Composition of Ocean Water** *page 23*	• discuss ways to distinguish between samples of fresh water (tap water) and salt water ("ocean water") • evaporate the water from each sample and examine the substance that remains • compare the crystal residue from the salt water sample to ordinary table salt • speculate about how the oceans became salty
3 **Properties of Ocean Water** *page 31*	• discover how the presence of salt increases the density of ocean water • observe that the denser a liquid, the higher things float in that liquid • make a simple hydrometer and use it to measure the relative density of salt water samples
4 **Mapping the Ocean Floor** *page 43*	• review some of the landforms that exist on dry land and speculate about the shape of the ocean floor • make depth profiles by graphing sets of ocean depth data • infer the shape of the ocean floor based on their depth profiles • make a three-dimensional model of the ocean floor from the depth profiles
5 **The Water Cycle** *page 55*	• build a closed system for the evaporation and condensation of water • observe and then diagram the movement of water in the water cycle chamber • compare their simulated water cycle with the water cycle in the environment • conclude that most of the precipitation that falls on Earth both originates in and returns to the oceans
6 **Ocean Waves** *page 65*	• observe how waves are produced by the friction of wind against the surface of water • identify the parts of a wave • model the movement of waves with a wave bottle • discover that a wave travels forward but the water does not
7 **Surface Currents** *page 75*	• model the formation of a surface current • observe what happens to surface currents when they are interrupted by landforms • discover how Earth's rotation affects the movement of surface currents north and south of the equator
8 **Density Currents** *page 89*	• review the concept of density and some factors that may affect the density of water • model the formation of density currents due to differences in salinity • model the formation of density currents due to differences in water temperature
9 **Tides** *page 99*	• review the spatial relationship between Earth and the Moon • model the effect of the Moon's gravitational pull on Earth and its oceans • infer from the model that there are two high tides and two low tides along most coastal regions each day
10 **Adapting to Life in the Ocean** *page 113*	• model how a fish uses its swim bladder to control buoyancy • demonstrate how marine mammals maintain a warm body temperature in cold water • discover that blubber also helps marine mammals float
11 **Life at the Ocean's Edge** *page 125*	• discuss the conditions in the intertidal zone • infer the importance of a hard exterior for survival in the intertidal zone • examine a variety of mollusk shells, and learn to distinguish between bivalves and univalves
12 **Curious Sea Creatures** *page 135*	• discuss the conditions in the neritic zone • examine the skeletons of some sea creatures commonly found in the intertidal zone and the shallow ocean area covering the continental shelf
Assessment *page 143*	• See page 143.

Process Skills	Vocabulary	Delta Science Reader
use numbers; collect, record, display, or interpret data; compare	**sea, world ocean**	page 2
communicate, compare, infer	**dissolve, salinity**	pages 3, 11
define based on observations, measure	**density, hydrometer**	page 3
use numbers, make and use models, infer	**abyssal plain, continental shelf, continental slope, depth profile, island, mid-ocean ridge, seamount, sonar, trench**	pages 4–5, 15
make and use models, predict, observe, compare	**condensation, evaporation, precipitation, runoff, water cycle**	page 10
observe, make and use models, communicate	**breaker, crest, trough, wave height, wavelength**	page 7
make and use models, observe, use variables	**Coriolis effect, current, prevailing winds, surface current**	page 8
make and use models, observe, compare	**density current**	page 8
use numbers; collect, record, display, or interpret data; infer	**gravitational pull, high tide, low tide, tides**	page 9
make and use models, experiment	**adaptation, buoyancy, cold-blooded, swim bladder, warm-blooded**	pages 12–13, 14, 15
communicate, infer, observe, compare, classify	**bivalve, exoskeleton, gastropod, intertidal zone, mollusk, univalve**	page 6
predict, observe, communicate	**invertebrate, neritic zone, vertebrate**	pages 12–13, 14

See the following page for the Delta Science Reader Overview Chart.

Overview Chart for Delta Science Reader
Oceans

Selections	Vocabulary	Related Activity
Think About...		
Why Is Earth the Water Planet? *page 2*	**bay, gulf, ocean**	Activity 1
• Ocean Water *page 3*	**density, salinity, water pressure**	Activities 2, 3
• Features of the Ocean Floor *page 4*	**abyssal plain, atoll, continental rise, continental shelf, continental slope, coral reef, mid-ocean ridge, ocean basin, rift, sea-floor spreading, seamount, trench**	Activity 4
• Where Ocean Meets Land *page 6*	**estuary, headland, jetty, shoreline**	Activity 11
How Does Ocean Water Move? *page 7*		
• Waves *page 7*	**crest, trough, wave**	Activity 6
• Currents *page 8*	**current, deep-water current, surface current, upwelling**	Activities 7, 8
• Tides *page 9*	**tide**	Activity 9
How Do Oceans Affect Weather and Climate? *page 10*	**water cycle**	Activity 5
Ocean Resources *page 11*	**desalination**	Activity 2
Ocean Habitats *page 12*	**intertidal zone, near-shore zone, nekton, open-ocean zone, plankton, tide pool**	Activities 10, 11, 12
People in Science		
• **Marine Biologists** *page 14*	**marine biologist**	Activities 10, 11, 12
Did You Know?		
• **About Deep-Ocean Exploration** *page 15*	**hydrothermal vent, submersible**	Activities 4, 10

See pages 151–159 for teaching suggestions for the Delta Science Reader.

MATERIALS LIST

Oceans

Quantity	Description
9	bags, reclosable, 6 in. × 6 in.
8	barnacles
9	bases, plastic
33	beads, plastic*
1	cinnamon, ground*
1	circle, cardboard, 12 in.*
4	clay, modeling, 1 lb*
8	containers, plastic, 1-gal
8	containers, plastic, octagon
4	coral pieces
32	cups, plastic, 10-oz
32	dishes, evaporating
8	eyedroppers, glass
1	fasteners, paper, p/100*
24	folders, manila*
1	food coloring, blue, 1 oz*
1	food coloring, red, 1 oz*
8	graph sheets, 11 in. × 17 in.*
1	knife, plastic
16	magnifiers
1	map, world†
78	marbles, blue, 1.5-cm
1	marker, erasable, black
1	marker, erasable, blue
1	marker, erasable, brown
1	marker, erasable, green
1	oil, corn, 32 oz*
8	paper, construction, black*
9	pencils, hydrometer, 10-cm*
8	plates, plastic*
1	rubber bands, p/33*
2	salt, 26 oz*
1	sand, 2 lb*
8	sand dollars
4	sea horses
8	sea urchins
1	sheets, Crossword Puzzle, p/2
1	sheets, Depth Data, p/8
1	sheets, Hemispheres, p/2
1	sheets, Mollusks, p/2
1	sheets, Ocean Facts, p/8
1	sheet, Tidal Dial
4	shells, mollusk, assorted pkg
8	shells, mollusk, bivalve, p/3
4	shells, mollusk, univalve, p/6
1	shortening, 1 lb*
4	sponges, organic
1	spoon, plastic
8	starfish
1	stickers, hydrometer, p/12*
1	straws, wrapped, p/50*
1	sugar crystals, colored*
8	thermometers, Celsius
1	thumbtacks, p/100*
1	toothpicks, p/100*
1	transparency, Standard Ruler
1	transparency, Tidal Dial
8	trays, paint, plastic
9	tubes, plastic
1	**Teacher's Guide**
8	**Delta Science Readers**

TEACHER-PROVIDED ITEMS

Quantity	Description
1	ball
1	bottle, plastic, 1-L, with cap
8	bottles, plastic, 2-L, with caps
2	buckets
1	chalk, white*
8	clams or mussels* (optional)
32	crayons, p/8
1	egg, fresh*
1	globe
2	glue, white, btl*
3	ice cubes, 5-lb bag*
2	light sources (optional)
1	overhead projector
3	paper towel rolls*
32	paper, white, $8\frac{1}{2}$ in. × 11 in.*
1	marker
32	pencils
—	pictures of coastlines
2	pitchers, 2-qt
16	rocks, 2–3 in. diameter
16	rulers
33	scissors
32	smocks (optional)
1	sponge, cellulose (optional)
1	tape, masking*
—	water, tap*

* = consumable item † = in separate box

To order consumable items or refill kits, please call 1-800-442-5444.

ACTIVITY SUMMARY

In this Delta Science Module, students are introduced to the ocean, the enormous body of salt water that covers nearly three-fourths of Earth's surface.

ACTIVITY 1 Students come to understand the great size of the ocean by comparing the ratio of land to water on Earth. Then they identify and compare the relative sizes of the four main oceans that make up the world ocean. Students record the information on a bar graph made from a paper ruler.

ACTIVITY 2 Students learn about the chemical composition of ocean water. They compare samples of fresh and salty water, then evaporate the water from the samples. Students examine the residue left behind by the salty sample and compare the crystals to ordinary table salt. Students then speculate about how the oceans became salty.

ACTIVITY 3 Students investigate an important property of ocean water. A series of simple class demonstrations teaches students how the presence of salt increases the density of water, and that the denser a liquid, the higher things float in that liquid. Then students make their own hydrometers and use them to measure the relative density of some salt water samples.

ACTIVITY 4 Students map a section of the ocean floor. Teams are given a series of depth data sheets to graph. The resulting depth profiles are then turned into a three-dimensional model of the ocean floor. From this activity students learn that the ocean floor contains all of the features that exist on dry land—but on a much larger scale.

ACTIVITY 5 Students explore how the water in Earth's oceans gets continuously cycled through the environment. Students make water cycle chambers and observe the evaporation, condensation, and precipitation that occurs inside. From this they conclude that most of the precipitation that falls on Earth comes from and returns to the oceans.

ACTIVITY 6 Students use several different models to learn how waves form and how they move. They discover that most waves are wind-generated and increase in size the longer and harder the wind blows. They also discover that while the energy of a wave travels forward, the water itself does not.

ACTIVITY 7 Students model the formation of surface currents and learn about the two factors that affect the direction in which surface currents move: the presence of landforms and the Coriolis effect.

ACTIVITY 8 Students model the formation of density currents due to differences in salinity and differences in water temperature.

ACTIVITY 9 Students study the phenomenon of the tides. They make a simple Tidal Dial and use it to model not only the spatial relationship between Earth and the Moon but the effect of the Moon's gravitational pull on Earth and its oceans.

ACTIVITY 10 Students begin to look at some of the ways in which animals have adapted to life in the ocean.

ACTIVITIES 11 and 12 Students are introduced to a variety of animals that live where the ocean meets land—the intertidal zone—and in the shallow ocean area that covers the continental shelf—the neritic zone. Students examine the skeletal remains of a variety of sea creatures that live in the tidal and neritic zones. Students discover the enormous variety, interdependence, and unique adaptive features that characterize marine life.