

Unit Title: A Vicious (Rock) Cycle

Grade Level: Freshmen, Grade 9

Subject Area: Earth Science

Duration/Length/Number of class periods: 7 class periods

Description: In this unit the students will explore the rock cycle with a focus on interconnectedness. They will begin by grasping the basics of how the rock cycle works. Their knowledge will be expanded by examining the relationships of rocks to everyday objects in human civilization, to other rocks around the world, and to the Earth itself. To accomplish this end, the students will use online resources to investigate these relationships and prepare a presentation to share their research with their classmates.

Established Goals (National, State, Local):

9.3.1.1.4 Explain how the rock record provides evidence for plate movement. *For example:* Similarities found in fossils, certain types of rocks, or patterns of rock layers in various locations.

9.3.1.1.3 Describe how the pattern of magnetic reversals and rock ages on both sides of a mid-ocean ridge provides evidence of sea-floor spreading.

9.3.1.3.2 Cite evidence from the rock record for changes in the composition of the global atmosphere as life evolved on Earth. *For example:* Banded iron formations as found in Minnesota's Iron Range.

What Enduring Understandings are desired?

Understanding how a rock was formed can tell us about how the natural systems of Earth operate.

Information from rock qualities can reveal traits of the Earth that are not otherwise observable.

Changing environmental factors in a specific location can be responsible for the creation of unique rocks that humanity relies upon.

What Essential Questions will be considered?

How does the Earth create each type of rock?

How can we understand the Earth's processes when there is so much that we can't observe with the naked eye?

How do we create products that human civilization needs out of Earth's raw materials?

Students will know / be able to:

Explain the process of the rock cycle

Describe the agents of change for rocks (weathering, heat & pressure, melting)
 Cite the research of Alfred Wegener that established the current Tectonic theory
 Identify physical properties that make a rock valuable
 Research the production process for conventional products
 Understand the processes used to prepare natural minerals for industrial use
 Teach their own discoveries to an audience

Description	Formative	Summative	Introductory Activity	Learning Activity	Student Technology Used	Teacher Technology Used	ISTE Standards
Basics of the Rock Cycle Introduction to the relationships of the rock cycle using a Powerpoint that creates a narrative of Quartz on a journey through the Rock Cycle. Begin with a review of the difference between an atom and a molecule while defining what a mineral is. Then focus on Quartz as the sample mineral and walk through it's journey through the Earth starting with Obsidian, breaking down into black sand and forming Limestone, and eventually being transformed into Marble. Stop before introducing each new rock to let students guess what rock comes next. If students are interested in Minecraft, connect this process to the use of Obsidian within the game.			X			X	
Expanding our Knowledge Break the students up into three groups, one for each type of rock. Assign them to read their section of the Rock Cycle chapter in the textbook. Instruct them to determine what information in the section is essential for their classmates to know and prepare a five-minute presentation of that information with an emphasis on terms. Offer students a rubric for their presentation. Wrap up the class with a review of the previous plate tectonics chapter and the research that led to the development of plate tectonics theory.	X			X			
Modeling Research Discuss with the students what the importance of rocks is. If the students don't mention it, point out to them that every object in the classroom was created using raw materials. Introduce the "How it's Made" project by presenting your own presentation on how a product was created. I use a Powerpoint on the creation of Iron using Hematite from the Minnesota Iron Range, and how that iron was essential to building P-51 engines to help the Allies defeat the Nazis. Hand out a rubric for the presentation before you give your own to demonstrate.						X	7b, 7c
Team-Based Research Let the students break up into groups of two and ask them to choose a product for them to research its creation process. Give the students a class day to	X						1a, 2b, 3c,

work and check in with every group to help them find resources if they are struggling and offer feedback. If students use their time well, but still need more time, offer another class period for work if the schedule allows.							3d, 6a, 6b, 6d
Presentation of Research Moderate the students' presentations of their research. Take constructive notes and fill out their rubrics. Encourage the students to pay attention to each other's presentations since some of the student research will be included in the test. This can empower them to be more responsible for their learning.		X			X		6a, 6b, 6d
Test Prep If your curriculum follows the textbook, prepare the students for a test on the previous chapters of plate tectonics, earthquakes & volcanoes, and the rock cycle. Make sure you take time to focus the class with a discussion on how these three units are interconnected. Provide the students with a study guide that lists the big questions of the units that they should be able to answer. (Break down the standards into more specific questions based on the textbook in use). Explain to the students how the questions on the test will look differently from the study guide. The study guide asks definition questions, but the test questions will ask students to apply their knowledge to solve a problem. (i.e.: Study Guide: What are the two types of igneous rock, Test: Which igneous rock are you looking at if you see a lot of different crystals?) Facilitate studying by asking students to create a helpful meme that embodies one or more of the unit principles to help people study (think mnemonic device). Ask the students to post the memes on the Google Class home page.				X	X		
Unit Test Proctor test and pay attention to which questions students frequently miss. Discuss them with the students in a post-mortem when you hand the tests back.		X					

Materials, tools and resources: Textbook: Holt Physical Science with Earth & Space Science, Google Classroom, Powerpoint
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