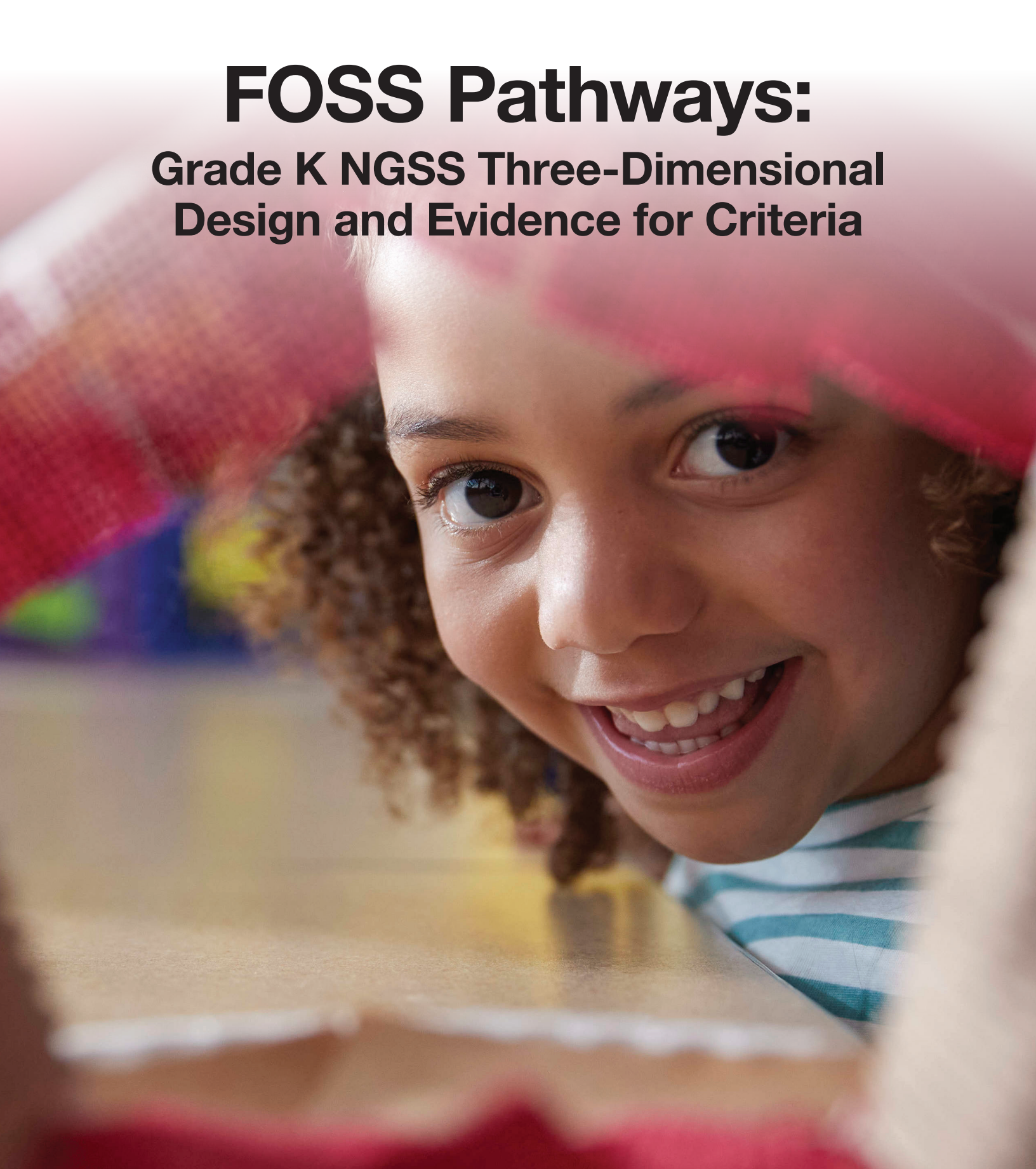
FOSS Pathways:

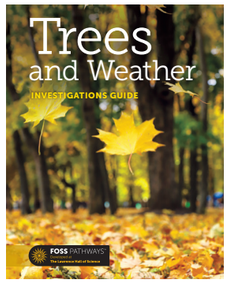
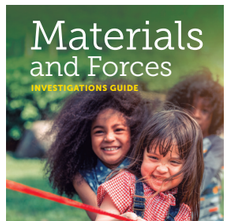
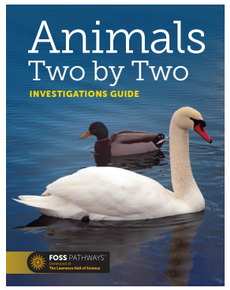
Grade K NGSS Three-Dimensional Design and Evidence for Criteria



FOSS PATHWAYS™
Developed at
The Lawrence Hall of Science

FOSS Pathways Modules Grade K

Alignment to NGSS

FOSS Module	Module Overview/Bundled Performance Expectations	Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts
 Earth Science	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	• 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 • Stability and change
 Physical Science * Still in development	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-PS2-2** **K-PS3-1** **K-PS3-2** **Earth Sciences:** **K-ESS2-2** **K-ESS3-3** **ETAS:** **K-2-ETS1-1** **K-2-ETS1-2** **K-2-ETS1-3**	**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	• Asking questions and defining problems • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Constructing explanations and designing solutions • Engaging in argument from evidence • Obtaining, evaluating, and communicating information	• Patterns • Cause and effect • Systems and system models • Scale, proportion, and quantity
 Life Science * Still in development	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	• 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

NGSS 3-D Design Criteria

Instruction and Assessment

Use Phenomena/Problems

Materials provide relevant and authentic learning contexts through which students:

- 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

Presence of Logical Sequence

Student learning across the three dimensions is:

- arranged in a logical sequence
- sufficient and appropriate for students to figure out the phenomena or problems

FOSS Pathways Evidence:

Trees and Weather

Anchor Phenomena 1
Changes to trees
Investigation 1, Parts 1-4

Inv. 1, Parts 1-4

Students engage with the phenomenon of trees to make observations throughout the school year, ending with planting a class tree.

Introduce observe (pg. 42)

Introduce and respond to the focus question (pgs. 43, 47, 57, 68, 70, 84 and 91)

Students have a sense-making discussion (pgs. 46, 58, 69, and 91)

Introduce the anchor phenomenon (pg. 49)

Review and revisit the anchor phenomenon (pgs. 56, 59, 68, 77 and 92)

Trees and Weather Module instructs on NGSS Performance Expectation: K-LS1-1, K-ESS2-2, and K-ESS3-1 (pgs. 2-5)

Conceptual Flow of Trees and Weather Module (pgs.6-7)

Developing the Phenomenon Storyline of changes to trees (pg. 31) through investigating

Part 1 - Observing Schoolyard Trees (pgs. 36-37)

Part 2 - Tree Parts (pgs. 50-51)

Part 3 - Adopt Schoolyard Trees (pgs. 62-63)

Part 4 - A Tree Comes to Class (pgs. 78-79)

Anchor Phenomenon 2
Different clothes for two trips
Investigation 2, Parts 1-3

Inv. 2, Parts 1-3

Students investigate a need for different clothing when visiting the same location at different times of the year.

Introduce the anchor phenomenon (pg. 104)

Introduce and respond to the focus question (pgs. 106, 114, 117, 132 and 133)

Students construct, revise, revisit and review the explanation of phenomenon (pgs. 114 and 123)

Students have a sense-making discussion (pgs. 105, 116, 132 and 143)

Students finalize the driving question response (pg. 145)

Trees and Weather Module instructs on NGSS Performance Expectation: K-ESS2-1, K-ESS3-2, and K-PS3-1 (pgs. 2-5)

Conceptual Flow of Trees and Weather Module (pgs.6-7)

Developing the Phenomenon Storyline of clothes for two trips (pg. 95) through investigating

Part 1 - Weather Calendar (pgs. 98-99)

Part 2 - Recording Temperature (pgs. 108-109)

Part 3 - Wind Direction (pgs. 124-125)

Anchor Phenomenon 3
Changes to trees continued
Investigation 3, Parts 1-3

Inv. 3, Parts 1-3

Students continue their systematic investigation of changes in weather over the seasons.

Review and return to the changes to trees phenomenon (pgs. 156, 161, 168, 173 and 180)

Introduce and respond to the focus question (pgs. 156, 160, 169, 181 and 184)

Students have a sense-making discussion (pgs. 159, 172, and 184)

Students finalize the response to the changes in trees phenomenon (pg. 185)

Trees and Weather Module instructs on NGSS Performance Expectation: K-LS1-1, and K-ESS2-1 (pgs. 2-5)

Conceptual Flow of Trees and Weather Module (pgs.6-7)

Developing the Phenomenon Storyline of changes to trees (pg. 147) through investigating

Part 1 - In Fall: Visiting Adopted Trees (pgs. 150-151)

Part 2 - In Winter: Visiting Adopted Trees (pgs. 162-163)

Part 3 - In Spring: Visiting Adopted Trees (pgs. 174-175)

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

NGSS 3-D Design Criteria

Instruction and Assessment

Students are Figuring Out

Materials position students to make sense of phenomena and design solutions to problems by:

- asking and answering questions that link learning over time
- using the three dimensions to link prior knowledge and negotiate new understandings and abilities

Three-dimensional Performances

Materials include assessments designed to:

- 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

FOSS Pathways Evidence:

Anchor Phenomena 1
Changes to trees
Investigation 1, Parts 1-4

Elements of the FOSS Instructional Design
Active Investigation - Figuring Out Phenomena (pgs. 12-13)

Materials position students to make sense of phenomena and design by eliciting metacognition on the following questions:

- What did we learn from our schoolyard trees? (pg. 43)
- What are parts of trees? (pg. 57)
- What can we observe about leaves (pg. 60) Side Trip
- What can we find out about our adopted trees? (pg. 68)
- What do trees need to grow? (pg. 84)

Three-dimensional assessment of Performance Expectation ESS2.E: Biogeology, ESS3.A: Natural resources, LS1.C: Organization for matter and energy flow in organisms

- Part 1, Step 16 Engage in argument from evidence (pg. 48)
- Part 2, Step 5 Respond to the focus question (pg. 56)
- Part 2, Step 9 Share notebook entries (optional) (pg. 59)
- Part 3, Step 7 Respond to the focus question (pg. 70)
- Part 3, Step 14 Share notebook entries (optional) (pg.77)
- Part 4, Step 12 Share notebook entries (optional) (pg. 92)

Anchor Phenomenon 2
Different clothes for two trips
Investigation 2, Parts 1-3

Elements of the FOSS Instructional Design
Active Investigation - Figuring Out Phenomena (pgs. 12-13)

Materials position students to make sense of phenomena and design by eliciting metacognition on the following questions:

- What is the weather today? (pg. 106)
- How can we measure the air temperature? (pg. 114)
- What does a windsock tell us about the wind? (pg. 132)

Three-dimensional assessment of Performance Expectation ESS2.D: Weather and climate, PS3.B: Conservation of energy and energy transfer, ESS3.B: Natural hazards

- Part 1, Step 8 Respond to the focus question (pg. 106)
- Part 1, Step 9 Share notebook entries (optional) (pg. 107)
- Part 2, Step 12 Respond to the focus question (pg. 117)
- Part 2, Step 15 Share notebook entries (optional) (pg. 123)
- Part 3, Step 7 Respond to the focus question (pg. 133)

Trees and Weather

Anchor Phenomenon 3
Changes to trees continued
Investigation 3, Parts 1-3

Elements of the FOSS Instructional Design
Active Investigation - Figuring Out Phenomena (pgs. 12-13)

Materials position students to make sense of phenomena and design by eliciting metacognition on the following questions:

- What do fall trees look like? (pg. 156)
- What do winter trees look like? (pg. 168)
- What do spring trees look like? (pg. 181)

Three-dimensional assessment of Performance Expectation LS1.C: Organization for matter and energy flow in organisms, ESS2.D: Weather and climate

- Part 1, Step 11 Share notebook entries (optional) (pg. 161)
- Part 2, Step 7 Respond to the focus question (pg. 169)
- Part 2, Step 10 Share notebook entries (pg. 173)
- Part 3, Step 9 Respond to the focus question (pg. 184)

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

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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FOSS™

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