

Lesson Planning Guide

Develop Lesson Plans for Instruction

Steps in developing [NGSS](#)-standards-aligned, phenomenon-based lessons that are guided by the [5Es instructional model](#):

1. Complete the Lesson Plan Overview (Part A) to guide development of lesson plans.
2. Use the Lesson Plan Template (Part B) to create detailed lesson plans.



Lesson Overview Template (Part A)

1.a Select grade level NGSS [Performance Expectations](#) (PEs) or [Topics](#), or district/state standards that support lesson-based student learning goals.
For NGSS, PE color coding reflects its 3-dimensional learning components. Search the [Evidence Statements](#) for details on what students should know and do.

6-8 Middle School Science.

MS-ESS2-2 Earth's Systems: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

1.b Identify a lesson-based [anchoring phenomenon](#) that builds towards understanding of the PEs/standards, and is engaging and relevant to students.
See more about [phenomena](#) and using [phenomena with NGSS](#).

Sand properties, weathering and erosion concepts, general tectonic processes

1.c Ask a Driving Question, which is authentic and student-focused, that relates to investigating the PEs/standards and phenomenon.

See more about [Driving Questions](#) and using [Driving Questions with NGSS](#).

What characteristics do you observe about your sand sample? What forces helped shape your sand? What does the appearance of your sand sample tell about the possible tectonics that took place?

1.d Unpack the 3-D learning components of the Performance Expectations/standards in the table below.

For NGSS guidance, see the [NGSS Topic Arrangements](#) and [NGSS DCI Arrangements](#). Use tools to **unpack** each PE separately.

Science and Engineering Practices (SEP) (skills)	Disciplinary Core Ideas (DCI) (content)	Crosscutting Concepts (CCC) (connections)
Analyzing and Interpreting Data: Analyze Interpret data to provide evidence for phenomena. Students will analyze samples of sand and describe the general characteristics of the sample and link those characteristics to erosion, weathering, transportation, and tectonics.	ESS1.C: The History of Planet Earth and Large-Scale System Interactions: Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth’s plates have moved great distances, collided, and spread apart. Students will use maps of the sand sample sites locations to help analyze the tectonics that helped shape their sand sample.	Patterns: Patterns in rates of change and other numerical relationships can provide information about natural systems. Students will compare sand samples analyzed by other groups in the class and identify similarities and differences.

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.)

Prior to the lesson the teacher should overview the basic topics in a class discussion. Characteristics of sand (grain size, shape etc.), basic tectonic processes that they should be prepared to discuss (convergence zones, subduction zones, mountain building etc.).

1.f Identify Lesson Topics and Learning Goals: List main lesson concepts related to grade level PEs/standards that support student learning goals in figuring out the anchoring phenomenon; revise as needed.

Students will build upon the knowledge they have of tectonic processes.
Students will be able to discuss erosion and weathering and the impact those forces could have on rock and sand samples.
Students will be able to analyze and describe a sand sample and hypothesize on why it appears the way it does.

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).

Resources:
5 sand samples from different areas in the U.S.
Magnifying glass/microscope to get a close up look of the sand.



Lesson Plan Template (Part B)

Lesson Plan Template (Part B)			
Grade and Subject	Middle School Science (Grades 6-8)	Instructional Time (min.)	60 minutes
Lesson Title (Topic)	Comparative Sands from around the U.S.		
Anchoring Phenomenon (copy from 1.b)	Sand properties, weathering and erosion concepts, general tectonic processes		
Driving Question (copy from 1.c)	What characteristics do you observe about your sand sample? What forces helped shape your sand? What does the appearance of your sand sample tell about the possible tectonics that took place?		
Lesson Overview			
Lesson Summary (description)	Lesson Topics and Student Learning Goals (copy from 1.f)		
<p>The teacher will open up the class with a discussion to overview basic concepts that students have already learned in previous units such as characteristics of sand, general tectonic processes, and weathering and erosion processes. Then students will break into small groups (2-3 students per group) and analyze a sand sample from a location in the U.S. There should be enough sand in the samples that two groups can work off of the same location. Students will use a worksheet to describe their sand. They will include color, any identifiable minerals, shape of the sand, and grain size of the sand. In their small group they will review the images and maps provided that show the sand sample location and they will hypothesize about how the sand came to be there (what tectonic process) and why it possesses those specific characteristics (weathering/erosion etc.). Students will then compare their group's analysis with the second group that was working on the same sample. The two groups will compare what they observed and hypothesized and prepare to present their collective analysis to the rest of the class that worked on the other sand samples. In the end each sand sample will be discussed to the whole class. At the end of the class, each individual student will complete a short essay regarding what they have learned in the lesson.</p>	<p>Students will build upon the knowledge they have of tectonic processes. Students will be able to discuss erosion and weathering and the impact those forces could have on rock and sand samples. Students will be able to analyze and describe a sand sample and hypothesize on why it appears the way it does.</p>		



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)	
5 sand samples from different areas in the U.S.	Analyzing and Interpreting Data: Analyze Interpret data to provide evidence for phenomena. ESS1.C: The History of Planet Earth and Large-Scale System Interactions: Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.	
Magnifying glass/microscope to get a close up look of the sand.	Analyzing and Interpreting Data: Analyze Interpret data to provide evidence for phenomena. ESS1.C: The History of Planet Earth and Large-Scale System Interactions: Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.	
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)	
Students might find it difficult to understand why different sands from different locations possess specific characteristics based on plate tectonics.	Convergent Plate Boundary Subduction Zone 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.)
Notebook to write sand observations	Microscope/magnifying glass Sand Samples Maps and Pictures of sand collection location	None
Supporting Information		
References (links to cite sources of data, images, websites, etc.)	Background Reading (for teachers and/or students)	
	Textbook on plate tectonics, weathering and erosion	

Complete the 5E Instructional Model section(s) that are relevant to the lesson:

Engage: *Interest in a concept is generated and students' current understanding is assessed.*

ACTIVATE interest: Introduce anchoring phenomenon and driving question.

- Engages students in the concepts through a short activity or relevant discussion
- Connects students' past and present experiences
- Creates interest and generates curiosity
- Uncovers students' current knowledge and misconceptions
- Initiates students' investigation into the anchoring phenomenon based on an observation, problem, or question

Phenomenon-based Driving Questions (questions students are likely to ask about the lesson topic)

How can the sand from one area in the U.S. look so similar or so different from sand from another area in the U.S.?

Lesson Activities (experiment, demonstration, video, visualization, reading, etc., coherently sequenced to help build understanding of PE/standard)

For each activity, provide details of the procedure including timing, teacher guidance, student prompts, strategies for discussions and differentiation, etc.

Teacher will lead students in brief overview class discussion regarding general plate tectonics, erosion and weathering, and classifying sand. Students will break up into groups of 2-3 and each group will receive a sand sample from a different location in the U.S. There will be 5 sand samples total and there will be two separate groups analyzing each sample at the same time. Teacher will have each group observe their sand and write about the characteristics. They will hypothesize if it has always looked like the way it does now or if it was once different and how it possible could have changed over time. What role did weathering or erosion play on the sand sample? What types of tectonics do we know about the specific area this sand was taken from? Students will utilize maps and images provided with the sand samples as part of their analysis. The small groups that studied the same sample will then get together and compare their analysis and prepare to explain a collective summary to the rest of the class.

Formative Assessment (activity sheet, Venn diagram, summary, exit ticket, think-pair-share, etc. to check for understanding of lesson concepts)

Students will write a summary of what they learned from studying their specific sand sample

Consensus Discussion (claims, evidence, and reasoning on what students figured out in this lesson)

Teacher will then lead a discussion highlighting all 5 sand samples outlining the processes at work for each location (tectonics/weathering/erosion).

New Questions and Next Steps (student-driven questions, ideas on what to investigate in the next lesson and how to investigate it, etc.)

Based on what we learned from studying this one sand sample, how will it be similar or different to another sand sample from the U.S.? If this was being stretched over multiple lessons it is possible to break the students back into their small groups to investigate a sample of sand from the Science of Sand Website and do a similar analysis that they did in class.

Comparative Sands from Around the U.S. Summary Assessment

Prompt: Write a paragraph explaining what you learned from this lesson about your specific sand sample. Be sure to include where the sand was located, a quick description of your sand, and some general processes that made your sand into what it is today.