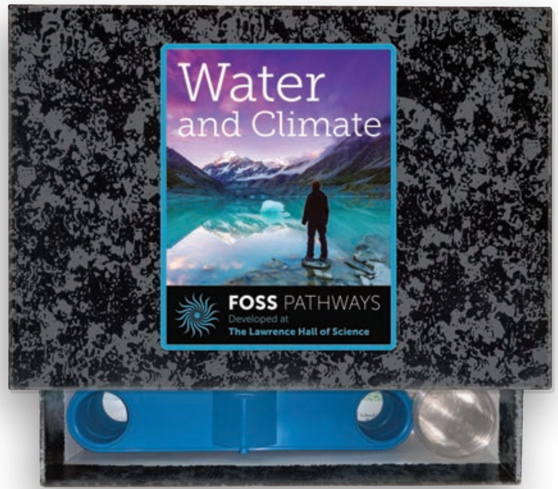
Welcome!

FOSS® Pathways is an active-learning PreK–5 science program developed at the Lawrence Hall of Science for the Next Generation Science Standards (NGSS). This document will introduce you to the major components of the program to get you started with FOSS.

FOSS PATHWAYS™
Developed at
The Lawrence Hall of Science

Meet Your Module

Your FOSS module equipment is organized in one or more large sturdy boxes, called drawers, and two smaller boxes for the print teacher guide and student books. Each drawer has a label on the front listing its contents. Your packing list is always in Drawer 1.



FOSS Pathways modules include one to three drawers of durable science equipment.

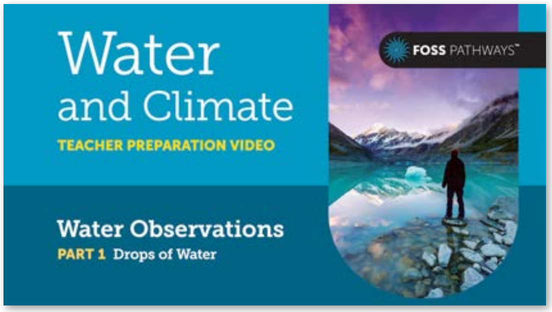
Equipment

FOSS provides the equipment needed for all the investigations, including metric measuring tools. Our high-quality, classroom-tested materials are long-lasting and packaged by investigation to facilitate preparation and clean up. There is enough permanent equipment in each kit for 32 students. Consumable materials are supplied for three uses. Convenient grade-level and refill kits are available.

Instructional Support

Teacher Preparation Videos

Getting Started and module Teacher Preparation Videos will help get you started with instruction.

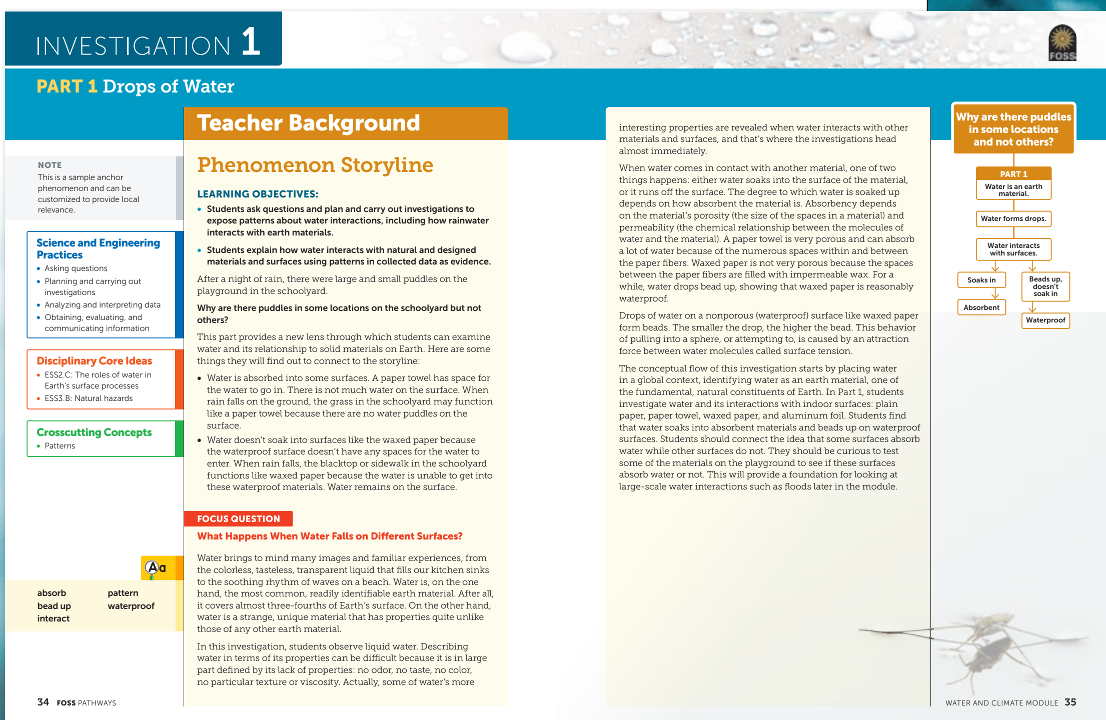


Anchor Phenomenon Resource Videos

Videos that introduce local and relevant anchor phenomenon to students by showing visuals to allow for observations and asking questions.

Teacher Background

The Teacher Background at point-of-use in the *Investigations Guide* provides an explicit connection to phenomenon being investigated and the disciplinary core ideas being discovered.



INVESTIGATION 1

PART 1 Drops of Water

NOTE
This is a sample anchor phenomenon and can be customized to provide local relevance.

Science and Engineering Practices
- Asking questions
- Planning and carrying out investigations
- Analyzing and interpreting data
- Obtaining, evaluating, and communicating information

Disciplinary Core Ideas
- ESS2.C: The roles of water in Earth's surface processes
- ESS3.B: Natural hazards

Crosscutting Concepts
- Patterns

absorb
bead up
interact
pattern
waterproof

Teacher Background

Phenomenon Storyline

LEARNING OBJECTIVES:
- **Students ask questions and plan and carry out investigations to expose patterns about water interactions, including how rainwater interacts with earth materials.**
- **Students explain how water interacts with natural and designed materials and surfaces using patterns in collected data as evidence.**

After a night of rain, there were large and small puddles on the playground in the schoolyard.

Why are there puddles in some locations on the schoolyard but not others?

This part provides a new lens through which students can examine water and its relationship to solid materials on Earth. Here are some things they will find out to connect to the storyline:

- Water is absorbed into some surfaces. A paper towel has space for the water to go in. There is not much water on the surface. When rain falls on the ground, the grass in the schoolyard may function like a paper towel because there are no water puddles on the surface.
- Water doesn't soak into surfaces like the waxed paper because the waterproof surface doesn't have any spaces for the water to enter. When rain falls, the blacktop or sidewalk in the schoolyard functions like waxed paper because the water is unable to get into these waterproof materials. Water remains on the surface.

FOCUS QUESTION

What Happens When Water Falls on Different Surfaces?

Water brings to mind many images and familiar experiences, from the colorless, tasteless, transparent liquid that fills our kitchen sinks to the soothing rhythm of waves on a beach. Water is, on the one hand, the most common, readily identifiable earth material. After all, it covers almost three-fourths of Earth's surface. On the other hand, water is a strange, unique material that has properties quite unlike those of any other earth material.

In this investigation, students observe liquid water. Describing water in terms of its properties can be difficult because it is in large part defined by its lack of properties: no odor, no taste, no color, no particular texture or viscosity. Actually, some of water's more interesting properties are revealed when water interacts with other materials and surfaces, and that's where the investigations head almost immediately.

When water comes in contact with another material, one of two things happens: either water soaks into the surface of the material, or it runs off the surface. The degree to which water is soaked up depends on how absorbent the material is. Absorbency depends on the material's porosity (the size of the spaces in a material) and permeability (the chemical relationship between the molecules of water and the material). A paper towel is very porous and can absorb a lot of water because of the numerous spaces within and between the paper fibers. Waxed paper is not very porous because the spaces between the paper fibers are filled with impermeable wax. For a while, water drops bead up, showing that waxed paper is reasonably waterproof.

Drops of water on a nonporous (waterproof) surface like waxed paper form beads. The smaller the drop, the higher the bead. This behavior of pulling into a sphere, or attempting to, is caused by an attraction force between water molecules called surface tension.

The conceptual flow of this investigation starts by placing water in a global context, identifying water as an earth material, one of the fundamental, natural constituents of Earth. In Part 1, students investigate water and its interactions with indoor surfaces: plain paper, paper towel, waxed paper, and aluminum foil. Students find that water soaks into absorbent materials and beads up on waterproof surfaces. Students should connect the idea that some surfaces absorb water while other surfaces do not. They should be curious to test some of the materials on the playground to see if these surfaces absorb water or not. This will provide a foundation for looking at large-scale water interactions such as floods later in the module.

Why are there puddles in some locations and not others?
PART 1
Water is an earth material.
Water forms drops.
Water interacts with surfaces.
Soaks in
Absorbent
Beads up, doesn't soak in
Waterproof

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WATER AND CLIMATE MODULE 35

FOSS Instructional Design

FOSS is designed around active investigation that provides engagement with science concepts, science and engineering practices, and crosscutting concepts. Driving those firsthand investigations are instructional procedures that facilitate student sensemaking leading to understanding of phenomena and scientific habits of mind.

All FOSS investigations share **instructional design** strategies to provide consistent coherent engagement with science concepts in an iterative manner. There is variability in the implementation of the instructional design depending on the context and content of the science. Here is the general flow implemented to maximize every student's opportunity to learn.

- **Active investigation** in collaborative groups: firsthand experiences with phenomena in the natural and designed worlds and sense-making experiences in small groups and as a class to figure out phenomena. The design involves an anchor phenomenon with a driving question to activate prior knowledge and elicit student questions.
  - **context setting:** sharing prior knowledge, questioning, and planning investigations **(Engagement)**
  - **investigating:** doing, observing, collecting, and organizing data to figure out phenomena **(Exploration)**
  - **sensemaking:** analyzing data, constructing explanations, and communicating understanding about phenomena **(Explanation)**
- **Obtaining and interpreting information:** using media and local outdoor and community experiences to apply and extend the firsthand investigation to real-world contexts **(Elaboration)**
- **Reflecting using formative assessment:** monitoring progress continuously to inform student learning, and develop a growth mind-set **(Evaluation)**

Engagement with real-world phenomena is at the heart of FOSS. Investigations present an anchor phenomenon and a **driving question**. In every part of every investigation, the investigative phenomenon is referenced implicitly in the focus question that guides instruction of each part and frames the intellectual work. Students record the focus question in their science notebooks, and after exploring and making sense of the phenomenon thoroughly, explain their thinking in words and drawings. At the end of each part and the investigation, the students integrate their experiences through discussion of the driving questions for the entire investigation.

Reflecting using formative assessment

Figuring out phenomena using science notebooks

ACTIVE INVESTIGATION

Figuring out phenomena

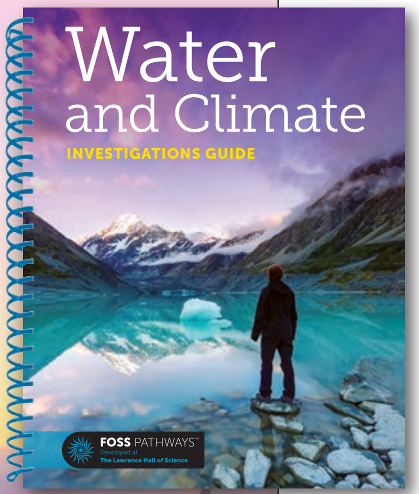
Applying science outdoors and in the local community

Engaging in sensemaking and science-centered language development

Investigating ideas through technology

Obtaining and interpreting information through reading

Teacher Guide

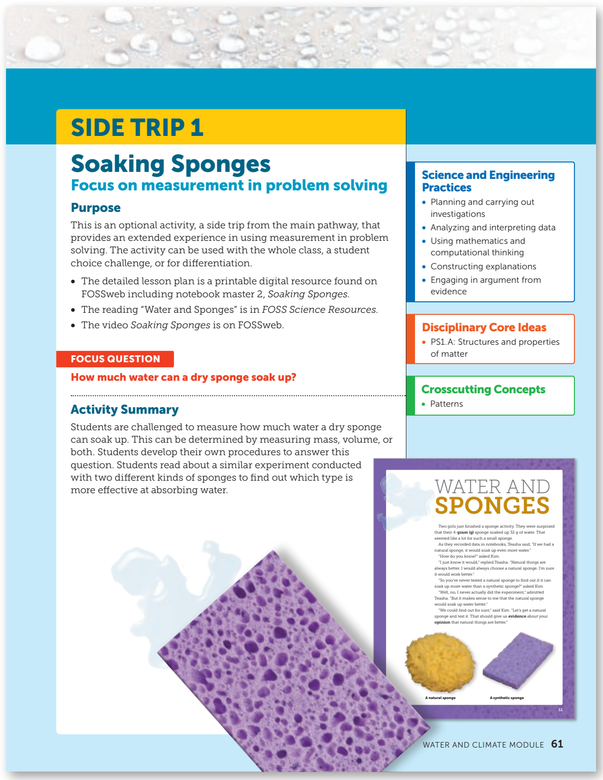


The *Investigations Guide* is a spiral-bound guide containing everything you need to teach the module. FOSS active investigation lesson plans include:

- Three-dimensional learning objectives
- Relevant and local phenomena storylines with driving questions
- Sense-making discussions
- Embedded assessment and "What to Look For" guidance
- Vocabulary reviews
- English language support strategies
- ELA strategies and connections

Side Trips

Side Trips (optional activities outside of the main pathway) provide ways to customize the curriculum instruction by selecting additional pathways, such as environmental literacy, engineering, or a specific practice, such as modeling. Side Trips can be used with the whole class, as student choice challenges, or for differentiation.



SIDE TRIP 1

Soaking Sponges

Focus on measurement in problem solving

Purpose

This is an optional activity, a side trip from the main pathway, that provides an extended experience in using measurement in problem solving. The activity can be used with the whole class, a student choice challenge, or for differentiation.

- The detailed lesson plan is a printable digital resource found on FOSSweb including notebook master 2, *Soaking Sponges*.
- The reading "Water and Sponges" is in *FOSS Science Resources*.
- The video *Soaking Sponges* is on FOSSweb.

FOCUS QUESTION

How much water can a dry sponge soak up?

Activity Summary

Students are challenged to measure how much water a dry sponge can soak up. This can be determined by measuring mass, volume, or both. Students develop their own procedures to answer this question. Students read about a similar experiment conducted with two different kinds of sponges to find out which type is more effective at absorbing water.

Science and Engineering Practices

- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations
- Engaging in argument from evidence

Disciplinary Core Ideas

- PS1.A: Structures and properties of matter

Crosscutting Concepts

- Patterns

WATER AND SPONGES

WATER AND CLIMATE MODULE 61

INVESTIGATION 1

PART 4 Water on a Slope

Guiding the Investigation

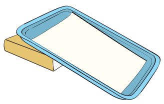
NOTE
...or ...this step or ...schoolyard.

Relevant and local phenomenon

SESSION 1 **45 MINUTES**

1 Revisit the puddle phenomenon

Visit your schoolyard if there is a slope, use an image of your schoolyard, or use the hillside from the anchor phenomenon video. Ask students how a hill near the schoolyard might affect puddles forming, and listen to their ideas. They should know that **gravity** causes water to flow downhill. Ask students for their ideas on how the class could collect data on the affect of **slope** on puddles forming.



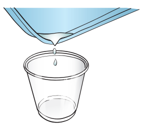
2 Introduce the focus question

FOCUS QUESTION

How does slope affect water on the schoolyard?

Ask students to open their notebooks to a new page, write the date, and write the focus question at the top of the page.

→ *How does slope affect water on the schoolyard?*



3 Describe the activity setup

Tell students that you have materials they can use to model a schoolyard slope in order to investigate the movement of rainwater downhill. Demonstrate this procedure.

a. *Create a model slope by using a book to prop up one end of a tray. Work with your group to engineer a slope that raises one end of the tray about 5–7 cm above the tabletop.*

b. *Lay waxed paper on the tray to create a smooth waterproof surface. Use a small piece of transparent tape to secure it to the tray at the top.*

c. *Use droppers to carefully place water on the waxed paper. Observe. Start with a single drop and slowly add more drops.*

d. *Return the water to the plastic cup when it collects at the bottom of the tray, and reuse the water.*

MATERIALS FOR STEP 4
- Pieces of waxed paper
- Droppers
- Trays
- Cups of water
- Thick books
- Paper towels
- Transparent tape

4 Start the activity

Ask the Getters to pick up materials from the materials station. Let the groups begin making water drops. Visit groups as they work. If necessary, suggest these investigations:

- Put drops on top of each other to make them bigger.
- Compare the speed of different sizes of drops on the slope.
- Look to see if the water collects in a **basin** at the bottom of the tray by forming a puddle.

5 Assess progress: performance assessment

Embedded assessment and What to Look For

When students begin their investigations, circulate from group to group to observe their three-dimensional thinking. Listen to group discussions. Make notes on the *Performance Assessment Checklist* while students work through Steps 6 and 7.

WHAT TO LOOK FOR
- Students collaborate and carry out the investigation.
- Students express the cause-and-effect relationships they should be noticing (steeper slopes and larger drops cause water to run sooner and faster).

Science and Engineering Practices
- Planning and carrying out investigations

Disciplinary Core Ideas
- ESS2.C: The roles of water in Earth's surface processes

Crosscutting Concepts
- Cause and effect

6 Describe results

As you visit the groups, encourage students to describe what they did and what they discovered. Make sure that by the end of this investigation students agree that water moves downhill when placed on a slope and collects in an area called a basin.

7 Investigate the effect of water-drop size

Starters should make sure the waxed paper is dry and if not, dry it with a paper towel. Starters should also make sure everyone has a chance to help set up the water drops of different sizes.

Ask,

→ *Let's model raindrops of different sizes (different amounts of rainfall). If you tested two water drops of different sizes, which one would get to the bottom of the slope first?*

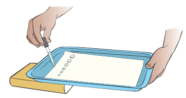
Propose a way to find out. Demonstrate the procedure.

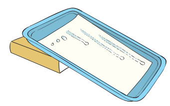
a. *Prop one end of the tray on a thick book.*

b. *Hold up the other end of the tray so it is level.*

c. *Make several water drops of different sizes across the paper at the uphill end. Leave enough space between the drops so you can watch each one move.*

d. *Lower the tray to create a slope and observe.*





8 Discuss water-drop size results

Ask students to report observations. If necessary, ask,

→ *Did all of the water drops move?* [Maybe not the smallest drops.]

→ *Which drop reached the bottom first?* [The largest drop moved fastest.]

→ *What is the effect on the speed if the size of the drop increases?* [Water drops move faster as their size increases.]

INVESTIGATION 1

PART 4 Water on a Slope

SESSION 1

ENGLISH LANGUAGE SUPPORT
Illustrate or demonstrate the word *slope* and discuss other words that describe a slope, e.g., *steep, steeper, incline, angle, uphill, downhill, high, low,* etc.

If needed, add an illustration and/or use hand gestures to demonstrate gravity.

Science and Engineering Practices
- Planning and carrying out investigations
- Analyzing and interpreting data

English language support strategies

9 Increase the slope

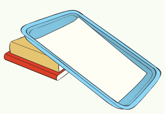
Ask,

→ *What force caused the water drops to move down the slope?* [Gravity, a pulling force.]

→ *How could you find out what happens to the speed of the water drops on steeper slopes?*

Ask students to work in their groups to design a plan to investigate what happens to the speed of water drops on a steeper slope. After a few minutes, discuss the plans as a class and write some ideas in the class notebook.

At this point you can let the groups begin to work following their own design. Or you might suggest that two groups work together to compare a one-book slope and a two-book slope. Suggest that the groups take turns using the one-book and two-book slopes. Supply new waxed paper if necessary. Continue carrying out the investigation.



When the students have finished their observations, have them clean up. Have Getters return materials to the materials station. They should recycle the water in the plastic cups and dry all the equipment.

10 Have a sense-making discussion

Project or distribute notebook sheet 5, *Water on a Slope*. Have students analyze their firsthand observations and then discuss the four questions in their groups. They should write their ideas and interpretations in their notebooks.

After 3–4 minutes, call on groups to share their conclusions.

→ *What rule describes the **direction** that water domes move?* [Water domes always move downhill, from high to low. Gravity pulls water downhill.]

→ *What is the cause-and-effect **relationship** between the size of a water dome and the speed at which it moves?* [Larger water domes move down slopes faster.]

Crosscutting Concepts
- Cause and effect

Sense-making discussions

→ *What is the cause-and-effect relationship between the slope of a surface and the speed at which water moves?* [The steeper the slope, the faster water moves.]

→ *What happens to water after it flows to the bottom of the slope?* [It forms a puddle.]

Refer to the Crosscutting Concepts—Grade 3 chapter on FOSSweb for more information.

NOTE
You might use the anchor phenomenon video in this step.

11 Connect to the anchor phenomenon

After discussing the cause-and-effect relationships, revisit the anchor phenomenon. Ask students what they think happened to the rainwater in the schoolyard.

→ *How would the amount of rain affect how many puddles formed?*

→ *Where are there puddles? Were they on the slope? At the top? At the bottom?*

→ *Would the effect be different if the slope was covered with soil or gravel?*

Aa
basin
direction
gravity
relationsh...
slope

12 Review vocabulary

Vocabulary review

Review words introduced in this part that will help students develop a complete response to the focus question.

ENGLISH LANGUAGE SUPPO...
Remind students to use cause-an... effect language structures and to respond in complete sentences, e.g., _____ *causes* _____ . *The* _____ *er the slope, the* _____ *er the water* _____ .

If needed, provide a writing frame to help students organize their ideas.

Today we observed _____ .
A pattern we discovered is _____ .
The steeper the slope, the _____ .
The larger the water dome, the _____ .
Next, I would like to investigate _____ .

13 Respond to the focus question

Ask students to construct an explanation by responding to the focus question below their answers to the questions on notebook sheet 5.

→ *How does slope affect water on the schoolyard?*

Ask students to work independently to record a response to the focus question. Ask them to explain the cause-and-effect relationships between the size of the drops and speed and the slope of the drops and speed.

Students should state that the steeper the slope, the faster the water flows downhill; that larger drops of water move faster down the slope than smaller drops; and that gravity causes the water to flow downhill.

Science and Engineering Practices
- Constructing explanations

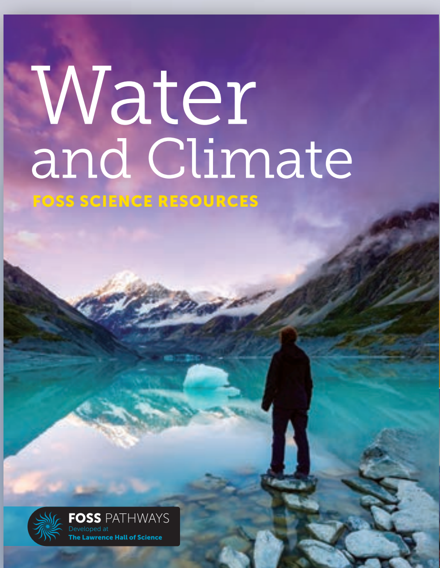
Crosscutting Concepts
- Cause and effect

Student Books

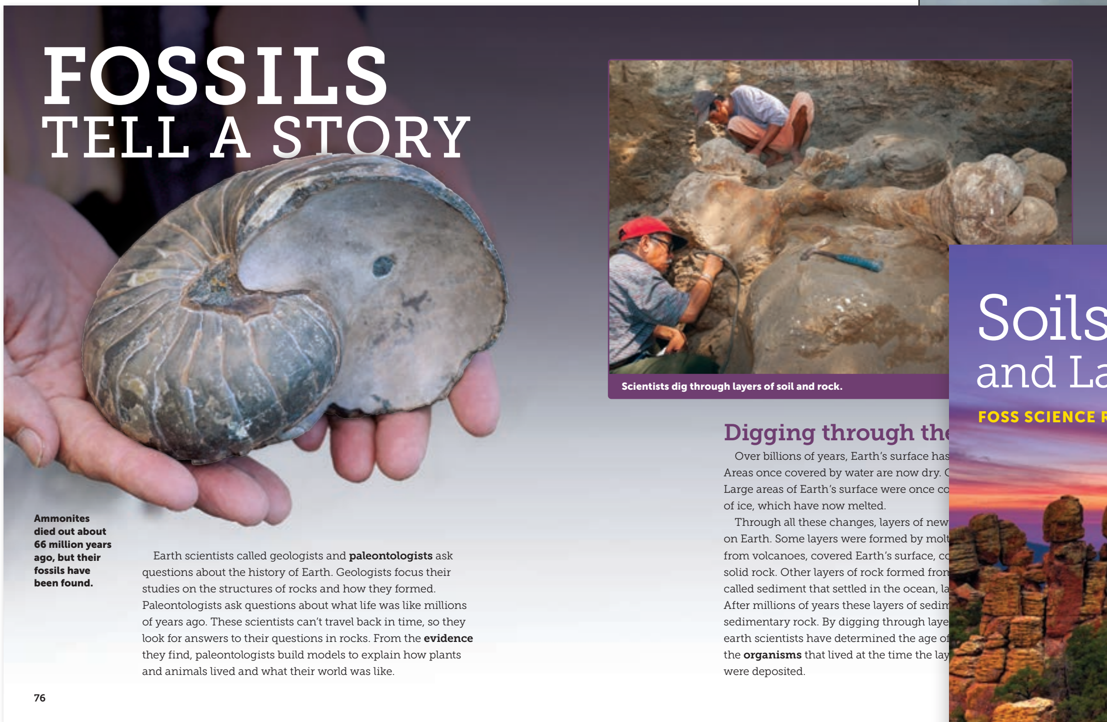
The *FOSS Science Resources* student book contains readings developed to reinforce, extend, or apply core ideas covered during FOSS active investigations. Readings give students opportunities to:

- Use text to obtain, evaluate, and communicate information
- Use evidence to support their ideas during sense-making discussions and focus question responses
- Integrate information from multiple sources
- Interpret graphs, diagrams, and photographs to build understanding

Available in print and as an interactive eBook in English and Spanish.



Students can demonstrate their understanding by discussing the “Questions for Reflection” at the end of each in-class reading.



FOSSILS TELL A STORY

Ammonites died out about 66 million years ago, but their fossils have been found.

Earth scientists called geologists and **paleontologists** ask questions about the history of Earth. Geologists focus their studies on the structures of rocks and how they formed. Paleontologists ask questions about what life was like millions of years ago. These scientists can't travel back in time, so they look for answers to their questions in rocks. From the **evidence** they find, paleontologists build models to explain how plants and animals lived and what their world was like.

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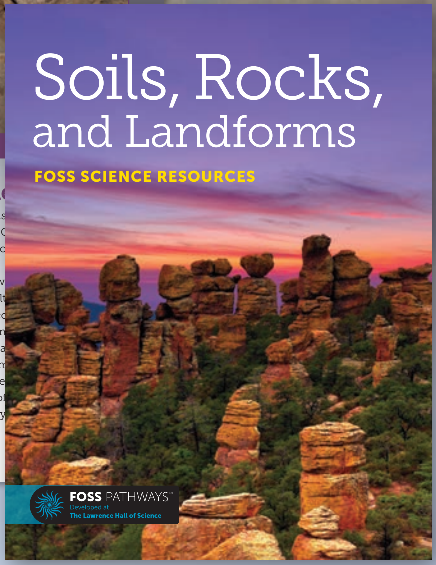
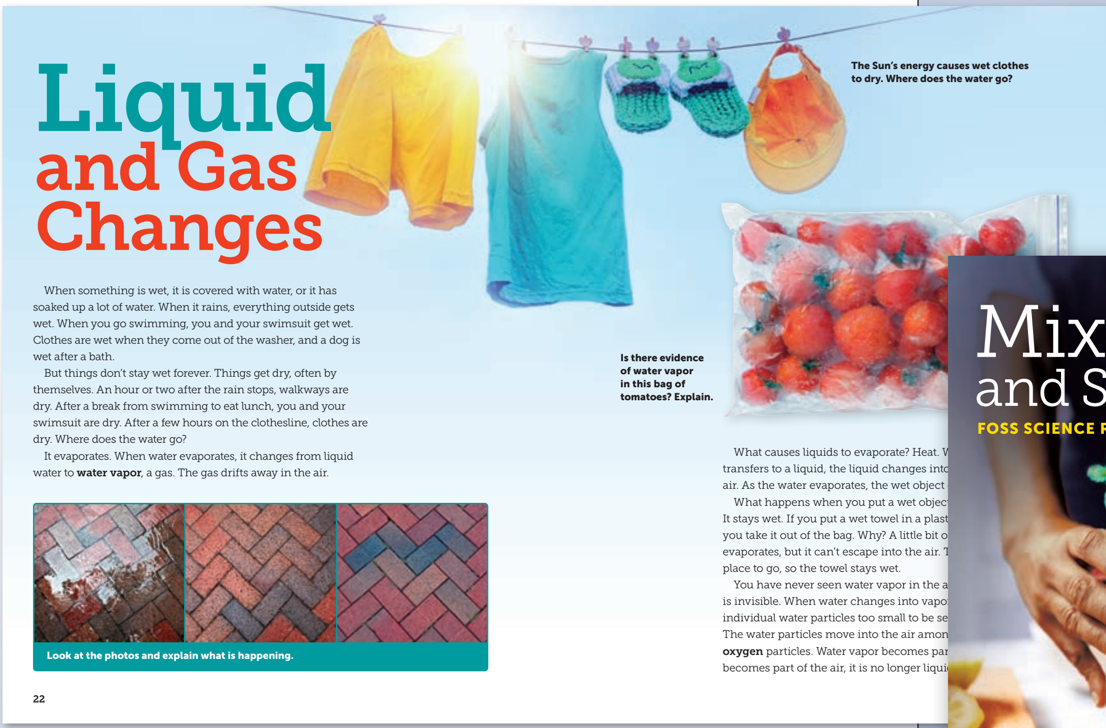
Scientists dig through layers of soil and rock.

Digging through the

Over billions of years, Earth's surface has
Areas once covered by water are now dry.
Large areas of Earth's surface were once co
of ice, which have now melted.

Through all these changes, layers of new
on Earth. Some layers were formed by molt
from volcanoes, covered Earth's surface, co
solid rock. Other layers of rock formed fron
called sediment that settled in the ocean, la
After millions of years these layers of sedim
sedimentary rock. By digging through laye
earth scientists have determined the age of
the **organisms** that lived at the time the lay
were deposited.





Liquid and Gas Changes

The Sun's energy causes wet clothes to dry. Where does the water go?

When something is wet, it is covered with water, or it has soaked up a lot of water. When it rains, everything outside gets wet. When you go swimming, you and your swimsuit get wet. Clothes are wet when they come out of the washer, and a dog is wet after a bath.

But things don't stay wet forever. Things get dry, often by themselves. An hour or two after the rain stops, walkways are dry. After a break from swimming to eat lunch, you and your swimsuit are dry. After a few hours on the clothesline, clothes are dry. Where does the water go?

It evaporates. When water evaporates, it changes from liquid water to **water vapor**, a gas. The gas drifts away in the air.

Look at the photos and explain what is happening.

Is there evidence of water vapor in this bag of tomatoes? Explain.

What causes liquids to evaporate? Heat. W
transfers to a liquid, the liquid changes into
air. As the water evaporates, the wet object

What happens when you put a wet objec
It stays wet. If you put a wet towel in a plast
you take it out of the bag. Why? A little bit o
evaporates, but it can't escape into the air. T
place to go, so the towel stays wet.

You have never seen water vapor in the a
is invisible. When water changes into vapo
individual water particles too small to be se
The water particles move into the air amon
oxygen particles. Water vapor becomes par
becomes part of the air, it is no longer liqui

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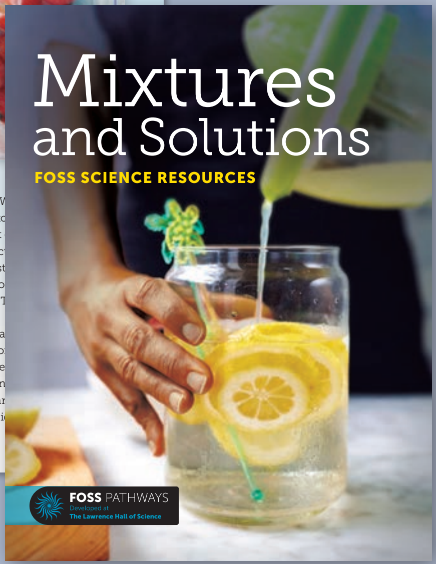


SCAN HERE FOR A TOUR OF FOSSWEB!

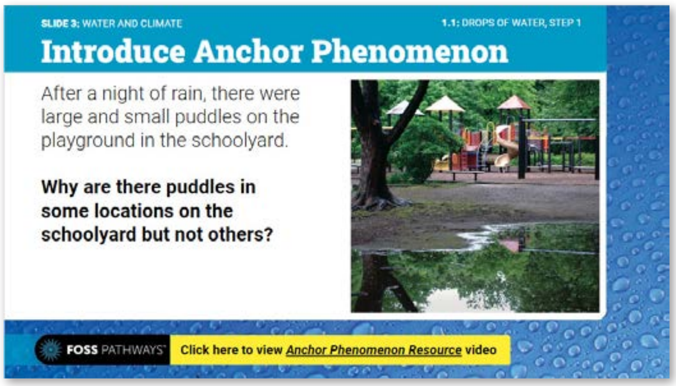
FOSSweb

FOSSweb digital resources are delivered on School Specialty's curriculum platform called ThinkLink.

- Supports single sign-on and class management with Google classroom and learning management systems.
- Provides access to both teacher and student digital resources, including duplication masters, teaching slides, FOSSmap online assessment, streaming videos, and online activities.

Teaching Slides

Downloadable and editable slides from FOSSweb can be used to facilitate each part of each investigation. Teaching slides are available as Google slides in English and Spanish.

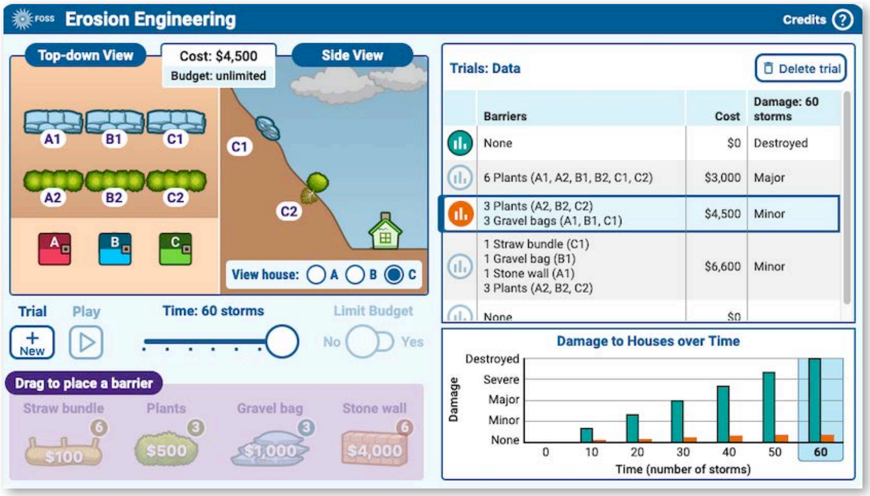


Streaming Videos

New engaging content videos in English and Spanish were developed to specifically support FOSS investigations.

Online Activities

New engaging simulations developed to address core ideas in FOSS, and interactive virtual investigations and tutorials offer additional content support for students.



Interactive eBooks

Keep your students engaged while teaching literacy skills with interactive *FOSS Science Resources* eBooks. The eBooks include integrated audio with text syncing and links to online activities and videos that bring the photos to life.

FOSSmap Online Assessment

Students in grades 3–5 can take summative assessments online with automatic coding of most responses. Student- and class-level reports help you identify the need for instructional next steps.

Grade K NGSS Correlation

Performance Expectations		Materials and Forces	Animals Two by Two	Trees and Weather
K-PS2-1	Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.	✓		
K-PS2-2	Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.	✓		
K-PS3-1	Make observations to determine the effect of sunlight on Earth's surface.	✓		✓
K-PS3-2	Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.	✓		
K-LS1-1	Use observations to describe patterns of what plants and animals (including humans) need to survive.		✓	✓
K-ESS2-1	Use and share observations of local weather conditions to describe patterns over time.			✓
K-ESS2-2	Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.		✓	✓
K-ESS3-1	Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.		✓	✓
K-ESS3-2	Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.			✓
K-ESS3-3	Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.	✓		
K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	✓		
K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.	✓		✓
K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	✓		

Grade K NGSS Correlation Continued

Disciplinary Core Ideas		Materials and Forces	Animals Two by Two	Trees and Weather
PS2.A	**Forces and Motion** (K-PS2-1, K-PS2-2) • Pushes and pulls can have different strengths and directions. • Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.	✓		
PS2.B	**Types of Interactions** (K-PS2-1) When objects touch or collide, they push on one another and can change motion.	✓		
PS3.B	**Conservation of Energy and Energy Transfer** (K-PS3-1, K-PS3-2) Sunlight warms Earth's surface.	✓		✓
PS3.C	**Relationship Between Energy and Forces** (K-PS2-1) A bigger push or pull makes things go faster.	✓		
LS1.C	**Organization for Matter and Energy Flow in Organisms** (K-LS1-1) All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.		✓	✓
ESS2.D	**Weather and Climate** (K-ESS3-2) Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.			✓
ESS2.E	**Biogeology** (K-ESS2-2) Plants and animals can change their environment.		✓	✓
ESS3.A	**Natural Resources** (K-ESS3-1) Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.		✓	✓
ESS3.C	**Human Impacts on Earth Systems** (K-ESS3-3) Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.	✓		
ESS3.B	**Natural Hazards** (K-ESS3-2) Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events.			✓
ETS1.A	**Defining and Delimiting Engineering Problems** (K–2-ETS1-1) • A situation that people want to change or create can be approached as a problem to be solved through engineering. • Asking questions, making observations, and gathering information are helpful in thinking about problems. • Before beginning to design a solution, it is important to clearly understand the problem.	✓		✓
ETS1.B	**Developing Possible Solutions** (K–2-ETS1-2) Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	✓		
ETS1.C	**Optimizing the Design Solution** (K–2-ETS1-3) Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	✓		

Grade K NGSS Correlation Continued

Science and Engineering Practices	Materials and Forces	Animals Two by Two	Trees and Weather
Asking Questions and Defining Problems	✓	✓	✓
Developing and Using Models	✓	✓	✓
Planning and Carrying Out Investigations	✓	✓	✓
Analyzing and Interpreting Data	✓	✓	✓
Using Mathematics and Computational Thinking	✓		✓
Constructing Explanations and Designing Solutions	✓	✓	✓
Engaging in Argument From Evidence	✓	✓	✓
Obtaining, Evaluating, and Communicating Information	✓	✓	✓

Crosscutting Concepts	Materials and Forces	Animals Two by Two	Trees and Weather
Patterns	✓	✓	✓
Cause and Effect	✓	✓	✓
Scale, Proportion, and Quantity	✓		
Systems and System Models	✓	✓	✓
Energy and Matter	✓		
Structure and Function	✓	✓	✓
Stability and Change			✓

Grade 1 NGSS Correlation

Performance Expectations		Sound and Light	Plants and Animals	Changes in the Sky
1-PS4-1	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.	✓		
1-PS4-2	Make observations to construct an evidence-based account that objects can be seen only when illuminated.	✓		
1-PS4-3	Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.	✓		
1-PS4-4	Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.*	✓		
1-LS1-1	Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*		✓	
1-LS1-2	Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.		✓	
1-LS3-1	Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.		✓	
1-ESS1-1	Use observations of the sun, moon, and stars to describe patterns that can be predicted.			✓
1-ESS1-2	Make observations at different times of year to relate the amount of daylight to the time of year.			✓
K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	✓		✓
K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.	✓	✓	✓
K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	✓		✓

Grade 1 NGSS Correlation Continued

Disciplinary Core Ideas		Sound and Light	Plants and Animals	Changes in the Sky
PS4.A	**Wave Properties** Sound can make matter vibrate, and vibrating matter can make sound.	✓		
PS4.B	**Electromagnetic Radiation** Objects can be seen only when light is available to illuminate them. Some objects give off their own light.	✓		
PS4.B	**Electromagnetic Radiation** Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.)	✓		
PS4.C	**Information Technologies and Instrumentation** People also use a variety of devices to communicate (send and receive information) over long distances.	✓		
LS1.A	**Structure and Function** All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.		✓	
LS1.D	**Information Processing** Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help the offspring to survive.		✓	
LS1.B	**Growth and Development** Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.		✓	
LS3.A	**Inheritance of Traits** Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents.		✓	
LS3.B	**Variation of Traits** Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.		✓	
ESS1.A	**The Universe and its Stars** Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.			✓
ESS1.B	**Earth and the Solar System** Seasonal patterns of sunrise and sunset can be observed, described, and predicted.			✓
ETS1.A	**Defining and Delimiting Engineering Problems** A situation that people want to change or create can be approached as a problem to be solved through engineering.	✓		✓
ETS1.A	**Defining and Delimiting Engineering Problems** Asking questions, making observations, and gathering information are helpful in thinking about problems.	✓		✓
ETS1.A	**Defining and Delimiting Engineering Problems** Before beginning to design a solution, it is important to clearly understand the problem.	✓	✓	✓
ETS1.B	**Developing Possible Solutions** Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	✓		✓
ETS1.C	**Optimizing the Design Solution** Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	✓		✓

Grade 1 NGSS Correlation Continued

Science and Engineering Practices	Sound and Light	Plants and Animals	Changes in the Sky
Asking Questions and Defining Problems	✓	✓	✓
Developing and Using Models	✓		
Planning and Carrying Out Investigations	✓	✓	✓
Analyzing and Interpreting Data	✓	✓	✓
Using Mathematics and Computational Thinking			✓
Constructing Explanations and Designing Solutions	✓	✓	✓
Engaging in Argument From Evidence			
Obtaining, Evaluating, and Communicating Information		✓	✓

Crosscutting Concepts	Sound and Light	Plants and Animals	Changes in the Sky
Patterns	✓	✓	✓
Cause and Effect	✓	✓	✓
Scale, Proportion, and Quantity			
Systems and System Models	✓		✓
Energy and Matter		✓	
Structure and Function			✓
Stability and Change			✓

Grade 2 NGSS Correlation

Performance Expectations		Solids and Liquids	Insects and Plants	Water and Landforms
2-PS1-1	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.	✓		✓
2-PS1-2	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*	✓		✓
2-PS1-3	Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.	✓		
2-PS1-4	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.	✓		
2-LS2-1	Plan and conduct an investigation to determine if plants need sunlight and water to grow.		✓	
2-LS2-2	Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*		✓	
2-LS4-1	Make observations of plants and animals to compare the diversity of life in different habitats.		✓	
2-ESS2-1	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*			✓
2-ESS2-2	Develop a model to represent the shapes and kinds of land and bodies of water in an area.			✓
2-ESS2-3	Obtain information to identify where water is found on Earth and that it can be solid or liquid.			✓
K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	✓		✓
K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.	✓	✓	✓
K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	✓		✓

Grade 2 NGSS Correlation Continued

Disciplinary Core Ideas		Solids and Liquids	Insects and Plants	Water and Landforms
PS1.A	**Structure and Properties of Matter** Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.	✓		✓
PS1.A	**Structure and Properties of Matter** Different properties are suited to different purposes.	✓		✓
PS1.A	**Structure and Properties of Matter** Different properties are suited to different purposes.	✓		
PS1.A	**Structure and Properties of Matter** A great variety of objects can be built up from a small set of pieces.	✓		
PS1.B	**Chemical Reactions** Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.	✓		
LS2.A	**Interdependent Relationships in Ecosystems** Plants depend on water and light to grow.		✓	
LS2.A	**Interdependent Relationships in Ecosystems** Plants depend on animals for pollination or to move their seeds around.		✓	
ETS1.B	**Developing Possible Solutions** Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.		✓	
LS4.D	**Biodiversity and Humans** There are many different kinds of living things in any area, and they exist in different places on land and in water.		✓	
ESS2.A	**Earth Materials and Systems** Wind and water can change the shape of the land.			✓
ETS1.C	**Optimizing the Design Solution** Because there is always more than one possible solution to a problem, it is useful to compare and test designs.			✓
ESS2.B	**Plate Tectonics and Large-Scale System Interactions** Maps show where things are located. One can map the shapes and kinds of land and water in any area.			✓
ESS2.C	**The Roles of Water in Earth's Surface Processes** Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.	✓		✓
ETS1.A	**Defining and Delimiting Engineering Problems** A situation that people want to change or create can be approached as a problem to be solved through engineering.	✓		✓
ETS1.A	**Defining and Delimiting Engineering Problems** Asking questions, making observations, and gathering information are helpful in thinking about problems.	✓		✓
ETS1.A	**Defining and Delimiting Engineering Problems** Before beginning to design a solution, it is important to clearly understand the problem.	✓		✓
ETS1.B	**Developing Possible Solutions** Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	✓	✓	✓
ETS1.C	**Optimizing the Design Solution** Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	✓		✓

Grade 2 NGSS Correlation Continued

Science and Engineering Practices	Solids and Liquids	Insects and Plants	Water and Landforms
Asking Questions and Defining Problems	✓	✓	✓
Developing and Using Models	✓	✓	✓
Planning and Carrying Out Investigations	✓	✓	✓
Analyzing and Interpreting Data		✓	✓
Using Mathematics and Computational Thinking	✓		
Constructing Explanations and Designing Solutions	✓	✓	✓
Engaging in Argument From Evidence			
Obtaining, Evaluating, and Communicating Information			

Crosscutting Concepts	Solids and Liquids	Insects and Plants	Water and Landforms
Patterns	✓	✓	✓
Cause and Effect		✓	✓
Scale, Proportion, and Quantity	✓		✓
Systems and System Models	✓		
Energy and Matter	✓		
Structure and Function	✓	✓	✓
Stability and Change	✓		

Grade 3 NGSS Correlation

Performance Expectations		Motion	Structures of Life	Water and Climate
3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.	✓		
3-PS2-2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.	✓		
3-PS2-3	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.	✓		
3-PS2-4	Define a simple design problem that can be solved by applying scientific ideas about magnets. *	✓		
3-LS1-1	Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.		✓	
3-LS2-1	Construct an argument that some animals form groups that help members survive.		✓	
3-LS3-1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.		✓	
3-LS3-2	Use evidence to support the explanation that traits can be influenced by the environment.		✓	
3-LS4-1	Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.		✓	
3-LS4-2	Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.		✓	
3-LS4-3	Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.		✓	
3-LS4-4	Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.*		✓	
3-ESS2-1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.			✓
3-ESS2-2	Obtain and combine information to describe climates in different regions of the world.			✓
3-ESS3-1	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*			✓
3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	✓		
3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	✓		
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	✓		

Grade 3 NGSS Correlation Continued

Disciplinary Core Ideas		Motion	Structures of Life	Water and Climate
PS2.A	**Forces and Motion** Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.)		✓	
PS2.B	**Types of Interactions** Objects in contact exert forces on each other.		✓	
PS2.A	**Forces and Motion** The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.)		✓	
PS2.B	**Types of Interactions** Electric, and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other.		✓	
LS1.B	**Growth and Development of Organisms** Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles.		✓	
LS2.D	**Social Interactions and Group Behavior** Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2).		✓	
LS3.A	**Inheritance of Traits** Many characteristics of organisms are inherited from their parents.		✓	
LS3.B	**Variation of Traits** Different organisms vary in how they look and function because they have different inherited information.		✓	
LS3.A	**Inheritance of Traits** Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment.		✓	
LS3.B	**Variation of Traits** The environment also affects the traits that an organism develops.		✓	
LS4.A	**Evidence of Common Ancestry and Diversity** Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: moved from K-2)		✓	
LS4.A	**Evidence of Common Ancestry and Diversity** Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.		✓	

Grade 3 NGSS Correlation Continued

Disciplinary Core Ideas		Motion	Structures of Life	Water and Climate
LS4.B	**Natural Selection** Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.		✓	
LS4.C	**Adaptation** For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.		✓	
LS4.D	**Biodiversity and Humans** Populations live in a variety of habitats, and change in those habitats affects the organisms living there.		✓	
LS2.C	**Ecosystem Dynamics, Functioning, and Resilience** When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.		✓	
ESS2.D	**Weather and Climate** Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.			✓
ESS2.D	**Weather and Climate** Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.			✓
ESS3.B	**Natural Hazards** A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.			✓
ETS1.A	**Defining and Delimiting Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	✓		
ETS1.B	**Developing Possible Solutions** Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.	✓		
ETS1.B	**Developing Possible Solutions** At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	✓		
ETS1.B	**Developing Possible Solutions** Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	✓		
ETS1.C	**Optimizing the Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	✓		

Grade 3 NGSS Correlation Continued

Science and Engineering Practices	Motion	Structures of Life	Water and Climate
Asking Questions and Defining Problems	✓	✓	✓
Developing and Using Models	✓	✓	✓
Planning and Carrying Out Investigations	✓	✓	✓
Analyzing and Interpreting Data	✓	✓	✓
Using Mathematics and Computational Thinking	✓	✓	
Constructing Explanations and Designing Solutions	✓	✓	✓
Engaging in Argument From Evidence	✓	✓	✓
Obtaining, Evaluating, and Communicating Information	✓	✓	✓

Crosscutting Concepts	Motion	Structures of Life	Water and Climate
Patterns	✓	✓	✓
Cause and Effect	✓	✓	✓
Scale, Proportion, and Quantity			✓
Systems and System Models	✓	✓	
Energy and Matter			
Structure and Function		✓	
Stability and Change			

Grade 4 NGSS Correlation

Performance Expectations		Energy	Soils, Rocks, and Landforms	Senses and Survival
4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.	✓		
4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.	✓		
4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.	✓		
4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*	✓		
4-PS4-1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.	✓		
4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	✓		
4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.*	✓		
4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.			✓
4-LS1-2	Use a model to describe that animals' receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.			✓
4-ESS1-1	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.		✓	
4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.		✓	
4-ESS2-2	Analyze and interpret data from maps to describe patterns of Earth's features.		✓	
4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	✓	✓	
4-ESS3-2	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*		✓	
3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	✓		
3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	✓	✓	
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	✓		

Grade 4 NGSS Correlation Continued

Disciplinary Core Ideas		Energy	Soils, Rocks, and Landforms	Senses and Survival
PS3.A	**Definitions of Energy** The faster a given object is moving, the more energy it possesses.	✓		
PS3.A	**Definitions of Energy** Energy can be moved from place to place by moving objects or through sound, light, or electric currents.	✓		
PS3.B	**Chemical Reactions** No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.)	✓		
PS3.B	**Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.	✓		
PS3.B	**Conservation of Energy and Energy Transfer** Light also transfers energy from place to place.	✓		
PS3.B	**Conservation of Energy and Energy Transfer** Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.	✓		
PS3.A	**Definitions of Energy** Energy can be moved from place to place by moving objects or through sound, light, or electric currents.	✓		
PS3.B	**Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.	✓		
PS3.C	**Relationship Between Energy and Forces** When objects collide, the contact forces transfer energy so as to change the objects' motions.	✓		
PS3.B	**Conservation of Energy and Energy Transfer** Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.	✓		
PS3.D	**Energy in Chemical Processes and Everyday Life** The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use.	✓		
ETS1.A	**Defining Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	✓		
PS4.A	**Wave Properties** Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; it does not move in the direction of the wave except when the water meets the beach. (Note: This grade band endpoint was moved from K–2).	✓		
PS4.A	**Wave Properties** Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).	✓		
PS4.B	**Electromagnetic Radiation** An object can be seen when light reflected from its surface enters the eyes.	✓		
PS4.C	**Information Technologies and Instrumentation** Digitized information transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa.	✓		

Grade 4 NGSS Correlation Continued

Disciplinary Core Ideas		Energy	Soils, Rocks, and Landforms	Senses and Survival
ETS1.C	**Optimizing The Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	✓		
LS1.A	**Structure and Function** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.			✓
LS1.D	**Information Processing** Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.			✓
ESS1.C	**The History of Planet Earth** Local, regional and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.		✓	
ESS2.A	**Earth Materials and Systems** 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.		✓	
ESS2.E	**Biogeology** Living things affect the physical characteristics of their regions.		✓	
ESS2.B	**Plate Tectonics and Large-Scale System Interactions** The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth.		✓	
ESS3.A	**Natural Resources** Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.	✓	✓	
ESS3.B	**Natural Hazards** A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts.		✓	
ETS1.B	**Designing Solutions to Engineering Problems** Testing a solution involves investigating how well it performs under a range of likely conditions.		✓	
ETS1.A	**Defining and Delimiting Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	✓		
ETS1.B	**Developing Possible Solutions** Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.	✓	✓	
ETS1.B	**Developing Possible Solutions** At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	✓	✓	
ETS1.B	**Developing Possible Solutions** Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	✓		
ETS1.C	**Optimizing the Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	✓		

Grade 4 NGSS Correlation Continued

Science and Engineering Practices	Energy	Soils, Rocks, and Landforms	Senses and Survival
Asking Questions and Defining Problems	✓	✓	
Developing and Using Models	✓	✓	✓
Planning and Carrying Out Investigations	✓	✓	
Analyzing and Interpreting Data	✓	✓	
Using Mathematics and Computational Thinking		✓	
Constructing Explanations and Designing Solutions	✓	✓	
Engaging in Argument From Evidence	✓	✓	✓
Obtaining, Evaluating, and Communicating Information		✓	

Crosscutting Concepts	Energy	Soils, Rocks, and Landforms	Senses and Survival
Patterns	✓	✓	
Cause and Effect	✓	✓	
Scale, Proportion, and Quantity		✓	
Systems and System Models	✓	✓	✓
Energy and Matter	✓	✓	
Structure and Function			✓
Stability and Change		✓	

Grade 5 NGSS Correlation

Performance Expectations		Mixtures and Solutions	Living Systems	Earth and Sun
5-PS1-1	Develop a model to describe that matter is made of particles too small to be seen.	✓		
5-PS1-2	Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	✓		
5-PS1-3	Make observations and measurements to identify materials based on their properties.	✓		
5-PS1-4	Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	✓		
5-PS2-1	Support an argument that the gravitational force exerted by Earth on objects is directed down.			✓
5-PS3-1	Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.		✓	
5-LS1-1	Support an argument that plants get the materials they need for growth chiefly from air and water.		✓	
5-LS2-1	Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.		✓	
5-ESS1-1	Support an argument that the apparent brightness of the sun and stars is due to their relative distances from Earth.			✓
5-ESS1-2	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.			✓
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.		✓	✓
5-ESS2-2	Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.			✓
5-ESS3-1	Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.		✓	✓
3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	✓		
3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	✓		✓
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	✓		✓

Grade 5 NGSS Correlation Continued

Disciplinary Core Ideas		Mixtures and Solutions	Living Systems	Earth and Sun
PS1.A	**Structure and Properties of Matter** Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model shows that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects.	✓		
PS1.A	**Structure and Properties of Matter** The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.	✓		
PS1.B	**Chemical Reactions** No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.)	✓		
PS1.A	**Structure and Properties of Matter** Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.)	✓		
PS1.B	**Chemical Reactions** When two or more different substances are mixed, a new substance with different properties may be formed.	✓		
PS2.B	**Types of Interactions** The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.			✓
PS3.D	**Energy in Chemical Processes and Everyday Life** The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).		✓	
LS1.C	**Organization for Matter and Energy Flow in Organisms** Plants acquire their material for growth chiefly from air and water.		✓	
ESS1.A	**The Universe and its Stars** The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.			✓
ESS1.B	**Earth and the Solar System** The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.			✓
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.		✓	✓
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.			✓
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.		✓	✓

Grade 5 NGSS Correlation Continued

Disciplinary Core Ideas		Mixtures and Solutions	Living Systems	Earth and Sun
ETS1.A	**Defining and Delimiting Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	✓		
ETS1.B	**Developing Possible Solutions** Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.	✓		✓
ETS1.B	**Developing Possible Solutions** At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	✓		✓
ETS1.B	**Developing Possible Solutions** Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	✓		✓
ETS1.C	**Optimizing the Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	✓		✓

Science and Engineering Practices	Mixtures and Solutions	Living Systems	Earth and Sun
Asking Questions and Defining Problems			
Developing and Using Models	✓	✓	
Planning and Carrying Out Investigations	✓	✓	✓
Analyzing and Interpreting Data		✓	✓
Using Mathematics and Computational Thinking	✓		✓
Constructing Explanations and Designing Solutions		✓	✓
Engaging in Argument From Evidence	✓		✓
Obtaining, Evaluating, and Communicating Information			

Crosscutting Concepts	Mixtures and Solutions	Living Systems	Earth and Sun
Patterns	✓		✓
Cause and Effect	✓	✓	✓
Scale, Proportion, and Quantity	✓		✓
Systems and System Models		✓	✓
Energy and Matter	✓	✓	
Structure and Function			
Stability and Change			✓

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