Unit 3: Composition of Earth

Content Area: **Template**
Course(s):
Time Period:
Length:
Status: **Published**

State Mandated Topics Addressed in this Unit

This unit aligns with the following NJ Student Learning Standards for Science (NJSLS-S) and supports geologic classification, modeling, and analysis:

NJSLS-S Performance Expectations:

- **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-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-ESS1-6**: Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.

Integrated Mathematics Standards (NJSLS-M):

- **A-CED.A.2**: Create equations in two or more variables to represent relationships between quantities.
- **F-IF.C.7**: Graph functions expressed symbolically and show key features of the graph.

Science & Engineering Practices (SEPs):

- SEP 2: Developing and Using Models
- SEP 4: Analyzing and Interpreting Data
- SEP 6: Constructing Explanations and Designing Solutions
- SEP 7: Engaging in Argument from Evidence
- SEP 8: Obtaining, Evaluating, and Communicating Information

Crosscutting Concepts:

- Stability and Change
- Energy and Matter
- Scale, Proportion, and Quantity
- Systems and System Models

These standards support instructional objectives including:

- Classifying minerals and identifying diagnostic properties
- Modeling the rock cycle across geologic settings
- Interpreting rock strata to determine geologic history
- Describing rock transformations driven by internal and surface processes
- Evaluating the use of Earth materials in technology and infrastructure
- Constructing scientific explanations of geologic phenomena using evidence

Unit Summary

This unit focuses on the classification and formation of rocks and minerals as key components of Earth's structure. Students will learn to identify the three major rock types—igneous, sedimentary, and metamorphic—based on their properties and formation processes. They will explore how rocks cycle through the geosphere and how minerals are essential resources with diverse physical and chemical properties. Emphasis will be placed on the practical uses of rocks and minerals in everyday life, as well as their role in Earth's dynamic processes. Students will develop models and use data to understand the cycling of matter within Earth's interior and surface systems.

Essential Questions

- Do preexisting rocks change form?
- How are igneous rocks formed?
- How are minerals used in everyday life?
- How can the properties of rocks and minerals help us interpret Earth's geologic history?
- How does the rock cycle model Earth's dynamic nature?
- What are the processes that form sedimentary and metamorphic rocks?
- Why is mineral identification important in geology and industry?

Objectives

- Analyze the complete rock cycle, including transformations among rock types
- Classify igneous rocks by texture and composition
- Classify minerals based on their properties (e.g., hardness, luster, streak, cleavage)

- Compare and contrast regional and contact metamorphism
- Construct models to show matter cycling in Earth's interior and crust
- Define what a mineral is and how minerals form
- Define what a mineral is and how minerals form.
- Describe the composition and origin of magma
- Describe the formation and properties of clastic, chemical, and organic sedimentary rocks.
- Describe the types of clastic sedimentary rocks
- Describe uses of igneous rocks in construction and daily life
- Evaluate how plate tectonics and surface processes drive rock transformations
- Explain the process of lithification and sediment formation
- Explain the process of lithification and sediment formation.
- Identify different groups of minerals and provide examples.
- Identify foliated and non-foliated metamorphic rocks
- Summarize how igneous rocks form from magma and lava

Standards

SCI.HS-ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
9-12.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.
9-12.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.
9-12.HS-ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.

Instructional Tasks/Activities

- Common assessment chapter test
- Common assessment quiz
- Constructed response
- Do nows and/or exit slips
- Exit Cards (answer to daily objective questions)
- Graphic organizers or models
- Guided practice
- Homework
- Homework
- Individual, small, and large group work
- Laboratory investigations within small groups
- Mineral Identification Lab

- Mineral Project
- Mineral use article
- Review Activity
- Rock Identification lab
- Rock Identification Lab Conclusions
- Section Review Questions
- Study Guide Packets
- Types of rocks research
- Vocabulary flash cards or map (word, picture, sentence, example)

Assessment Procedure

- Classroom Total Participation Technique
- Classwork
- DBQ
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Flashcards and/or drill and practice
- Inquiry based activities with reflective discussion
- Laboratory groups
- Lecture with note taking or guided notes
- Online models and simulators
- Power point presentations
- Whole and small group discussions

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline

- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- Resource 1
- Resource 2
- Resource 3
- Resource 4
- Resource 5