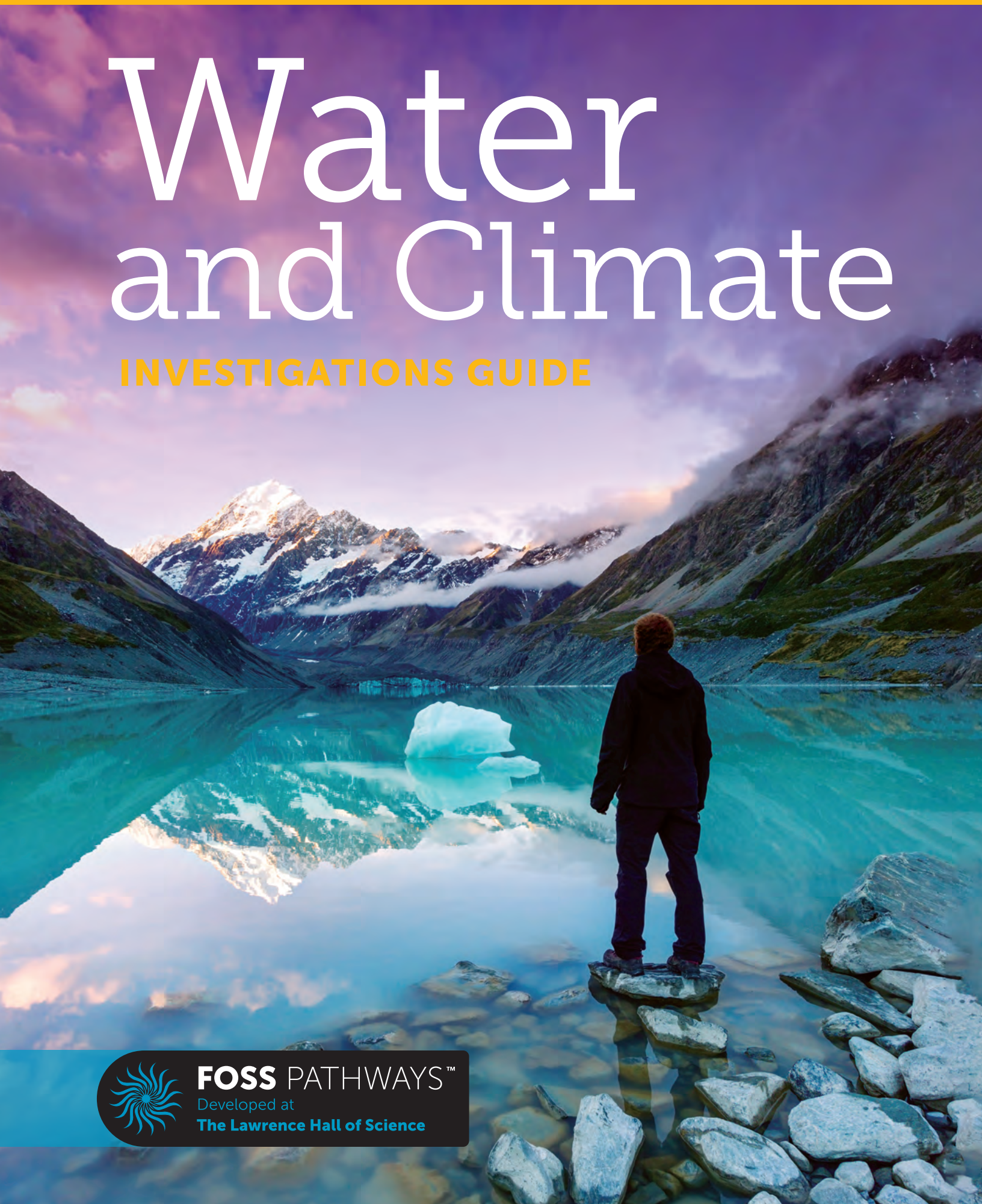
SAMPLER

Water and Climate

INVESTIGATIONS GUIDE



FOSS PATHWAYS™
Developed at
The Lawrence Hall of Science

PreK–5 science that meets the challenge of our time

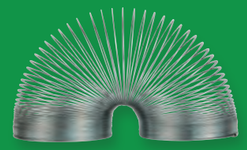
Welcome to new FOSS® Pathways™. Now as never before, the world needs scientific thinkers—to view the world thoughtfully, approach challenges analytically, and embrace opportunities enthusiastically. For educators to help unlock this potential in their students, they need powerful tools that work for the needs of today. A program that engages students of all backgrounds and experiences. Fully leverages modern digital technology. And does it all in the hours available.

A major advancement from a proven leader

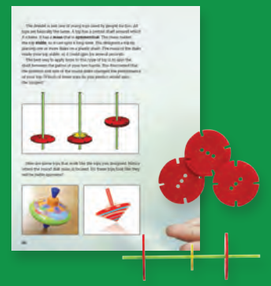
The Full Option Science System™ (FOSS) was conceived to enlist students not as passive recipients of information, but as active investigators of phenomena. That principle has proven its worth for 150,000 teachers and 4 million students across all 50 states, building a legacy of student engagement and test-score improvement. Now FOSS takes science education another significant step forward, with FOSS Pathways. This new PreK–5 core curriculum:

Aligns with today's national science standards and is adaptable to meet state and local requirements

Incorporates the digital tools for a flexible multimedia experience



Lends flexibility to teach in the class time allotted for science



Teaches through a multimodal approach to resonate with every student

Engages students through coherent phenomenon storylines that are local and relevant

Provides unmatched educative support to teach phenomena-based science

How Pathways develops the scientific thinkers of tomorrow

New FOSS Pathways supports today's demand to develop scientifically literate thinkers and problem solvers in a multitude of ways.

A logical progression

Students develop core ideas in a relevant and coherent learning progression that allows them to construct an explanation of the phenomena they have experienced.

Support for students

Comprehensive support and multimodal instructional experiences engage learners of all languages and cultures, taking advantage of prior experiences so all students can reason scientifically.

Evidence of learning

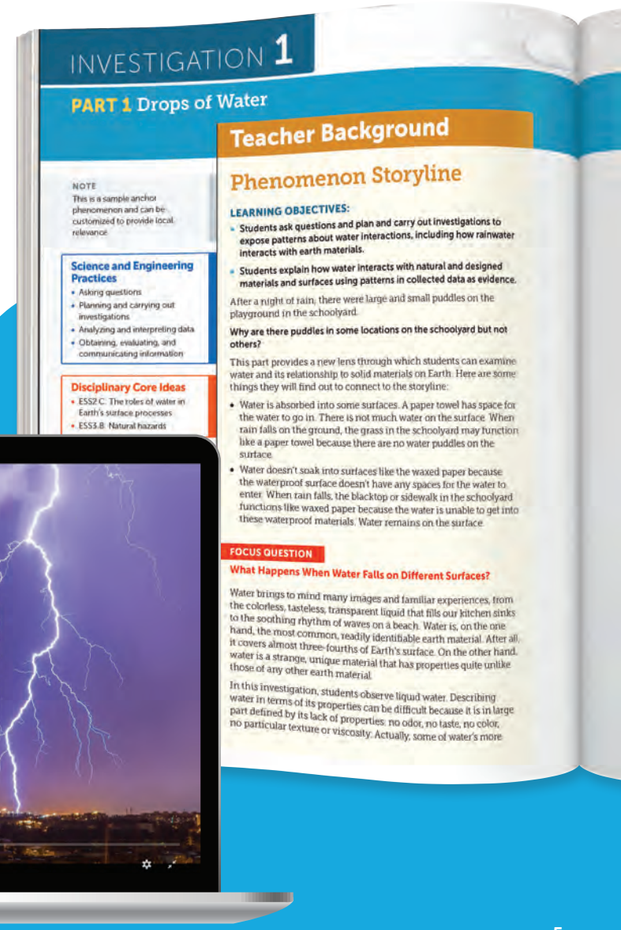
Research-based and field-tested assessments accurately measure student learning and progress. A variety of formative assessment tools provide evidence of students' use of the three dimensions and their knowledge of phenomena.

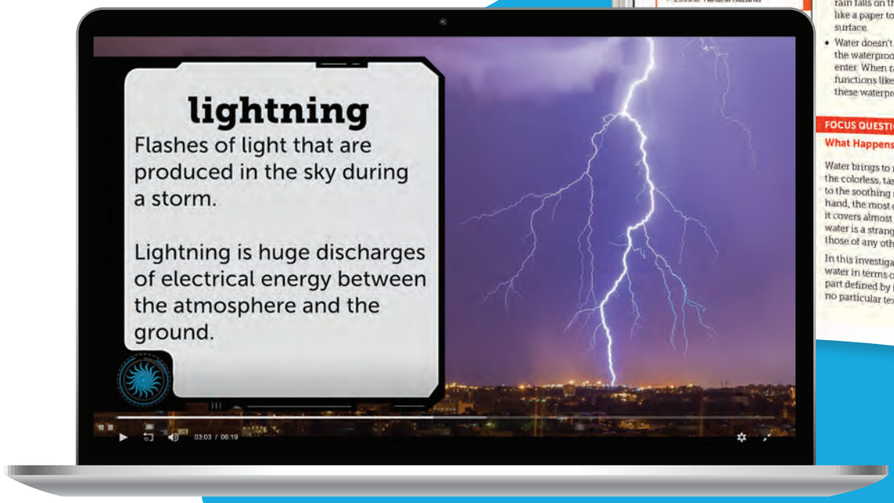
Support for teachers

Phenomena-based instruction is facilitated by appropriate educative support. This includes explicit background information needed for teachers to engage students in making the connection between the anchor phenomenon being investigated and the core ideas being exposed.

Rich digital resources

Digital resources for students and teachers are provided through FOSSweb on ThinkLink™. These multimedia materials are purposefully designed to enhance the learning experience and lend the flexibility to keep active science teaching viable if classroom circumstances change.





How FOSS Pathways aligns with today's standards

In this Sampler, pages 9-19 and 21-41 are provided from the teacher *Investigations Guide*. As you review, you will begin to witness the numerous ways that FOSS Pathways supports the development of tomorrow's scientists, engineers, and informed citizens. You'll see examples for:

Investigations driven by local, relevant phenomena and real-world problems

Instruction led by multimodal experiences that cognitively engage students to figure out phenomena

Identification of performances to meet targeted learning goals and elicit evidence of students' use of all three dimensions

Instructional support for teachers that provides an explicit connection between the phenomenon, three-dimensional learning, and multimodal learning experiences

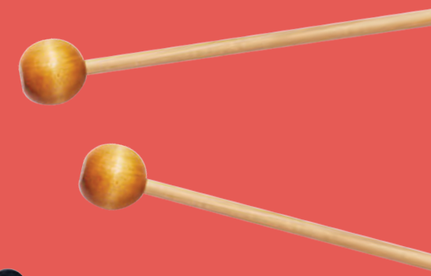
Clear integration of ELA/ELD skills and practices, with ties to standards and resources for engaging multilingual students

Cross-curricular activities that give students a choice and voice to differentiate instruction

▶ Images on this page include actual components, resources and/or materials provided in FOSS kits.

How FOSS aligns to NGSS Performance Expectations

Grade 3 NGSS Performance Expectations	FOSS Water and Climate Module	
	Investigation(s)	Benchmark Assessment
3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	**Investigation 2** **Investigation 4**	• Investigations 1–2 I-Check • Investigations 3–4 I-Check • Survey/Posttest
3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.	**Investigation 4**	• Investigations 1–2 I-Check • Investigations 3–4 I-Check • Survey/Posttest
3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	**Investigation 1** **Investigation 3**	• Investigations 1–2 I-Check • Investigations 3–4 I-Check • Survey/Posttest



Water and Climate Investigations

Investigation 1: Water Observations

Part 1: Drops of Water
Part 2: Water in Nature
Part 3: Water in Earth Materials
Part 4: Water on a Slope

Investigation 2: Weather Data

Part 1: Measuring Temperature
Part 2: Local Weather

Investigation 3: Weather and Water

Part 1: Evaporation
Part 2: Evaporation Variables
Part 3: Condensation
Part 4: Weather-Related Natural Hazards

Investigation 4: Seasons and Climate

Part 1: Seasonal Weather
Part 2: Describing Climate

Water and Climate

▶ Start here to begin your review of the Grade 3 Water and Climate Investigations Guide.

Introduction

Water dominates the surface of our planet, changes the face of the land, and defines life. Weather is driven by the Sun and involves the movement of water on Earth through evaporation, condensation, precipitation, and runoff. Severe weather might bring floods that impact people and natural ecosystems. Climate is determined in part by the amount of precipitation in a region and by temperature range. Humans depend on water, and new technologies are being engineered to conserve and protect this natural resource to provide for the needs of people around the world.

Student engagement with the ideas in the **Water and Climate Module** are driven by several anchor phenomena. Students explore the properties of water and interactions between water and other earth materials. They investigate these phenomena:

- Anchor phenomenon 1—schoolyard puddles
- Anchor phenomenon 2—unexpected gardening weather
- Anchor phenomenon 3—extreme rain
- Anchor phenomenon 4—unusual seasonal weather

Students engage in science and engineering practices as they investigate the role of water in weather and how weather conditions change around the world and throughout the year while exploring the crosscutting concepts of patterns; cause and effect; and scale, proportion, and quantity. They are introduced to the nature of science, how science affects everyday life, and the influence of engineering, technology, and science on society and the natural world.

CONTENTS

The NGSS Performance Expectations bundled in this module include:

Earth and Space Sciences
3-ESS2-1
3-ESS2-2
3-ESS3-1

NOTE

The three modules for grade 3 in FOSS Pathways are:

- Water and Climate
- Motion
- Structures of Life

Module Matrix
At a Glance

Phenomenon and Storyline	Driving Question and Focus Questions	Content and Disciplinary Core Ideas	Practices and Crosscutting Concepts	NGSS PEs
INV. 1 Water Observations **Phenomenon 1—Schoolyard puddles:** After a night of rain, there were large and small puddles on the playground in the schoolyard. **Storyline:** Students plan and carry out investigations to explore cause-and-effect relationships about the interaction between water and Earth's surface. They construct explanations to describe interactions of water on various types of surfaces. Finally, they construct an explanation using evidence to describe interactions of water with materials and on slopes to explain the wet and dry areas of the playground.	***Why are there puddles in some locations on the schoolyard but not others?*** **FOCUS QUESTIONS:** **What happens when water falls on different surfaces?** **What is the effect of rain on natural materials?** **What happens when water flows over solid materials on Earth's surface?** **How does slope affect water on the schoolyard?**	**ESS2.C:** The roles of water in Earth's surface processes **ESS3.B:** Natural hazards • Water is absorbed by some materials but not others. • Water drains more easily through some earth materials than through others. • Water moves downhill. • The volume of water affects the speed of the water flow. The steepness of the slope of the land affects how fast water flows. • Water beads up on waterproof materials and soaks into absorbent materials. • Soils absorb and retain more water than rock particles alone. Some materials on Earth's surface absorb more water than others.	**Science and Engineering Practices** Asking questions Developing and using models Planning and carrying out investigations Analyzing and interpreting data Constructing explanations Obtaining, evaluating, and communicating information **Crosscutting Concepts** Patterns Cause and effect	**3-ESS3-1:** Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.
INV. 2 Weather Data **Phenomenon 2—Unexpected gardening weather:** Students in a school in your area scheduled a series of four workdays in their school garden but they had a problem. The workdays were spread out over two months. The first scheduled garden work was at the end of a sunny week, but the weather that day was unexpectedly cold and rainy so they had to cancel. The students wanted to know if the other scheduled days would be likely to have good weather for working in the garden. **Storyline:** Students measure and interpret local weather data for the current period and analyze meteorologists' forecasts to determine patterns.	***What information should the students gather to identify the month and days best suited for outdoor garden work?*** **FOCUS QUESTIONS:** **How is temperature measured and reported?** **How can weather data be used to make predictions about future weather conditions?**	**ESS2.D:** Weather and climate • Thermometers measure temperature. The metric unit for temperature is the degree Celsius (°C). • Weather conditions include temperature, precipitation, and wind. • Weather data can be analyzed, and patterns can be used to predict future weather. • Weather varies from one location to another. • Temperature is a measure of how hot matter is. • Water freezes at 0°C and boils at 100°C. • Weather is measured using observation and tools such as thermometers, rain gauges, and wind vanes.	**Science and Engineering Practices** Planning and carrying out investigations Analyzing and interpreting data Engaging in argument from evidence Obtaining, evaluating, and communicating information **Crosscutting Concepts** Patterns Scale, proportion, and quantity	**3-ESS2-1:** Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

Module Matrix
At a Glance CONTINUED

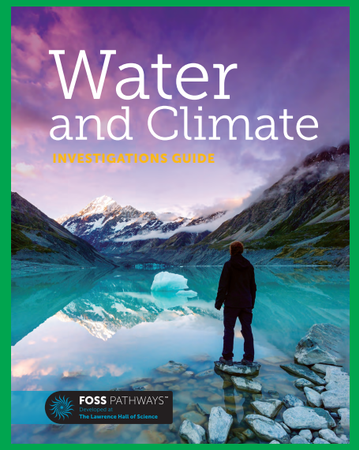
Phenomenon and Storyline	Driving Question and Focus Questions	Content and Disciplinary Core Ideas	Practices and Crosscutting Concepts	NGSS PEs
INV. 3 Weather and Water **Revisit phenomenon 1—Schoolyard puddles:** Sometimes it's dry outside and other times it's wet. Sometimes it's cold and other times it's hot. During dry conditions, puddles get smaller and disappear. **Phenomenon 3—Extreme rain:** During wet conditions, water appears on different surfaces. A lot of rain can cause problems for humans. **Storyline:** Students develop and use models to describe how the processes of evaporation and condensation contribute to weather conditions. They construct explanations about cause-and-effect relationships between temperature, evaporation, and condensation and gather information about severe weather. They evaluate ways to reduce the impacts of river and coastal floods.	***Why are there puddles in some locations on the schoolyard but not others?*** **FOCUS QUESTIONS:** **What happens to the water in puddles over time?** **What affects how fast water evaporates?** **When rain falls from clouds, where does that water come from?** ***What happens when there is too much rain and what can people do about it?*** **What happens when there is too much rain and what can people do about it?**	**ESS2.D:** Weather and climate **ESS3.B:** Natural hazards • When liquid water is exposed to air (wind), some water evaporates. Evaporation increases as temperature and surface area increase. • When water vapor hits a cooler surface, liquid water forms. • Water vapor cools and condenses to form drops of water in clouds that forms rain. • Evaporation is the process by which liquid (water) changes into gas (water vapor). • As temperature increases, the rate of evaporation increases. • The larger the surface area of a volume of water that is exposed to air, the greater the rate of evaporation. • Moving air (wind) increases the rate of evaporation. • Condensation is the process by which gas (water vapor) changes into liquid (water). • Weather-related natural hazards include tornadoes, hailstorms, blizzards, lightning, floods, and drought.	**Science and Engineering Practices** Asking questions Developing and using models Planning and carrying investigations Analyzing and interpreting data Constructing explanations Engaging in argument from evidence Obtaining, evaluating, and communicating information **Crosscutting Concepts** Cause and effect	**3-ESS3-1:** Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.
INV. 4 Seasons and Climate **Phenomenon 4—Unusual seasonal weather:** One morning in January, students in Oakland, California, came into class excited as they talked about the weather. They had seen snow on the ground on their way to school. None of them could remember seeing snow near their school. This was very unusual. **Storyline:** Students obtain, analyze, and interpret seasonal weather for their local area. They interpret graphical displays of world climate data for regions to reveal climate patterns based on location.	***Is snow in January unusual or typical in our community? What about the rest of the world?*** **FOCUS QUESTIONS:** **What are typical weather conditions in our region?** **What data do we need to determine climates in different regions?**	**ESS2.D:** Weather and climate • Typical weather in a region often varies with seasons. High and low temperatures and the amount of precipitation are the main ways to describe seasonal weather changes. • Climate is the average or typical weather that can be expected to occur in a region of Earth's surface, based on long-term observation and data analysis. • Expected weather conditions for a region can be predicted from climate region data. • Seasonal weather can vary depending on geographical conditions within a climate region. • There are seasonal changes to local weather that can be displayed graphically and used to predict future weather conditions.	**Science and Engineering Practices** Analyzing and interpreting data Constructing explanations Obtaining, evaluating, and communicating information **Crosscutting Concepts** Patterns Scale, proportion, and quantity	**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.

FOSS Pathways includes:

Investigations 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

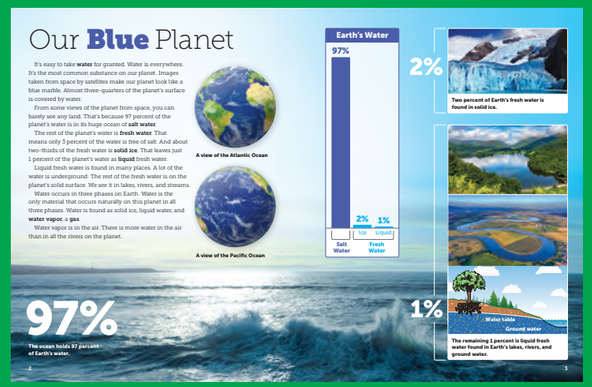


Science Resources Student Book

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

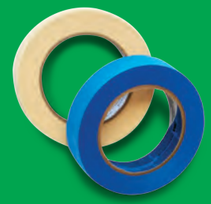
Available in print and as an interactive eBook in English and Spanish.



▶ Images on this page include actual components, resources and/or materials provided in FOSS kits.

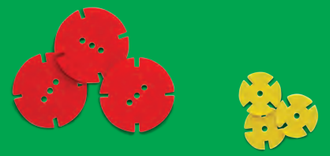
Equipment Kit

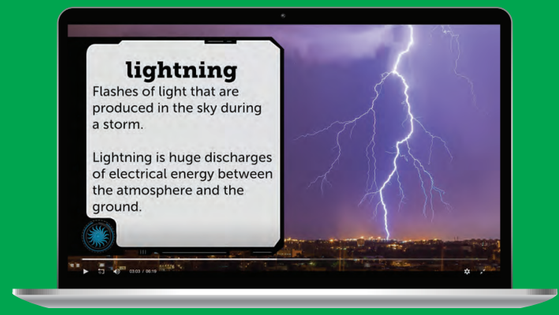
FOSS provides the equipment needed for all the investigations, including metric measuring tools. Our high-quality, classroomtested materials are long-lasting and packaged by investigation to facilitate preparation and clean up. There is enough permanent equipment in each kit for 32 students. Consumable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



Technology

Online resources include duplication masters, eInvestigations Guide, teaching slides, FOSSmap online assessment, streaming videos, virtual investigations, and tutorials, as well as a library of teacher resources, including access and equity, three-dimensional teaching and learning, and environmental literacy.





SCAN HERE FOR A TOUR OF FOSSWEB!

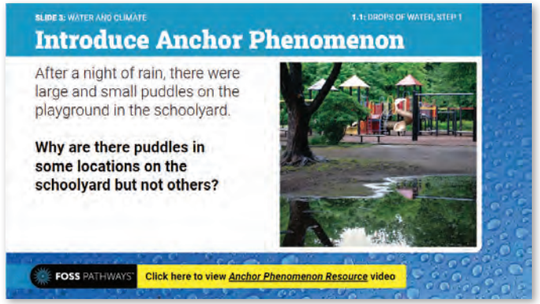
FOSSweb

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

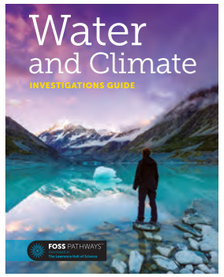
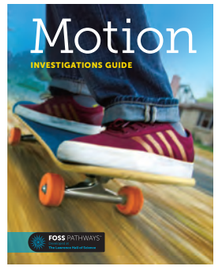
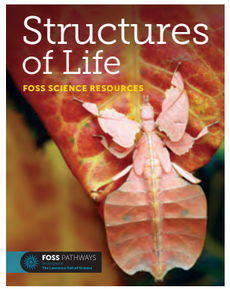
Keep your students engaged while teaching literacy skills with interactive *FOSS Science Resources* eBooks. The eBooks include integrated audio with text syncing and links to online activities and videos that bring the photos to life.

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 Level Planning Guide

FOSS Pathways Modules Grade 3

FOSS Module	Module Overview/Bundled Performance Expectations	Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts
 Earth Science	In the Water and Climate Module, students engage in science and engineering practices as they investigate the role of water in weather and how weather conditions change around the world and throughout the year while exploring the crosscutting concepts of patterns; cause and effect; and scale, proportion, and quantity. They are introduced to the nature of science, how science affects everyday life, and the influence of engineering, technology, and science on society and the natural world. **NGSS PEs:** **Earth and Space Sciences:** **3-ESS2-1** **3-ESS2-2** **3-ESS3-1**	**ESS2.D:** Weather and climate **ESS3.B:** Natural hazards **ESS2.C:** The roles of water in Earth's surface processes	• Asking questions • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Constructing explanations • Engaging in argument from evidence • Obtaining, evaluating, and communicating information	• Patterns • Cause and effect • Scale, proportion, and quantity
 Physical Science	In the Motion Module, students engage in science and engineering practices as they investigate phenomena and collect data to answer questions about the effects of magnetic force and the force of gravity on objects. Students explore the crosscutting concepts of patterns; cause and effect; and systems and system models as they define problems in order to develop solutions. Students reflect on their own use of science and engineering practices and find out how others use these practices in their careers. **NGSS PEs:** **Physical Sciences:** **3-PS2-1** **3-PS2-2** **3-PS2-3** **3-PS2-4** **ETAS:** **3-5 ETS1-1** **3-5 ETS1-2** **3-5 ETS1-3**	**PS2.A:** Forces and motion **PS2.B:** Types of interactions **ETS1.A:** Defining and delimiting engineering problems **ETS1.B:** Developing possible solutions **ETS1.C:** Optimizing the design solution	• 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	• Patterns • Cause and effect • Systems and system models
 Life Science	In the Structures of Life Module, students observe, compare, categorize, and care for organisms. Students engage in science and engineering practices to investigate the structures and behaviors of organisms and learn how the structures function in growth, survival, and reproduction. Students look at the interactions between organisms of the same kind, among organisms of different kinds, and between the environment and populations of organisms over time. Students focus on these crosscutting concepts to develop understandings about organisms and population survival—patterns; cause and effect; scale, proportion, and quantity; systems and system models; and structure and function. **NGSS PEs:** **Life Sciences:** **3-LS1-1** **3-LS2-1** **3-LS3-1** **3-LS3-2** **3-LS4-1** **3-LS4-2** **3-LS4-3** **3-LS4-4**	**LS1.A:** Structure and function **LS1.B:** Growth and development of organisms **LS2.D:** Social interactions and group behaviors **LS3.A:** Inheritance of traits **LS3.B:** Variation of traits **LS4.C:** Adaptation	• Asking questions • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Using mathematics and computational thinking • Constructing explanations • Engaging in argument from evidence • Obtaining, evaluating, and communicating information	• Patterns • Cause and effect • Systems and system models • Structure and function

FOSS® Pathways™ is an engaging PreK–5 science program developed at the Lawrence Hall of Science for the Next Generation Science Standards (NGSS). This sampler will introduce you to the major components of the program and show examples from FOSS Pathways Water and Climate Investigations Guide.

Recommended Scope and Sequence

FOSS Pathways

GRADE	PHYSICAL SCIENCE	EARTH SCIENCE	LIFE SCIENCE
PK		Observing Nature	
K	Materials and Forces	Trees and Weather	Animals Two by Two
1	Sound and Light	Changes in the Sky	Plants and Animals
2	Solids and Liquids	Water and Landforms	Insects and Plants
3	Motion	Water and Climate	Structures of Life
4	Energy	Soils, Rocks, and Landforms	Senses and Survival
5	Mixtures and Solutions	Earth and Sun	Living Systems

Learn more at **FOSSPathways.com**

Scan the QR code and explore additional FOSS Pathways Samplers today.

Developed at:
The Lawrence Hall of Science
UNIVERSITY OF CALIFORNIA, BERKELEY

Published & distributed by:
Delta Education
School Specialty