SAMPLER

Observing Nature

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

FOSS®, a longtime leader in science education, has stepped forward to meet that challenge with the newly streamlined FOSS Pathways[™]. Pathways was designed to provide teachers with everything they need to meet standards in the time they have allotted to teach science. In these pages, you will see how Pathways:



Aligns to national science standards using threedimensional teaching, learning, and assessment





Utilizes a multimodal approach to resonate with every student



Incorporates the digital tools for a flexible multimedia experience



Lends flexibility to teach in the class time allotted for science

Immerses students in figuring out local and relevant phenomena and engineering problems



Provides unmatched teacher 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.



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.

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.



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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

Rich digital resources



Observing Nature Investigations

Investigation 1: Trees

Part 1: Getting to Know Trees Part 2: Following Trees through the Seasons

Investigation 2: Leaves

Part 1: Grouping Leaves Part 2: Comparing Leaf Shapes Part 3: Comparing Leaf Sizes Part 4: Matching Leaves Part 5: Displaying Pressed Leaves

Investigation 3: Earth Materials

Part 1: Exploring Rocks Part 2: Soil Painting Part 3: Changes to Water Part 4: Recycling Materials

Investigation 4: Isopods

Part 1: Getting to Know Isopods Part 2: Homes for Plants and Animals Part 3: Sorting Isopods Part 4: Observing Isopods Move

Investigation 5: Wood

Part 1: Getting to Know Wood Part 2: Putting Wood on Water Part 3: Changing Wood by Sanding Part 4: Exploring Sawdust and Shavings Part 5: Making Plywood



INVESTIGATIONS GUIDE

Introduction

Looking out at the schoolyard, young students are curious about the natural phenomena all around them. Trees, leaves, critters, rocks, and structures made of wood. Together they make an environment to explore, learn from, and play in. In the **Observing Nature Module**, the class is challenged to create a nature guide for their schoolyard. Students observe and investigate trees and their leaves, the animals that make their home in leaf litter, the soil and rocks around the roots, and the wood that comes from trees to develop a better understanding of the living and non-living factors that make a schoolyard habitat. Throughout the module, students produce their own class nature guide book to document these observations.

These five investigations use local trees through the seasons to provide Pre-K students with age-appropriate experiences with life, earth, and physical science. These experiences will serve them well as they investigate these concepts in more sophisticated ways when they are in kindergarten.

Throughout this module students engage in aspects of the science and engineering practices that are appropriate for Pre-K students such as asking questions, participating in collaborative investigations, observing, recording, and interpreting data to build explanations, and obtaining information from photographs. They have opportunities to draw and label their observations, and to share their ideas verbally with their peers and adults. Students gain experiences that expose them to the crosscutting concepts of patterns, cause and effect, structure and function, and scale, proportion, and quantity.

Inviting students to explore and communicate about what interests them in the local environment provides agency and opportunities to make connections to their family and culture.



Observing Nature

Start here to begin your review of the Grade PK Observing Nature Investigations Guide.

CONTENTS

Introduction

Module Matrix

Conceptual Flow of Module

FOSS Pathways Teaching Schedule

FOSS Investigation Organization

A New Vision for High-Quality Preschool Curriculum

The Elements of the FOSS Instructional Design

Diversity, Equity, and Inclusion

Establishing a Classroom Culture



OVERVIEW

Module Matrix At a Glance

Phenomenon and Storyline	Driving Question and Focus Questions	Content and Core Ideas	Practices and Crosscutting Concepts	Assessment
INV. 1 Trees Students are presented with the anchor problem for this module: What should we include in a nature guide for our schoolyard? They will observe nature around the school, record observations, collect artifacts, and create a nature guide book as a class. Students go on a walk around the schoolyard, developing general concepts about trees and discussing how trees are useful to people and animals. The class adopts several trees to observe throughout the school year. A classroom tree scrapbook documents students' observations through the seasons. They extend their understanding of trees as a changing, living part of their world. During each season, students visit the schoolyard trees to observe their branches, leaves, flowers, and seeds and describe changes.	What should we include in a nature guide for our schoolyard? FOCUS QUESTIONS: What did we observe about trees? What did we observe about our trees?	 Opportunities to identify characteristics of plants, describe similarities and differences, identify plant structures, and describe changes: Trees are living plants and may change through the seasons. Trees have structures: branches, leaves, trunk, and roots. Trees are a natural resource. Trees differ in size and shape. Trees have basic needs: light, air, nutrients, water, and space. 	Science and Engineering Practices Asking questions Planning and carrying out investigations Analyzing and interpreting data Obtaining, evaluating, and communicating information Crosscutting Concepts Patterns Structure and function	 Embedded Assessment Teacher observation of these learning objectives: Students plan and carry out investigations of trees by observing and describing their characteristics. Students provide evidence that trees are living things that support animals, including people. Students gather firsthand observations to compare and contrast different trees and how they change over the seasons.
INV. 2 Leaves Students continue to add to their nature guide by looking more closely at trees. They begin with a schoolyard walk, focusing on the leaves of trees. They match leaves to geometric shapes, go on a leaf hunt to compare properties of leaves, work at centers with representational materials, and make a leaf book.	What should we include in a nature guide for our schoolyard? FOCUS QUESTIONS: What did we observe about leaves? What shapes are leaves? How are leaves different? How are leaf edges different? What did we observe about leaves?	 Opportunities to identify characteristics of leaves, describe similarities and differences, and describe changes through the seasons: Different kinds of trees have different leaves. Leaves have properties: size, shape, tip, edge, texture, and color. Leaf properties vary. Leaves can be described and compared by their properties. 	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 Structure and function Scale, proportion, and quantity	 Embedded Assessment Teacher observation of these learning objectives: Students ask questions and plan and carry out investigations of tree leaves. Students analyze leaves to determine patterns in their properties. Students obtain information through reading and discussion about what plants need to grow and how trees change through the seasons.



OVERVIEW

Module Matrix At a Glance CONTINUED

Phenomenon and Storyline	Driving Question and Focus Questions	Content and Core Ideas	Practices and Crosscutting Concepts	Assessment
INV. 3 Earth Materials Students continue to develop their class nature guide by turning their exploration to what's below the trees and leaves. They focus on earth materials, observing and sorting rocks by properties. They describe changes when they put rocks in water. Students collect and describe soil samples and make mud paint to observe the colors. They freeze and melt water to observe phase change, and discuss natural resources that can be conserved through reuse and recycling.	What should we include in a nature guide for our schoolyard? FOCUS QUESTIONS: How are rocks different? What happens when soil gets wet? How can we change water? What materials can we recycle?	 Opportunities to identify and compare characteristics of and changes in earth materials: Rocks, soil, and water are earth materials. Rocks can be compared and described. Soil can be described by its properties. Water can change from solid to liquid with heat and from liquid to solid with cold. Land, air, water, and trees are natural resources. People reuse and recycle to conserve resources. 	Science and Engineering Practices Asking questions Planning and carrying out investigations Analyzing and interpreting data Obtaining, evaluating, and communicating information Crosscutting Concepts Patterns Cause and effect	 Embedded Assessment Teacher observation of these learning objectives: Students plan and carry out investigations of earth materials. Students analyze their observation of earth materials (rocks, soil, and water) to explain how they are similar and different. Students plan and carry out investigations to observe patterns of how water changes from solid to liquid and back depending on temperature. Students identify living and nonliving resources and explain how people can reuse and recycle them.
INV. 4 Isopods Students continue to solve the anchor problem of creating a class nature guide by looking at the organisms that live in soil below trees and leaves. They observe structures of two kinds of isopods, pill bugs and sow bugs. They hold isopod races and observe how they move. Students make a terrarium as a model to explore how isopods and plants live together. They read about and compare photos of isopods and a variety of other animals to learn about how they live.	What should we include in a nature guide for our schoolyard? FOCUS QUESTIONS: What are isopods? What do isopods need to live? How are pill bugs and sow bugs different? How do isopods move?	 Opportunities to identify characteristics of animals, describe similarities and differences, and create a habitat for plants and animals: Isopods are animals and have basic needs—water, air, food, and space with shelter. Different kinds of isopods have some structures and behaviors that are the same and some that are different. Isopod behavior is influenced by conditions in the environment. 	Science and Engineering Practices Asking questions Planning and carrying out investigations Analyzing and interpreting data Constructing explanations Obtaining, evaluating, and communicating information Crosscutting Concepts Patterns Structure and function	 Embedded Assessment Teacher observation of these learning objectives: Students ask questions, plan and carry out investigations, and analyze data to describe patterns in the structures and behaviors of isopods that help them live. Students ask questions, plan and carry out investigations, and gather data to construct explanations about the needs of isopods and where they live.



OVERVIEW

Module Matrix At a Glance CONTINUED

Phenomenon and Storyline

INV. 5 Wood

Students explore objects in the schoolyard habitat and in the classroom that are made from the material wood. They investigate three different wood samples to determine the properties of wood. They begin with free exploration, drop water on wood samples, and float them in basins. Students explore the room and label objects made of wood. They use sandpaper to change the shape of wood. They compare sawdust and shavings and how they interact with water. They simulate the manufacture of plywood.

With a year's experience visiting local trees, observing their trunks, roots, leaves, branches, flowers, and seeds, students can explain what a tree needs to grow, what trees provide for animals and people, and how trees as living plants change through the seasons. They document their learning in the class nature guide as a culmination of the module.

Driving Question and Focus Questions

What should we include in a nature guide for our schoolyard?

FOCUS QUESTIONS:

Where does wood come from? What is made of wood?

What happens when wood gets wet?

How can you change the shape of wood?

- How are sawdust and shavings different?
- How is plywood made?

Content and Core Ideas

Opportunities to observe, investigate, and describe characteristics and physical properties of objects and materials, and to know that objects can be described in terms of the materials they are made of and their physical properties:

- Wood can be described in terms of its properties.
- Different kinds of wood come from different kinds of trees. Trees are natural resources.
- Some kinds of wood are processed and made by people.
- Wood can be changed by sanding and mixing with water.
- Sawdust is tiny wood pieces that can be recycled.

Patterns quantity



Practices and Crosscutting Concepts

Science and Engineering Practices

- Asking questions
- Planning and carrying out
- investigations
- Developing and using models
- Analyzing and interpreting data
- Constructing explanations and designing solutions Obtaining, evaluating, and
- communicating information

Crosscutting Concepts

Cause and effect Structure and function Scale, proportion, and

Assessment

Embedded Assessment

Teacher observation of these learning objectives:

- Students plan and carry out investigations and interpret observations to compare the properties of different kinds of natural and processed wood to reveal patterns.
- Students plan and carry out investigations and interpret observations to compare how different kinds of wood interact with water to reveal patterns.
- Students plan and carry out investigations and interpret observations to explain how people change the natural resource of wood from trees to make objects with different properties.

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, 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 24 students. Consumable materials are supplied for three uses. Convenient grade-level and refill kits are available.



Technology

Online resources include duplication masters, elnvestigations 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 K

OSS Module	Module Overview/Bundled Performance Expectations	Disciplinary Core Ideas
	The Trees and Weather Module provides students with experiences to develop an understanding of what plants need to survive in their environment. Systematic investigation of trees over the seasons will bring students to a better understanding of trees at school and in the community. Students will observe day-to-day changes and patterns in weather over the year as well as the impact weather has on living things. NGSS PEs: Life Sciences: K-LS1-1 Earth Sciences: K-ESS2-1 K-ESS2-2 K-ESS3-1 K-ESS3-2 Physical Sciences: K-PS3-1	 LS1.C: Organization for matter and energy flow in organisms ESS2.D: Weather and climate ESS2.E: Biogeology ESS3.A: Natural resources ESS3.B: Natural hazards PS3.B: Conservation of energy and energy transfer
<image/>	The Materials and Forces Module provides experiences that heighten students' understanding of the physical world as they perform tests to observe properties of materials such as wood, paper, and fabric. They learn about different materials to engineer a shade structure. Students observe and compare pushes and pulls, the speed and motion of moving objects, and collisions. NGSS PEs: Physical Sciences: K-PS2-1 K-PS3-2 Earth Sciences: K-ESS2-2 K-ESS3-3 ETAS: K-2-ETS1-1 K-2-ETS1-1 K-2-ETS1-2	 PS2.A: Forces and motion PS2.B: Types of interactions PS3.B: Conservation of energy and energy transfer PS3.C: Relationship between energy and forces ESS2.E: Biogeology ESS3.C: Human impacts on Earth systems ETS1.A: Defining and delimiting engineering problems ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solutions
Anipoint Burger of the structure Description Descrind	The Animals Two by Two Module provides young students with opportunities to observe differences in structure and behavior and to learn about basic needs of animals. NGSS PEs: Life Science: K-LS1-1 Earth Sciences: K-ESS2-2 K-ESS3-1	LS1.C: Organization for matter and energy flow in organisms ESS3.A: Natural resources ESS2.E: Biogeology

FOSS Module

Science and Crosscutting **Engineering Practices** Concepts Asking questions Patterns • Developing and using models Cause and effect • Systems and system • Planning and carrying out investigations models • Analyzing and interpreting data • Structure and • Using mathematics and computational function thinking • Stability and change • Constructing explanations • Engaging in argument from evidence • Obtaining, evaluating, and communicating information Asking guestions and defining problems Patterns • Developing and using models Cause and effect • Planning and carrying out investigations Systems and system models • Analyzing and interpreting data • Scale, proportion, and • Constructing explanations and designing quantity solutions • Engaging in argument from evidence • Obtaining, evaluating, and communicating information

- 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
- Systems and system models

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 Observing Nature Investigations Guide.

Recommended Scope and Sequence FOSS Pathways

GRADE	PHYSICAL SCIENCE	EARTH SCIENCE	LIFE SCIENCE
РК		Observing Nature	
К	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





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