Unit 7: Earth Science- How Is the Earth Changing?

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **7 weeks**
Status: **Published**

CONTENT AREA STANDARDS

6-8.MS-ESS2-1	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
6-8.MS-ESS2-3	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
6-8.MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
6-8.MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
6-8.MS-LS4-1	Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
6-8.MS-PS1-4	Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

General Overview, Course Description or Course Philosophy

Science and engineering—significant parts of human culture that represent some of the pinnacles of human achievement—are not only major intellectual enterprises but also can improve people's lives in fundamental ways. Although the intrinsic beauty of science and a fascination with how the world works have driven exploration and discovery for centuries, many of the challenges that face humanity now and in the future—related, for example, to the environment, energy, and health—require social, political, and economic solutions that must be informed deeply by knowledge of the underlying science and engineering.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Many of Earth's geographic features and events (volcanoes, earthquakes, mountains, islands) can be explained in terms of the movement and interaction of tectonic plates (large slabs of rock that make up Earth's outermost layer).

Learning Set 1: How is the Earth's surface changing? What is the universe, and what is Earth's place in it? How do people reconstruct and date events in Earth's planetary history? How and why is Earth constantly changing? Why do the continents move, and what causes earthquakes and volcanoes?

Learning Set 2: What causes the features on Earth's surface? What is the universe, and what is Earth's place in it? How do people reconstruct and date events in Earth's planetary history? How and why is Earth constantly changing? How do Earth's major systems interact? Why do the continents move, and what causes

earthquakes and volcanoes? How can one explain the structure, properties, and interactions of matter? How do particles combine to form the variety of matter one observes? How is energy transferred and conserved? What is energy?

Learning Set 3: How are tectonic plates changing? What is the universe, and what is Earth's place in it? How do people reconstruct and date events in Earth's planetary history? How and why is Earth constantly changing? How do Earth's major systems interact? Why do the continents move, and what causes earthquakes and volcanoes?

Learning Set 4: How do plate tectonics explain earth's features? What is the universe, and what is Earth's place in it? How do people reconstruct and date events in Earth's planetary history? How and why is Earth constantly changing? How do Earth's major systems interact? Why do the continents move, and what causes earthquakes and volcanoes?

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

MA.K-12.2	Reason abstractly and quantitatively.
LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
MA.6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
LA.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).
LA.RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
LA.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
MA.6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
TECH.9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross-cultural, gender-specific, generational), and determine how the data can best be used to

	design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
TECH.9.4.8.CI.2	Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).
TECH.9.4.8.CI.3	Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).
TECH.9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.
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).
TECH.9.4.8.CT.3	Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

1. The earth's surface is made up of interlocking plates of various shapes and sizes.New material is constantly being added to some edges of some plates, which has created new ocean floor between continents or forced them together.
2. Tectonic plates are mobile slabs of rock of various shapes and sizes that make up the surface of the earth.
3. Plates rest on the mantle, a hot, softer rock layer that can move and flow. Convection (cycling of hot and cold material) occurs in the mantle as hot material rises, because it is less dense, and cold material sinks, because it is denser. Earth's plates ride on the moving mantle rock.
4. Plates move on Earth's surface in a variety of ways, including toward each other, away from each other, and alongside each other.
5. When two plates interact, the geologic features and events common on Earth occur (e.g., volcanoes, mountains, trenches, earthquakes).
6. There are two kinds of plates: oceanic plates (denser, thinner) and continental plates (less dense, thicker).
7. Volcanoes are the result of magma rising up through the crust at plate boundaries or over hotspots.
8. Due to the principle of conservation of matter, no new rock material is created or destroyed; rock is recycled as a result of moving plates.

Procedural Knowledge

Students will be able to:

- develop a model to describe the cycling of Earth's materials and the flow of energy that drives this

process
- construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
- analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
- construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
- develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed
- cite specific textual evidence to support analysis of science and technical texts.
- 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).
- compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
- write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
- use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- reason abstractly and quantitatively.

EVIDENCE OF LEARNING

Formative Assessments

PS1-4: Earth Science 3- Activity 4.1: Convection in Liquids

LS4-1: Earth Science 3- Activity 2.1: The Theory of Continental Drift, Reading 2.1: What Is Continental Drift? Activity 2.2: The Exploration of the Ocean Floor, Activity 3.1: The Theory of Plate Tectonics Concept Builder: Macroevolution

MS-ESS1-4:Earth Science - Activity 2.1: The Theory of Continental Drift

MS-ESS2-1: Earth Science 3- Activity 4.2: Silly Putty. Rocks. Reading 4.2: Formation of Metamorphic Rock, Activity 5.2: Two Types of Rock Comprise Plates, Activity 8.1: How Does the Earth Cycle Rock Material?, Activity 9.3: Building Physical Models Concept Builder: Human Impacts on Earth's Systems

MS-ESS2-2: Earth Science 3- Activity 1.1: Worldwide Pattern of Volcanoes, Activity 1.2: Worldwide Pattern of Earthquakes, Activity 1.3: Earthquakes, Volcanoes, and World Elevation, Activity 5.1: What Happens When Plates Move?, Reading 5.1: Ring of Fire, Activity 6.1: Volcano Formation, Activity 6.2: Hotspot Formation, Reading 6.2: Is a Hotspot Lurking Beneath the Continental United States?

MS-ESS2-3: Earth Science 3: Reading 2.1: What Is Continental Drift?, Activity 2.2: The Exploration of the Ocean Floor, Activity 3.1: The Theory of Plate Tectonics, Activity 7.1: Determining Plate Movement, Activity 9.1: Creating a List of Important Ideas and Annotating a Cross Section of Earth, Reading 9.1: How Well Do Scientists Understand Plate Tectonics?, Activity 9.2: Filling Out the Summary Chart, Activity 10.1: Exploration of Case Study Sites, Reading 10.1: How Are Case Studies Useful?, Activity 10.2: Scientific Explanation of One Site

MS-ESS3-2:Earth Science 3: Reading 1.2: Volcanoes and Earthquakes

MS-ESS3-4: Earth Science 3: Reading 8.1: Recycling for Earth and Cycling within Earth Concept Builder: Human Impacts on Earth's Systems

Summative Assessments

- Benchmark Assessments
    - Multiple Choice Assessment administered at the end of each marking period.

Alternative Assessments

- Oral Presentations
- Questions for Comprehension

- Performance Tasks
- Scientific Journals/Notebooks
- Self-Assessment
- WebQuests

RESOURCES (Instructional, Supplemental, Intervention Materials)

IQWST Unit Materials for Earth Science 3 Learning Set 1-4

A Framework For K-12 Science Education

Onlne Resources provided by IQWST not included in the program (to be used as support/reinforcement/enrichment): https://docs.google.com/spreadsheets/d/1VpyFCL4_50_-1w2NhcGpdNNZ2jj6aJJegcIUNCy_uzQ/pubhtml

INTERDISCIPLINARY CONNECTIONS

Collaboration with Math and Language Arts teachers is an essential part of the IQWST curriculum.

Information Writing

Current Events

Topography

Data collection/analysis

Computations

Statistics

Engineereering

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.

IQWST provides audio recording for all readings in student workbook-available through teacher portal online

Reading differentiation strategies are embedded in the IQWST program and all students prepare for reading through a 'Getting Reading' section which begins each reading.

The sections are desgined to engage students, generate interest, activate prior knowledge and provide a purpose for reading. Teachers use advance organizers for desired readings and to encourage students to plan and annote the passages.

A word wall is developed through vocabulary aquisition in the program. Students develop the word wall as words are learned in context and through experience in class. This helps to build meaning and understanding which support students when reading text.

Students are encouraged to ask questions and post them to the Driving Question Board. This DQB helps students develp a greater level of understanding and encourages students to work together to solve problems in and outside of class.

Supoort will be provided to students when writing in the student manual and use of teh computer, printing, and pasting into the manual is acceptable if there is a present need.