Chapter 13 Exploring the Oceans

Section 1 Earth's Ocean

Objectives
List the major divisions of the global ocean.
Describe the history of Earth's oceans
Identify the properties of ocean water.
Describe the interactions between the ocean and the atmosphere.

Ocean overview - video

http://video.nationalgeographic.com/video/oceans-narrated-by-sylvia-earle/oceans-ove

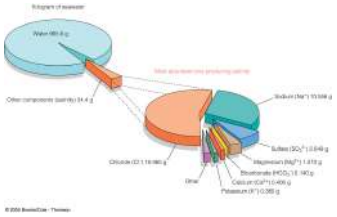
https://www.youtube.com/watch?v=7PRsKYLpofY Bill Nye - Oceanography

71% is covered by the Earth's Ocean

Divisions of the Global Ocean
Global Ocean
divided by the continents
Pacific Ocean - largest
Atlantic Ocean
Indian Ocean
Arctic Ocean - smallest
most of surface is covered by ice

How did the oceans form?
4.5 billion years ago - there were no oceans
4.0 billion years ago - Earth started to cool - water vapor began to condense, soon it began to rain, rain filled the deep levels and the first oceans formed

Characteristics of Ocean Water



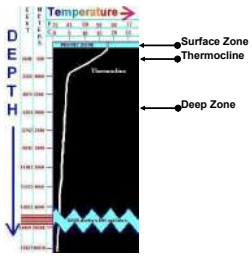
Ocean water is salty
Sodium Chloride
same salt that is on your food
NaCl - most abundant dissolved mineral from rivers and streams

Salinity
a measure of the amount of dissolved salts in a given amount of liquid

Climate affects Salinity
different parts of the ocean may have different salt concentrations
hotter dryer climates have more salt - WHY?

Water movement affects Salinity
slower moving water = higher salinity

Temperature Zones



Surface Temperature Changes
different parts of the ocean have different temps - water near equator is much warmer than water near the poles

WHY?

The Ocean and the Water Cycle
evaporation, condensation, precipitation

The Global Thermostat
Ocean Function - regulate temperatures in the atmosphere by absorbing and holding energy from the sun

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Section 2 The Ocean Floor

Objectives

Describe technologies for studying the ocean floor.
Identify the two major regions of the ocean floor.
Classify subdivisions and features of the two major regions of the ocean floor.

It has been said that we know more about the surface of the moon than about the ocean floor.

Do you believe this? Explain.

Studying the Ocean Floor

Seeing by Sonar

Sonar = sound navigation and ranging
ships send sound pulses to the bottom of the ocean
then bounce off the floor and return, then calculate by multiplying half the travel time by the speed of sound
the longer it takes to return the deeper it is

Oceanography via Satellite

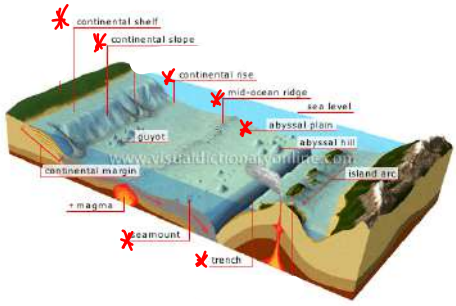
Satellite - Seasat
sent images back to Earth where scientists could measure the direction and speed of ocean currents

Studying the Ocean with Geosat

Geosat - military satellite
used to measure slight changes in the height of the ocean floor
satellites can cover more space than ships

Revealing the Ocean Floor

Not a flat surface



Continental Shelf - begins at shoreline and slopes slightly

Continental Slope - steep incline following the continental shelf

Continental Rise - base of the continental slope, made of sediments

Abyssal Plain - large flat part of the ocean floor, covered with mud and remains of dead organisms

Mid-ocean Ridge - chains of mountains that form when plates pull apart

Rift Valley - long, narrow valley that forms where the plates pull apart

Seamounts - individual mountains formed from magma that has pushed its way to the surface, must be 1000 m high, if grows above sea level it becomes an island

Ocean Trench - cracks in the ocean floor when two plates are being pushed together and one subsides

Homework

Directed Reading - The Ocean Floor
Continue working on Concept Map

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Section 3 Life in the Ocean

Objectives
Identify the three groups of marine life.
Describe the two main ocean environments.
Identify the ecological zones of the benthic and pelagic environments.

Deep Ocean Video - Planet Earth Series

Three Groups of Marine Life

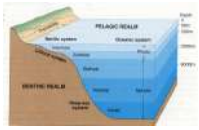
Plankton
organisms that float or drift near the surface
microscopic

Two types
Phytoplankton - plantlike
Zooplankton - animal-like

Nekton
all organisms that swim actively in open water
whales, sea lions, dolphins

Benthos
live on or in the ocean floor
crabs, worms, coral, clams

Benthic Environment
area near the bottom of a pond, lake or ocean and all the organisms that live on or in it



Intertidal Zone
located between low and high tide limits
organisms must be able to live in water and land
holdfasts - rootlike structures that help hold plants

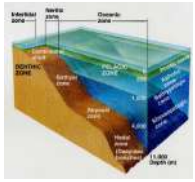
Sublittoral Zone
most organisms remain in the upper 100m where pressure, sunlight, temperature are constant

Bathyal Zone
ranges from about 200m - 4000m
plant life rare
sponges, sea stars, octopuses

Abyssal Zone
no plants and very few animals live here
animals live near - **black smokers**: hot-water vents
largest zone

Hadal Zone
includes the floor of the ocean trenches
a type of sponge, clams, worms

Pelagic Environment
the area in the ocean between the sublittoral zone and the abyssal zone



Neritic Zone
covers the continental shelf
largest concentration of marine life

Oceanic Zone
includes the volume of water covering the ocean floor but not including the continental shelf

Homework
Create a drawing of the 5 imaginary organisms, each inhabiting a different benthic zone. You should describe each plant or animal.

You must:
create and color a drawing
include 5 organisms - one for each level
description of organism
how the organisms obtain food
how they avoid predation
how they withstand the water pressure and temperature at the depth where they live

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Section 4 Resources from the Ocean

Objectives

List two ways of harvesting the ocean's living resources.
Identify three nonliving resources in the ocean.
Describe the ocean's energy resources.

https://www.youtube.com/watch?v=euY7vdM5mpE

Imagine a world without ocean resources and then create a list of activities that would no longer be available.

We need ocean seaweed called kelp so we can have thick ice cream.

Coral for chalk.
Makeup, fertilizers, shampoo

Living Resources

Fishing the ocean

75 million tons of fish
efforts are being made to keep dolphins and turtles safe

Farming the ocean

people raising ocean fish to help meet demand which helps prevent over fishing and taking directly from the ocean

Savory Seaweed

kelp is used to thicken jelly, ice cream
some species of seaweed are used in sushi

Nonliving Resources

Oil and Natural Gas

nonrenewable resource - being used faster than it is made
locate oil by using pulses of sound

Stage 1 - Oil and gas we use today began as microscopic plants and animals living in the ocean millions of years ago. As these microscopic plants and animals lived, they absorbed energy from the sun, which was stored as carbon molecules in their bodies. When they died, they sank to the bottom of the sea. Over millions of years, layer after layer of sediment and other plants and bacteria were formed.

Stage 2 - As they became buried ever deeper, heat and pressure began to rise. The amount of pressure and the degree of heat, along with the type of biomass, determined if the material became oil or natural gas. More heat produced lighter oil. Even higher heat or biomass made predominantly of plant material produced natural gas.

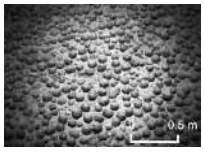
Stage 3 - After oil and natural gas were formed, they tended to migrate through tiny pores in the surrounding rock. Some oil and natural gas migrated all the way to the surface and escaped. Other oil and natural gas deposits migrated until they were caught under impermeable layers of rock or clay where they were trapped. These trapped deposits are where we find oil and natural gas today.

Fresh Water and Desalination

Desalination - process of removing salt from ocean H_2O
very expensive

Sea-Floor Minerals

manganese nodules - used to make steel
also contain iron, copper, nickel and cobalt
other nodules contain phosphates - fertilizers
formation of nodules - dissolved substances in sea water stick to pebbles
estimated to cover 15% of ocean floor but located in deep ocean so hard to locate and expensive



Tidal Energy

energy generated from the movement of tides
renewable resource - energy that can be replenished

Wave Energy

energy created by ocean surface waves
renewable
power plants

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Section 5 Ocean Pollution

Objectives

Explain the difference between point-source pollution and nonpoint-source pollution.
Identify three different types of point-source ocean pollution.
Describe what is being done to control ocean pollution.

https://www.youtube.com/watch?v=Arm8841kFPI

What is one type of pollution you saw coming to school today?

Nonpoint-Source Pollution

pollution from more than one source in the same area

Point-Source Pollution

pollution resulting from one site

Trash Dumping

putting garbage in ocean
stricter laws have been developed, but it is still occurring

Effects of Trash Dumping

marine animals mistake plastic for food
animals get tangled up in plastic pop rings and other garbage

Sludge Dumping

part of raw sewage - liquid and solid wastes flushed down the toilet
sludge - solid waste

Oil Spills

responsible for about 5% of ocean pollution

Saving our Ocean Resources

Nations and Citizens are changing ways to protect our oceans.
US - Clean Water Act (first) then came the US Marine Protection, Research, and Sanctuaries Act

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