

Diocese of Wheeling-Charleston

Unit Planner

Name of Teacher: Angela McKeen and David Maurer	Grade Level: 9 th Grade
Subject Area: Earth Science	Cross Curricular Opportunities: Math, Art, Technology, Engineering, Social Studies
Unit Title: Our Evolving Earth	Estimated Duration of Unit: 4 Weeks - 20 days
<p>Overview of Unit: The students are re-introduced to the planet Earth. The unit kicks off with an exploration of their prior knowledge of the Earth by eliciting what they think they know about the Earth, the layers of the Earth, as well as any ideas they may have about the composition (as well as states of matter) of the interior layers of the Earth. The students incorporate engineering strategies at various points throughout the unit (e.g. scaling the layers of the Earth; modeling the Earth; designing replicas of assigned volcanoes of the world). This concept is developed through hands-on/minds-on activities, websites, and research, such as researching the historical aspect of how science determined the composition of the Earth's layers, how density plays a part in the layering of the Earth, and what science still cannot completely explain (like the Mohorovicic discontinuity). From these activities and readings, students will focus on the crust of the Earth. Students will compare the ideas of Continental Drift with the Theory of Plate Tectonics. This leads to a graphic organizer on the three interactions of plates (convergent, divergent, transform fault) as well as the types of plates (continental or oceanic) that can interact in these ways and the geologic results of the interactions (volcanic mountains or fault/block mountains or island arcs, new crust or rift valleys, shallow focus or deep focus earthquakes.) At this point in the unit we have our first formal (still formative) teacher-made assessment. They use their graphic organizers as their study guides to be able to sketch and label a subduction zone at a continent to ocean convergent boundary and be able to explain why the oceanic plate subducts rather than the continental plate. As a critical thinking skill, students had to explain why the volcanoes formed where they formed. From this point in the unit, we begin our study of magma that results from oceanic plate interactions versus magma that results from continental to oceanic interactions. Students are assigned a small group along with one of the ten most famous volcanoes of the world. Students research their volcanoes within their small groups, identify the plate to plate boundary involved in its formation, the type of volcano (stratovolcano, shield volcano, cinder cone, etc), infer the type of magma (mafic versus felsic – based on their eruption characteristics), the students then present their volcano, discuss the history of the country in which the volcano is located, and shares food the students have prepared representative of each country. This project is their summative assessment, putting together everything they have learned about the Earth so far as well as describing their understanding of volcano formation, magma types, and the impact eruptions can have on people.</p>	

Forms of Text (non fiction/fiction): Both fiction and non-fiction including their Earth Science Textbook, historical translated brief documents from the Pompeii eruption,		Teaching Strategies: whole group, small group, think-pair-share, project based learning, independent research, round table discussions, direct instruction, guided practice, peer critique		
Catholic Identity Connections: Care for God’s Creations (in this unit, we especially consider our Earth as one of God’s creations)				
Assessment (authentic/published - summative/formative) alternative assessments, authentic assessments, formative assessments, and a final summative assessment project				
Standard Number	Standards	Description of Activity	Resources	Date of Completion
HS-ESS1-5 Earth's Place in the Universe	Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.	Students are asked to describe “What makes up the Earth? Can you describe the layers that you know?” We compare the students’ prior knowledge with a more accurate model of the Earth that also includes descriptions of the composition of the layers. Students explore an interactive scholarly article about how the composition of the Earth was determined.	NASA photograph of the Earth from space www.classzone.com/books “Pie Slice of the Earth” activity from Purdue University	Days 1 - 4
RST.11-12.1	recognize that the Earth is made of plates (plate tectonics).	Using a plate map of the world, students will explore the meanings of the symbols on the map (volcanoes and earthquakes of the world) to hypothesize the patterns, if any, they see in the map	www.pbs.org/wgbh/nova	Day 5
HS-ESS1-5 Earth's Place in the Universe	demonstrate an understanding of the history of science and the evolvement of scientific knowledge recognize scientific knowledge is subject to modification as new scientific information	Focus will begin on the upper two layers of the Earth. Using an historical science approach, students will actively read and compare the idea of Continental Drift and the evidence brought forth by Alfred Wegener. Students will try to justify why the science community rejected his ideas. Venn Diagrams will compare the this idea with its counterpart the Theory of Plate Tectonics using the Think-Pair-Share technique Students will also actively read and create a brief timeline of the scientists who were instrumental in bringing about the Theory of Plate Tectonics	http://www.livebinders.com I use this site to begin the students on their journey through the scientists who helped shape today’s theory of plate tectonics	Day 6 and 7

SC.0.9.1.2	challenges current explanations			
SC.0.9.2.25 CCSS.ELA-Literacy.RI.HS.3	recognize that the Earth is made of plates (plate tectonics). Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.	Students will each create a graphic organizer of Plate Boundaries. Graphic Organizers will be graded against a rubric that addresses areas of Science Evidence; Scientific Accuracy; Neatness and Creativity Results of the plate interactions are introduced and discussed. Types of magma are introduced along with each one's basic viscosity and behaviors. Video clips help visually represent the behavior of the magma in terms of volcanics.	Student designed flip book with teach made skeletal outline	Days 8 & 9
HS-ESS1-5	Reason abstractly and quantitatively. (HS-ESS1-5)	Students will take their first formal, yet formative assessment. They use their graphic organizers as their study guides to be able to sketch and label a subduction zone at a continent to ocean convergent boundary and be able to explain why the oceanic plate subducts rather than the continental plate. As a critical thinking skill, students had to explain why the volcanoes formed where they formed.	Teacher-made test with student-generated sketches with a critical thinking component	Day 10
HS-ESS1-4 HS-ESS1-2	Cooperate and collaborate to ask questions to find answers and solve problems. demonstrate an understanding of the interdependence between science and technology	Students are assigned to a group of three and the group is assigned one of the top ten most famous volcanoes of the world. Students are given guidelines as well as a rubric to guide their research. The Art Teacher also is involved in students creating papier mache models of their volcanoes that will be used to demonstrate the eruption types based on magma composition.	Students are given 4 class days with their own technology in order to conduct and put together small group research projects	Days 11 - 15
CCSS.ELA-Literacy.SL.5.4	Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.	Final Summative Assessment - Students research their volcanoes within their small groups, identify the plate to plate boundary involved in its formation, the type of volcano (stratovolcano, shield volcano, cinder cone, etc), infer the type of magma (mafic versus felsic – based on their eruption characteristics), describe the country and the culture surrounding the volcano, present their visual presentations (including costumes that are respectful) and share the foods that represent the country in which the volcano is located. This project is their summative assessment, putting together everything they have learned about the Earth so far	Student presentations of projects Peers critique each other by using the rubric to assess whether each portion had been followed and to what extent	Days 16 – 18

				Day
				Day
Differentiated Instruction Opportunities/Overview: Menu selections, Think-Pair-Share, Small Group, Whole Group, Individual instruction, interest guided extensions				
Cross Curricular Opportunities level: Application as well as exploration of concepts				
Standard Number	Standards	Description of Activity	Resources	Date
M.O.HS.3.5	draw a similar figure using a scale, given a real-world situation.	Students sketch a cross-sectional and scaled model of the layers of the Earth in centimeters rather than kilometers with the help of the teacher	NASA photograph of the Earth from space www.classzone.com/books "Pie Slice of the Earth" activity from Purdue University	Days 1 – 4
VA.O.VAI.1.01	distinguish among a variety of two-dimensional and three-dimensional media, techniques and processes.	. The Art Teacher also is involved in students creating papier mache models of their volcanoes that will be used to demonstrate the eruption types based on magma composition.	St. Mary's Art Teacher	Days 11 – 18 (outside the science classroom)
SS.8.H.CL5.2	identify prominent inventors & scientists of the period & summarize their discoveries	Using an historical science approach, students will actively read and compare the idea of Continental Drift and the evidence brought forth by Alfred Wegener. Students will try to justify why the science community rejected his ideas. Venn Diagrams will compare the this idea with its counterpart the Theory of Plate Tectonics using the Think-Pair-Share technique Students will also actively read and create a brief timeline of the scientists who were instrumental in bringing about the Theory of Plate Tectonics	http://www.livebinders.com This is a partial link to an interactive timeline of historical scientists crucial to the current Theory of Plate Tectonics	Days 6-7
21C.O.5-8.2.TT2	Student collaborates with peers, experts, & others using telecommunications & collaborative tools to investigate curriculum-related problems, issues, & information, & to	Students are assigned to a group of three and the group is assigned one of the top ten most famous volcanoes of the world. Students are given guidelines as well as a rubric to guide their research. The Art Teacher also is involved in students creating papier mache models of their volcanoes that will be used to demonstrate the eruption types based on magma composition.	Students are given 4 class days with their own technology in order to conduct and put together small group research projects	Days 11 – 15

	develop solutions or products			
Common Core Checklist				
Writing				
X	Paragraph			
	Essay (narratives, fairy tales, realistic fiction)			
X	Summary			
X	Research			
	Detailed answers (text supported)			
X	Notes (note taking skills, outlines)			
X	Complete sentences			
Reading				
X	Informational text			
	Lexile			
X	Complex literature			
X	Speaking			
X	Listening			
X	Varied strategies and instructional methods			
X	Critical thinking in whole class discussion			
X	Student led activities			
X	common core standards (literature circles)			
Technology				
X	Smartboard			
X	Computers			
X	iPads			
X	Powerpoint, Elmo etc.			
Differentiated Instruction				
X	Used multiple resources			
X	Domain Vocabulary			

X	Cross-Curricular
X	Collaborative engagement (meaningful feedback)
X	Higher level learning and teaching
Assessment	
X	Project based
	Writing prompt
	Portfolio
X	Observation
X	Quiz
	Technology based
X	Test
	Student created test
X	Presentation
	Journal
X	Think, pair, share
X	Summary
X	Oral questioning
	Analogy
	Powerpoint, or movie maker
Authenticity	
X	Various activities
X	Inquiry, research and evidence
X	Evidence of time management and planning
X	Problem solving strategies
<p>Summary of Unit: The timing of this project was a little off. It actually took us almost 25 days to complete. The students enjoyed completing their own research, coming up with costumes, and preparing food together. Students were also the harshest critics of each other's projects. Though the students were respectful, they took the time to really try to catch any science that was misrepresented in a report. At the end, we talked through any misconceptions, corrected mistakes, and I believe this was where the true understanding took place. Do not forget to allow students the opportunity to speak to each other about the science of the presentations.</p>	

