Kenmore-Tonawanda Union Free School District
1500 Colvin Blvd
Buffalo, NY 14223-3119

Science - Oceanography

Add to My ePortfolio Export Print Display Mode

Options	Standards	Essential Questions	Content	Skills	Suggested Resources	Assessme
		Green is common to both High Schools Blue is Kenmore East Red is Kenmore West				
		Historical Perspective				
		How has the knowlege obtained form previous Oceanographers helped us understand the evolution of our oceans here on earth?	Important Early American Oceanographers Recent Oceanographers A. Jacques Cousteau 1. History of SCUBA 2. SCUBA terminology B. Dr. Robert Ballard Early Important Research Vessels A. H.M.S. Challenger 1. Importance of Challenger 2. Science obtained from Challenger 3. U.S. Space Shuttle tie-in B. The Albatross Pirates:Past and present Other Shipwrecks/IncidentsBritannic C. Bismarck 1. Sink the Bismarck - Johnny Horton 1960 D. Lusitania E. Andrea Doria Environmental Disasters A. Exxon Valdez B. Amoco Cadiz Ocean Archeology I. Maritime Law A. Salvage B. The idea of a “Derelict and Ownership	Broadly state the purpose of oceanographic institutes discuss the contributions of oceanographic institutes and oceanographers since the conception of oceanography as a science Research and present the type and amount of schooling needed to enter into a career in the oceanographic field Compare and contrast contributions of early and present day oceanographers Construct time line illustrating the advances in	**History of Oceanography (Powerpoint)** - A brief history of early ocean going vessels and their missions, along with an outline of early significant achievements in the field of oceanography. The importance of Woods Hole Oceanographic Institute (WHOI) is also touched upon. (14 slides included) **History of Oceanography Note Sheet (for Powerpoint)** - A blank Powerpoint outline to go along with Powerpoint presentation. **Oceanographic Institutes and Careers** - Students must look up two oceanographic institutes and list their addresses and mission statements, and also identify two careers in the field of oceanography. **Careers in Marine Science** - Worksheet that follows along with a brief video regarding what careers are available in the field of marine science. The textbook, "Oceanography" is also needed to fill in the Venn diagram that is included.	

			C. Rights D. Salvor obligations E. Salvage Awards F. Sunken Vessels vs. Salvage G. "law of finds H. Shipwreck ownership issues II. Ways to fund the archeological operation A. The ethics of selling items B. To visit or not to visit – submarine tourism C. Cruises to wreck sites? Scripps Oceanographic Institute 1. Research Vessels A. FLIP (http://www.sio.ucsd.edu/voyager/flip/flip3.html The Oceanographic Institutes: Their mission statement A. Woods Hole Oceanographic Institute (WHOI) 1. Location 2. Year Opened 3. Original purpose of institute 4. Funding sources - military and non military 5. Research Vessels owned by WHOI 6. Reasearch Scientist (ie Ballard)	Oceanography since its conception Identify and discuss the contributions Dr. Robert Ballard has made in the technological evolution of modern Oceanography Compare and contrast the technological advances in early and modern Oceanographic vessels Relate the importance of the crossover technology between Oceanography and the U.S. Space program Identify the names of shipwrecks based on historical accounts Given historical accounts of specific shipwrecks students will formulate an opinion as to the contributing factors (man/nature) Compare and contrast the difference between Salvage Law and the Law Finds Provide evidence to justify or criticize the actions taken by salvage experts in the archeological exploration of	**Challenging the Abyss - Deep Sea Exploration (Video)** - 16 question worksheet that follows along with the video of the same name mentioned above. Video is produced by the History Channel. **Aquascape Adventure - The Blue Frontier (video)** - 20 question worksheet which goes along with movie of the same name mentioned above. A great introduction to the field of oceanography, and the history behind the youngest science. Narrated by Leslie Nielson. Part of the Blue Frontier video series. **Ghosts of the Deep -** Reading the disaster description, students must match up the tragedy to the ship that it took place on board. Computer necessary for looking up historical information. 15 famous shipwrecks listed. **The Wreck of the Edmund Fitzgerald and Sink the Bismark Lyrics -** Students should follow along with the lyrics to these two songs, while they are being played on CD. Activity should be done after students have completed Ghosts of the Deep worksheet. **Plunging Into History (Video) -** Students should fill out sheet by using either a computer, or while watching "Secrets of the Titanic" (the first video ever made of the Titanic AFTER it was located at the bottom of the Atlantic in 1985). Video focuses on the circumstances leading up to the disaster, the disaster itself, and the locating of the lost liner by Dr. Robert Ballard. 27 questions. **Titanic News Articles** - 4 news articles about the raising of a piece of the Titanic. Articles are from 1996. **Maritime Salvage Laws** - A note sheet that covers the "law of

				historical shipwrecks Calculate and describe the effects of water pressure at increasing depths Examine the ethics of removing artifacts from a wreck site Compare and contrast the benefit vs. potential negative impact of eco-tourism Analyze the effects of human activity in creating or changing ecosystems	finds", and "the law of salvage". Handout should be given out after students have completed the worksheets on Titanic - that way they will understand the term salvage and what is involved prior to receiving these notes. **Notes on the Glomar Explorer** - Notes are a lead-in to the unit on submarines, spying, and sabotage. The Glomar Explorer was a ship designed and built to pick up a sunken Soviet submarine. The cover story was that it was built by Howard Hughes to pick up manganese nodules off of the ocean floor. When finished giving notes, show a clip about the Glomar from the "extras" section off of the DVD "The Aviator". **The Raising of the Kursk (Article) -** Popular Science article from April 2001 issue about the Russian nuclear submarine Kursk that sank in the Barents Sea in late 2000. All hands aboard died. Story focuses on raising the ship to avoid an environmental disaster. **The Raising of the Kursk Questions -** 25 fill in the blank / short answer questions to go along with Popular Science article of the same name. **Titanic / Kursk / Glomar Challenger (Test) -** Multiple Choice Test (50 questions) with short answer Part II essay questions. Covers the topics as seen in the title. **Glomar Explorer (PowerPoints) -** Two different PowerPoint presentations that highlight the history and the supposed uses of the Glomar Explorer. **Glomar Explorer (Notes)-** One page of notes for students to copy down off of the overhead projector, BEFORE you tell them the real reason that it was built. Following these notes, instructor should show them a clip from the "Extras" section of the DVD "The Aviator". **Edmund Fitzgerald (PowerPoint) -**

					A PowerPoint that was created to be shown as the song is played for the class. The story of the Edmund Fitzgerald is depicted, but a copy of the music must be obtained on CD and played along simultaneously in order for this presentation to be effective. **Shipwreck Jeopardy (PowerPoint) -** PowerPoint presentation used for review for shipwreck test. Jeopardy format - students can play along.	
		Physical Oceanography				
		How were/are the oceans formed? How does the movement of crustal plates effect ocean basins?	Evidence of Seafloor Spreading 1.Continental Drift 2.Polarity Reversal 3.Mirror Images of Coastline/Mid Ocean Ridges 4.Studies from WWII Plate Boundaries: Divergent, Convergent, Transform Mid-Atlantic Ridge East Pacific Rise Growing and Shrinking Oceans Hot Spots in Ocean Basins	State the 4 pieces of evidence supporting continental drift Construct a map using continental drift evidence pieces relate reversed polarity found along ocean floor to support theory of magnetic pole reversal analyze oceanic data to show proof that the ocean floor is a mirror image of itself from the mide ocan ridges outward to the oceans Compare and Contrast divergent, transform and convergent boundaries in midocean ridges, Pacific trenches and San Andreas Faultines Compare and Contrast the Mid-Atlantic Ridge and East Pacific Rise (include		

				development and size of each feature) Discuss the differences in two ocean basins, Atlantic and Pacific Define active and passive margins and their locations identify hot spots as seperate feature not associated with mid-ocean ridges Identify the Hawaiian Island Chain and its formation Locate Indian Ocean Archipelago and identify its future from recent tectonic activity	
		Air - Sea Interactions				
		How are the Oceans, Weather and Climate related? How have ocean currents affected the history of man? How does wind influence water dynamics?	Hurricanes Sea Ice in the Arctic Ocean Sea Ice near Antarctica Icebergs The Ocean's Role in Reducing the Greenhouse Effect Measuring Ocean Currents Surface Currents Ocean Currents and Climate El Nino and La Nina events Tsunami What causes waves How waves move Wave Characteristics	Define Tropical Cyclones, Hurricanes, Typhoons, Eye of the Hurricane, Storm Surge Define Icebergs, Pancake Ice, Ice Flows, Pack Ice, Polar Ice, Fast Ice and Shelf Ice Explain how the RMS Titanic Disaster is related to Sea Ice and Icebergs Look at Ocean currents and describe how they would affect a nearby continental land mass Define wave terminology:crests,	El Nino Worksheets **TSUNAMI: The Wave that Shook the World (Video)** - Worksheet to follow along with video of the same title by NOVA. Students jot down their own notes, and then write 3 things they learned new from this video, and 3 things why the study of this topic is important to people that live in coastal regions. **Tsunami Advisories Worksheet** - Students are required to look up definitions of Warning, Watch, Advisory, and Information Statement, in regards to Tsunami press releases and the earthquakes that cause them. Use the following website: http://wcatwc.arh.noaa.gov/definition.htm **Tsunami Vocabulary (Powerpoint)** - Slide presentation focuses on different types of tsunamis, and the technical	

		Why are tides important?	Wind Generated Waves Surf Tide Generating Forces Moon's Effect Sun's Effect Coastal Tidal Currents	troughs, wave height, wavelength, wave steepness, wave base, wave speeds: shallow water waves and deep water waves, rogue waves, Define Lunar Bluges, Solar Bulges Tidal period, Lunar Day, Solar Day, phases of the moon, syzygy, neap tide, quadrature and explain how they effect tides. Define declination, ecliptic, precession, perihelion, aphelion, perigee, apogee and proxigean	terms associated with their causes and effects. (21 slides) **Tsunami Vocabulary Notesheet (Powerpoint)** - Blank copy of powerpoint presentation of tsunamis. Students fill in the information presented by the instructor. **Tsunami Article Summary Sheet** - A blank worksheet for students to take notes about news articles they read focusing on tsunamis. The instructor should find 8 different articles online dealing with the causes, aftereffects, and the devastating consequences tsunamis have upon people of different genders and ethnic backgrounds. **Station Activity Journal (Tsunami)** - 4 stations need to be set up by instructor. First hand accounts of tsunami devastation need to be printed, along with photos of tsunami aftermath. A list of top 10 things people should know about a tsunami is created by the students using a handout provided by the instructor, along with creating a disaster preparedness kit based on first hand accounts, and lists provided by the Red Cross. **Tsunami Scenario Role Play** - Students are placed into groups, and their goal is to develop a system to manage the effects of an emergency, save as many lives as possible, provide necessary assistance, and establish a recovery plan for their community. Each student is assigned a job description (mayor, public works director, school superintendent, etc), and they have to decided how to proceed. **Tracking Tsunamis (Lab)** - Purpose of lab is to allow students to plot the location of three tsunamis on a world map, and then determine the travel time of each as it radiates out from the epicenter.	
		Living Oceans				

		How is life adapted to different oceanic environments? What roles do organisms play in the food chain? How are organisms adapted for specific ocean environments? Why do some organisms live in specific areas of the ocean? What does the study of ocean mammals reveal to humans?	Ocean Zones Habitat Fish Sharks Whales Dolphins	Explain the relationships that occur between organisms in a marine ecosystem. Define and locate major zones of the ocean Identify organisms which inhabit different zones of the ocean Identify the three categories of fish Define camouflage Give examples of several fish defense mechanisms Define Countershading Compare and Contrast characteristics of fish including reproduction, means of movement(fin action/placement), feelers, scale as adaptations to different oceanic environments Compare and Contrast and label Sharks and Bony Fish Distinguish between toothed and non-toothed whales (Mysticeti and Odontoceti) State how to distinguish between whales Identify how whales communicate. Write a paragraph	**Ocean Life (Powerpoint)** - Slide presentation focuses on three categories of life in the oceans: plankton, nekton, and benthos. The three categories of fish are also covered: agnathas, chondrichthyes, and oseteichthyes. Zones of the ocean are mentioned too, and what creatures can be found within them. **Ocean Life Powerpoint (Notes)** - Blank copy of slide show presentation that students may take notes on while instructor presents material. **Amazing Planet - Creatures of the Deep (Video)** - 43 question video sheet which students fill in the answers to as they watch the video of the same name mentioned above. Video is from National Geographic Kids. **Here Fishy, Fishy, Fishy!** - Worksheet focused on different forms of fish defense mechanisms, including, but not limited to countershading and cryptic coloration. **Sea Nasties (Video)** Video starring Leslie Nielson. Illustrates how the ugliest things in the sea camoflauge themselves from predators. 22 questions included. Video is produced by National Geographic. **Hide in Plain Sight (Worksheet)** - Students must describe the physical characteristics of some of the ugliest creatures that live in the sea. Websites included. **Design Your Own Realistic Fish (PROJECT)** - Students must design AND BUILD their own realistic looking fish, based on other fish and sea creatures that they have studied prior to this assignment. Grading rubric is included. **Sharks! - The Apex Predator -** Worksheet contains directions to two on-line quizzes about sharks. Shark anatomy, habitat, and eating habits are

				on how whales and whaling were an important part of human history. Identify the main ideas in a video production on whales Identify the threat to dolphins involving tuna fishing	covered, along with various types of sharks common to the waters of North America. **The Great White Powerpoint -** Guided notes from above named Powerpoint. Food chain, hunting techniques, habitat, reproduction, senses, success in captivity, and peoples fears about sharks are all covered. The "Jaws" movies are mentioned, as well as uses of different shark parts. **Sharks!** - A 33 question computer worksheet focused on shark anatomy, and different species of sharks. **Dolphin and Shark Test Review** - 55 question worksheet covering both sharks and dolphins. Questions are short answer fill in the blank. **Sharks and Dolphins Test Part I (Test) -** 50 multiple choice questions - answer on SCANTRON. **Sharks and Dolphins Test Part II (Test)** - 2 short answer essay questions, one of which is based off of a article about fishing techniques included with Part II of the test. **In the Company of Whales (Video)** - 36 question worksheet that follows along with the video of the same name mentioned above. Dr. Payne provides narration. Video is shot in Patagonia. **Whales of the Sea World (Worksheet) -** Worksheet on Killer Whales and Beluga Whales. Whale anatomy and behavior are two topics of interest. The Sea World website is utilized. **Thar She Blows! (News article)** - Article about dead whale exploding on the streets of Taiwan. Good introduction to unit on whales - will grab kids attention.

Whale Flatulence Captured in Photo (News article) -
News article about whale farts. An attention grabber for sure.

Keiko the Killer Whale - The True Story Behind Free Willy (Video) -
19 question worksheet that follows along with the video of the same name mentioned above. Rene Russo narrates, and the real story of Keiko, the star of "Free Willy" is told. AWESOME DOCUMENTARY!!!
Produced by the Discovery Channel.

Keiko Buried in Secret Ceremony (News article) -
Article about the eventual release and death of Keiko the killer whale (star of "Free Willy"). Give to students to read after they have seen the documentary - "Keiko the Killer Whale - The True Story Behind Free Willy".

The True Story of Free Willy - Keiko the Killer Whale
Part II - Movie follow-up questions -
This worksheet asks questions about what happened to Keiko after the documentary ended. Students will need the article entitled, "Keiko Buried in Secret Ceremony".

Whales -
Computer search for information on blue, humpback, killer, and right whales. The terms Odontoceti (toothed), and Mysticeti (baleen) are introduced.

Moby Dick Movie Guide (Video) -
36 question worksheet that follows along with the movie, "Moby Dick". Questions may be answered while students are watching the movie, or after the movie has ended. Questions are open-ended.

The Demise of the Whaleship Essex - The True Life Story of Moby Dick -
A 30 question computer worksheet that introduces the REAL story of the whaleship Essex, which is what the novel Moby Dick was based on.
Should be done after students watch

					Moby Dick. **Whale Test (Part 1)** - Test on Keiko, Moby Dick, The Essex Tragedy, and Ethics of Captivity. True / False and Fill in the Blank (word bank included). 72 questions **Whale Test - Part II** - 5 short answer essay questions about Keiko, Ethics of Captivity, The Tragedy of the Essex, whale anatomy, and Moby Dick. **Review Sheet for Whale Test** - Fill in the blank worksheet on Keiko, Moby Dick, the ethics of captivity, and The Essex Tragedy. **They Call Him Flipper, Flipper!** - A computer worksheet on the Flipper Seal of Approval, different kinds of fishing techniques harmful to dolphins, and questions about Flipper in general. **So You Wanna Work With Da Dolphins?** - Computer worksheet focused on dolphin training techniques, and different scientific fields associated with marine science. **Look at da wittle Dolphins! -** Computer worksheet that has students find facts about different dolphin species. The Bottlenose, Pacific White-Sided, Commerson dolphins are all covered. When completed. students get to choose 3 more species on which to focus. **Dolphins - IMAX Movie (DVD) -** While watching the above named movie, students write down at least 20 facts that they did not know prior to watching the DVD.	
		Environmental Issues in Oceanography				

		How are humans affecting the Oceans?	Point vs. Non-Point Pollution	Define Marine Pollution Define and identify the causes of increasing red-tides and their impact on humans	
		Local Bodies of Water			
		How are local bodies of water influenced by human activity? Why should the state of local bodies of water concern everyone? How have invasive species led to changes in commerce and the global economy? How has man started to protect the Great Lakes from Destruction? Why should fisheries in the Great Lakes be maintained? Why is water a Great Lakes area Commodity? Why are the 5 North American lakes called the "Great Lakes"?	Water as a Commodity - Industrial Uses - Agricultural Uses - Recreational Uses - Fisheries - Municipal Water Supplies	Idenfity the Zebra Mussel and write a paragraph describing its harm to the Great Lakes Ecosystem. Compare and Contrast the effects of the Quaga Mussel, Spiny Water Flea, Round Goby and Lamprey in the Great Lakes Ecosystem. Identify any positive effects invasive species have had on the Great Lakes. Read and summarize articles which detail the effects of invasive species and attempts to eradicate them. Identify major ports on the Great Lakes Identify the Great Lakes Identify how water is a valuable resource for industry, agriculture, recreation, and drinking supplies. Identify each Great Lake on a map, noting its major tributaries	**Invasive Species of the Great Lakes (PowerPoints)** - Two different PowerPoint presentations that focus on invasive species such as the zebra mussel, sea lamprey, purple loosestrife, etc. Covers how they were transported here, and their effects upon the ecosystem. A good introduction to the Great Lakes Invasive Species Summary Sheet. **Great Lakes Invasive Species -** Students are placed into groups, and assigned 1 of 8 exotic species that have been introduced into the Great Lakes. They have to find a picture of their exotic, and then using a set of flashcards, determine where the species originated, how it was transported, what affect it is having on the ecosystem, and what the effect of a warming climate will be on it. When all of these questions are answered, students have to make a poster to be shared with the class. This **Great Lakes Invasive Species Summary Sheet -** Used as a culminating activity to the Great Lakes Invasive Species Sheet (group poster project). Students take around their summary sheet for each of the 8 species, and using their classmates posters, fill in the information for each exotic. U **Lake Effect (Article) and Summary Sheet** - This article from the Buffalo News focuses on the lack of water in the southwest United States, and the possibility of lessening the water shortage by transporting or piping the water from the Great Lakes. Politics, environmental regulations, and water quality issues are brought to the forefront.

					The Geography of the Great Lakes - A worksheet that focuses on labeling the 5 Great Lakes, along with the surround states and provinces. Using a computer, students are asked to find information about each of the great lakes and the rivers that connect them. A final fill in the blank paragraph is included with website about the formation of the Great Lakes system.	

Last updated: 7/19/2011