

Lessons 1–2

Transformation of Surtsey

Prepare

Throughout this module, students explore the dynamic nature of Earth’s land. Lesson 1 introduces students to the module anchor phenomenon: the transformation of the island of Surtsey. Students wonder what land is and how the natural features of their local area compare with those of Surtsey. In Lesson 2, students read *An Island Grows* by Lola M. Schaefer and Cathie Felstead (2006), which depicts the volcanic origins of islands. Students then use patterns from their observations of Surtsey’s natural features to draw a model of the island’s formation. Next, students capture their learning in an anchor model that begins to explain changes to Surtsey’s land. Students update the anchor model throughout the module to reflect their growing knowledge of how land changes. Students also use their observations to generate questions about changes to land on a driving question board, which will guide their exploration throughout the module as they work to answer the Essential Question:

How can the island of Surtsey change shape over time?

Concept 1: The Composition and Shape of Land

Focus Question

How can we describe land?

Phenomenon Question

What is happening to the island of Surtsey?

Student Learning

Knowledge Statement

Land can be described by its natural features.

Objectives

- Lesson 1: Observe land areas and describe their natural features.
- Lesson 2: Develop an anchor model that begins to explain the formation and transformation of Surtsey.

Standards Addressed

		Lesson 1	Lesson 2
Texas Essential Knowledge and Skills: Content			
3.5C	Predict, observe, and record changes in the state of matter caused by heating or cooling such as ice becoming liquid water, condensation forming on the outside of a glass of ice water, or liquid water being heated to the point of becoming water vapor. (Introduced)	●	●
3.7B	Investigate rapid changes in Earth's surface such as volcanic eruptions, earthquakes, and landslides. (Introduced)		●
Texas Essential Knowledge and Skills: Investigation and Reasoning			
3.2A	Plan and implement descriptive investigations, including asking and answering questions, making inferences, and selecting and using equipment or technology needed, to solve a specific problem in the natural world.	●	●
3.2B	Collect and record data by observing and measuring using the metric system and recognize differences between observed and measured data.		●
3.2C	Construct maps, graphic organizers, simple tables, charts, and bar graphs using tools and current technology to organize, examine, and evaluate measured data.		●
3.2D	Analyze and interpret patterns in data to construct reasonable explanations based on evidence from investigations.	●	●
3.2F	Communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion.		●
3.3A	Analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing.	●	●

3.3B	Represent the natural world using models such as volcanoes or the Sun, Earth, and Moon system and identify their limitations, including size, properties, and materials.	●	●
3.3C	Connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.		●
3.4	Collect, record, and analyze information using tools, including cameras, computers , hand lenses, metric rulers, Celsius thermometers, wind vanes, rain gauges, pan balances, graduated cylinders, beakers, spring scales, hot plates, meter sticks, magnets, collecting nets, notebooks , and Sun, Earth, and Moon system models; timing devices; and materials to support observation of habitats of organisms such as terrariums and aquariums.	●	●
English Language Proficiency Standards			
4A	Learn relationships between sounds and letters of the English language and decode (sound out) words using a combination of skills such as recognizing sound-letter relationships and identifying cognates, affixes, roots, and base words.	●	●

Materials

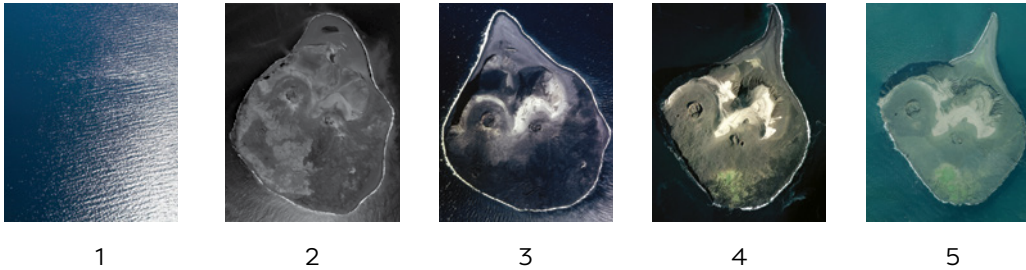
		Lesson 1	Lesson 2
Student	Science Logbook (Lesson 1 Activity Guides A and B)	●	
	Science Logbook (Lesson 2 Activity Guides A and B)		●
Teacher	Surtsey Photographs (Lesson 1 Resource A)	●	
	Surtsey Photographs by Year (Lesson 1 Resource B)	●	●
	Inflatable globe (1), small stickers (2)	●	
	Life on Surtsey: Iceland's Upstart Island (Burns 2017)		●
	An Island Grows (Schaefer and Felstead 2006)		●
Preparation	Inflate the inflatable globe.	●	
	Identify a nearby outdoor location where students can describe the features of their local area.	●	
	Access Google Earth™ mapping service: http://phdsci.link/1310 .		●
	Access Surtsey three-dimensional interactive model from the Icelandic Institute of Natural History: http://phdsci.link/1584 .		●

Lesson 1

Objective: Observe land areas and describe their natural features.

Launch 10 minutes

Show students the photographs of Surtsey (Lesson 1 Resource A) without revealing that they all show the same location on Earth. Inform students that these are aerial pictures, which means they were taken from high in the air. 🧑🧑🧑



Tell students to record in their Science Logbooks (Lesson 1 Activity Guide A) what they notice and wonder about the group of pictures.

Agenda

Launch (10 minutes)

Learn (30 minutes)

- Define Land (5 minutes)
- Explore Natural Features of Local Land (25 minutes)

Land (5 minutes)




English Language Development

Students will encounter the term *aerial* throughout the module. Providing the Spanish cognate *aéreo* may be helpful. Explain that *aerial* comes from the Latin root *aeri*, which means “of the air.” Consider asking students to share any experiences they have had with aerial views, such as the view from a drone or an airplane (4A).

Sample student response:

I Notice	I Wonder
<ul style="list-style-type: none"> I notice an island in all the pictures but one. 	<ul style="list-style-type: none"> Where did the island come from?
<ul style="list-style-type: none"> Some parts are light and some are dark. 	<ul style="list-style-type: none"> Is the light part sand?
<ul style="list-style-type: none"> I see what looks like a big round dent in the island. 	<ul style="list-style-type: none"> How did a big dent get there?
<ul style="list-style-type: none"> Only two of the islands in the pictures are green. 	<ul style="list-style-type: none"> Do some of the islands have plants?
<ul style="list-style-type: none"> The island looks like it's changing shape. 	<ul style="list-style-type: none"> Are all the pictures of the same island?

Have students share their observations and questions. Reveal that all the pictures are of the same location: an island named Surtsey.  Explain that an **island** is an area of land surrounded by water on all sides.




English Language Development

Introduce the term island explicitly by using strategies such as these:

- Pronounce the word *island* and have students repeat it.
- Pronounce the word in syllables (i.e., *is-* and *-land*) and then repeat the full word.
- Point to the photographs of Surtsey and draw attention to the water surrounding it.
- Provide the Spanish cognate for *island* (*isla*).

After introducing this and other important terms, provide scaffolds for English learners as they use the terms when speaking, writing, and investigating. For more information, see the English Language Development section of the Implementation Guide (4A).

Explain that each picture shows Surtsey at a different point in time. Then display the photographs with the years in which they were taken (Lesson 1 Resource B). Allow students time to add new observations and questions to the notice and wonder charts in their Science Logbooks (Lesson 1 Activity Guide A). 



English Language Development

Students will encounter the term location throughout the module. Explain that a location is a specific place where something is found. Students may benefit from identifying various locations at different scales and in relation to other places. For example, a gym and a cafeteria have specific locations within a school, and a school has a specific location within a community.




Content Area Connection: Mathematics

Consider providing students with a timeline of Surtsey's transformation to support their understanding of timescales and the period between the first photograph and the last photograph.

Sample student response:

I Notice	I Wonder
<ul style="list-style-type: none"> ▪ <i>The island wasn't there in 1962, but it was there in 1967.</i> 	<ul style="list-style-type: none"> ▪ <i>How can an island just appear?</i>
<ul style="list-style-type: none"> ▪ <i>It looks like parts of the island got skinnier through the years.</i> 	<ul style="list-style-type: none"> ▪ <i>Why is the island a different shape now?</i>

Have students Think–Pair–Share  and circle on their charts one or two questions they would most like to investigate about Surtsey. Ask pairs to share their selected questions with the class. Identify categories or themes among the questions, and use these to develop the Phenomenon Question

What is happening to the island of Surtsey?

► **What information could help us describe what is happening to Surtsey?**

- *I think we need to look at more pictures of Surtsey.*
- *Maybe we could figure out where islands come from.*
- *We could learn what the light and dark parts of the island are.*

Highlight student responses that refer to land and its composition. Tell students that they will take a closer look at land to build an understanding of what land is and how to describe it.




Teacher Note

Think–Pair–Share is a collaborative conversation routine in which students respond to a question or prompt by discussing their ideas with a peer before sharing the response with the class. For more information, see the Instructional Routines section of the Implementation Guide.

Learn 30 minutes



Define Land 5 minutes

Hold up an inflatable globe for students to observe. Explain that the globe is a ball-shaped model of Earth. 

▶ **What different parts of Earth do you see on this globe?**

- *The blue part is water.*
- *The parts that aren't water are land.*

Point out the location of the school on the globe and place a sticker over the area. Do the same for the location of Surtsey, and explain that Surtsey is located off the coast of the country of Iceland.

Invite students to pass the globe around the classroom by gently tossing it to one another.  Instruct students who catch the globe to point to an area they think shows land. 

After several tosses, have students share what they noticed about the globe and the places they identified as land.

▶ **How did you decide which parts of the globe were land?**

- *You stand on land, but you can't stand on water, so I picked a place that wasn't water.*
- *I know where we live is land, so I picked a place that looked the same.*

▶ **What information do you think a globe gives us about land?**

- *We could see that some places of land we pointed to were connected to each other.*
- *It shows us that some areas of land are really big and some are really small.*

Again, point out the sticker placed over students' local land area and the sticker on Surtsey.

▶ **Why is it difficult to describe land using only a globe?**

- *The globe shows only where land is and what is around it, like water.*
- *We can't tell if one place looks like another in real life.*



English Language Development

Students will encounter the term globe throughout the module. Providing the Spanish cognate *globo* may be helpful. Consider showing students a globe if one is available (4A).



Teacher Note

In this module, students build knowledge about mapping and the location of water and land on Earth. As students continue to explore these ideas, encourage them to look for specific physical features, such as islands and mountains, to further develop their understanding of what maps can represent and how to use them.



Differentiation

If students are limited in their abilities to toss or catch the inflatable globe, consider having them pass the globe by rolling it or handing it to one another.



Teacher Note

In Level 2, students describe ice as a solid material (2.5A). Students may categorize ice as land because both substances are solid. Very thick ice, such as glacial ice, is a type of rock; therefore, it is included as a solid part of land. However, not all ice on Earth meets this criterion. For example, ice covering a pond in winter or a floating iceberg is not considered land. As needed, provide students with relevant information about ice and land as they explore the similarities and differences.


Explain that the globe shows the locations and overall shapes of land on Earth but does not provide enough information to describe land areas in detail. Explain to students that **land** is the solid material that covers part of Earth's surface. Tell students that they will have the opportunity to make closer observations of land as they explore the land near their school.



English Language Development

Introduce the term *land* explicitly. Have students locate land areas on the globe and contrast them with water areas. In Level 2, students learned that a *surface* is the top or outer layer of something. Revisit the Spanish cognate for *surface* (*superficie*) if necessary. Invite students to identify different solid surfaces around the classroom (4A).

Explore Natural Features of Local Land 25 minutes

Take the class outside to a location where students can make observations of their local land area.  Have students record their observations by writing or drawing in their Science Logbooks (Lesson 1 Activity Guide B), and then return to the classroom.

Invite students to share their observations. 



Work as a class to refine students' observations to those that are natural features. Tell students that a **natural feature** is a unique part of an area that is not made by humans.



English Language Development

Introduce the term *natural feature* explicitly. As students discuss their observations, English learners may benefit from additional scaffolding in the form of sentence frames.

- I think _____ is a natural feature because _____.
- I don't think _____ is a natural feature because _____.

Record the natural features students observed on a class list. Remind students that land is the solid material that covers part of Earth's surface, and work with students to identify and circle the natural features on the list that can be considered part of Earth's land. Title the list Land Features, and place it in a location where students can easily refer to it.  



Teacher Note

If it is not possible to take the class outside, have students make observations through a window. Alternatively, provide students with photographs of the land around their school. If neither option is possible, consider introducing Google Earth™ mapping service and zooming in on student's locality.



Teacher Note

The natural features of a given area depend on regional conditions. Consider preparing a list of the natural features of students' locality ahead of time to use as a guide for this discussion.



Teacher Note

In Lesson 5, students add other natural features to this list. Be sure to circle any new land features added to the list.



Check for Understanding

As students discuss natural features that they believe can be considered part of Earth's land, encourage them to reflect on the definition of land. Listen for students to refer to Earth's solid parts or to describe the shapes of its solid parts. At this point in the module, students may view plants as part of Earth's land rather than organisms that grow in and on land (3.3A). Upcoming lessons will address this distinction.

Sample class list:



Land 5 minutes

Refer to the class list of land features, and encourage students to think about how observing these features could help them answer the Phenomenon Question **What is happening to the island of Surtsey?**

- ▶ How do the natural features of the land where we live compare with Surtsey's natural features?
 - *I think Surtsey is probably different, but I'm not sure how.*
 - *Surtsey could have some of the parts we have, like hills.*

Tell students that in the next lesson, they will compare their local land to Surtsey as they explore the island in more detail.

Optional Homework

Students record observations of the natural features of land they see on their way to and from school. Students then share their observations with the class.