

Teacher: CORE
 OceanographyCP Year: 2016-17
 Course:
 Oceanography Month: All Months

A Historical
 Oceanography

u	Essential							
	Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
g	What is oceanography?	Scientific Method	Students will be able to:	Scientific Method, oceanography, latitude, longitude, celestial	Science Skills Lab 8/30/2016			3.1.12.C-Assess and apply patterns in science and technology.
u	What science disciplines does oceanography entail?		-formulate a hypothesis and use the scientific method to test that hypothesis.	navigation, Chinese navigators, compass, Prince Henry the Navigator, Ferdinand	Latitude and Longitude Handout 8/30/2016			3.2.12.A-Evaluate the nature of scientific and technological knowledge.
s		Study of Oceanography	-plot data points of longitude and latitude on a map.	Magellan, Matthew Maury, HMS Challenger, Chronometer, Ben Franklin, cartographer,	Latitude and Longitude of Central Asia 9/3/2016			3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.
t		Maritime Exploration and Historical Oceanography	-understand the importance of ocean exploration prior to the 20th century.	Christopher Columbus, James Cook, echo sounder, GPS, John Harrison, marine science, Meteor Expedition,	Marine Geography, Latitude, Longitude Lab 9/4/2016			3.4.12.A-Apply concepts about the structure and properties of matter.
		Modern Oceanography	-bridge the gap from the 20th century into the 21st century and see how oceanographers study the ocean processes today.	oceanus, SEASTAR, sounding, TOPEX/Poseiden, Vikings.	Early Ocean Quiz 9/7/2016			3.5.12.A-Analyze and evaluate Earth features and processes that change the Earth.
			-understand that oceanography is an interdisciplinary science that requires scientific knowledge from all different scientific subjects.		Scientific Method Experiment 8/20/2016			3.5.12.B-Analyze the availability, location and extraction of Earth resources.
								3.5.12.D-Analyze the principles and history of hydrology.
								3.8.12.A-Synthesize and evaluate the interactions and constraints of science and technology on society.

3.8.12.C-Evaluate the consequences and impacts of scientific and technological solutions.

S Chemical Oceanography ~ In this unit, students will explore the chemical aspects of seawater. We discuss where the ocean originated, why it is salty, density properties, the formation of bottom water, temperature-salinity-density relations, and oceanic pressure.

e	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
p	How was the ocean formed?	Water and Ocean Structure	Students will be able to:	Absorption, acid, adhesion, aphotic zone, atom, base, bond, calorie, chemical bond, cohesion, compound, covalent bond, deep zone, density, density curve, electron, element, freezing point, halocline, heat, heat capacity, hydrogen bond, latent heat of	Water Domes TOPS 9/10/2016			3.1.12.C-Assess and apply patterns in science and technology.
t	Where did the salts of the ocean originate from?	Ocean Chemistry	-define heat and temperature.	deep zone, density, density curve, electron, element, freezing point, halocline, heat, heat capacity, hydrogen bond, latent heat of	Current Event Article 1 9/14/2016			3.2.12.B-Evaluate experimental information for appropriateness and adherence to relevant science processes.
e	Why is the ocean density stratified?		-differentiate between heat and temperature.	latent heat of vaporization, latent heat of fusion, latent heat of evaporation, light, mixed layer, molecule, nucleus	Density of Water Lab 9/12/2016			3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.
m	Why is the ocean blue?		-explain the density stratification of the ocean	photic zone, polar molecule, proton, pycnocline, refraction, scattering, sensible heat, shadow zone, sonar, sound, state, surface zone, temperature, thermal	Temperature-Salinity-Density Relations Lab 9/18/2016			3.2.12.D-Analyze and use the technological design process to solve problems.
b			-explain the formation of the ocean and identify avenues of salinity entering the ocean water.	inertia, thermocline, thermostatic property, water mass, buffer, chemical equilibrium,	Water Density Quiz 9/21/2016			3.4.12.A-Apply concepts about the structure and properties of matter.
e			-draw and label a water molecule.		Salinity Handout 9/19/2016			3.4.12.B-Apply and analyze energy sources and conversions and their relationship to heat and temperature.
r			-determine the polar nature of water and discuss the importance of hydrogen bonds in water.		Residence Time Handout 9/28/2016			3.5.12.C-Analyze atmospheric energy transfers.

-discuss why the ocean is blue.	chlorinity, colligative properties,	Current Event Article 2	3.5.12.D-Analyze the principles and history of hydrology.
-describe the temperature and salinity properties of the three density layers of the ocean.	conservative constituent, diffusion, excess volatiles, Forchhammer's principle, ion, ionic bond, mixing time, mixture, nonconservative	10/5/2016 Water and Ocean Structure Review 10/5/2016	
-differentiate between adhesion and cohesion and explain capillary action and surface tension.	constituent, pH scale, precipitate, principle of constant proportions, residence time, salinity, salinometer, saturation,	Water and Ocean Structure Test 10/5/2016	3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.
Students will be able to: -explain the four colligative properties of pure water.	solute, solution, solvent, trace element.		
-discuss water's ability to take in copious amounts of heat with little change.			
-explain water's role in moderating temperature of the Earth.			
-discuss the principle of constant proportions.			
-analyze two different samples of water and determine the proportions of salt in the ocean.			
-relate residence time to Forchhammer's principle.			
-discuss the ability of water to be a universal solvent.			
-explain the chemical properties that occur when salt is added to water.			
-explain the calcium carbonate depth and how that relates to acid in the ocean.			

-discuss the dissolution of gas in the ocean, specifically carbon dioxide and what the effect of that has on the world climate.
-differentiate between solution and mixture.

O Physical Oceanography ~ Students are introduced to the interaction between the atmosphere and ocean. The unit is broken down into two sections. The first section covers the atmosphere and its properties. The second section covers the circulation of the ocean and its importance in transporting heat throughout the world.

c	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
t	Why is it important that oceanographers study the atmosphere?	Atmospheric Properties	Describe the relationship between pressure, temperature, and wind.	Station Model, Isobar, Isotherm, High Pressure, Low Pressure, Weather, Climate, Wind, Insolation, Convection, Conduction, Radiation, Thermal Equilibrium, Coriolis Effect				3.4.11.B-Analyze energy sources and transfers of heat.
o		Atmospheric Circulation	Discuss characteristics of different types of fronts.					3.5.11.A-Explain the relationship between Earth features and processes of change.
b		Weather Map Reading	Interpret atmospheric data and plot that data on weather maps.					3.5.11.C-Analyze atmosphere energy transfers.
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m		Weather Map Reading	Interpret atmospheric data and plot that data on weather maps.					3.5.11.C-Analyze atmosphere energy transfers.
b	What drives the movement of the ocean?	Ocean Circulation	Describe how ocean currents move energy throughout the world.	Gyre, El Nino, La Nina, West Wind Drift, Gulf Stream, Upwelling, Downwelling				3.5.12.A-Analyze and evaluate Earth features and processes that change the Earth.
e		Thermohaline Circulation	Differentiate between western boundary ocean currents and eastern boundary ocean currents.					3.5.12.C-Analyze atmospheric energy transfers.
r		El Nino	Discuss weather characteristics that each ocean boundary current is associated with. Explain the formation of deep water masses and their role in thermohaline circulation.					3.5.12.D-Analyze the principles and history of hydrology. 3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

Explain characteristics necessary for an El Nino and how those characteristics differ from normal conditions.

3.8.12.C-Evaluate the consequences and impacts of scientific and technological solutions.

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y			Explain characteristics necessary for an El Nino and how those characteristics differ from normal conditions.					3.8.12.C-Evaluate the consequences and impacts of scientific and technological solutions.
	How does energy move through the ocean?	Properties of a Wave	Describe all dynamics of a wave.	Wavelength, wave height, frequency, still water level, amplitude, restoring force,				3.5.12.C-Analyze atmospheric energy transfers.
	Are tides important?	Tides	Describe how energy moves through a wave	disturbing force, forced wave, free waves, stokes drift, tides				3.5.12.A-Analyze and evaluate Earth features and processes that change the Earth.

Describe the different types of waves in the ocean.

3.5.12.D-Analyze the principles and history of hydrology.

Describe 4 ways that waves are classified.
Describe different types of disturbing forces.
Describe basic tidal motion.

Discuss the differences between spring tides and neap tides.

F Geological Oceanography ~ In this unit, students will explore the geological side of oceanography. We will study the ocean floor, ocean sediments, and coasts of the United States.

e	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
b	Why is it important to study the ocean floor?	Ocean Floor Dynamics	Determine the geologic formations on the seafloor.	Continental Margin, Deep Ocean Basin, Mid-Ocean Ridge, Continental Crust,				3.5.12.A-Analyze and evaluate Earth features and processes that change the Earth.
r		Continental Margins	Determine how the ocean was created	Oceanic Crust, Density, Hydrothermal Vents, Abyssal Plains				3.5.12.B-Analyze the availability, location and extraction of Earth resources.
u		Deep Ocean Basins	Determine different characteristics between ocean floor landforms and continental landforms.					
a		Mid-Ocean Ridges	Demonstrate use of technology, such as Google Earth, and enhance their ability to read paper maps.					
r			Know how oceanographers determine the height of sea level and different ways to measure ocean depths.					
y			Identify and label different characteristics of different parts of ocean basins.					

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Oceanography ~

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	Why are sediments considered the	Types of Sediment	Determine that sediments are loose accumulations of particulate material.	Stratigraphy, Paleooceanography, Biogenous Sediment,				3.1.11.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.

i	memory of the ocean?	Particle sizes of sediment and their importance to the ocean	Use sediment depth and composition to explain recent events in the above ocean basin.	Terrigenous Sediment, Hydrogenous Sediment, Cosmogenous Sediment				3.5.11.A-Explain the relationship between Earth features and processes of change.
I		Paleoceanography using sediment samples	Discuss the four main types of sediment and discuss properties of type. Determine the overall distribution of sediments.					3.5.11.D-Describe the principles and history of hydrology.
			Discuss differences between calcareous oozes and siliceous oozes.					3.7.11.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes. 3.5.12.A-Analyze and evaluate Earth features and processes that change the Earth. 3.5.12.B-Analyze the availability, location and extraction of Earth resources. 3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes. 3.8.12.B-Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.
M	Geological Oceanography ~	In this unit, students will explore the geological side of oceanography. We will study the ocean floor, ocean sediments, and coasts of the United States.						3.8.12.C-Evaluate the consequences and impacts of scientific and technological solutions.

a	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
y	Why is it important to study coastal characteristics?	Marine and terrestrial processes of coasts	Describe physical and chemical differences found at active and passive coasts.	Barrier island, beach, coast, coastel cell, estuary				3.5.12.A-Analyze and evaluate Earth features and processes that change the Earth.

	What are the differences between the coasts of the United States?	Beach formation and shape	Differentiate and identify erosional coasts and depositional coasts.						3.5.12.D-Analyze the principles and history of hydrology.
		Estuaries	Discuss beach formation and characteristics of different types of beaches.						
		Characteristics of U.S. Coasts	Explain the importance of estuaries to marine and terrestrial organisms.						
		Human interference in coasts	Describe the characteristics of the three different coasts of the United States.						
J	Biological Oceanography ~	In this unit, students will understand the impact that humans have on the ocean environment. Particular attention will be paid to ocean pollution and overfishing.							
u	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards	
n	What are the effects of overfishing on the ocean environment?	Loss of Biodiversity in the Ocean	Describe the basic types of overfishing and how that affects ocean ecosystems.	Trash Island, biodiversity, populations, overfishing				3.5.12.B-Analyze the availability, location and extraction of Earth resources.	
e	What is trash island?	Trash Island	Discuss environmental impacts of pollution on the marine environment.					3.5.12.D-Analyze the principles and history of hydrology.	
		Conservation Methods	Describe conservation methods to aid in less marine pollution.						