MP3-Earth's Structure

Content Area: **Science**
Course(s): **Science 6**
Time Period: **Marking Period 3**
Length: **MP3**
Status: **Published**

Essential Questions

- What is the structure of Earth?
- How do rocks form?
- How do moving plates change Earth's crust?
- Why do earthquakes occur more often in some places than in others?
- How does a volcano erupt?

Big Ideas

- Earth's land, water, air and life form a system.
- Earth is a continually changing planet.

Cross-Curricular Integration

Language Arts Companion Standards:

WHST 6-8.1 Write arguments focused on *discipline-specific content*.

RST 6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST 6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

RST 6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Activity:

Continental Drift vs. Plate Tectonics: The theory of continental drift introduced by Alfred Wegener in the early 1900's was not widely accepted until 1960. Wegener's theory was later developed into The Theory of Plate Tectonics. Compare and contrast both theories looking at the relationship between the two. Compose an argument in the form of an essay that defends Wegener's claim about continental drift based on your analysis of each theory. What parts of Wegener's theory are also parts of the Theory of Plate Tectonics? Use evidence from your analysis to defend your claim.

Diversity Integration

Objective: Students will complete a graphic organizer on a chosen Scientist every month.

Activity:

1. Students are to make a copy of the graphic organizer that they are to complete on the scientists.
2. They will then need to complete the organizer by doing research on the person and their field of science that the scientists work in.
3. After finding information about the scientist, they will then need to write a paragraph on the person and explain to us "Why is this scientist famous? What have they done in their lifetime to help out the world?"

Science and Engineering Practices

Developing and Using Models

- Develop and use a model to describe phenomena. (MSESS2-1)

Constructing Explanations and Designing Solutions

- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future. (MS-ESS2-2)

Science and Society

Charles Darwin (February 12, 1809 - April 19, 1882)

Was an English naturalist, eminent as a collector and geologist, who proposed and provided scientific evidence that all species of life have evolved over time from common ancestors through the process he called natural selection.

James Hutton (June 3, 1726 — March 26, 1797)

Was a Scottish geologist, naturalist, chemist and experimental farmer. He is considered the father of modern geology. His theories of geology and geologic time, also called deep time, came to be included in theories which were called plutonism and uniformitarianism.

Charles Lyell (November 14, 1797 – February 22, 1875)

Was a Scottish lawyer, geologist, and populariser of uniformitarianism.

Technology Integration

8.1.8.DA.4 Transform data to remove errors and improve the accuracy of the data for analysis.

8.1.8.DA.5 Test, analyze .and refine computational models.

Activity:

SWBAT understand how the rock cycle works and what types of rocks come about after each process an interactive PowerPoint Presentation on the Rock Cycle and 2 Youtube videos on the different types of rocks.

Enduring Understandings

Next Generation Standards

MS. Earth's Systems

MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Disciplinary Core Ideas

ESS3.A:Natural Resources

- Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)

ESS2.A: Earth's Materials and Systems

- The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history

and will determine its future. (MS-ESS2-2)

Crosscutting Concepts

Stability and Change

Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1)

Scale Proportion and Quantity

Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS2-2)

Focus Areas

Introducing Earth

- The Earth system has four main spheres; the atmosphere, the hydrosphere, the geosphere and the biosphere. As a major source of energy for Earth's processes the sun can be considered part of the Earth system as well.
- Lands are constantly being created and destroyed by completing forces. Constructive forces shape the land's surface by building up mountains and other landmasses. Destructive forces destroy and wear away land masses through processes like erosion and weathering.
- Geologists have used two main types of evidence to learn about Earth's interior: direct evidence from rock samples and indirect evidence from seismic waves.
- The three main layers of Earth are the crust, the mantle, and the core. The crust is a layer of solid rock that includes both dry land and the ocean floor. The mantle is made up of rock that is very hot, but solid. Overall, the mantle is nearly 3,000 kilometers thick. The core is made mostly of the metals iron and nickel. It consists of two parts – a liquid outer core and a solid inner core.
- The deeper down inside Earth the greater the pressure. The temperature inside Earth increases as depth increases.
- There are three types of heat transfer: radiation, convection and conduction.
- Heating and cooling of a fluid, changes in the fluid's density, and the force of gravity combine to set convection currents in motion.
- Heat from the core and the mantle itself causes convection currents in the mantle.

Minerals and Rocks

- To study a rock sample geologists observe the rock's mineral composition, color, and texture.
- Geologists have classified rocks into three major groups: igneous rock, sedimentary rock, and metamorphic rock.

Plate Tectonics

- Wegener's hypothesis was that all the continents were once joined together in a single landmass and have since drifted apart.
- Mid-ocean ridges form long chains of mountains that rise up from the ocean floor.
- Sea-floor spreading adds more crust to the ocean floor. At the same time, older strips of rock move

outward from either side of the ridge.
- In a process taking tens of millions of years, part of the ocean floor sinks back into the mantle at deep-ocean trenches.
- The theory of plate tectonics states that Earth's plates are in slow, constant motion, driven by convection currents in the mantle.

Earthquakes

- Seismic waves carry energy produced by an earthquake.
- The amount of earthquake damage or shaking that is felt is rated using the Modified Mercalli scale. An earthquake's magnitude, or size, is measured using the Richter scale or moment magnitude scale.
- Geologists use seismic waves to locate an earthquake's epicenter.

Volcanoes

- Volcanic belts form along the boundaries of Earth's plates.
- A volcano forms above a hot spot when magma erupts through the crust and reaches the surface.
- When a volcano erupts, the forces of the expanding gases pushes magma from the magma chamber through the pipe until it flows or explodes out of the vent.
- Geologists classify volcanic eruptions as quiet or explosive.
- Geologists often use the terms active, dormant, or extinct to describe a volcano's stage of activity.

Resources

Scientific Inquiry

MS-ESS2-1 (5.4.6.B.4) *What is Soil?* p. 42
MS-ESS2-2 (5.4.6.B.1) *Which Layer is the Oldest?* p. 104