

Lesson Overview (Part A)

1.a Performance Expectations (PEs)

HS-ESS2 Earth's Systems:

- HS-ESS2-1. Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
- HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

1.b Anchoring phenomenon that builds towards understanding of the PEs/standards, and is engaging and relevant to students.

The footprints left by Neil Armstrong and Buzz Aldrin on the moon will be there forever. Why? What do you think will happen to the footprints of the first astronauts on Mars?

1.c Driving Questions:

What are the mountain ranges on the eastern coast of the United States smaller than the mountain ranges on the western coast of the United States?

1.d Unpack the 3-D learning components:

Science and Engineering Practices (SEP) (skills)	Disciplinary Core Ideas (DCI) (content)	Crosscutting Concepts (CCC) (connections)
<ul style="list-style-type: none"> <input type="checkbox"/> Developing and using models <input type="checkbox"/> Planning and carrying out investigations 	<ul style="list-style-type: none"> <input type="checkbox"/> ESS2.A: Earth Materials and Systems <input type="checkbox"/> ESS2.B: Plate Tectonics and Large Scale System Interactions <input type="checkbox"/> ESS2.C: The Role of Water in Earth's Surface Processes 	<ul style="list-style-type: none"> <input type="checkbox"/> Cause and effect - Show cause and effect <input type="checkbox"/> Systems and System models - Illustrate or model <input type="checkbox"/> Structure and Function - Design Structure <input type="checkbox"/> Stability and Change- Examine rates of change

1.e Determine students' prior knowledge about the lesson concepts. (e.g., pre-test, class discussion, exit ticket, 1-minute report, KWL chart, survey, etc.)

Bellringer: Think-Pair-Share Activity: The footprints on the moon left by Neil Armstrong and Buzz Aldrin will be there forever. Why? What do you think will happen to the footprints of the first astronauts on Mars?

1.f Learning Goals:

I Can: Model and explain how sediment is produced through constructive and destructive tectonic forces

I Can: Explain mechanical and chemical effects water has on a variety of solid materials

I Can: Differentiate between the various types of mechanical and chemical weathering and how each produces sediment

I Can: Determine the probable origin for various samples of sand based on their chemical and physical properties

1.g Select Lesson Resources: Identify resources to develop lessons that address the PEs/standards and investigate the anchoring phenomenon through a variety of sequenced activities; revise as needed (include title and URL).

Textbook

<https://courses.lumenlearning.com/wmopen-geology/chapter/outcome-weathering-and-erosion/>

<https://www.scienceofsand.info>

Lesson Plan (Part B)

Grade and Subject	11/12 Grade Dynamic Earth Systems	Instructional Time	90 Minute Block
Lesson Title (Topic)	Unit: Weathering, Erosion, and Mass Wasting		
Anchoring Phenomenon (copy from 1.b)	The footprints on the moon left by Neil Armstrong and Buzz Aldrin will be there forever. Why? Will the first humans on Mars leave footprints as well? Why or why not?		
Driving Question (copy from 1.c)	What are the mountain ranges on the eastern coast of the United States smaller than the mountain ranges on the western coast of the United States?		

Lesson Overview

Lesson Summary (description)			Lesson Topics and Student Learning Goals (copy from 1.f)
Time	Instructional Sequence	Student Work (Formative and Summative)	<p>I Can: Model and explain how sediment is produced through constructive and destructive tectonic forces</p> <p>I Can: Explain mechanical and chemical effects water has on a variety of solid materials</p> <p>I Can: Differentiate between the various types of mechanical and chemical weathering and how each produces sediment</p> <p>I Can: Determine the probable origin for various samples of sand based on their chemical and physical properties</p>
7-10 minutes	Engage: Bellringer: Question to spark thinking: The footprints on the moon left by Neil Armstrong and Buzz Aldrin will be there forever. Why?	Formative: Think-Pair-Share	
60 minutes	Explore and Explain: Article: Vocabulary Reading, Graphic Organizers (notes) Group Activity: Sand comparison lab	Formative: Carousel Activity Summative: Lab Activity	
10 minutes	Elaborate: <i>Independent student work:</i> Project	Formative: Independent Research Project (Choice Board)	
7-10 minutes	Evaluate: <i>Exit Ticket</i>	Formative: Exit Slip	

Lesson Resources Aligned with Standards		
Lesson Resource (copy from 1.g, sequenced with titles and links)		Resource Standards Alignment (copy from 1.d, standards notated, link optional)
Textbook		<input type="checkbox"/> ESS2.A: Earth Materials and Systems
https://courses.lumenlearning.com/wmopen-geology/chapter/outcome-weathering-and-erosion/		<input type="checkbox"/> ESS2.B: Plate Tectonics and Large Scale System Interactions
https://www.scienceofsand.info		<input type="checkbox"/> ESS2.C: The Role of Water in Earth's Surface Processes
Teacher Preparation		
Student Misconceptions (potential student ideas that are problematic when engaging in the lesson)		Scientific Terminology (vocabulary named once students "figure out" concepts of lesson)
All sediment samples are composed of the same material and weather at the same rate.		Sediment Weathering Chemical Weathering Mechanical Weathering Erosion
Materials Preparation		
Student Needs (activity sheets, data packet, etc.)	Group Needs (lab equipment, group data packets, etc.)	Safety & Technology Needs (unsafe materials, websites cued, etc.)
Engage: Bellringer: Science Notebook Elaborate: Independent student work: Project directions/choice board Evaluate: Exit Ticket	Explore and Explain: Article, markers, poster paper, tape, note sheet Lab: Various sand samples, black and white construction paper, hand lens, microscope, sand sieve, small magnet, test tubes test tube rack, acetic acid, ruler, laminated Sand Identification Key sheet	Lab materials (see left) Computers https://www.scienceofsand.info
Supporting Information		
References (links to cite sources of data, images, websites, etc.)		Background Reading (for teachers and/or students)
https://www.scienceofsand.info		Weathering Article for carousel activity