Unit 2: Earth's Internal Processes

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **5 Weeks**
Status: **Published**

Brief Summary of Unit

Students will learn about Earth's interior and study the theory of plate tectonics. Students will learn about the causes and classification of earthquakes and volcanoes and how both are related to plate tectonics.

Revised: July 2026

Standards

1	Make sense of problems and persevere in solving them
L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
2	Reason abstractly and quantitatively
HS-PS1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
L.KL.11–12.2	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
HS-PS2-1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
HS-ESS1-5	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.
HS-ESS2-1	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
HS-ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Essential Questions / Enduring Understandings

Essential Questions

1. How do thermal convection currents within Earth's mantle drive the movement of lithospheric plates and continuously reshape the planet's surface features over geologic time?

2. How does the strain energy accumulated at different tectonic plate boundaries dictate the mechanics, wave behaviors, and severity of earthquakes?

3. In what ways do magma composition and gas content determine the eruptive violence and structural morphology of volcanoes across different tectonic settings?

Enduring Understandings

1. Earth's internal geothermal energy drives mantle convection, which acts as the primary mechanism moving rigid lithospheric plates across convergent, divergent, and transform boundaries to construct Earth's macroscopic landforms.

2. Earthquakes and volcanic eruptions are not random occurrences; their spatial distribution and physical characteristics are directly governed by plate boundary dynamics, where fault stress release generates seismic waves and magma chemistry dictates eruptive violence.

3. Understanding the seismic mechanics and volcanic processes associated with plate tectonics is essential for assessing natural hazard risks, forecasting geologic events, and engineering resilient infrastructure to protect human populations.

Objectives: Students will know/Students will be skilled at

- • Compare the dynamics of Earth’s structure to planets in our solar system.
- • Compare/contrast magma/lava composition from igneous rock analysis.
- • Compare/contrast seismic magnitude and intensity.
- • Describe Earth’s internal process of convection currents and its association to plate tectonics.
- • Describe the formation of magma.
- • Describe the major parts of a volcano.
- • Describe the theory of Plate Tectonics and its application to explain natural events.
- • Determine the explosively of volcanoes.
- • Differentiate types of fault boundaries and how they change the landscape.
- • Discuss Alfred Wegener’s evidence of continental drift.
- • Explain how earthquakes are generated.
- • Explain how plate movements create changes in Earth’s crust.
- • Explain the geologic significance of sea-floor spreading.
- • How earthquake data is collected, expressed, and its energy is calculated.
- • Identify the different types of seismic waves and how they are detected.

- Identify the different types of volcanoes based on eruption type.
- Locate where earthquakes are most likely to occur.

Learning Plan

- Activity/Assessment – Concept map of the different types of faults
- Activity/Assessment – Concept map of the different types of seismic waves
- Activity/Assessment – Concept map of the types of volcanoes
- Assessment – United Streaming video with accompanying questions
- Assessment – United Streaming video with accompanying questions
- Describe how volcanoes form.
- Describe several types of igneous features and explain how they are formed.
- Describe the causes and effects of stress in Earth's crust.
- Describe the internal structure of a volcano.
- Differentiate the different types of volcanoes.
- Discuss what controls the viscosity of magma and lava.
- Discuss where most earthquakes occur.
- Explain how earthquakes are measured and how earthquake data is used to learn about Earth's interior.
- Explain the correlation of the locations of earthquake and volcanoes to Plate Tectonics.
- Explain the hypothesis of continental drift.
- Explain the mechanisms of plate movement.
- Explain why earthquakes occur and how their energy is propagated as seismic waves.
- Lab/Activity – Convection currents
- Lab/Activity – Demonstrating/illustrating seismic waves
- Lab/Activity – Geographic distribution of volcanoes (computer or classroom)
- Lab/Activity – Locating an earthquake/seismology computer activity
- Lab/Activity – Plate tectonics computer or classroom activity (matching coastlines)
- Lab/Activity – Rates of Seafloor spreading activity
- Lab/Activity – Silica content and viscosity
- Lab/Activity/Project – Constructing seismic safe structures
- Make and label the processes of convection currents.
- Meaningful participation in guided question/answer sessions, individual/group discussions, demonstrating an understanding of the purpose of the unit lesson(s), key terms, and concepts.
- Preview the essential questions, provide answers, and connect to learning throughout the unit.
- Project/Assessment – United States/National Park volcanoes poster/power point presentation
- Quiz/Assessment – Earthquakes
- Quiz/Assessment – Plate tectonics
- Quiz/Assessment – Volcanoes
- Relate how the theory of plate tectonics explains sea-floor spreading, subduction, and the

formation of mountains.

- • Relate the type of volcanic eruption to the characteristics of magma.
- • Unit Assessment – Earth's Internal Structures
- • View/analyze current USGS (US Geological Survey) data on tectonic activity

Materials

- Earth Science, Glencoe
- Earth Science, Merrill, and ancillary resource materials
- Earth Science, Prentice-Hall, and ancillary resource materials
- igneous, metamorphic rock sample sets
- quantitative/qualitative lab equipment for activities, experiments
- related geologic maps
- sample seismogram read-outs
- supplementary interactive multimedia, internet websites, videos
- Textbook, Physical Science with Earth Science, Glencoe, and ancillary resource materials