

4th Grade

Unit 1: Earth & Space Science

Duration: 4-8 weeks

Birth of Rocks- Rock Cycle, Erosion, & Natural Hazards

Desired Results

ESTABLISHED GOALS/ 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. Identify evidence from patterns in rock formations and fossils in rock layers to support possible explanations of Michigan’s geological changes over time. **[Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.]**
[Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative 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. **[Clarification**

Transfer

Meaning

ENDURING UNDERSTANDINGS: Crosscutting Concepts

Students will understand that...

- Students identify patterns about the location of the world’s volcanoes and use these patterns as evidence to support an argument about why a volcano may or may not erupt in their backyard.
- Students reason about the cause and effect of the type of lava (cause) and the nature of the eruption (effect) as well as the shape of the volcano (effect).
- Students consider the cause and effect of ice and root wedging on rock as it is broken down into small pieces.
- Engineering a solution to landslide hazards depends on scientific knowledge about the causes of landslides.

Meaning

Acquisition

Disciplinary Core Ideas

Students will know...

- Rocks begin as lava--volcanic rocks are lava that has been frozen in time. Volcanoes don’t just exist--they form, or ‘pop up’. There is a pattern to where most volcanoes exist today on the earth. And yet dead volcanoes--and volcanic rock they erupted--can be found in lots

Science and Engineering Practices

Students will be skilled at...

- Students analyze and interpret data from recent volcanic eruptions. They use their findings as evidence for an argument that volcanoes are (or are not) likely to erupt in their backyard.
- Student conduct an investigation to construct an explanation for why some volcanoes explode and why

Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]

4-ESS2-2

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

[Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

4-ESS3-2

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 Michigan's people and places.

[Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]

of places. (So the pattern today isn't necessarily what it used to be.) You can look for volcanic rocks near you. DCIs: ESS1.C, ESS2.B

- Volcanic rocks are lava frozen in time. There are two primary types of lava, each of whose thickness explains two major differences in a volcano's shape & style of eruption. These two lavas also account for two commonly observed volcanic rocks that you might find. DCIs: Foundational for ESS2.B; Extends ESS2.B
- Rock does not stay as massive monoliths of volcanoes--it tends to get broken into smaller pieces ("sediments") over time due to natural forces ("weathering"), and tumble downhill. You can look for evidence of this where you live. DCIs: ESS2.A
- The weathering process is not benign; it creates some of the worst natural hazards, including rock falls, landslides, and debris flows. If we are to be safe from these hazards, we have to design solutions to protect us. DCIs: ESS3.B

some do not. Students model thick and thin lava to conduct their investigations.

- Students conduct an investigation by modeling how rocks erode over time. Students construct an explanation for why rocks erode
- Students design solutions to protect their "homes" from rock slides. Students argue for the merits of their design.

Inquiry Questions:

1. Could a volcano pop up where you live?
2. Why do volcanoes explode?
3. Will a mountain last forever?
4. How could you survive a landslide?

Acquisition

<p>4-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <p>4-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>		
Evidence		
Evaluation Criteria	Assessment Evidence	
	PERFORMANCE TASK(S):	
	OTHER EVIDENCE: Unit assessment	
Learning Plan		
<i>Summary of Key Learning Events and Instruction</i>		