

FOSS Pathways:

Grade 2 NGSS Three-Dimensional Design and Evidence for Criteria

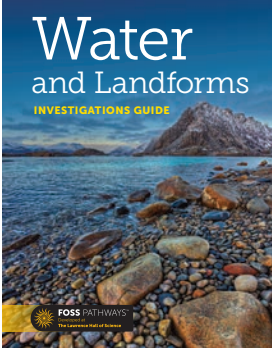
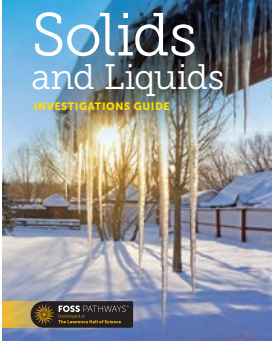
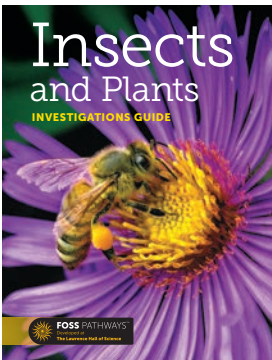


FOSS PATHWAYS™

Developed at
The Lawrence Hall of Science

FOSS Pathways Modules Grade 2

Alignment to NGSS

FOSS Module	Module Overview/Bundled Performance Expectations	Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts
 <p>Water and Landforms INVESTIGATIONS GUIDE</p> <p>Earth Science * Still in development</p>	<p>The Water and Landforms Module provides experiences with Earth’s natural resources—rocks, soil, and water—and provides opportunities for students to engage in science and engineering practices. Students explore the natural world by using simple tools to observe and describe the properties of earth materials.</p> <p>NGSS PEs: Earth and Physical Sciences: 2-ESS1-1 2-ESS2-1 2-ESS2-2 2-ESS2-3 2-PS1-1 ETAS: K-2-ETS1-3</p>	<p>ESS1.C: The history of planet Earth ESS2.A: Earth materials and systems ESS2.B: Plate tectonics and large-scale system interactions ESS2.C: The roles of water in Earth’s surface processes PS1.A: Structures and properties of matter ETS1.C: Optimizing the design solution</p>	<ul style="list-style-type: none"> Asking questions Planning and carrying out investigations Analyzing and interpreting data Constructing explanations Obtaining, evaluating, and communicating information 	<ul style="list-style-type: none"> Patterns Cause and effect Stability and change Scale, proportion, and quantity
 <p>Solids and Liquids INVESTIGATIONS GUIDE</p> <p>Physical Science</p>	<p>In the Solids and Liquids Module, students observe, describe, and compare properties of common solids and liquids through firsthand experience. They plan and carry out investigations to find out what happens when solids and water are mixed and when liquids and water are mixed. They gain firsthand experience with reversible and irreversible changes caused by heating or cooling, and then expand their data collection through a simulation. They use evidence to engage in argumentation and support claims about reversible and irreversible changes to materials due to temperature changes.</p> <p>NGSS PEs: Physical Sciences: 2-PS1-1 2-PS1-2 2-PS1-3 2-PS1-4 ETAS: K-2-ETS1-1 K-2-ETS1-2 K-2-ETS1-3</p>	<p>PS1.A: Structure and properties of matter ETS1.A: Defining and delimiting an engineering problem ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solution</p>	<ul style="list-style-type: none"> Asking questions and defining problems Developing and using models Planning and carrying out investigations Analyzing and interpreting data Constructing explanations and designing solutions Obtaining, evaluating, and communicating information 	<ul style="list-style-type: none"> Patterns Cause and effect Energy and matter Structure and function
 <p>Insects and Plants INVESTIGATIONS GUIDE</p> <p>Life Science * Still in development</p>	<p>The Insects and Plants Module builds understanding of growth and development of plants by observing new organisms over time. Students see the life cycles of insects unfold in real time and compare the structures and functions exhibited by each species to reveal patterns. At the same time, they grow a flowering plant in the classroom and gain experience with pollination, seed dispersal, and the ways in which plants and insects interact in feeding relationships.</p> <p>NGSS PEs: Life Sciences: 2-LS2-1 2-LS2-2 2-LS4-1 ETAS: K-2-ETS1-2</p>	<p>LS1.B: Growth and development of organisms LS2.A: Independent relationships in ecosystems LS4.D: Biodiversity and humans ETS1.B: Developing possible solutions</p>	<ul style="list-style-type: none"> Asking questions Developing and using models Planning and carrying out investigations Analyzing and interpreting data Constructing explanations Obtaining, evaluating, and communicating information 	<ul style="list-style-type: none"> Patterns Cause and effect Structure and function

NGSS 3-D Design Criteria	FOSS Pathways Evidence: Solids and Liquids			
Instruction and Assessment	Anchor Phenomena 1 Design a model of a tower Investigation 1, Parts 1-3	Anchor Phenomenon 2 Pouring liquid water and solid water (ice) Investigation 2, Parts 1-3	Anchor Phenomenon 3 Objects fell in water Investigation 3, Part 1	Anchor Phenomenon 4 Objects stuck together Investigation 3, Parts 2-3
<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 1-3</p> <p>Students identify three states of matter then explore the properties of solids to determine the best materials to build a tower and bridge.</p> <p>Introduce solid, liquid, and gas as matter (pg. 40)</p> <p>Introduce and respond to the focus question (pgs. 41, 44, 58, 61, 81 and 84)</p> <p>Students have a sense-making discussion (pgs. 42, 83 and 91)</p> <p>Introduce the problem to solve (pg. 51)</p> <p>Revisit the problem to solve (pgs. 58, 70, 78)</p> <p>Students finalize the solution to the problem (pg. 86)</p>	<p>Inv. 2, Parts 1-3</p> <p>Students investigate liquids in a variety of settings to become familiar with their properties.</p> <p>Introduce the anchor phenomenon (pg. 104)</p> <p>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 109, 116, 128, 134)</p> <p>Students have a sense-making discussion (pgs. 106, 117)</p> <p>Students finalize the anchor phenomenon response (pg. 141)</p>	<p>Inv. 3, Part 1</p> <p>Students investigate a variety of objects that fell off a shelf into water to understand the process of change and the use of representational materials.</p> <p>Introduce the problem to solve (pg. 154)</p> <p>Students have a sense-making discussion (pg. 159)</p> <p>Students finalize the response to the problem (pg.161)</p>	<p>Inv. 4, Parts 2-3</p> <p>Students conduct firsthand investigation of interactions between solids and liquids and water to find out that some changes are reversible and some are not.</p> <p>Introduce the anchor phenomenon (pg. 170)</p> <p>Students have a sense-making discussion (pgs. 171, 172, 176, and 190)</p> <p>Students review the explanation of phenomenon (pg. 186)</p> <p>Students construct a partial explanation of the anchor phenomenon (pg. 178)</p> <p>Students finalize the problem to solve (pgs.163 and 199)</p> <p>Students finalize the anchor phenomenon response in the class notebook (pg. 192)</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>Solids and Liquids Module instructs on NGSS Performance Expectation: 2-PS1-1, 2-PS1-2, 2-PS1-3, K-2 ETS1-1, and K-2 ETS1-2 (pgs. 2-5)</p> <p>Conceptual Flow of Solids and Liquids Module (pgs.6-7)</p> <p>Developing the Phenomenon Storyline of design a model of a tower (pg. 31)</p> <p>Part 1 - Solid Objects (pgs. 34-35) Part 2 - Solid Materials (pgs. 52-53) Part 3 - Construct with Solids (pgs. 72-73)</p>	<p>Solids and Liquids Module instructs on NGSS Performance Expectation: 2-PS1-1 (pgs. 2-5)</p> <p>Conceptual Flow of Solids and Liquids Module (pgs.6-7)</p> <p>Continuing the Phenomenon Storyline of pouring liquid water and solid water (ice) (pg. 95) through investigating</p> <p>Part 1 - Liquids in Bottles (pgs. 98-99) Part 2 - Properties of Liquids (pgs. 110-111) Part 3 - Comparing Solids and Liquids (pgs. 130-131)</p>	<p>Solids and Liquids Module instructs on NGSS Performance Expectation: 2-PS1-1, and 2-PS1-4 (pgs. 2-5)</p> <p>Conceptual Flow of Solids and Liquids Module (pgs.6-7)</p> <p>Developing the Phenomenon Storyline of objects fell in water (pg. 145) through investigating</p> <p>Part 1 - Mixing Solids and Liquids with Water (pgs. 148-149)</p>	<p>Solids and Liquids Module instructs on NGSS Performance Expectation: 2-PS1-1, and 2-PS1-4 (pgs. 2-5)</p> <p>Conceptual Flow of Solids and Liquids Module (pgs.6-7)</p> <p>Developing the Phenomenon Storylines of objects stuck together (pg. 180) through investigating</p> <p>Part 2 - Changing Properties (pgs. 164-165) Part 3 - Reversible or Not (pgs. 180-181)</p>

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

NGSS 3-D Design Criteria	FOSS Pathways Evidence: Solids and Liquids			
Instruction and Assessment	Anchor Phenomena 1 Design a model of a tower Investigation 1, Parts 1-3	Anchor Phenomenon 2 Pouring liquid water and solid water (ice) Investigation 2, Parts 1-3	Anchor Phenomenon 3 Objects fell in water Investigation 3, Part 1	Anchor Phenomenon 4 Objects stuck together Investigation 3, Parts 2-3
<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"> • How can solid objects be described? (pg. 41) • What are solid objects made of? (pg. 58) • What are the properties of successful towers? (pg. 81) 	<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 are liquids different from each other? (pg. 105) • How can liquids be described? (pg. 116) • What properties of solids and liquids are the same, and what properties are different? (pg. 134) 	<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 solids are mixed with water? What about liquids mixed with water? (pg. 154) 	<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 the properties of materials change when they are heated or cooled? (pg.170) • What materials can return to their original form after heating or cooling? (pg. 186)
<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 PS1.A: Structure and properties of matter, ETS1.A: Defining and delimiting an engineering problem, ETS1.B: Developing possible solutions, ETS1.C: Optimizing the design solution</p> <ul style="list-style-type: none"> • Part 1, Step 11 Assess progress: notebook entry (pg. 45) • Part 2, Step 12 Assess progress: notebook entry (pg. 62) • Part 3, Step 7 Assess progress: performance assessment (pg. 82) 	<p>Three-dimensional assessment of Performance Expectation PS1.A: Structure and properties of matter</p> <ul style="list-style-type: none"> • Part 1, Step 5 Assess progress: performance assessment (pg. 105) • Part 2, Step 12 Assess progress: notebook entry (pg. 119) <p>-Check 1-2 administered to assess student three-dimensions learning of Investigation 1 Solids and Investigation 2 Liquids, Part 3 Step 9 Assess progress: I-Check (pg. 142).</p>	<p>Three-dimensional assessment of Performance Expectation PS1.A: Structure and properties of matter</p> <ul style="list-style-type: none"> • Part 1, Step 17 Assess progress: notebook entry (pg. 160) 	<p>Three-dimensional assessment of Performance Expectation PS1.A: Structure and properties of matter, PS1.B: Chemical reactions</p> <ul style="list-style-type: none"> • Part 2, Step 16 Assess progress: notebook sheet (pg. 177) • Part 3, Step 9 Assess progress: performance assessment (pg. 190) <p>I-Check 3 of Investigation 3 Changes to Solids and Liquids, Part 3 Step 16 Assess progress: I-Check (pg. 196)</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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