


Lesson Planning Guide

Part A
Develop Lesson Overview

Prepare lesson plan foundation:


- Select PEs/standards
- Connect to anchoring phenomenon
- Ask driving question
- Unpack PEs/standards
- Identify lesson topics and resources



Part B
Create Lesson Plan

Develop lesson plan:


- Lesson summary and learning goals
- Compile lesson logistics
- Select 5E(s) to guide instruction
- Complete lesson plan details



Part C
Lesson Instruction and Reflection

Review and revise lesson plan:

- Keep notes and modify lesson during instruction, as needed
- Review and revise lesson post-instruction



Key

Next Generation Science Standards (NGSS)
PE = Performance Expectation
SEP = Science and Engineering Practices
DCI = Disciplinary Core Ideas
CCC = Crosscutting Concepts
and
5Es = The 5E Instructional Model

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.

2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties

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](#).

Students will be provided with one sheet printouts that each include information about different sand types. These “sand guides” will include a picture of the general location of the sand, the name of the location along with a map pinpointing the area. The one-pager will include a microphotograph of the sand crystals. Additionally, it will name the types of sand crystals present in the photograph. Each student will be given a tray and encouraged to recreate the sand using full size rocks of the same type to represent the crystals.

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 are the types of rocks that make-up different beach sands around the world? Describe the different characteristics of each parent rock.

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)
<p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</p> <ul style="list-style-type: none"> • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) 	<p>PS1.A: Structure and Properties of Matter</p> <ul style="list-style-type: none"> • A great variety of objects can be built up from a small set of pieces. (2-PS1-3) 	<p>Patterns</p> <ul style="list-style-type: none"> • Patterns in the natural and human designed world can be observed. (2-PS1-1) <p>Energy and Matter</p> <ul style="list-style-type: none"> • Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)

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.)

Teacher driven show and tell with various rock types asking the students to provide descriptive for the rocks various physical attributes. This will gauge the students vocabulary in describing physical features: shiny, gritty, smooth, 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 be able to:

- Identify and name characteristics for different rock types
- Determine the component parts of sand types and recreate the samples visually
- Explore the textures of various rock types and the sand samples they create

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).

- Science of Sand website - <https://www.scienceofsand2.info/>
 Teacher designed one-page sand sample handouts
 Regular sized rocks divided by type into different buckets
 Lunch tray for student to recreate the sand sample



Lesson Plan Template (Part B)

Grade and Subject	2 nd & 3 rd Grade	Instructional Time (min.)	3*30 minute classes
Lesson Title (Topic)	Let's Make Sand		
Anchoring Phenomenon (copy from 1.b)	Students will be provided with one sheet printouts that each include information about different sand types. These "sand guides" will include a picture of the general location of the sand, the name of the location along with a map pinpointing the area. The one-pager will include a microphotograph of the sand crystals. Additionally, it will name the types of sand crystals present in the photograph. Each student will be given a tray and encouraged to recreate the sand using full size rocks of the same type to represent the crystals.		
Driving Question (copy from 1.c)	What are the types of rocks that make-up different beach sands around the world? Describe the different characteristics of each parent rock.		
Lesson Overview			
Lesson Summary (description)	Lesson Topics and Student Learning Goals (copy from 1.f)		

<p>Day 1: A teacher driven show and tell of various rock types. The teacher will show each rock on at a time and ask for words to describe its physical characteristics. The teacher can also guide the class with suggestions including: glassy, smooth, sandy, gritty, grey, clear, etc.</p> <p>Day 2: Students will each be given a tray with a rock form each of the each of the various groups. The teacher will lead the students as they explore the physical texture of each rock and ask them to use the vocabulary words to describe each rock.</p> <p>Day 3: Students will be provided a one-sheet sand sample and a tray. They will then each be allowed to go to the “rock bar” and recreate the sand sample by selecting rocks similar to the crystals they see in the photo. After they’ve each filled their tray, they will describe the physical characteristics of their sand sample.</p>	<p>Students will be able to:</p> <ul style="list-style-type: none"> - Identify and name characteristics for different rock types - Determine the component parts of sand types and recreate the samples visually - Explore the textures of various rock types and the sand samples they create
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Lesson Resources Aligned with Standards

<p style="text-align: center;">Lesson Resource (copy from 1.g, sequenced with titles and links)</p>	<p style="text-align: center;">Resource Standards Alignment (copy from 1.d, standards notated, link optional)</p>
<p>Science of Sand website - https://www.scienceofsand2.info/</p>	<p>PS1.A: Structure and Properties of Matter</p>
<p>Teacher designed one-page sand sample handouts</p>	
<p>Regular sized rocks divided by type into different buckets</p>	
<p>Lunch tray for student to recreate the sand sample</p>	

Teacher Preparation

<p style="text-align: center;">Student Misconceptions (potential student ideas that are problematic when engaging in the lesson)</p>	<p style="text-align: center;">Scientific Terminology (vocabulary named once students “figure out” concepts of lesson)</p>
<p>Students do not realize that sand is made-up of weathered and eroded rocks.</p> <p>Students do not understand that large size rocks and small crystals of the rocks have the same properties</p>	<p>Weather, Erosion, Properties</p>

Materials Preparation



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Student Needs (activity sheets, data packet, etc.)	Group Needs (lab equipment, group data packets, etc.)	Safety & Technology Needs (unsafe materials, websites cued, etc.)
Vocabular list of rock and sand physical descriptive words	<ul style="list-style-type: none"> - Teacher prepared sand sample one-sheets - Buckets of rocks - Trays for each student 	ScienceofSand.info
Supporting Information		
References (links to cite sources of data, images, websites, etc.)	Background Reading (for teachers and/or students)	
ScienceofSand.info	ScienceofSand.info	

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 do the rocks get so small? How many sand crystals make-up one rock? How long does it take to turn a rock into sand crystals?

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 provide a show and tell of various rock types and introduce vocabulary words to describe their physical characteristics
- Teacher will provide each student with a sample of various rocks so they can physically interact and explore the characteristics of different rocks
- Students will recreate sand sample from a visual one-pager by assembling different rocks into a tray

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

Show and Tell quiz so students can use the new physical descriptive words to identify different rock types.

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

Sand is made-up of weathered and eroded rocks.
Learning the definitions and examples of stone related physical characteristics.
Sand in different areas of the world is made-up of different rocks.

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

What is all sand not the same? What are different rocks in different sand types? Where do the rocks come from? How does erosion and weathering work?

AND/OR

Explore: Students participate in activities to explore questions related to a concept.

BUILD Knowledge: Learn the science behind concepts.

- Students explore the concepts with others to develop a common set of experiences
- Provides students with one or more actual experiences
- Offers opportunities for creative thinking and skills development
- Students make and record observations and ideas, make connections, and ask questions
- Students usually work in groups
- Teacher acts as coach or facilitator in student-led investigations

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

How do rocks become sand crystals? How long does it take to make rocks into sand? Why is sand different in different places?

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.

Day 1:

A teacher driven show and tell of various rock types. The teacher will show each rock on at a time and ask for words to describe its physical characteristics. The teacher can also guide the class with suggestions including: glassy, smooth, sandy, gritty, grey, clear, etc. This should be approximately 30 minutes. The Teacher will guide the student answer response by prompting different students for answers.

Day 2: Students will each be given a tray with a rock from each of the each of the various groups. The teacher will lead the students as they explore the physical texture of each rock and ask them to use the vocabulary words to describe each rock. This will take approximately 30 minutes. The teacher will prompt each student to focus on one rock at a time. During this time they will explore the physical attributes of each rock.

Day 3: Students will be provided a one-sheet sand sample and a tray. They will then each be allowed to go to the “rock bar” and recreate the sand sample by selecting rocks similar to the crystals they see in the photo. After they’ve each filled their tray, they will describe the physical characteristics of their sand sample. This will take between 30 minutes – 1hour depending on class size. Each student must review their hand out sheet and visual the different rock types in the sand. They will then each be givne a few minutes to remake their sand at the “rock bar”. They will then each describe the sand to their teachers using the physical vocabulary words.

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

The teacher will ask each student to describe their sand and collection of rocks on day three. Additionally, the teacher will conduct a verbal show and tell quiz by holding up each rock and asking students to describe its physical characteristics.

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

Students will have learned that rocks are transformed into sand.
Students will have learned that each rock type has different characteristics.
Students will have learned basic scientific physical characteristic vocabulary words.

Students will have learned that sand in different parts of the world have different parent rock types.

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

What is all sand not the same? What are different rocks in different sand types? Where do the rocks come from? How does erosion and weathering work?



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Step 4: Lesson Instruction and Reflection

Lesson Notes During Instruction

- What modifications (instruction, timing, etc.) were made or are needed for the lesson, activities, or resources?
- Which parts of the lesson, activities, or resources were or need to be changed?
- How effective (or ineffective) were the lesson, activities, or resources for student learning?

Review and Revise Post-Instruction

- Which parts of the lesson were a success?
- What were some challenges about the lesson?
- How could the lesson be changed or improved?