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.

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.

Rock cycle, 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.

Why does sand look different or similar depending on where it is found?

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)
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future.	**ESS2.A: Earth's Materials and Systems** • The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. **ESS2.C: The Roles of Water in Earth's Surface Processes** • Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.	**Scale Proportion and Quantity** • Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.

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.)

Class discussion reviewing concepts previously taught. This includes plate tectonics, Pangaea, rock cycle.

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.

-The learner will identify source rocks in different types of sand.
-The learner will connect the source rock to the event that created it.
-The learner will search geologic events to identify to what degree the sands were rounded and sorted.

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).

Distribution of Sand Student Lab Packets
Science of Sand photographs: https://scienceofsand.info

Lesson Plan Template (Part B)

Grade and Subject	8th Grade General Science	**Instructional Time** (min.)	53 min.
Lesson Title (Topic)	What Is Sand's Story?		
Anchoring Phenomenon (copy from 1.b)	Rock cycle, tectonic processes		
Driving Question (copy from 1.c)	Why does sand look different or similar depending on where it is found?		

Lesson Overview

Lesson Summary (description)	**Lesson Topics and Student Learning Goals** (copy from 1.f)
Students will explore microphotographs of sand samples from around the world, noting observations of similarities and differences. They will use these similarities and differences to research where these sands might be found, connecting the sand's qualities to that area's geologic history.	-The learner will identify source rocks in different types of sand. -The learner will connect the source rock to the event that created it. -The learner will search geologic events to identify to what degree the sands were rounded and sorted.

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)
Distribution of Sand Student Lab Packets Science of Sand photographs: https://scienceofsand.info	Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future.
	ESS2.A: Earth's Materials and Systems The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.
	ESS2.C: The Roles of Water in Earth's Surface Processes Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.
	Scale Proportion and Quantity Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small

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 may not understand that sand can be carried great distances. Students may not understand that sand can come from any type of rock.	Sorting Rounding

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.)
Sand Distribution Student Lab Packets	One copy of sand sample cards, color printed	Chromebook per group to research places if needed

Supporting Information	
References (links to cite sources of data, images, websites, etc.)	**Background Reading** (for teachers and/or students)
Scienceofsand.info for pictures of microphotographs	Reading on lab worksheet

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

Elaborate: *Students deepen and expand their understanding by applying their understanding in new contexts.*

APPLY Learning: Utilize information in new ways.

- Extends students' understanding or applies what they have learned in a new setting
- Students use the information they have gained to propose solutions and extend their learning to new situations
- Teacher supports students in broadening their understanding and extend ideas to other situations so they can draw broader conclusions beyond their experiment or investigation

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

Why does sand look different or similar depending on where it is found?

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.

1. Teacher will facilitate discussion to review main concepts of tectonic plates, rock cycle, and specifics of weathering and erosion.
2. Students will complete the Distribution of Sand Student Lab in groups. Teacher can decide to read the first page together or have students read at tables. Each group should have their own copy of the sand sample cards to make their observations.
3. When groups have completed, complete formative assessment.

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

If time, have one person from a group move to another group to share their CER. Teacher will rotate and listen.

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

CER within packet