

FOSS Pathways:

Grade 5 NGSS Three-Dimensional Design and Evidence for Criteria

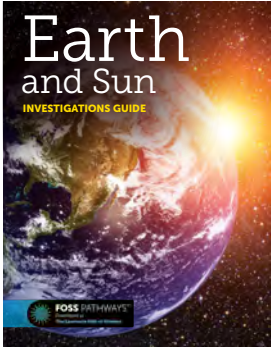

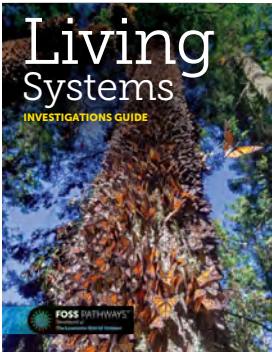


FOSS PATHWAYS™

Developed at
The Lawrence Hall of Science

FOSS Pathways Modules Grade 5

Alignment to NGSS

FOSS Module	Module Overview/Bundled Performance Expectations	Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts
 <p>Earth Science</p>	<p>In the Earth and Sun Module, students explore the properties of the atmosphere, the energy transfer from the Sun to Earth, and the dynamics of weather and water cycling in Earth's atmosphere. The constant renewal of water on Earth's land surfaces by the activities in the atmosphere is one of the defining characteristics of Earth, the water planet. Other experiences help students to develop and use models to understand Earth's place in the solar system, and the interactions of Earth, the Sun, and the Moon to reveal predictable patterns—daily length and direction of shadows, day and night, and the seasonal appearance of stars in the night sky. Students gain experiences that will contribute to the understanding of crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; and energy and matter.</p> <p>NGSS PEs: Earth Sciences: 5-ESS1-1 5-ESS1-2 5-ESS2-1 5-ESS2-2 5-ESS3-1</p> <p>Physical Sciences: 5-PS1-1 5-PS2-1</p>	<p>ESS1.A: The universe and its stars ESS1.B: Earth and the solar system ESS2.A: Earth materials and systems ESS2.C: The roles of water in Earth's surface processes ESS3.C: Human impacts on Earth systems PS1.A: Structure and properties of matter PS2.B: Types of interactions</p>	<ul style="list-style-type: none"> Asking questions 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 	<ul style="list-style-type: none"> Patterns Cause and effect Scale, proportion, and quantity Systems and system models Energy and matter Stability and change
 <p>Physical Science</p>	<p>In the Mixtures and Solutions Module, students construct models about matter made of particles too small to be seen and develop the understanding that matter is conserved when it changes state (from solid to liquid), when it dissolves in another substance, and when it is part of a chemical reaction. Students have experiences with mixtures, solutions of different concentrations, and reactions forming new substances. They also engage in engineering experiences using the properties of materials to design useful products. Learning about the properties and behaviors of substances and systems of substances develops their understanding about how things go together and how they can be taken apart. This gives them the opportunity to use and develop models that explain phenomena too small to see directly. Students gain experiences that will contribute to the understanding of the crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; and energy and matter.</p> <p>NGSS PEs: Physical Sciences: 5-PS1-1 5-PS1-2 5-PS1-3 5-PS1-4 ETAS: 3-5 ETS1-2</p> <p>Earth and Space Sciences: 5-ESS3-1</p>	<p>PS1.A: Structure and properties of matter PS1.B: Chemical reactions ETS1.B: Designing solutions to engineering problems ESS3.C: Human impacts on Earth systems</p>	<ul style="list-style-type: none"> Asking questions 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 	<ul style="list-style-type: none"> Patterns Cause and effect Scale, proportion, and quantity Systems and system models Energy and matter Structure and function
 <p>Life Science</p>	<p>In the Living Systems Module, students think about systems on different scales—systems within an organism that move matter and provide energy to the individual organism, and feeding relationships in ecosystems that move matter among plants, animals, decomposers, and the environment. Students come to understand through a variety of experiences that plants get the materials they need for growth primarily from water and air, and that energy in animals' food was once energy from the Sun. There are opportunities for students to explore how human activities in agriculture, industry, and everyday life can have major effects on these systems. Students gain experiences that will contribute to the understanding of the crosscutting concepts of patterns; scale, proportion, and quantity; systems and system models; and energy and matter.</p> <p>NGSS PEs: Life Sciences: 5-LS1-1 5-LS2-1 Physical Sciences: 5-PS3-1 Earth Sciences: 5-ESS2-1 5-ESS3-1</p>	<p>LS1.C: Organization for matter and energy flow in organisms LS2.A: Interdependent relationships in ecosystems LS2.B: Cycles of matter and energy transfer in ecosystems PS3.D: Energy in chemical processes and everyday life ESS2.A: Earth materials and systems ESS3.C: Human impacts on Earth systems</p>	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Patterns Cause and effect Systems and system models Energy and matter

NGSS 3-D Design Criteria	FOSS Pathways Evidence:		Living Systems	
Instruction and Assessment	Anchor Phenomena 1 Changed into compost Investigation 1, Parts 1-2	Anchor Phenomenon 2 Fruit from plants growing with and without soil Investigation 2, Parts 1-2	Anchor Phenomenon 3 Changed into a fishing pond Investigation 3, Parts 1-3	Anchor Phenomenon 4 Migrating monarch butterfly problem Investigation 4, Part 1
<p>Use Phenomena/Problems</p> <p>Materials provide relevant and authentic learning contexts through which students:</p> <ul style="list-style-type: none"> engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources have the potential to use the three dimensions to make sense of phenomena or design solutions to problems 	<p>Inv. 1, Parts 1-2</p> <p>Students engage with ecosystems by setting up redworm habitats to monitor detritivores' role in the phenomenon of composition.</p> <p>Introduce the anchor phenomenon (pg. 40)</p> <p>Students construct, revise, revisit, and review the explanation of phenomenon (pgs. 48 and 58)</p> <p>Students have a sense-making discussion (pgs. 50 and 71)</p> <p>Students finalize the anchor phenomenon explanation (pg. 72)</p>	<p>Inv. 2, Parts 1-2</p> <p>Students plant wheat to make observations about how plants get their food. Digital simulations are also used to provide evidence for the argument on where plants get the materials needed to grow.</p> <p>Introduce the anchor phenomenon (pg. 86)</p> <p>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 101 and 108)</p> <p>Students have a sense-making discussion (pgs. 93, 94, 100)</p> <p>Students finalize the anchor phenomenon explanation (pg. 113)</p>	<p>Inv. 3, Parts 1-3</p> <p>Students are presented with an ecological problem a salt lake is facing. Students then collect data to make a recommendation.</p> <p>Introduce the anchor phenomenon (pg. 126)</p> <p>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 134, 142, 154, 162)</p> <p>Students have a sense-making discussion (pgs. 132 and 172)</p> <p>Students finalize the anchor phenomenon explanation (pg. 178)</p>	<p>Inv. 4, Part 1</p> <p>Students obtain information on the life cycle of monarch butterflies populations. The impacts of climate change are related to earth systems and how they interact.</p> <p>Introduce the anchor phenomenon (pg. 188)</p> <p>Students have a sense-making discussion (pg. 195)</p> <p>Students finalize the anchor phenomenon explanation (pg. 196)</p>
<p>Presence of Logical Sequence</p> <p>Student learning across the three dimensions is:</p> <ul style="list-style-type: none"> arranged in a logical sequence sufficient and appropriate for students to figure out the phenomena or problems 	<p>Living Systems Module instructs on NGSS Performance Expectation: 5-PS3-1, 5-LS1-1, 5-LS2-1, 5-ESS2-1, and 5-ESS3-1 (pgs. 2-5)</p> <p>Conceptual Flow of Living Systems Module (pgs. 6-7)</p> <p>Developing the Phenomenon Storyline of changed into compost (pg. 31) through investigating</p> <p>Part 1 - Composting (pgs. 34-35) Part 2 - Ecosystems (pgs. 52-53)</p>	<p>Living Systems Module instructs on NGSS Performance Expectation: 5-PS3-1, 5-LS1-1, 5-LS2-1, 5-ESS2-1, and 5-ESS3-1 (pgs. 2-5)</p> <p>Conceptual Flow of Living Systems Module (pgs. 6-7)</p> <p>Continuing the Phenomenon Storyline of fruit from plants growing with and without soil (pg. 77) through investigating</p> <p>Part 1 - Plants Make Food (pgs. 80-81) Part 2 - Animals Get Food (pgs. 104-105)</p>	<p>Living Systems Module instructs on NGSS Performance Expectation: 5-PS3-1, 5-LS1-1, 5-LS2-1, 5-ESS2-1, and 5-ESS3-1 (pgs. 2-5)</p> <p>Conceptual Flow of Living Systems Module (pgs. 6-7)</p> <p>Developing the Phenomenon Storyline of changed into a fishing pond (pg. 117) through investigating</p> <p>Part 1 - Freshwater Ecosystems (pgs. 122-123) Part 2 - Marine and Estuary Ecosystems (pgs. 136-137)</p>	<p>Living Systems Module instructs on NGSS Performance Expectation: 5-PS3-1, 5-LS1-1, 5-LS2-1, 5-ESS2-1, and 5-ESS3-1 (pgs. 2-5)</p> <p>Conceptual Flow of Living Systems Module (pgs. 6-7)</p> <p>Developing the Phenomenon Storylines of migrating monarch butterfly problem (pg. 181) through investigating</p> <p>Part 1 - Migration Systems (pgs. 184-185)</p>

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

NGSS 3-D Design Criteria	FOSS Pathways Evidence:		Living Systems	
Instruction and Assessment	Anchor Phenomena 1 Changed into compost Investigation 1, Parts 1-2	Anchor Phenomenon 2 Fruit from plants growing with and without soil Investigation 2, Parts 1-2	Anchor Phenomenon 3 Changed into a fishing pond Investigation 3, Parts 1-3	Anchor Phenomenon 4 Migrating monarch butterfly problem Investigation 4, Part 1
<p>Students are Figuring Out</p> <p>Materials position students to make sense of phenomena and design solutions to problems by:</p> <ul style="list-style-type: none"> • asking and answering questions that link learning over time • using the three dimensions to link prior knowledge and negotiate new understandings and abilities 	<p>Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)</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"> • What happens when compost worms interact with organic litter? (pg. 40) • What are the roles of organisms in a food web? (pg. 58) 	<p>Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)</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"> • How do plants get the materials they need for growth and development? (pg. 86) • How do animals get the materials they need for growth and development? (pg. 108) 	<p>Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)</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"> • How does the biosphere, hydrosphere, atmosphere, and/or geosphere interact in a freshwater ecosystem? (pg. 127) • How does energy and matter interact through marine ecosystems? (pg. 143) • How does salinity affect the hatching of brine shrimp eggs and the food web in a salt lake? (pg. 163) 	<p>Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)</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"> • What is the monarch butterfly migration system? (pg. 188)
<p>Three-dimensional Performances</p> <p>Materials include assessments designed to:</p> <ul style="list-style-type: none"> • match the targeted learning goals • elicit evidence of students' use of the three dimensions to make sense of phenomena and/or to design solutions to problems 	<p>Three-dimensional assessment of Performance Expectation LS2.A: Interdependent relationships in ecosystems, LS2.B: Cycles of matter and energy transfer in ecosystems</p> <ul style="list-style-type: none"> • Part 1, Step 8 Assess progress: performance assessment (pg. 42) • Part 2, Step 20 Assess progress: notebook entry (pg. 67) 	<p>Three-dimensional assessment of Performance Expectation LS1.C: Organization for matter and energy flow in organisms, PS3.D: Energy in chemical processes and everyday life, ESS2.A: Earth materials and systems</p> <ul style="list-style-type: none"> • Part 1, Step 23 Assess progress: notebook entry (pg. 100) • Part 2, Step 8 Assess progress: response sheet (pg. 112) <p><i>I-Check 1-2</i> administered to assess student three-dimensions learning of Investigation 1 and 2 of Food Webs and Producers and Consumers, Part 2, Step 11 Assess progress: I-Check (pg. 114) Next-step strategy for instruction (pg. 114)</p>	<p>Three-dimensional assessment of Performance Expectation LS2.A: Interdependent relationships in ecosystems, LS2.B: Cycles of matter and energy transfer in ecosystems, ESS2.A: Earth materials and systems, ESS3.C: Human impacts on Earth systems</p> <ul style="list-style-type: none"> • Part 1, Step 10 Assess progress: notebook entry (pg. 133) • Part 2, Step 11 Assess progress: notebook sheet (pg. 145) • Part 3, Step 8 Assess progress: performance assessment (pg. 164) <p><i>I-Check 3</i> administered to assess three-dimensions learning of Investigation 3 Aquatic Ecosystems (pg. 178), Part 3 Step 28 Assess progress: I-Check (pg. 179) Next-step strategy for instruction (pg. 179)</p>	<p>Three-dimensional assessment of Performance Expectation LS2.A: Interdependent relationships in ecosystems, ESS2.A: Earth materials and systems, ESS3.C: Human impacts on Earth systems</p> <p><i>Posttest</i> of Investigations 1-4 of Living Systems administered prior to teaching the next Pathways Module, Part 1 Step 14 Assess progress: Posttest (pg. 197)</p>

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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

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**The Lawrence
Hall of Science**
UNIVERSITY OF CALIFORNIA, BERKELEY®

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