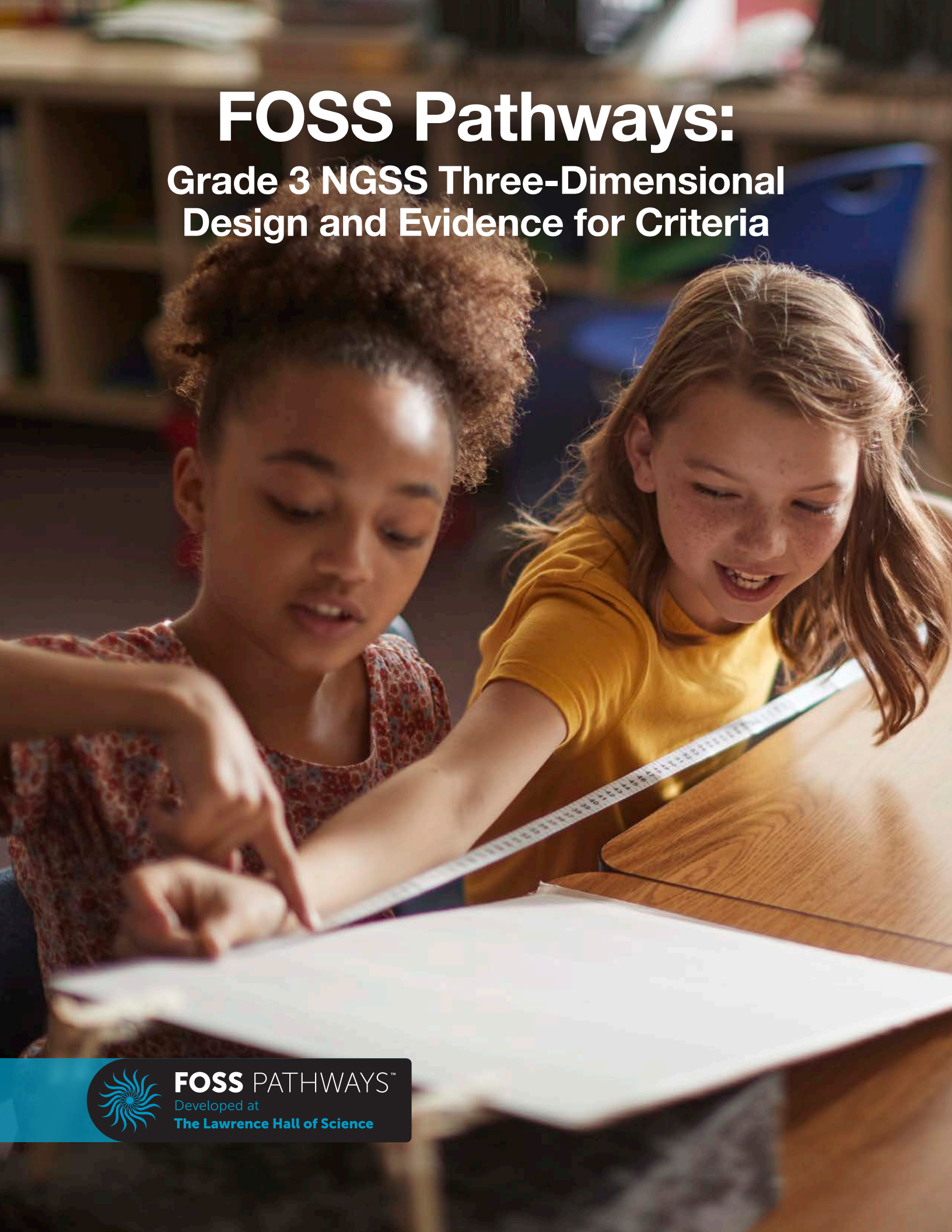
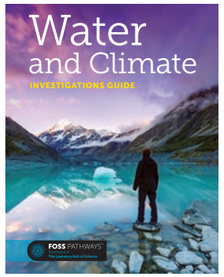
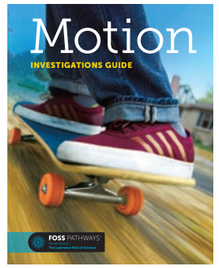
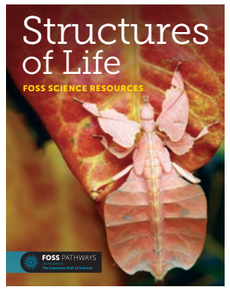
# FOSS Pathways:

## Grade 3 NGSS Three-Dimensional Design and Evidence for Criteria



FOSS PATHWAYS™
Developed at
The Lawrence Hall of Science

# FOSS Pathways Modules Grade 3 Alignment to NGSS

| FOSS Module | Module Overview/Bundled Performance Expectations | Disciplinary Core Ideas | Science and Engineering Practices | Crosscutting Concepts |
|---|---|---|---|---|
|  <br>Earth Science | In the Water and Climate Module, students engage in science and engineering practices as they investigate the role of water in weather and how weather conditions change around the world and throughout the year while exploring the crosscutting concepts of patterns; cause and effect; and scale, proportion, and quantity. They are introduced to the nature of science, how science affects everyday life, and the influence of engineering, technology, and science on society and the natural world.<br><br>**NGSS PEs:**<br>**Earth and Space Sciences:**<br>**3-ESS2-1**<br>**3-ESS2-2**<br>**3-ESS3-1** | **ESS2.D:** Weather and climate<br>**ESS3.B:** Natural hazards<br>**ESS2.C:** The roles of water in Earth's surface processes | • Asking questions<br>• Developing and using models<br>• Planning and carrying out investigations<br>• Analyzing and interpreting data<br>• Constructing explanations<br>• Engaging in argument from evidence<br>• Obtaining, evaluating, and communicating information | • Patterns<br>• Cause and effect<br>• Scale, proportion, and quantity |
|  <br>Physical Science | In the Motion Module, students engage in science and engineering practices as they investigate phenomena and collect data to answer questions about the effects of magnetic force and the force of gravity on objects. Students explore the crosscutting concepts of patterns; cause and effect; and systems and system models as they define problems in order to develop solutions. Students reflect on their own use of science and engineering practices and find out how others use these practices in their careers.<br><br>**NGSS PEs:**<br>**Physical Sciences:**<br>**3-PS2-1**<br>**3-PS2-2**<br>**3-PS2-3**<br>**3-PS2-4**<br>**ETAS:**<br>**3-5 ETS1-1**<br>**3-5 ETS1-2**<br>**3-5 ETS1-3** | **PS2.A:** Forces and motion<br>**PS2.B:** Types of interactions<br>**ETS1.A:** Defining and delimiting engineering problems<br>**ETS1.B:** Developing possible solutions<br>**ETS1.C:** Optimizing the design solution | • Asking questions and defining problems<br>• Developing and using models<br>• Planning and carrying out investigations<br>• Analyzing and interpreting data<br>• Using mathematics and computational thinking<br>• Constructing explanations and designing solutions<br>• Engaging in argument from evidence<br>• Obtaining, evaluating, and communicating information | • Patterns<br>• Cause and effect<br>• Systems and system models |
|  <br>Life Science | In the Structures of Life Module, students observe, compare, categorize, and care for organisms. Students engage in science and engineering practices to investigate the structures and behaviors of organisms and learn how the structures function in growth, survival, and reproduction. Students look at the interactions between organisms of the same kind, among organisms of different kinds, and between the environment and populations of organisms over time. Students focus on these crosscutting concepts to develop understandings about organisms and population survival—patterns; cause and effect; scale, proportion, and quantity; systems and system models; and structure and function.<br><br>**NGSS PEs:**<br>**Life Sciences:**<br>**3-LS1-1**<br>**3-LS2-1**<br>**3-LS3-1**<br>**3-LS3-2**<br>**3-LS4-1**<br>**3-LS4-2**<br>**3-LS4-3** | **LS1.A:** Structure and function<br>**LS1.B:** Growth and development of organisms<br>**LS2.D:** Social interactions and group behaviors<br>**LS3.A:** Inheritance of traits<br>**LS3.B:** Variation of traits<br>**LS4.C:** Adaptation | • Asking questions<br>• Developing and using models<br>• Planning and carrying out investigations<br>• Analyzing and interpreting data<br>• Using mathematics and computational thinking<br>• Constructing explanations<br>• Engaging in argument from evidence<br>• Obtaining, evaluating, and communicating information | • Patterns<br>• Cause and effect<br>• Systems and system models<br>• Structure and function |

# NGSS 3-D Design Criteria

# FOSS Pathways Evidence: Motion

| Instruction and Assessment | Anchor Phenomena 1<br>Artwork falling from fridge<br>Investigation 1, Parts 1-3 | Anchor Phenomenon 2<br>Objects falling and scattering<br>Investigation 2, Parts 1-3 | Anchor Phenomenon 3<br>Riding a skateboard down a hill<br>Investigation 3, Parts 1-4 |
|---|---|---|---|
| **Use Phenomena/Problems**<br><br>Materials provide relevant and authentic learning contexts through which students:<br><br>• engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources<br>• have the potential to use the three dimensions to make sense of phenomena or design solutions to problems | **Inv. 1, Parts 1-3**<br><br>Students begin a series of first hand activities needed to scientifically explain the phenomena of magnets, magnetic fields and change of motion.<br><br>Introduce the anchor phenomenon (pg. 39)<br><br>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 42, 48, 56, 58, 64, 65, 70, and 81)<br><br>Students have a sense-making discussion (pg. 42, 58, 80) | **Inv. 2, Parts 1-3**<br><br>Students use a variety of materials to understand wheel-and-axle systems, predicting motion and understanding design changes.<br><br>Introduce the objects falling and scattering phenomenon (pg. 94)<br><br>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 98, 100, 106, 108, 112, 120, and 126)<br><br>Students have a sense-making discussion (pg. 98, 108, and 124) | **Inv. 3, Parts 1-4**<br><br>Students engineer designs by understanding features of a cart system that impact distance prior to creating a magnetic design solution.<br><br>Describe the challenge/problem (for engineering practices) (pg. 140)<br><br>Introduce the challenge (pg. 186)<br><br>Students construct, revise, revisit and review the explanation of phenomenon (pgs. 148, 157, 163, 170, 173, 179, 193)<br><br>Students have a sense-making discussion (pg. 141,159, 173) |
| **Presence of Logical Sequence**<br><br>Student learning across the three dimensions is:<br><br>• arranged in a logical sequence<br>• sufficient and appropriate for students to figure out the phenomena or problems | **Motion Module instructs on NGSS Performance Expectations: 3-PS2-2 and PS2-3 (pgs. 2-5)**<br><br>**Conceptual Flow of Forces and Motion Module (pgs.6-7)**<br><br>Developing the Phenomenon Storylines of artwork falling from fridge (pg. 29) through investigating<br><br>Part 1 - Two Forces (pgs. 32-33)<br>Part 2 - Magnetic-Force Investigation (pg. 50-51)<br>Part 3 - More About Forces (pgs. 66-67) | **Motion Module instructs on NGSS Performance Expectations: 3-PS2-2 (pgs. 2-5)**<br><br>**Conceptual Flow of Forces and Motion Module (pgs.6-7)**<br><br>Developing the Phenomenon Storylines of objects falling and scattering (pg. 85) through investigating<br><br>Part 1 - Wheel-and-Axle Systems (pgs. 88-89)<br>Part 2 - Predicting Motion of New Systems (pgs. 102-103)<br>Part 3 - Twirly Birds (pgs. 114-115) | **Motion Module instructs on NGSS Performance Expectations: 3-PS2-1, 3-PS2-4, 3–5 ETS1-1,3–5 ETS1-2, and 3–5 ETS1-3 (pgs. 2-5)**<br><br>**Conceptual Flow of Forces and Motion Module (pgs.6-7)**<br><br>Developing the Phenomenon Storylines of riding a skateboard down a hill (pg. 129) through investigating<br><br>Part 1 - From Here to There (pgs. 134-135)<br>Part 2 - Distance Challenge (pgs. 150-151)<br>Part 3 - Investigating Start Position (pgs. 164-165)<br>Part 4 - Magnetic Solutions (pgs. 180-181) |

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

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|---|---|---|---|
| **Students are Figuring Out**<br><br>Materials position students to make sense of phenomena and design solutions to problems by:<br><br>• asking and answering questions that link learning over time<br>• using the three dimensions to link prior knowledge and negotiate new understandings and abilities | **Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)**<br><br>Materials position students to make sense of phenomena and design by figuring out the following questions:<br><br>• What happens when magnets interact with other magnets and with paper clips? (p. 40)<br>• How does a magnetic field change when multiple magnets work together? (pg. 56)<br>• What causes a change of motion? (pg. 72) | **Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)**<br><br>Materials position students to make sense of phenomena and design by using metacognition on the following question:<br><br>• How can we change the motion of wheel-and-axle systems rolling down a ramp? (pg. 96)<br>• What rules help predict where a rolling cup will end up? (pg. 106)<br>• Student-created questions, e.g., What happens to the motion of a twirly bird when its design changes? (pg. 122, Step 7 Determine the focus question) | **Elements of the FOSS Instructional Design Active Investigation - Figuring Out Phenomena (pgs. 12-13)**<br><br>Materials position students to make sense of phenomena and design by figuring out the following question:<br><br>• What are some important features of a cart system that will roll from here to there? (pg. 142)<br>• How does the design of a cart affect the distance it travels? (pg. 157)<br>• Student-created questions, e.g., How does start position affect how far a cart rolls? (pg. 170, Step 2 Introduce the focus question)<br>• How can you use magnets to meet cart challenges? (pg. 186) |
| **Three-dimensional Performances**<br><br>Materials include assessments designed to:<br><br>• match the targeted learning goals<br>• elicit evidence of students' use of the three dimensions to make sense of phenomena and/or to design solutions to problems | Three-dimensional assessment of Performance Expectation PS2.A: Forces and motion & PS2.B: Types of interactions<br><br>• Part 1, Step 12 Assess progress: notebook entry (pg. 43)<br>• Part 2, Step 6 Assess progress: notebook entry (pg. 57)<br>• Part 3, Step 10 Assess progress: response sheet (pg. 75)<br><br>***I-Check 1 and I-Check 2-3* administered to assess student three-dimensions learning of Investigations in Motion Module (pg. 8)**<br><br>*I-Check 1*- administered to assess student three-dimensions learning of Investigations 1 Parts 1-3 Step 21 Assess progress: *I-Check* (pg. 82) Next-step strategy for instruction (pg. 83) | Three-dimensional assessment of Performance Expectation PS2.A: Forces and motion<br><br>• Part 1, Step 18 Assess progress: notebook entry (pg. 99)<br>• Part 2, Step 12 Assess progress: response sheet (pg. 111)<br>• Part 3, Step 10 Assess progress: performance assessment (pg. 123) | Three-dimensional assessment of Performance Expectation ETS1.B: Developing possible solutions<br><br>• Part 1, Step 11 Assess progress: notebook entry (pg. 142)<br>• Part 2, Step 15 Assess progress: notebook entry (pg. 159)<br><br>Three-dimensional assessment of Performance Expectation PS2.A: Forces and motion<br><br>• Part 3, Step 6 Assess progress: performance assessment (pg. 171)<br><br>Three-dimensional assessment of Performance Expectation PS2.B Types of interactions & ETS1.B: Developing possible solutions<br><br>• Part 4, Step 9 Respond to focus question and assess progress (pg. 188)<br><br>*I-Check 1*- administered to assess student three-dimensions learning of Investigation 2-3 Part 4 Step 18 Assess progress: *I-Check* (pg. 194)<br><br>*Posttest* of Investigations 2 & 3 of Motion administered prior to teaching the next Pathways Module |

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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 |

Learn more at **FOSSPathways.com**

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