

02: Earth Science-Rocks and Minerals

Content Area: **Science**
Course(s):
Time Period: **Trimester**
Length: **Trimester 2**
Status: **Published**

General Overview, Course Description or Course Philosophy

In this unit, students investigate features and processes of the Earth's surface. Students explore the rapid process of volcanic eruptions! In contrast, students also explore the gradual Earth processes of weathering and erosion. Students apply their knowledge and design solutions to mitigate the impacts of these processes on humans.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives and Enduring Understandings:

- Students investigate the properties and formation of rocks and minerals, within the context of social, economic, and historic use.
- Students reflect on the presence of rocks and minerals in their daily lives and discuss the materials used to make buildings in their neighborhood.
- Through observation and analysis, students discover how minerals are indispensable and how their overuse adversely affects the environment.
- Students begin to learn how rocks and minerals form, and examine and analyze various samples of rocks.
- Students initially create their own criteria for ranking the samples, then in later lessons focus on physical properties such as luster, color, magnetism, hardness, and the presence of smooth surfaces and crystals.
- Throughout the unit, students learn of the importance of geologists and paleontologists in society, performing some of the basic tasks of these professions.

Essential Questions:

- How do Rocks form in layers?
- Can the shape of rocks be changed?
- What do rocks tell us about life on earth?
- What is earth like inside?
- What natural resources can we get from the earth?
- How can human reduce the impact of floods on their environment?
- How does climate change impact our environment?

CONTENT AREA STANDARDS

4-ESS1-1	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
4-ESS3-2	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.
4-ESS2-2	Analyze and interpret data from maps to describe patterns of Earth's features.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

MA.4.OA.A.1	Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
LA.RI.4.1	Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
LA.RI.4.7	Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.
LA.RI.4.9	Integrate and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) information from two texts on the same topic in order to write or speak about the subject knowledgeably.
MA.4.MD.A.1	Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table.
MA.4.MD.A.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
LA.W.4.7	Conduct short research projects that build knowledge through investigation of different aspects of a topic.
LA.W.4.8	Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.
LA.W.4.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
TECH.9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
TECH.9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
TECH.9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.
- Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.
- Living things affect the physical characteristics of their regions.
- The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns.
- Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans.
- Major mountain chains form inside continents or near their edges.
- Maps can help locate the different land and water features areas of Earth.
- Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways.
- Some resources are renewable over time, and others are not.
- A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions).
- Humans cannot eliminate the hazards but can take steps to reduce their impacts.
- Testing a solution involves investigating how well it performs under a range of likely conditions.

Procedural Knowledge

Students will be able to:

- Identify evidence from patterns in rock formations to support an explanation for changes in a landscape over time.
- Identify evidence from patterns in fossils in rock layers to support an explanation for changes in a landscape over time.
- Make observations to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- Make measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- Analyze data from maps to describe patterns of Earth's features (mountains, volcanoes, water features, etc).
- Interpret data from maps to describe patterns of Earth's features (mountains, volcanoes, water features, etc).
- Obtain information to describe that energy and fuels are derived from natural resources.
- Obtain information to describe the use of natural resources affect the environment.
- Combine information to describe that energy and fuels are derived from natural resources.
- Combine information to describe their uses affect the environment.

- Generate multiple solutions to reduce the impacts of natural Earth processes on humans.
- Compare multiple solutions to reduce the impacts of natural Earth processes on humans.
- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- Make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
- Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages)
- Explain how the information contributes to an understanding of the text in which it appears.
- Integrate (e.g., practical knowledge, historical/cultural context, and background knowledge) information from two texts on the same topic in order to write or speak about the subject knowledgeably.
- Reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) information from two texts on the same topic in order to write or speak about the subject knowledgeably.
- Conduct short research projects that build knowledge through investigation of different aspects of a topic.
- Recall relevant information from experiences or gather relevant information from print and digital sources
- Take notes and categorize information, and provide a list of sources.
- Draw evidence from literary or informational texts to support analysis, reflection, and research.
- Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table.
- Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
- Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5.
- Represent verbal statements of multiplicative comparisons as multiplication equations.

EVIDENCE OF LEARNING

Formative Assessments

- Lab Activities
- Student predictions, observations, and questions
- Teacher questions and discussion
- Observe students as they apply new concepts and skills
- Evidence of students changed thinking and behaviors
- Students answering questions using observations, evidence, and previous accepted explanations
- Students asking related questions that encourage future investigations

- Monitor students working in groups
- Listen to whole class conversations to check for understanding
- Completing tasks

Summative Assessments

Benchmark Assessments

- Multiple Choice Assessment administered at the end of each trimester (T1, T2, T3)

Alternative Assessments

- Oral Presentations
- Questions for Comprehension
- Performance Tasks
- Scientific Journals/Notebooks
- Self-Assessment
- WebQuests

RESOURCES (Instructional, Supplemental, Intervention Materials)

- Teacher Edition
- Student Lab Manual
- Student Science Notebook
- Graphic organizers
- Videos
- Lesson Slide Shows
- [Brain Pop-Climate Change lesson plans](#)
- [STEM Teaching Tools-Climate Change](#)

INTERDISCIPLINARY CONNECTIONS

- Integrate quantitative or technical information expressed in words in a text. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
- Compare and contrast the information gained from experiments, simulations, video, or multimedia

sources with that gained from reading a text on the same topic.

- Experimentation
- Social Emotional Learning
- Geoscience
- Sustainability

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.

*In addition to IEP Accommodations & Modifications:

- Restate and review directions
- Student restates directions or information
- Oral responses
- Small group/ one to one
- Additional time
- Concrete examples
- Extra visuals
- Support auditory information with visuals
- Space for movement or breaks
- Extra verbal cues and prompts