Unit 1: Foundations of Earth Science and the Composition of Earth

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **6 Weeks**
Status: **Published**

Brief Summary of Unit

Students will learn the different disciplines of earth science, including astronomy, geology, meteorology, and oceanography. Students will review the contents covered throughout the course, learn how to read maps, and understand the importance of laboratory safety. Students will model how scientists use the scientific method to solve problems and differentiate between scientific theories and laws. Students will learn that the earth's crust changes over time due to physical and chemical processes. Chemical elements exist in fixed amounts on Earth, forming a diverse variety of minerals. These minerals move and change through the crust and surface in a process called the Rock Cycle.

Revised: July 2026

P.1	Act as a responsible and contributing community members and employee.
P.2	Attend to financial well-being.
L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
P.3	Consider the environmental, social and economic impacts of decisions.
HS-PS1-1	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
P.4	Demonstrate creativity and innovation.
P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
P.6	Model integrity, ethical leadership and effective management.
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.
P.7	Plan education and career paths aligned to personal goals.
P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
P.9	Work productively in teams while using cultural/global competence.
HS-LS2	Ecosystems: Interactions, Energy, and Dynamics
HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems

	and how those relationships are being modified due to human activity (i.e., climate change).
HS-ETS1	Engineering Design
HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Objectives: Students will know/ Students will be skilled at

- • Apply technology into our daily lives and observe its effects.
- • Categorize rock samples into three major types.
- • Collect data and measurements in SI units and convert into cgi units.
- • Compare/contrast cgi system of measurements to the SI measurement system.
- • Construct a concept map on information provided by the different types of maps.
- • Determine the types of rock that form from internal/external processes.
- • Differentiate and correlate major branches of Earth Science.
- • Differentiate the various kinds of mixtures (solution, suspension, homogeneous, heterogeneous).
- • Examine and identify various rocks and their mineralogical composition.
- • Explain the physical and chemical processes that take place in the rock cycle.
- • Familiarize and distinguish the different elements on the periodic table.
- • How elements can be divided into three main classifications: metals, metalloids and non-metals.
- • How minerals are categorized and sub-categorized.
- • How some materials can be classified as a mineral?
- • How to classify rocks as igneous, sedimentary, or metamorphic.
- • How to classify rocks as igneous, sedimentary, or metamorphic.
- • How to identify the most common minerals in Earth’s crust.
- • Identify all factors considered in determining the economic value of minerals.
- • Identify and correlate scientific professions to specific earth science disciplines.
- • Identify and correlate scientific professions to specific geology disciplines.
- • Identify and differentiate the six basic crystal systems.
- • Identify how technology has a continuous impact on earth & in society.
- • Identify proper and improper lab safety practices/procedures.
- • Identify the 5 criteria to classify minerals.
- • Identify the most common/abundant minerals in Earth’s crust.
- • Know that all natural material is made of elements in different combinations.
- • know that elements can be divided into three main classifications
- • Locate specific landmarks, items on maps using their cartographic coordinate systems.
- • Measure, calculate, and convert quantitative data from cgi to SI units and vice versa.
- • Minerals can be classified according to their chemical and physical properties.
- • Observe, recognize, and explain how earth science affects our daily lives.

- Perform an experiment and produce a CHS Formal Lab report.
- Practice scientific measurements and know their application in science.
- Read and use various types of maps.
- Realize all material is made of elements in different combinations.
- Recognize and apply the scientific method to daily problems.
- Recognize certain types of maps are more appropriate for different types of use.
- Recognize the Earth scientists and their contributions (James Hutton, Charles Lyell, Alfred Wegener, Harry Hess).
- Recognize the steps in the scientific method in a real-life situation.
- Relate Physical Science concepts to Earth Science.
- The processes by which rocks continually change from one type to another in the rock cycle.
- There are different kinds of mixtures (solution, suspension, homogeneous, heterogeneous).
- Understand and follow the basic safety procedures in the classroom.
- Understand and utilize all information provided on the periodic table where applicable.

Learning Plan

- Assessment/Quiz – Branches in Earth Science
- Assessment/Quiz – Maps
- Assessment/Quiz – Scientific Units
- Compare and contrast magma and lava.
- Contrast the major types of metamorphism.
- Define a mineral and identify examples.
- Differentiate among the different types of metamorphic rocks.
- Discuss different types of mixtures (homogeneous, heterogeneous, solution, suspension).
- Discuss how cooling controls the size of a crystal.
- Discuss how rocks can change during metamorphism.
- Discuss the composition of Earth’s crust.
- Discuss the difference between amorphous and crystalline solids.
- Discuss the frequency that different states of matter occur on Earth (Can a rock melt?).
- Discuss the uses of minerals: ore vs. gem.
- Distinguish among the different types sedimentary rocks and how they are formed.
- Distinguish the different textures of igneous rocks and how they are classified.
- Explain how cooling rates allow one to hypothesize about the environment in which the crystal formed.
- Explain how minerals form.
- Explain the difference between elements, compounds, and mixtures.
- Explain what physical and chemical properties are.
- Explain why no single property is sufficient to identify a material.
- Lab/Activity – CHS Formal Lab report introduced using the scientific method

- Lab/Activity – Construct a concept map with the different types of maps
- Lab/Activity – Create a topographic map
- Lab/Activity – Creating a problem, hypothesis, and accompanying experiment
- Lab/Activity – Difference between solutions and mixtures
- Lab/Activity – Examine the local geology of New Jersey and Cranford
- Lab/Activity – Learning to navigate through the periodic table
- Lab/Activity – Locating places on a globe/map
- Lab/Activity – Measurement and various units in science
- Lab/Activity – Mineral hardness
- Lab/Activity – Salt precipitation experiment: formation of minerals.
- Lab/Activity – Testing the density of minerals
- Lab/Activity – Using topographic maps
- Lab/Activity/Quiz - Classify minerals according to their physical properties.
- Lab/Activity/Quiz – classifying igneous rocks
- Lab/Activity/Quiz – classifying metamorphic rocks
- Lab/Activity/Quiz – classifying sedimentary rocks
- List and explain the typical properties used to identify and classify minerals (texture, cleavage, fracture, hardness, acid test, etc).
- 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/Poster – “Fathers of Science”
- Project/Poster – Careers in Earth Science
- Project/Poster – Lab safety procedures
- Quiz – Lab safety
- Research New Jersey’s Geologic History.
- Student project/Assessment: pick a mineral and present its uses/importance
- Student project/Assessment: select a National Park and provide geologic history as a presentation
- Unit Assessment
- Unit test on minerals (incorporate lab/hands-on activities as part of test)
- Unit test on the rock cycle (incorporate lab/hands-on activities as part of test)

Materials

- Earth Science, Glencoe
- Earth Science, Merrill, and ancillary resource materials
- igneous, sedimentary, metamorphic rock sample sets
- minerals samples
- quantitative measuring lab equipment

- supplementary interactive multimedia, videos
- Textbook, Physical Science with Earth Science, Glencoe, and ancillary resource materials

Accommodations and Modifications