Richmond Public Schools
Department of Curriculum and Instruction
Curriculum Pacing And Resource Guide – Unit Plan

Course Title/ Course #: Earth Science 2 Oceanography/ Environmental Resources

Unit Title/ Marking Period # (MP): Oceanography ES.10a-e, 8e

Start day:

Meetings (Length of Unit):

Desired Results ~ What will students be learning?

Standards of Learning/ Standards

ES.10
The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include
a) physical and chemical changes related to tides, waves, currents, sea level and ice cap variations, upwelling, and salinity variations;
b) importance of environmental and geologic implications;
c) systems interactions;
d) features of the seafloor as reflections of tectonic processes; and
e) economic and public policy issues concerning the oceans and the coastal zone including the Chesapeake Bay.

ES.8
e) dependence on freshwater resources and the effects of human usage on water quality;
f) identification of the major watershed systems in Virginia, including the Chesapeake Bay and its tributaries.

Essential Understandings/ Big Ideas

ES. 10

The concepts developed in this standard include the following:

- The ocean is a dynamic system in which many chemical, biological, and physical changes are taking place. The oceans are an important source of food and mineral resources as well as a venue for recreation and transportation. Sea level falls when glacial ice caps grow and rises when the ice caps melt.
- Most waves on the ocean surface are generated by wind.
- There are large current systems in the oceans that carry warm water towards the poles and cold water towards the equator.

- Upwellings bring cold, nutrient-rich water from the deep ocean to the surface and are areas of rich biological activity.
- The tides are the periodic rise and fall of water level caused by the gravitational pull of the sun and moon.
- The oceans' resources are finite and should be utilized with care.
- Algae in the oceans are an important source of atmospheric oxygen.
- The ocean is the single largest reservoir of heat at Earth's surface. The stored heat in the ocean drives much of Earth's weather and causes climate near the ocean to be milder than climate in the interior of continents.
- Convection is the major mechanism of energy transfer in the oceans, atmosphere, and Earth's interior.
- The topography of the seafloor is at least as variable as that on the continents. Features of the seafloor that are related to plate tectonic processes include mid-ocean ridges and trenches (continental margins,
- The oceans' resources are finite and should be utilized with care. The oceans are environmentally and economically important. Human
- activities and public policy have important consequences for the oceans. The impact of human activities, such as waste disposal, construction, and agriculture, affect the water quality within watershed systems and ultimately the ocean. Pollution and overfishing can harm or deplete valuable resources.
- Estuaries, like the Chesapeake Bay, are areas where fresh and salt water mix, producing variations in salinity and high biological activity. Chemical pollution and sedimentation are great threats to the well-being of estuaries and oceans.

ES.8

- The three major regional watershed systems in Virginia lead to the Chesapeake Bay, the North Carolina sounds, and the Gulf of Mexico.

Key Essential Skills and Knowledge

ES. 10

In order to meet this standard, it is expected that students will

- identify the effects of human activities on the oceans.
- analyze the potential impact of a major environmental disaster on the base of the food web and vertebrate organisms; economics; cultures; and future productivity.
- analyze the relationship between moving continents, the presence of ice caps, and ocean circulation over long periods of time.
- relate important ocean conditions, including El Niño, to weather on the continents.
- evaluate the role of the marine environment in the extraction of carbon dioxide in carbonates and the production of oxygen.
- analyze the role of ocean currents in the distribution of heat from the equatorial regions to the poles, and predict what changes may occur as continents move and atmospheric conditions and climate vary.
- compare Atlantic Ocean and Gulf of Mexico water temperatures during the yearly cycle, and relate this to the formation of storms.
- describe how different types of pollution can pollute the Chesapeake Bay even though the pollutant source may be hundreds of miles from the Bay
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Vocabulary

abyssal plain
atoll
barrier reef
basins
benthos
breaker
chemosynthesis
continental shelf
continental slope
coral
crest
density current
desalination
gravity
issues
mid-ocean ridge
neap tides
nekton
nonpoint pollution
ocean trench
photosynthesis
plankton
point pollution
policy
pollution
reef
respiration
rift zone
salinity
spring tides
surface current
surface water
thermal
thermal pollution
tidal range
tides
trough
upwelling
water pollution
wave height
wavelength

Assessment Evidence ~ What is evidence of mastery? What did the students master & what are they missing?

Assessment/ Evidence

Evidence of mastery: Students will display mastery by consistently scoring at a "C" or above on all assessements. Success and mastery will also be shown by increasing scores from the beginning of the unit to the end of the unit. Overall mastery of the content and targeted objectives will be assessed during final unit assessment.

Assessment Methods:

- Teacher created IA Test/Quiz
- Group Discussions
- Predict and Explain Assessments- students apply principles and evidence
- Research Reports & Presentations
- Visual Displays- Concept maps, Diagrams, Models

Possible learning Gaps/Misconceptions

ES. 10, ES.8

- Earth has one big ocean with many features.
- The ocean and life in the ocean shape the features of Earth.
- The ocean is a major influence on weather and climate.
- The ocean makes Earth habitable.
- The ocean supports a great diversity of life and ecosystems.
- The oceans and humans are inextricably linked.
- The ocean is largely unexplored.

Learning Plan ~ What are the strategies and activities you plan to use

Learning Experiences/ Best Practice

ES. 10,ES.8

- Have student analyze the relationship between moving continents, the presence of ice caps, and ocean circulation over long periods of time.
- Have students relate important ocean conditions, including El Niño, to weather on the continents.
- Have students evaluate the role of the marine environment in the extraction of carbon dioxide in carbonates and the production of oxygen.
- Have students analyze the role of ocean currents in the distribution of heat from the equatorial regions to the poles, and predict what changes may occur as continents move and atmospheric conditions and climate vary.
- Have students to identify the effects of human activities on the oceans.
- Have students to analyze the potential impact of a major environmental disaster on the base of the food web and vertebrate organisms; economics; cultures; and future productivity
- Have students to compare Atlantic Ocean and Gulf of Mexico water temperatures during the yearly cycle, and relate this to the formation of storms.
- Have students to describe how different types of pollution can pollute the Chesapeake Bay even though the pollutant source may be hundreds of miles from the Bay.

Technology Integrations

Web Resources

Water deficits
Water pollution for kids
DDT and *Silent Spring*
Exxon Valdez oil spill
Everglades phosphorus pollution
Algal growth lab
Shoebox ocean floor 3D mapping activity Echolocation

History of ocean mapping

Satellite altimetry
Global warming:
Carbon Dioxide Information Analysis Center Melting of arctic sea ice
Effects of global warming
Ocean acidification

Meaningful Watershed Education Experiences (MWEE)
What's a Watershed?Part A: Make a Watershed Model, **Part B: Explore Your Watershed in Google Earth**
Math and Science center-**Virginia Watersheds lesson**
Chesapeake Bay/ Learn the issues

Resources

Sample Lesson Plans (VDOE)
Hydrologic cycle
Greenhouse Gas Modeling Activity

Cross Curricular Connection

Social studies Ask students to research online sites to learn some of the ways in which our oceans are threatened. Then have each student choose one threat and list two or more ways in which the threat can be avoided or minimized. Point out that their lists might include new laws, treaties, programs, or citizen action projects. Then encourage students to write a letter to appropriate politicians, organizations, or individuals outlining a plan for protecting the oceans against that threat.
- See more at: http://www.educationworld.com/a_lesson/lesson060.shtml#sthash.yrnUCJec.dpuf

English (Presentation) - Student may bring in articles from magazine and newspapers concerning global warming and/and or the Greenhouse Effects and share with the class.