

# **FOSS Pathways:**

## **Grade 1 NGSS Three-Dimensional Design and Evidence for Criteria**

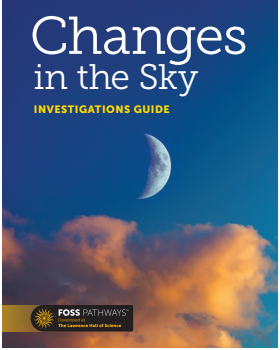
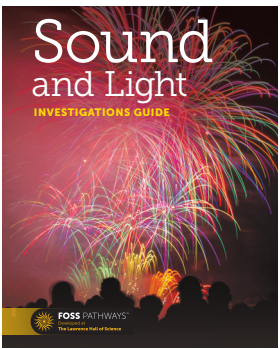
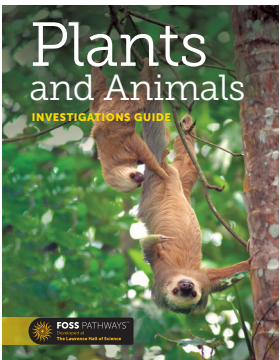


**FOSS PATHWAYS™**

Developed at  
**The Lawrence Hall of Science**

# FOSS Pathways Modules Grade 1

# Alignment to NGSS

FOSS Module	Module Overview/Bundled Performance Expectations	Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts
 <p>Earth Science * Still in development</p>	<p>In the Changes in the Sky Module, students turn their focus upward to explore that some objects in the sky change position in predictable ways. They make observations and record data about sunrise and sunset at different times of year to relate the amount of daylight to the seasons. They use observations of the Sun, Moon, and stars to describe patterns that can be predicted and discover that the Moon can be seen in the day and night skies.</p> <p><b>NGSS PEs:</b> <b>Earth Sciences:</b> <b>1-ESS1-1</b> <b>1-ESS1-2</b></p>	<p><b>ESS1.A:</b> The universe and its stars <b>ESS1.B:</b> Earth and the solar system</p>	<ul style="list-style-type: none"> <li>Asking questions</li> <li>Planning and carrying out investigations</li> <li>Analyzing and interpreting data</li> <li>Using mathematics and computational thinking</li> <li>Constructing explanations</li> <li>Obtaining, evaluating, and communicating information</li> </ul>	<ul style="list-style-type: none"> <li>Patterns</li> <li>Cause and effect</li> <li>Stability and change</li> </ul>
 <p>Physical Science</p>	<p>The Sound and Light Module provides students with experiences to explore how to change sound volume and develop simple models for how a sound travels from a source to a receiver. With light, students find out what happens when materials with different properties are placed in a beam of light and explore how to create and change shadows and reflections. Students explore how to use sound and light devices to communicate information and compare the ways in which animals use their senses to gather information about their environment.</p> <p><b>NGSS PEs:</b> <b>Physical Sciences:</b> <b>1-PS4-1</b> <b>1-PS4-2</b> <b>1-PS4-3</b> <b>1-PS4-4</b> <b>ETAS:</b> <b>K-2-ETS1-1</b> <b>K-2-ETS1-2</b> <b>K-2-ETS1-3</b></p>	<p><b>PS4.A:</b> Wave properties <b>PS4.B:</b> Electromagnetic radiation <b>PS4.C:</b> Information technologies and instrumentation <b>ETS1.A:</b> Defining and delimiting engineering problems <b>ETS1.B:</b> Developing possible solutions <b>ETS1.C:</b> Optimizing the design solution</p>	<ul style="list-style-type: none"> <li>Asking questions and defining problems</li> <li>Developing and using models</li> <li>Planning and carrying out investigations</li> <li>Analyzing and interpreting data</li> <li>Constructing explanations and designing solutions</li> <li>Obtaining, evaluating, and communicating information</li> </ul>	<ul style="list-style-type: none"> <li>Patterns</li> <li>Cause and effect</li> <li>Systems and system models</li> <li>Structure and function</li> </ul>
 <p>Life Science * Still in development</p>	<p>The Plants and Animals Module provides experiences with young plants and animals and the structures and behaviors that help them grow and survive in their habitat. Students explore structure and function relationships in nature and use that knowledge to develop models. They learn about the behaviors of animal parents to support their offspring.</p> <p><b>NGSS PEs:</b> <b>Life Sciences:</b> <b>1-LS1-1</b> <b>1-LS1-2</b> <b>1-LS3-1</b> <b>ETAS:</b> <b>K-2-ETS1-2</b></p>	<p><b>LS1.A:</b> Structure and function <b>LS1.B:</b> Growth and development of organisms <b>LS3.A:</b> Inheritance of traits <b>LS3.B:</b> Variation of trait <b>ETS1.A:</b> Defining and delimiting engineering problems <b>ETS1.B:</b> Developing possible solutions</p>	<ul style="list-style-type: none"> <li>Asking questions and defining problems</li> <li>Developing and using models</li> <li>Planning and carrying out investigations</li> <li>Analyzing and interpreting data</li> <li>Constructing explanations and designing solutions</li> <li>Obtaining, evaluating, and communicating information</li> </ul>	<ul style="list-style-type: none"> <li>Patterns</li> <li>Cause and effect</li> <li>Systems and system models</li> <li>Structure and function</li> </ul>

NGSS 3-D Design Criteria	FOSS Pathways Evidence: Sound and Light			
Instruction and Assessment	Anchor Phenomena 1 Hearing a bell ringing Investigation 1, Parts 1-2 Investigation 2, Part 1	Anchor Phenomenon 2 Designing a string phone Investigation 2, Part 2	Anchor Phenomenon 3 A shadow appears Investigation 3, Parts 1-2	Anchor Phenomenon 4 Use light to get information and communicate Investigation 4, Parts 1-3
<p><b>Use Phenomena/Problems</b></p> <p>Materials provide relevant and authentic learning contexts through which students:</p> <ul style="list-style-type: none"> <li>engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources</li> <li>have the potential to use the three dimensions to make sense of phenomena or design solutions to problems</li> </ul>	<p><b>Inv. 1, Parts 1-2</b></p> <p>Students explore the effects of vibrations from a tuning fork to a table-tennis ball to make connections that vibrations can move objects.</p> <p>Introduce the anchor phenomenon (pg. 42)</p> <p>Students construct, revise, revisit, and review the explanation of phenomenon (pgs. 53, 60 and 66)</p> <p>Students have a sense-making discussion (pgs. 51 and 63)</p> <p><b>Inv. 2, Part 1</b></p> <p>Students review the phenomenon (pg. 82)</p> <p>Students have a sense-making discussion (pg. 90)</p> <p>Students finalize the anchor phenomenon explanation (pg. 92)</p>	<p><b>Inv. 2, Parts 1-2</b></p> <p>Students continue to explore volume using simple instruments and solve the problem of redesigning a device to communicate over distance.</p> <p>Introduce the problem to solve (pg. 104)</p> <p>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 108 and 109)</p> <p>Students have a sense-making discussion (pg. 107)</p>	<p><b>Inv. 3, Parts 1-2</b></p> <p>Students use flashlights, sunlight, and solid materials to interact with transparent, translucent, and opaque items to explain shadows.</p> <p>Introduce the anchor phenomenon (pg. 122)</p> <p>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 126 and 138)</p> <p>Students have a sense-making discussion (pgs. 124 and 140)</p> <p>Students finalize the anchor phenomenon explanation (pg. 143)</p>	<p><b>Inv. 4, Parts 1-3</b></p> <p>Students investigate how to redirect light to different locations. Students also explore shapes and location of eyes on different animals as well as how to communicate using light.</p> <p>Introduce the problem to solve (pg. 154)</p> <p>Students have a sense-making discussion (pgs. 158, 177, and 195)</p> <p>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 174 and 184)</p> <p>Students finalize the problem to solve (pgs. 163 and 199)</p>
<p><b>Presence of Logical Sequence</b></p> <p>Student learning across the three dimensions is:</p> <ul style="list-style-type: none"> <li>arranged in a logical sequence</li> <li>sufficient and appropriate for students to figure out the phenomena or problems</li> </ul>	<p><b>Sound and Light Module instructs on NGSS Performance Expectation: 1-PS4-1, 1-PS4-3, 1 PS4-2, 1-PS4-4, K-2 ETS1-1, K-2 ETS1-2, and K-2 ETS1-3 1-1 (pgs. 2-5)</b></p> <p><b>Conceptual Flow of Sound and Light Module (pgs.6-7)</b></p> <p>Developing the Phenomenon Storyline of hearing a bell ring (pg. 31) through investigating</p> <p>Part 1 - Making Sounds (pgs. 34-35)</p> <p>Part 2 - Hearing Sounds (pgs. 54-55)</p>	<p><b>Sound and Light Module instructs on NGSS Performance Expectation: 1-PS4-1, 1-PS4-3, 1 PS4-2, 1-PS4-4, K-2 ETS1-1, K-2 ETS1-2, and K-2 ETS1-3 1-1 (pgs. 2-5)</b></p> <p><b>Conceptual Flow of Sound and Light Module (pgs.6-7)</b></p> <p>Continuing the Phenomenon Storyline of designing a string phone (pg. 73) through investigating</p> <p>Part 1 - Spoon-Gong System (pgs. 76-77)</p> <p>Part 2 - Sound Challenges (pgs. 98-99)</p>	<p><b>Sound and Light Module instructs on NGSS Performance Expectation: 1-PS4-1, 1-PS4-3, 1 PS4-2, 1-PS4-4, K-2 ETS1-1, K-2 ETS1-2, and K-2 ETS1-3 1-1 (pgs. 2-5)</b></p> <p><b>Conceptual Flow of Sound and Light Module (pgs.6-7)</b></p> <p>Developing the Phenomenon Storyline of a shadow appears (pg. 113) through investigating</p> <p>Part 1 - Making Shadows (pgs. 116-117)</p> <p>Part 2 - Transmitting Light (pgs. 132-133)</p>	<p><b>Sound and Light Module instructs on NGSS Performance Expectation: 1-PS4-1, 1-PS4-3, 1 PS4-2, 1-PS4-4, K-2 ETS1-1, K-2 ETS1-2, and K-2 ETS1-3 1-1 (pgs. 2-5)</b></p> <p><b>Conceptual Flow of Sound and Light Module (pgs.6-7)</b></p> <p>Developing the Phenomenon Storylines of use light to get information and communicate (pg. 145) through investigating</p> <p>Part 1 - Reflections (pgs. 148-149)</p> <p>Part 2 - Seeing with Light (pgs. 168-169)</p> <p>Part 3 - Designing with Light (pgs. 186-187)</p>

Purple = curricular embedded supports    Green = ongoing educator and student supports

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<p><b>Students are Figuring Out</b></p> <p>Materials position students to make sense of phenomena and design solutions to problems by:</p> <ul style="list-style-type: none"> <li>• asking and answering questions that link learning over time</li> <li>• using the three dimensions to link prior knowledge and negotiate new understandings and abilities</li> </ul>	<p><b>Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)</b></p> <p>Materials position students to make sense of phenomena and design by eliciting metacognition on the following questions:</p> <ul style="list-style-type: none"> <li>• What causes sound? (pg. 43)</li> <li>• What can vibrations do? (pg. 60)</li> <li>• Side Trip: What information does sound give us? (pg. 70)</li> </ul>	<p><b>Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)</b></p> <p>Materials position students to make sense of phenomena and design by eliciting metacognition on the following questions:</p> <ul style="list-style-type: none"> <li>• How does sound travel from the source to the receiver? (pg. 84)</li> <li>• How can we use sound to communicate over long distances? (pg. 106)</li> </ul>	<p><b>Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)</b></p> <p>Materials position students to make sense of phenomena and design by eliciting metacognition on the following questions:</p> <ul style="list-style-type: none"> <li>• What makes a shadow? (pg. 123)</li> <li>• Side Trip: How can we use the Sun to create shadows? (pg.130)</li> <li>• What happens when different materials block light? (pg. 139)</li> </ul>	<p><b>Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)</b></p> <p>Materials position students to make sense of phenomena and design by eliciting metacognition on the following questions:</p> <ul style="list-style-type: none"> <li>• How can we redirect a light beam? (pg. 154)</li> <li>• What can be seen with no light? (pg. 174)</li> <li>• How can we redirect light around a corner? (pg. 193)</li> </ul>
<p><b>Three-dimensional Performances</b></p> <p>Materials include assessments designed to:</p> <ul style="list-style-type: none"> <li>• match the targeted learning goals</li> <li>• elicit evidence of students' use of the three dimensions to make sense of phenomena and/or to design solutions to problems</li> </ul>	<p>Three-dimensional assessment of Performance Expectation PS4.A: Wave properties</p> <ul style="list-style-type: none"> <li>• Part 1, Step 19 Assess progress: notebook entry (pg. 52)</li> <li>• Part 2, Step 7 Assess progress: performance assessment (pg. 62)</li> </ul>	<p>Three-dimensional assessment of Performance Expectation PS4.A: Wave properties, PS4.C: Information technologies and instrumentation, ETS1.A: Defining and delimiting engineering problems, ETS1.B: Developing possible solutions, ETS1.C: Optimizing the design solution.</p> <ul style="list-style-type: none"> <li>• Part 1, Step 18 Assess progress: notebook entry (pg. 91)</li> <li>• Part 2, Step 5 Assess progress: performance assessment (pg. 105)</li> </ul> <p><i>I-Check 1-2 administered to assess student three-dimensions learning of Investigation 1 Sound and Vibration and Investigation 2 Using Sound, Part 2 Step 16 Assess progress: I-Check (pg. 110).</i></p>	<p>Three-dimensional assessment of Performance Expectation PS4.B: Electromagnetic radiation</p> <ul style="list-style-type: none"> <li>• Part 1, Step 13 Assess progress: notebook entry (pg. 125)</li> <li>• Part 2, Step 11 Assess progress: notebook sheet (pg. 142)</li> </ul>	<p>Three-dimensional assessment of Performance Expectation PS4.B: Electromagnetic radiation, PS4.C: Information technologies and instrumentation, ETS1.A: Defining and delimiting engineering problems, ETS1.B: Developing possible solutions</p> <ul style="list-style-type: none"> <li>• Part 1, Step 5 Assess progress: performance assessment (pg. 155)</li> <li>• Part 1, Step 11 Assess progress: performance assessment (pg. 157)</li> <li>• Part 2, Step 15 Assess progress: notebook entry (pg. 183)</li> <li>• Part 3, Step 7 Assess progress: performance assessment (pg. 194)</li> </ul> <p><i>I-Check 3-4 of Investigation 3 Light and Materials and Investigation 4 Eyes and Vision, Part 3 Step 13 Assess progress: I-Check (pg. 199)</i></p>

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# Recommended Scope and Sequence

## FOSS Pathways

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

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