

Grade 8: Earth's Systems

Stage 1 Desired Results

ESTABLISHED GOALS:

Competencies:

- **Cause and Effect-** Students will investigate, explain, and evaluate potential causal relationships, using evidence to support claims and predictions about the mechanisms that drive those relationships.
- **Scale, Proportion and Quantity-** Students will apply reasoning and modeling to determine the proportional relationships in observable and non-observable phenomena in terms of relative scale and quantity.
- **Energy and Matter in Systems-** Students will analyze evidence (e.g., investigations, models, theories, scenarios) to predict and track changes in the cycling of matter and flow of energy within and between systems in order to identify their possibilities and limitations.
- **Stability and Change-** Students will analyze and evaluate the stability of natural and human designed systems in order to develop evidence-based explanations and predictions of changes over time.
- Students will demonstrate the ability to analyze and summarize text and integrate knowledge to make meaning of discipline-specific materials.
- Students will demonstrate the ability to produce coherent and supported writing in order to communicate effectively for a range of discipline-specific tasks, purposes, and audiences.
- Students will demonstrate the ability to speak purposefully and effectively by strategically making decisions about content, language use, and discourse style.

Content Standards:

- MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
- MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
- MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Transfer

*Students will independently apply their learning to **predict, analyze, interpret, and model natural and designed systems***

Meaning

ENDURING UNDERSTANDINGS

Students will understand that...

- cause and effect relationships may be used to predict phenomena in natural or designed systems.
- within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter.
- explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales.
- patterns in rates of change and other numerical relationships can provide information about natural systems.
- time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.

ESSENTIAL QUESTIONS

- How do the processes shaping Earth's surface, the distribution of natural resources, and the passage of time reveal the history of our planet?

- 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. - MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. - MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	Acquisition	
	<i>Students will know...</i> - that all Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. - that global movements of water and its changes in form are propelled by sunlight and gravity. Movement in water throughout Earth's spheres contributes to the changing of Earth's surface through processes such as weathering and erosion. - that humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. - that the geologic time scale interpreted from rock strata provides a way to organize Earth's history. - that analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. - that tectonic processes continually generate new ocean seafloor at ridges and destroy old seafloor at trenches. - that the planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. - that maps of ancient land and water patterns, based on investigations of rocks and fossils,	<i>Students will be skilled at...</i> - developing and using models. - planning and carrying out investigations by collecting and interpreting data. - supporting scientific arguments with evidence.

	make clear how Earth's plates have moved great distances, collided, and spread apart. <u>vocabulary</u>: plate tectonics, crust, core, mantle (asthenosphere, lithosphere), convection, density subduction, convergent, divergent, transform, fault minerals, rock, igneous, metamorphic, sedimentary, compaction, cementation, weathering (physical, chemical), erosion, deposition, crystallization, evaporation, condensation, precipitation, sublimation, transpiration, strata, uniformitarianism, superposition, cross cutting, intrusion, tilt, uplift	
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Content Area Literacy Standards	21st Century Skills
• RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. • RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. • RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. • RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6-8 texts and topics</i>. • RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually. • 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. • WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. • WHST.6-8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. • WHST.6-8.6 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. • WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.	• <i>reason effectively</i> • <i>make judgments and decisions</i> • <i>solve problems</i> • <i>use systems thinking</i>

Stage 2 - Evidence

<i>Evaluative Criteria</i>	<i>Assessment Evidence</i>
	PERFORMANCE TASK(S):
	OTHER EVIDENCE:

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

<i>Science and Engineering Practices</i>	<i>Mathematics Integration</i>
S&EP 1. Asking questions and defining problems S&EP 2. Developing and using models S&EP 4. Analyzing and interpreting data S&EP 6. Constructing explanations (for science) and designing solutions (for engineering) S&EP 8. Obtaining, evaluating, and communicating information	• 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. • 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.
<i>Technology Integration</i>	<i>District Materials</i>