

Earth's Systems

Unit Planning Team:

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How is water distributed throughout the Earth?

How do the Earth's systems interact with each other?

How do humans protect Earth's resources?

Earth's Systems		
Students who demonstrate understanding can:		
5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; or the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]		
5-ESS2-2 Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]		
5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.		
The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. <ul style="list-style-type: none"> Develop a model using an example to describe a scientific principle. (5-ESS2-1) 	ESS2.A: Earth Materials and Systems <ul style="list-style-type: none"> Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1) 	Scale, Proportion, and Quantity <ul style="list-style-type: none"> Standard units are used to measure and describe physical quantities such as weight, and volume. (5-ESS2-2)
Using Mathematics and Computational Thinking Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. <ul style="list-style-type: none"> Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2) 	ESS2.C: The Roles of Water in Earth's Surface Processes <ul style="list-style-type: none"> Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2) 	Systems and System Models <ul style="list-style-type: none"> A system can be described in terms of its components and their interactions. (5-ESS2-1, 5-ESS3-1)
Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. <ul style="list-style-type: none"> Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1) 	ESS3.C: Human Impacts on Earth Systems <ul style="list-style-type: none"> Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1) 	Connections to Nature of Science Science Addresses Questions About the Natural and Material World <ul style="list-style-type: none"> Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1)

Earth's Systems

Background knowledge videos:

ESS2A - Earth Materials & Systems

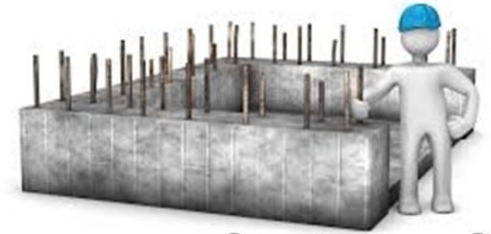
ESS2C - Role of Water on Earth

ESS3C - Human Impacts on Earth Systems

These videos are designed to assist in providing background knowledge with the associated DCI. The information in the videos follows the progression through high school.

Prior to 5th grade, students should have knowledge, understanding of, and experiences with the following ideas:

- ★ Wind and water can change the shape of the land.
- ★ Water is found in the ocean, rivers, lakes and ponds.
- ★ Water exists in solid ice and in liquid form.
- ★ Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.
- ★ Rainfall helps to shape the land and affects the types of living things found in a region.
- ★ Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.



Foundational Knowledge

With the implementation of new standards, students may not have had opportunities to engage in these foundational understandings and ideas before 5th grade. You may need to provide opportunities for students to experience these ideas as you move forward.

How is water distributed throughout the Earth?

How do the Earth's systems interact with each other?

How do humans protect Earth's resources?



Big Ideas

- ★ Earth's major systems are the:
 - Geosphere - solid and molten rock, soil and sediments
 - Hydrosphere - water and ice
 - Atmosphere - air
 - Biosphere - living things, including humans
- ★ These systems interact in multiple ways to affect Earth's surface materials and processes.
- ★ The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate.
- ★ Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

How is water distributed throughout the Earth?

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Big Ideas

- ★ Nearly all of the Earth's available water is in the ocean.
- ★ Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.
- ★ Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space.
- ★ Individuals and communities are doing things/can do things to help protect Earth's resources and environments.

Earth's Systems

Students who demonstrate understanding can:

5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; or the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]



Possible student misconceptions about **landforms**: (ESS2-1)

Misconception: Mountains and other landforms that they see today have always been on Earth.

Earth's surface is always changing. Wind, water, and glaciers have played major roles in creating unique landforms around us.

Misconception: All rivers flow from north to south.

Rivers always flow from higher elevations to lower elevations regardless of compass direction.

Misconception: Erosion happens quickly.

While erosion can happen quickly during a storm or rockslide, more often than not weathering, erosion, and deposition occur so slowly that you can hardly tell they are happening.

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

ESS2.C: The Roles of Water in Earth's Surface Processes

- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

ESS3.C: Human Impacts on Earth Systems

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

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Possible student misconceptions about **water in the atmosphere**: (ESS2-1)

Misconception: Humidity is liquid water.

Humidity is a measure of the amount of water vapor in the air. Water vapor is an invisible gas.

Misconception: Clouds are composed of water vapor.

Clouds are mostly made of tiny water droplets and/or tiny ice crystals.

Disciplinary Core Ideas
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ESS3.C: Human Impacts on Earth Systems <ul style="list-style-type: none">Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

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Possible Student Misconceptions about the waters of the Earth: (ESS2-1; ESS2-2)

Misconception: Groundwater flows in vast underground lakes.

Groundwater fills billions of tiny spaces in rocks, like the pores of a sponge.

Misconception: Groundwater and surface water are separate systems.

All water is connected via the water cycle and gets recycled again and again.

Misconception: Earth is producing new water all the time.

At any given time Earth contains the same amount of water that it has always contained. All water is connected via the water cycle and gets recycled again and again.

Misconception: Associate north with “up” on a map and south with “down” on a map might imagine all rivers flowing north to south.

Rivers flow downhill, pulled by gravity. There are countless examples of rivers that flow northward, including the Nile.

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

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ESS2.C: The Roles of Water in Earth's Surface Processes

- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

ESS3.C: Human Impacts on Earth Systems

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

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Possible Student Misconceptions about the Water Cycle: (ESS2-1; ESS2-2)

Misconception: Once water flows to the ocean, it stops moving.

It can flow to different parts of the world within the ocean as currents before it is evaporated.

Misconception: Plants and animals consume water but do not give it off.

Some water vapor enters the atmosphere through transpiration and breathing. Animals eventually excrete most of the water they consume or absorb.

Misconception: Water evaporates only from the oceans.

It evaporates from inland bodies of water and from the ground as well.

Misconception: Water cycles in a two-dimensional way, only in one direction, from one specific place to another, and through that exact cycle endlessly.

The physical paths of water molecules during the water cycle are very complex, and there are an endless number of possible paths that a water molecule may take.

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

ESS2.C: The Roles of Water in Earth's Surface Processes

- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

ESS3.C: Human Impacts on Earth Systems

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

Earth's Systems

Students who demonstrate understanding can:

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.



Possible Student Misconceptions about Earth's Resources and Alternate sources of energy: (ESS3-1)

Misconception: Energy, like a natural resource, is a thing.

Energy is the capacity of a system to do work, most often making something move, and is not a material substance like coal that has weight.

Misconception: Energy is not measureable and quantifiable.

Energy, like other quantities such as mass and length, can be quantified and measured. A gallon of gas contains a given amount of energy and that amount can be measured. Common units of energy include the BTU, joule, and watt-hour.

Misconception: Energy transformations involve only one form of energy at a time.

When energy is transformed, it changes its form. For example, energy of motion is changed into heat energy when a car tire skids on pavement and electrical energy is changed into sound energy with a radio.

Misconception: All the energy contained in a natural resource such as coal can be used for practical purposes like making electricity, forgetting energy losses.

When extracting energy from natural resources, not all of the energy is available to do useful work; some of the energy ends up as heat or other forms of unusable energy.

Disciplinary Core Ideas
ESS2.A: Earth Materials and Systems <ul style="list-style-type: none">Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)
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Discovery Education Science Techbook Units



UNIT: **The Changing Earth**

[View Unit](#) ▶

CONCEPT:

Waters of the Earth

Water Cycle

Water in the Atmosphere

Formation of Landforms



UNIT: **Protecting The Earth**

[View Unit](#) ▶

CONCEPT:

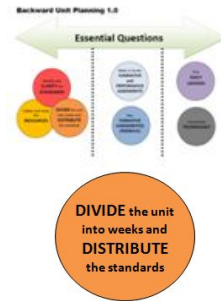
Alternative Energy Sources



**Gather and
study the
RESOURCES**

Week 1

Engage



Foundation Standards:

- Wind and water can change the shape of the land. (2-ESS1-1)
- Water is found in the ocean, rivers, lakes and ponds. (2-ESS2-2)
- Water exists in solid ice and in liquid form. (2-ESS2-3)

Grade Level Standard: 5-ESS2-2 Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

Instruction

Week 1 Questions:

- A. Where is Earth's water?
- B. How does water change the Earth?

(see following slides for example of KLEWS and CER)

Engage:

1. [Land and Water Globe Toss](#) (do as a class; keep a class totals chart)
2. [Earth's Water: A Drop in Your Cup](#) (If possible, do "alternative procedure, so students are investigating in groups)

Common Misconceptions

- Students might think groundwater flows in vast underground lakes. In fact, groundwater fills billions of tiny spaces in rocks, like the pores of a sponge.
- Students might think groundwater and surface water are separate systems. In fact, all water is connected via the water cycle and gets recycled again and again.
- Many students believe that erosion happens quickly. In reality, while erosion can happen quickly during a storm or rockslide, more often than not weathering, erosion, and deposition occur so slowly that you can hardly tell they are happening.

Resources for question A:

[Where is the Earth's Water Located?](#) article
[Land or Water?](#) Assessment Probe (intranet protected page)

Resources for question B:

["Slow Land Changes" BrainPop Jr.](#)
[Grand Canyon Virtual Field Trip](#)

Vocabulary

Weathering, erosion, ocean, river, lake, pond, solid, liquid

Possible KLEWS Chart for Week 1 Question B

Guiding Question: How does water change the Earth?



K	L	E	W	S
<p>(Varies by class.)</p>	<p>Wind and water change the shape of the land.</p> <p>(Not necessary to limit to information above.)</p>	<p>Rivers can wear away land to form canyons.</p> <p>Air and water turn copper green.</p> <p>Water softens limestones to form caves.</p> <p>(Not necessary to limit to information above.)</p>	<p>(Varies by class.)</p>	<p>Weathering (rocks and minerals break down in nature)</p> <p>Erosion (rocks and soil carried away by wind, water, and other forces)</p> <p>(Not necessary to limit to information above.)</p>



See possible student misconceptions on slides 7-10 for more information.

Possible SCIENTIFIC EXPLANATION for Week 1 Question B

Guiding Question: How does water change the Earth?

CLAIM Statement about the results of an investigation

- * One-sentence answer to the question you investigated.
- * It answers, what can you conclude?
- * It should not start with yes or no.
- * It should describe the relationship between dependent and independent variables.

EVIDENCE Scientific data used to support the claim

- * Evidence must be:
 - Sufficient: use enough evidence to support the claim
 - Appropriate: use data that support your claim
 - Qualitative (using the senses), quantitative (numerical), or a combination of both

REASONING Ties together the claim and the evidence

- * Shows how or why the data count as evidence to support the claim
- * Proves the justification for why this evidence is important to this claim
- * Includes one or more scientific principles that are important to the claim and evidence..

Water changes the Earth shape in many different ways. Rivers can wear away land to form canyons, and water can soften limestone to form caves. Earth's surface is always changing. Wind, water, and glaciers have played major roles in creating landforms around us.



DIVIDE the unit
into weeks and
DISTRIBUTE
the standards

Foundational Standards:

- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)
- Rainfall helps to shape the land and affects the types of living things found in a region. (4-ESS2-1)
- Water, ice, wind, living organisms, and gravity break rock, soils, and sediments into smaller particles and move them around. (4-ESS2-1)

Grade Level Standard: 5-ESS2-1 The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

Instruction

Week 2 Questions:

- A. What is climate?
- B. How does climate affect Earth's biotic and abiotic factors?

Common Misconceptions

- Students may believe that the mountains and other landforms that they see today have always been on Earth. In reality, Earth's surface is always changing. Wind, water, and glaciers have played major roles in creating unique landforms around us.
- Some students may believe that all rivers flow from north to south. Actually, rivers always flow from higher elevations to lower elevations regardless of compass direction.

Resources for question A:

[Coldest Winter Ever](#) Assessment Probe (intranet protected page)

[Youtube: Weather vs. Climate: Crash Course Kids #28.1](#)

DE Board: [Weather vs. Climate](#)

Resources for question B:

DE Video Clip: [Polar Bears Threatened](#)

DE Video Clip: [Rising Sea Levels at Tuvalu](#) *

**Teacher note: some of your students who have come from the Marshall Islands might relate to this video.*

Vocabulary

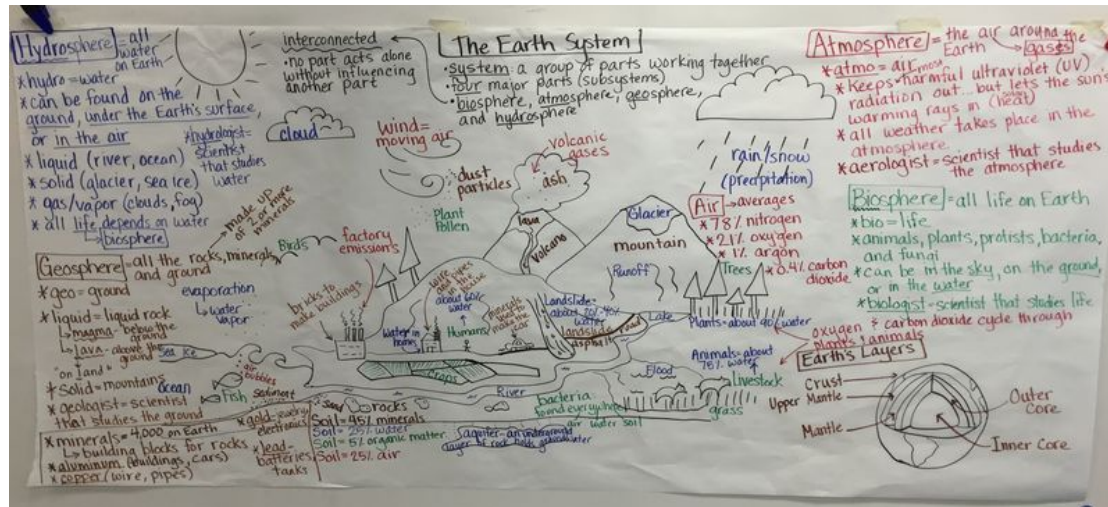
Climate, sediment

Weeks 3 & 4 - Introduction to developing a model

Standard: 5-ESS2-1 Develop a model using an example to **describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** [Clarification Statement: Example could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; or the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: **Assessment is limited to the interactions of two systems at a time.**]

The overarching goal for this standard is for students to be able to describe how the spheres interact through a model.

You will be working toward creating a model similar to this over the next few weeks:



GLOBE.gov has some lessons and a storybook that introduce these ideas in a kid-friendly way:

[Earth Systems - Overview and Storybook Learning Activities](#)

[Biomes and Ecosystems](#) is another great resource for working with these ideas. Start with **TASK ONE**.

Follow the Weeks 3 & 4 plans to fully develop these ideas with your students.

Week 3

Explore & Explain

Standard: 5-ESS2-1 Develop a model using an example to **describe ways the geosphere, biosphere**, hydrosphere, and/or atmosphere **interact**. [Clarification Statement: Example could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; or the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

Instruction

Week 3 Questions:

- A. What is geosphere?
- B. What is biosphere?
- C. How do the geosphere and biosphere interact?

Introduction to Earth's Systems - the 4 systems are **interconnected**

Watch videos and begin to take notes on the two sub-systems (Geosphere and Biosphere) See image on the previous slide.

Possible Formative assessment: [TASK TWO](#)- Display the 4 images. Students will identify the parts of the geosphere and biosphere in each image and fill out the table [Student Reproducible: The 4 Spheres](#)

[DE Intro to Earth Systems](#)

Resources for question A:

[What Is the Inside of Earth Like?](#) Assessment Probe
(intranet protected page)

[DE Intro Video](#)

Resources for question B:

[DE Intro Video](#)

Resources for question C:

[Geosphere/Biosphere Interactions](#)
[Crash Course Kids Video - Geosphere & Biosphere](#)

Vocabulary

Geosphere, biosphere,

Week 4

Explore & Explain

Standard: 5-ESS2-1 Develop a model using an example to **describe ways the** geosphere, biosphere, **hydrosphere, and/or atmosphere interact**. [Clarification Statement: Example could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; or the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

Instruction

Week 4 Questions:

- A. What is the hydrosphere?
- B. What is the atmosphere?
- C. How do the hydrosphere and atmosphere interact?

DE: [Water in the Atmosphere](#)

DE: [Model the Water Cycle](#) & [Student Investigation Sheet](#) Note: This is focusing more on the idea that there is water in the atmosphere ([Youtube Video](#) “Cloud in a Jar”)

Possible Formative assessment: [TASK TWO](#)- Display the 4 images. Students will revisit the images to identify the parts of the hydrosphere and atmosphere in each image and fill out the table [Student Reproducible: The 4 Spheres](#)

Resources for question A:

[Where is Most of the Freshwater?](#) Assessment probe (intranet protected page)
[DE Animation](#)

Resources for question B:

DE Board: [The Atmosphere](#)
DE Interactive: [The Atmosphere](#)

Resources for question C:

[Where Did the Water in the Puddle Go?](#) Assessment Probe (intranet protected page)
[Crash Course Kids Video - Hydrosphere & Atmosphere](#)
DE Interactive: [Water in the Atmosphere](#)

Vocabulary

Hydrosphere, atmosphere

Standard: 5-ESS2-2 Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

Instruction

Week 5 Question:

- How is water distributed throughout the Earth?

DE: Waters of the Earth [Explore](#)

DE Explain: What are the differences and similarities of the varied waters on the Earth?

DE: Water Cycle [Explore](#)

Resources

[Distribution of World's water infographic](#)

DE: [Earth's Freshwater Bodies Passage](#)

DE: [Waters of the Earth Exploration](#)

DE: [The Chesapeake Bay Estuary Passage](#)

DE: [Water Cycle Exploration](#)

Vocabulary

Estuary, groundwater, runoff, precipitation, transpiration, condensation, evaporation, accumulation

Week 6

Explore & Explain

Standard 5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Example could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; or the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

Instruction

Week 5 questions:

- A. How do the geosphere and hydrosphere interact?
- B. How do the atmosphere and geosphere interact?

Resources for Question A- DE Lab:

Teacher: [Geosphere and Hydrosphere Hands-On](#)

Student: [Student Investigation Sheet](#)

Photos: [Geosphere and Hydrosphere Interaction](#)

Crash Course Kids: [What on Earth](#)

[Groundwater](#) Assessment Probe (intranet protected page)

Resources for Question B- DE Lab:

Teacher: [Atmosphere and Geosphere Hands-On](#)

Student: [Student Investigation Sheet](#)

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Instruction

STEM Activity Project - [Modeling Water on Earth](#)

- How does water get to the top of the mountain and back down to the ocean?

STEM Activity Project - [Making a Landform Model](#)

- How do the Earth's systems create and/or influence landforms?

Resources

DE Video [What are Landforms?](#)

DE Image [Sand Dune](#)

DE Image [Canyon](#)

DE Image [Delta](#)

Vocabulary

Canyons

Sand dunes

Deltas

Standard- 5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Example could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; or the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

Instruction

Students will develop a model to represent and describe the interactions between two of the Earth's systems.

Assessment Boundary: Assessment is limited to the interactions of two systems at a time.

Resources

[Model Rubric](#)

Standard- ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment

Instruction

How do Earth's major systems and human activities affect the surface of the Earth?

Final Culminating Assessment:

[Aspire-Inspired Unit Assessment: Earth's Systems](#)

Resources

DE Video: [People Cause Changes](#)

DE [Interactive with student guide](#)

ONSC Connection - reducing your footprint on the Earth

YouTube [Drinking from the Sea - How and Why Sea Water is Desalinated](#)

DE Video [Protecting the Ocean's Resources](#)

DE Video [Protecting Our Planet: Erosion](#)

Article from ReadWorks.org [Healthy Eating, Healthy Planet](#)

Optional Lesson Plan [Dangerous Atmosphere](#)

[Protecting our Planet Lesson Plan](#)

[Aspire-Inspired Unit Assessment: Earth's Systems](#)

Possible KLEWS Chart

Essential Question: How is water distributed throughout the Earth?



K	L	E	W	S
(Varies by class.)	<p>Water is found in lakes, oceans, rivers, and ponds.</p> <p>Water exists in solid and liquid form.</p> <p>(Not necessary to</p>	<p>97% of Earth's water is salt water (ocean)</p> <p>3% of Earth's water is fresh water (glaciers, icecaps, groundwater, rivers, lakes)</p> <p>(Not necessary to limit to information above.)</p>	<p>(Varies by class.)</p>	<p>Water cycle (process by which water cycles from water vapor to liquid water back to water vapor)</p> <p>Climate</p> <p>Landforms</p> <p>(Not necessary to limit to information above.)</p>



See possible student misconceptions on slides 7-10 for more information.

Possible SCIENTIFIC EXPLANATION

Essential Question: How is water distributed throughout the Earth?

CLAIM Statement about the results of an investigation

- * One-sentence answer to the question you investigated.
- * It answers, what can you conclude?
- * It should not start with yes or no.
- * It should describe the relationship between dependent and independent variables.

EVIDENCE Scientific data used to support the claim

- * Evidence must be:
 - Sufficient: use enough evidence to support the claim
 - Appropriate: use data that support your claim
 - Qualitative (using the senses), quantitative (numerical), or a combination of both

REASONING Ties together the claim and the evidence

- * Shows how or why the data count as evidence to support the claim
- * Proves the justification for why this evidence is important to this claim
- * Includes one or more scientific principles that are important to the claim and evidence..

Earth's water is distributed **unequally throughout the planet**. **97% of the Earth's water is the salt water located in the ocean**. The other 3% is **freshwater in the form of glaciers, icecaps, groundwater, rivers, and lakes**. At any given time, Earth contains the same amount of water that it has always contained. All the water is connected through the water cycle.



DIVIDE the unit
into weeks and
DISTRIBUTE
the standards

Possible KLEWS Chart

Essential Question: How do Earth's systems interact with each other?



K	L	E	W	S
<p>(Varies by class.)</p>	<p>The hydrosphere affects the atmosphere and geosphere.</p> <p>The biosphere uses atmosphere to survive.</p> <p>The biosphere interacts with the geosphere when decomposing.</p> <p>(Not necessary to limit information above.)</p>	<p>Rain wears away ground and pours through atmosphere.</p> <p>Animals breathe oxygen from the air.</p> <p>Animals die, breakdown, and become a part of the geosphere.</p> <p>Animals need water to survive.</p> <p>(Not necessary to limit to information above.)</p>	<p>(Varies by class.)</p>	<p>Hydrosphere (all water on Earth; in all forms)</p> <p>Biosphere (all living things on Earth)</p> <p>Atmosphere (air)</p> <p>Geosphere (interior rocks, minerals, and crystals as well as landforms)</p> <p>Cycles (water, nitrogen, carbon dioxide, etc.)</p> <p>(Not necessary to limit to information above.)</p>

See possible student misconceptions on slides 7-10 for more information.



Possible SCIENTIFIC EXPLANATION

Essential Question: How do Earth's systems interact with each other?

CLAIM Statement about the results of an investigation

- * One-sentence answer to the question you investigated.
- * It answers, what can you conclude?
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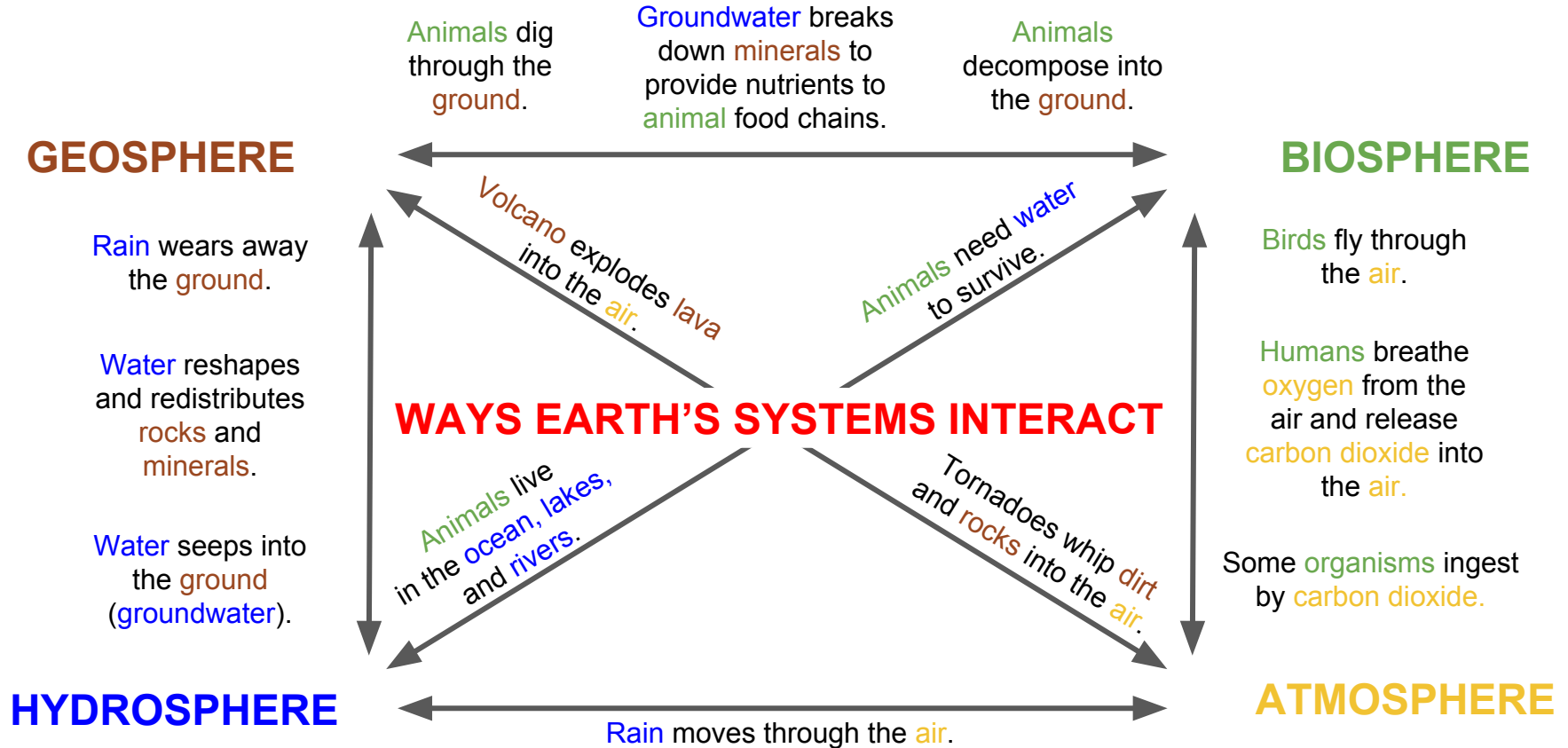
Earth's systems interact in multiple ways. Rain from the hydrosphere wears away rock in the geosphere. Water collects in the biosphere, which includes oceans and rivers, so that animals can live. Water also moves through the air in the atmosphere. Cycles, like the water cycle, cause Earth's systems to interact continually.

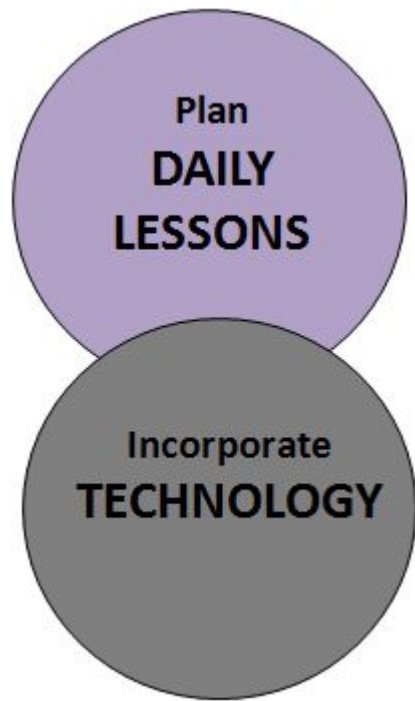


DIVIDE the unit
into weeks and
DISTRIBUTE
the standards

Possible MODEL to describe ways Earth's systems interact

Essential Question: How do Earth's systems interact with each other?



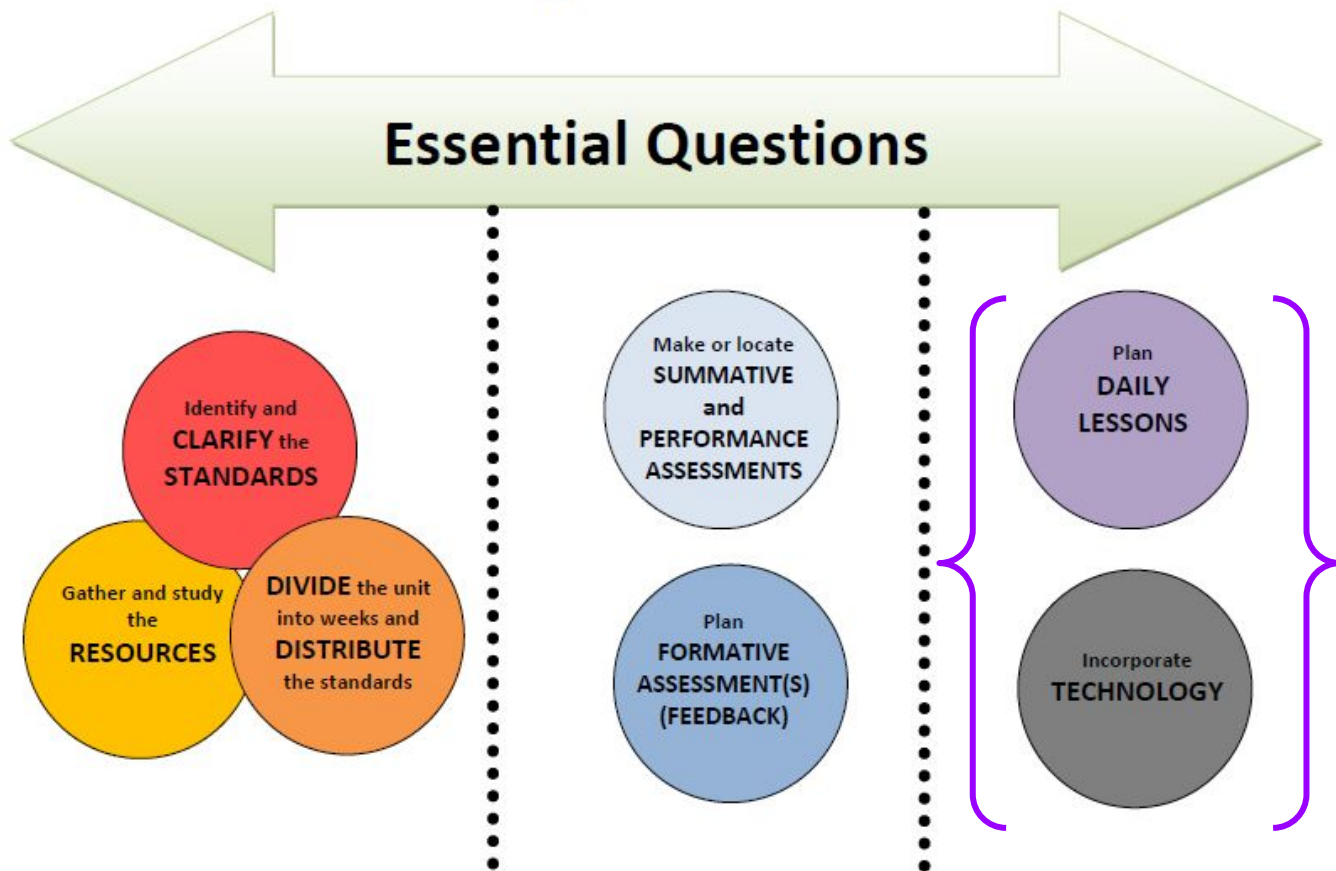


Additional Resources:



Uncovering Student Ideas in Science Assessment probes
*any assessment probes mentioned in plan are available on our website
[Assessment Probes for 5th Grade WebPage](#) -intranet password protected

Backward Unit Planning 1.0



Now you're
ready to
plan your
daily
lessons!