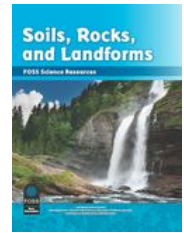


Investigation 1 - Soils and Weathering

Students investigate properties of soil by comparing four different soils. They learn that soils are composed of essentially the same types of materials (inorganic earth materials and humus), but the amounts of the materials vary. They begin to explore how rocks break into smaller pieces through physical and chemical weathering. Students go outdoors to explore and compare properties of local soils.



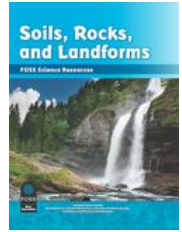
Standard - 4-ESS2-1

Investigation 1	Summary of Lesson	Priority
Part 1: Soil Composition	<p>Students observe and compare four different soils. They learn that soils are composed of essentially the same types of materials (inorganic earth materials and humus), but the amounts of the materials vary. Students speculate on where each of four soils came from: mountain, desert, river delta, or forest.</p> <p><i>Read, "What is soil?"</i></p> <p><i>FQ - What is soil?</i></p>	<p>High</p> <p>Introduction to concepts of soils and content vocabulary.</p>
Part 2: Physical Weathering	<p>Students begin to explore how large masses of rock break into smaller pieces. They tumble rocks and freeze water to see how these two types of physical weathering can break rocks.</p> <p><i>FQ -What causes big rocks to break down into smaller rocks?</i></p>	<p>High</p> <p>Introduction to new content vocabulary</p>
Part 3: Chemical Weathering	<p>Students plan and conduct an investigation to test rocks for interaction with "acid rain". They see that some rocks (limestone and marble) are very susceptible to acid rain, one form of chemical weathering, but other rocks (basalt and sandstone) are unaffected.</p> <p><i>Read, "Weathering".</i></p> <p><i>Video, "Weathering and Erosion".</i></p> <p><i>FQ - How are rocks affected by acid rain?</i></p>	<p>High</p>
Part 4: Schoolyard Soils	<p>Students collect and observe different soils from several locations in the schoolyard. They analyze the soil samples to determine how much humus and rock material are in local soils.</p> <p><i>Video, "Soils".</i></p> <p><i>FQ - What's in our schoolyard soils?</i></p>	<p>Low</p> <p>This activity could be done on a quick walk back from recess, then results could be shared in the classroom. Focus should be on viewing the video.</p>
Assessment	i-Check	

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.

Investigation 2 - Landforms

Students use stream-table models to observe that water moves earth materials from one location to another. They investigate the variables of slope and water quantity and plan and conduct their own stream-table investigations. Students look for evidence of erosion and deposition outdoors.



Students think about what happens to sediments over long periods of time as sediments layer on top of each other. They learn about the different processes that can result in fossils and how fossils provide evidence of life and landscapes from the ancient past.

Standards - 4-ESS1-1, 4-ESS2-1, 4-ESS2-2

Investigation 2	Summary of Lesson	Priority
<p>Part 1: Erosion and Deposition</p>	<p>Students use stream tables to observe that water moves earth materials from one location to another. After running a volume of water through the stream table, students shake a vial containing a sample of earth material mixed with water to observe the rate at which different particle sizes of earth materials settle out.</p> <p><i>Read, "Erosion and Deposition".</i></p> <p><i>FQ - How do weathered rock pieces move from one place to another?</i></p>	<p>High</p> <p>This lesson is the introduction for later lessons.</p>
<p>Part 2: Stream-Table Investigations</p>	<p>Students continue to run stream tables to learn how environmental variables can affect erosion and deposition. They investigate the variables of slope and water volume (flood). Then they plan and conduct their own stream-table investigations.</p> <p><i>Video, "Weathering and Erosion".</i></p> <p><i>Activity, "View Stream Tables".</i></p> <p><i>FQ - How does slope affect erosion and deposition? How do floods affect erosion and deposition?</i></p>	<p>Medium</p> <p>To save time, the variable tested could be done as a whole group.</p>
<p>Part 3: Schoolyard Erosion and Deposition</p>	<p>Students consider whether erosion and deposition are happening in their own schoolyard. They look for evidence of erosion and for locations where deposition is in evidence. They stimulate a rainstorm by pouring water on various outdoor surfaces.</p> <p><i>Activity, "Stream Tables"</i></p> <p><i>FQ - Where are erosion and deposition happening in our schoolyard?</i></p>	<p>Low</p> <p>This activity could be done on a quick walk back from recess, then results could be shared in the classroom.</p>

Part 4: Fossil Evidence	<p>Students think about what happens to and in sediments over long periods of time as sediments layer on top of each other. Students watch a video, make models, and read an article to learn about how sedimentation processes can result in fossils. They learn how fossils provide evidence of life and landscapes from the past.</p> <p><i>Read, "Fossils Tell a Story" and "Pieces of a Dinosaur Puzzle"</i></p> <p><i>Video, "Fossils"</i></p> <p><i>FQ - How do fossils get in rocks and what can they tell us about the past?</i></p>	<p>High</p> <p>This lesson involves a lot of different pieces of learning; video, activity and reading. All important to the overall application and learning of standards 4-ESS1-1 AND 4-ESS2-1.</p>
Assessment	i-Check	

Investigation 2 cont. - Landforms

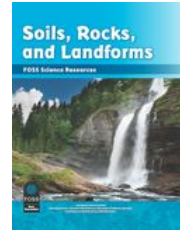
4-ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time.

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.

4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.

Investigation 3 - Mapping Earth's Surface

Students are introduced to the study of topography by building a model of a landform - a mountain. They use the foam model of Mount Shasta to create a topographic map, and use this map to produce another representation of the landforms - a profile of the mountain. Students learn about volcanoes; they use the topographer's tools to analyze the impact of the Mount St. Helens eruption. Students are introduced to processes that cause rapid changes to Earth's surface: landslides, earthquakes, floods, and volcanoes.



Standards - 4-ESS2-2, 4-ESS3-2

Investigation 3	Summary of Lesson	Priority
<p>Part 1: Making a Topographic Map</p>	<p>Students build a model mountain of Mount Shasta by stacking and orienting six foam layers. They trace outlines of the six pieces on top paper, creating a topographic map of the mountain.</p> <p><i>Read, "Topographic Maps"</i></p> <p><i>FQ - How can we represent the different elevations of landforms?</i></p>	<p>High</p> <p>This lesson is the introduction to topographic maps, leading students to meet standard, 4-ESS2-2 - Analyze and interpret data from maps to describe patterns of Earth's features.</p>
<p>Part 2: Drawing a Profile</p>	<p>Students use their topographic maps to produce two-dimensional profiles, or cross-sections, of their foam mountain. The profile reveals a side view of Mount Shasta, a dormant volcano. Students gather information about volcanoes from the video.</p> <p><i>Read, "The Story of Mount Shasta".</i></p> <p><i>Video, "Volcanos".</i></p> <p><i>Activity, "Topographer".</i></p> <p><i>FQ - How can we draw the profile of a mountain from a topographic map?</i></p>	<p>High</p> <p>This lesson involves a lot of different pieces of learning; video, activity and reading. All important to the overall application and learning of standard 4-ESS2-2.</p>
<p>Part 3: Mount St. Helens Case Study</p>	<p>Students compare two topographic maps and have a short debate about whether or not they show the same mountain. After learning that the two topo maps are the same mountain, they draw profiles of Mount St. Helens before and after its devastating eruption in 1980. Students watch a USGS video that explains how scientists were involved in predicting the eruption.</p> <p><i>Video, "Mount St. Helens Impact".</i></p> <p><i>FQ - How can scientists and engineers help reduce the impacts that events like volcanic eruptions might have on people?</i></p>	<p>High</p> <p>This lesson directly meets standard 4-ESS3-2.</p>

Part 4: Rapid Changes	<p>Students think about processes that cause rapid changes to Earth's surface; landslides, earthquakes, flood, and volcanoes.</p> <p><i>Read, "It Happened so Fast".</i></p> <p><i>FQ - What events can change Earth's surface quickly?</i></p>	<p>Medium</p> <p>This lesson could be done at another time of day other than science. The important piece should be the reading.</p>
Assessment	i-Check	

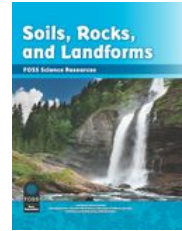
Investigation 3 cont. - Mapping Earth's Surface

4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.

4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Investigation 4 - Natural Resources

Students review what they have learned in Investigations 1-3. Then they focus on earth materials as renewable and nonrenewable natural resources. They learn the importance of earth materials as resources. The class makes a stepping stone out of concrete and goes on a schoolyard walk to find objects and structures and consider what natural resources were used to construct them.



Standards - 4-ESS3-2, 3-5 ETS1-1

Investigation 4	Summary of Lesson	Priority
Part 1: Introduction to Natural Resources	<p>Students review what they have learned in the module about soils, rocks, and landforms. They write a story or draw a concept map to bring the ideas together. They focus on earth materials as renewable and nonrenewable natural resources by viewing and discussing a video.</p> <p><i>Read, "Monumental Rocks" and "Geoscientists at Work".</i></p> <p><i>Video, "Natural Resources".</i></p> <p><i>Activity, "Resource ID".</i></p> <p><i>FQ - What are natural resources and what is important to know about them?</i></p>	<p>Low</p> <p>This lesson could be skipped.</p>
Part 2: Making Concrete	<p>Students focus on the earth resources that make up a very important materials used for walkways, buildings, and bridges - concrete. The class uses local resources to make one concrete stepping stone.</p> <p><i>Read, "Making Concrete".</i></p> <p><i>FQ - How are natural resources used to make concrete?</i></p>	<p>Low</p> <p>This lesson could be skipped.</p>
Part 3: Earth Materials in Use	<p>Students go on a walk around the school and schoolyard, searching for earth materials in use. They search for various objects and structures and consider when natural resources were used to construct them.</p> <p><i>Read, "Earth Materials in Art" and "Where do Rocks Come From".</i></p> <p><i>FQ- How do people use natural resources to make or build things?</i></p>	<p>Low</p> <p>This lesson could be skipped.</p>
Assessment		

4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

3-5 ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.