

Unit 3: Earth's Changing Surface

Content Area: **Science**
Course(s): **Science - Grade 4**
Time Period: **8 weeks**
Length: **Weeks**
Status: **Published**

Unit Overview

Students solve mysteries of different areas where the land has changed. They examine three clues in each area to determine what is changing the land: water, wind, or living things. Students plan and carry out an investigation using stream tables to simulate water flow and erosion. Students plan and carry out an investigation that simulates wind. They make observations to find evidence that wind causes weathering, erosion, and deposition. Students examine examples of how living things change and prevent change to Earth's surface. In pairs, students create an act-it-out about one example, and the rest of the class guesses which example they are demonstrating. Students act as paleontologists and dig for fossils. They examine the fossils to find evidence of how Earth's surface has changed over time. Students create a map of mountains, volcanoes, and earthquakes around the world. They use this map to look for patterns. Students build their own earthquake tables. They act as engineers and design structures that are earthquake resistant. They test their designs with the earthquake tables.

Transfer

Students will be able to independently use their learning to...

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
- Use evidence (e.g., measurements, observations patterns) to construct or support an explanation or design.
- Identify the evidence that supports particular points in an explanation.
- Analyze and interpret data to make sense of phenomena using logical reasoning.
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

- There are some clues that the Earth's surface changes
- Water changes Earth's surface
- Wind changes Earth's surface
- Living things change Earth's surface
- Fossils form and show the Earth's past
- Earthquakes, volcanoes and mountains are found in certain places on Earth
- People are affected by natural hazards

Essential Questions

Students will keep considering...

- What are some clues that Earth's surface changes?
- How does water change Earth's surface?
- How does wind change Earth's surface?
- How do living things change Earth's surface?
- How do fossils form and what do they show?
- Where on Earth are earthquakes, volcanoes and mountains found?
- What can people do about natural hazards?

Application of Knowledge and Skill

Students will know...

Students will know...

- There are some clues that the Earth's surface changes
- Water changes Earth's surface
- Wind changes Earth's surface
- Living things change Earth's surface
- Fossils form and show the Earth's past
- Earthquakes, volcanoes and mountains are found in certain places on Earth
- People are affected by natural hazards

Students will be skilled at...

Students will be skilled at...

- Cause and effect relationships are routinely identified, tested, and used to explain change.
- Use evidence (e.g., measurements, observations patterns) to construct or support an explanation or design.
- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
- Science assumes consistent patterns in natural systems.
- Patterns can be used as evidence to support an explanation.
- Identify the evidence that supports particular points in an explanation
- Analyze and interpret data to make sense of phenomena using logical reasoning.

Academic Vocabulary

deposition

erosion

weathering

glacier

minerals

sediment

sedimentary rock

dust storm

windbreak

dam

till

fossil

fossil record

earthquake

elevation

lava

magma

physical map

volcano

natural hazard

seismic hazard map

tsunami

Learning Goal 1 - Lessons 1, 2, 3, 4, 5

Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

- Some resources are renewable over time, and others are not.

SCI.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.

Target 1 - Lessons 1 & 2

Rainfall helps to shape the land and affects the types of living things found in a region.

- Rainfall helps to shape the land and affects the types of living things found in a region.

Target 2 - Lessons 2, 3, 4

Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.

- Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.

Target 3 - Lesson 4

Living things affect the physical characteristics of their regions.

- Living things affect the physical characteristics of their regions.

Target 4 - Lesson 5

Understand how the presence and location of certain fossil types indicate the order in which rock layers were formed.

- Understand how the presence and location of certain fossil types indicate the order in which rock layers were formed.

Learning Goal 2 - Lesson 5

Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

- Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

SCI.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.

Target 1 - Lesson 5

Discuss the process by which fossils were formed.

- Discuss the process by which fossils were formed.

Target 2 - Lesson 5

Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes.

- Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes.

Target 3 - Lesson 5

The presence and location of certain fossil types indicate the order in which rock layers were formed.

- The presence and location of certain fossil types indicate the order in which rock layers were formed.

Learning Goal 3 - Lesson 6

Analyze and interpret data from maps to describe patterns of Earth's features.

- Analyze and interpret data from maps to describe patterns of Earth's features.

SCI.4-ESS2-2

Analyze and interpret data from maps to describe patterns of Earth's features.

Target 1 - Lesson 6

The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Maps can help locate the different land and water features areas of Earth.

- The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Maps can help locate the different land and water features areas of Earth.

Target 2 - Lesson 6

Explain why most earthquakes and volcanoes occur in bands that are often along boundaries between continents and oceans.

- Explain why most earthquakes and volcanoes occur in bands that are often along boundaries between continents and oceans.

Target 3 - Lesson 6

Major mountain chains form inside continents or near their edges.

- Major mountain chains form inside continents or near their edges.

Learning Goal 4 - Lesson 7

Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

- Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

SCI.4-ESS3-2

Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Target 1 - Lesson 7

Make inferences about how A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions).

- Make inferences about how A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions).

Target 2 - Lesson 7

Develop strategies to reduce the impacts of hazards that cannot be eliminated.

- Develop strategies to reduce the impacts of hazards that cannot be eliminated.

Formative Assessment and Performance Opportunities

- Interactive notebook
- Lesson Games
- Quizzes
- Written assessments (can be modified)

Summative Assessment

- Class participation
- Vocabulary cards
- Interactive Tutorial
- Cooperative groups
- Centers
- Investigations

Accommodations/Modifications

Differentiation

- Focus on key science vocabulary words in unit
- Conduct a Think-Aloud to model the investigation
- Support writing during the investigation
- Assign groups and roles

- Conduct the investigation as a class
- Support the processing assignment
- Make explicit connections to nature throughout the investigation
- Setup your classroom for success
- Provide scripts for the Act-It-Outs
- Reduce note taking during the performances
- Walk through the text features
- Simplify the claim/evidence process
- Reduce the number of fossils
- Make a Home-School Connection
- Cut and tape the map
- Review map fundamentals with students
- Create a mixed ability groups
- Support the reading group
- Build quake tables before class

Enrichment

- Describe how difference agents change Earth's surface
- Draw weather and ice erosion and deposition
- Discover wind erosion in the solar system
- Watch a Live Global Wind Map
- Make a catalogue
- Draw a trace fossil
- Make a news report about earthquakes and volcanoes
(<http://earthquake.usgs.gov/earthquakes/states/seismicity/> <http://volcanoes.usgs.gov/>)
- Record the PSA broadcast
- Research local hazards

Unit Resources

TCI website

TCI material kits

21st Century Life and Careers

CAEP.9.2.4.A.1

Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

CAEP.9.2.4.A.2

Identify various life roles and civic and work - related activities in the school, home, and community.

CAEP.9.2.4.A.3	Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.
CAEP.9.2.4.A.4	Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Interdisciplinary Connections

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.
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.
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.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.