South Carolina Science Grade 4 Overview

FOSS Next Generation is the most engaging K-8 science program for the College- and Career-Ready Standards (SCCCR). This document has been created to guide grade 4 teachers and evaluators through the FOSS components, local and relevant anchor phenomena, and a critical pathway through the modules.

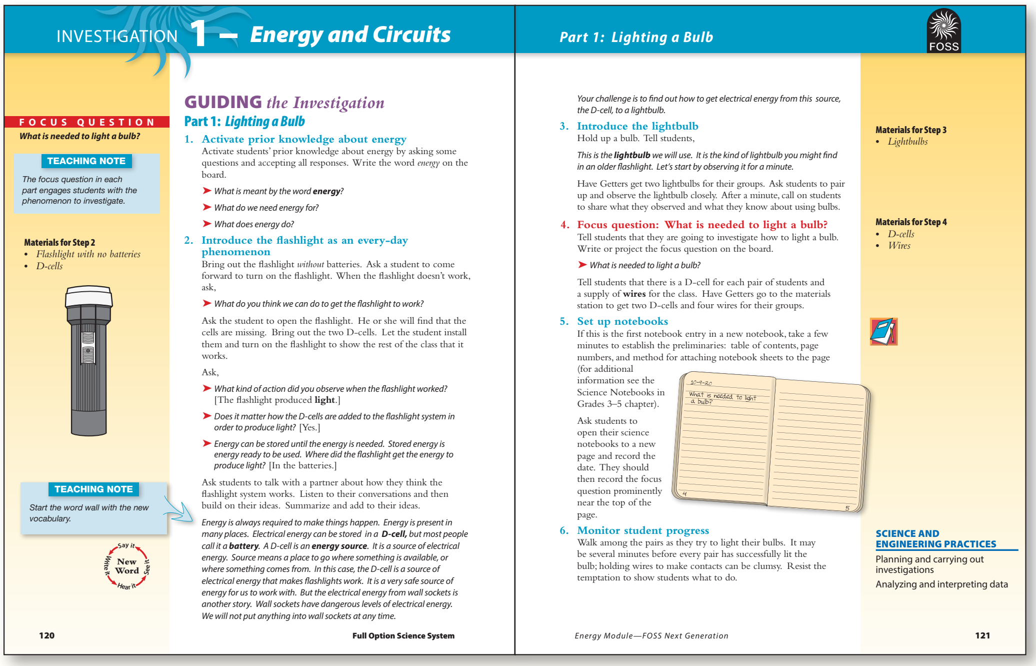
Navigation Guide

How to Review FOSS

Teacher Editions

The ***Investigations Guide*** is a spiral-bound guide containing the active investigations. FOSS lesson plans include:

- Materials used in the current steps
- Key three-dimensional highlights
- Embedded assessment "What to Look For"
- Sense-making discussions
- Strategies to support English learners
- Vocabulary review
- Teaching notes to facilitate instruction



Start your review here:

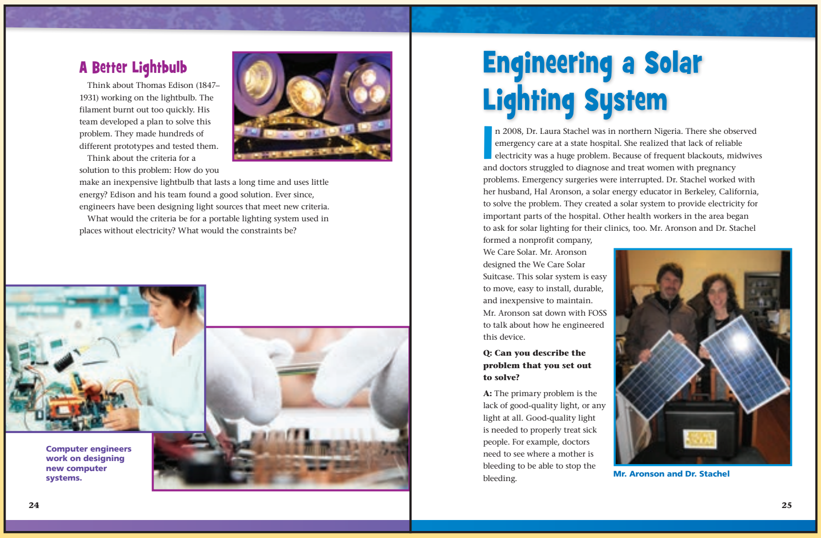
- **Soils, Rocks, and Landforms:** pp. 1–5, 83–85, 101–109
- **Energy:** pp. 1–7, 97–99, 120–129
- **Environments:** pp. 1–5, 79–81, 100–116

Teacher Resources (also online) contains teacher-support chapters on three-dimensional teaching and learning, connections to Common Core, access and equity, and environmental literacy.

Student Books

The ***FOSS Science Resources*** student book contains readings developed to reinforce and extend core ideas covered during FOSS active investigations. Readings give students opportunities to:

- Ask and answer questions
- Use evidence to support their ideas
- Use text to acquire information
- Draw information from multiple sources
- Interpret illustrations to build understanding

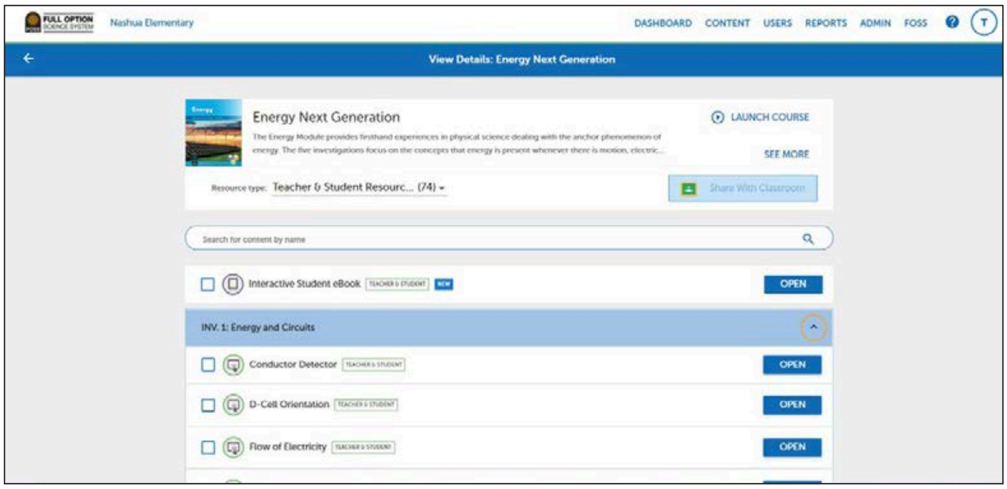


Also available in Spanish and as interactive eBooks.

FOSSweb on ThinkLink

Technology for Learning Anywhere

FOSSweb digital resources are located on ThinkLink, School Specialty's new cloud-based curriculum platform.

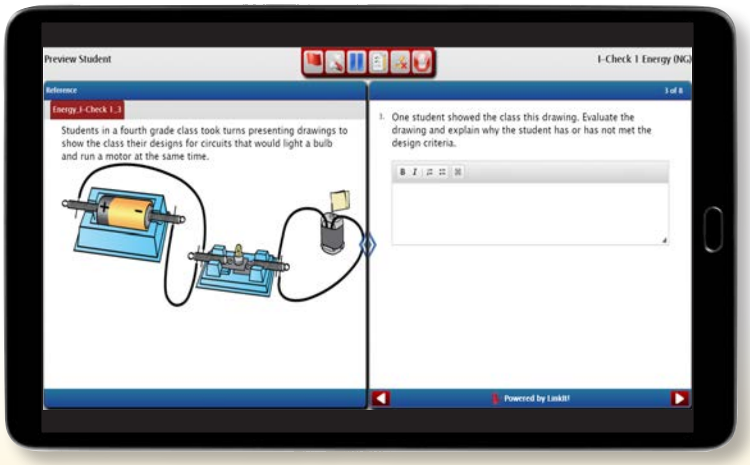


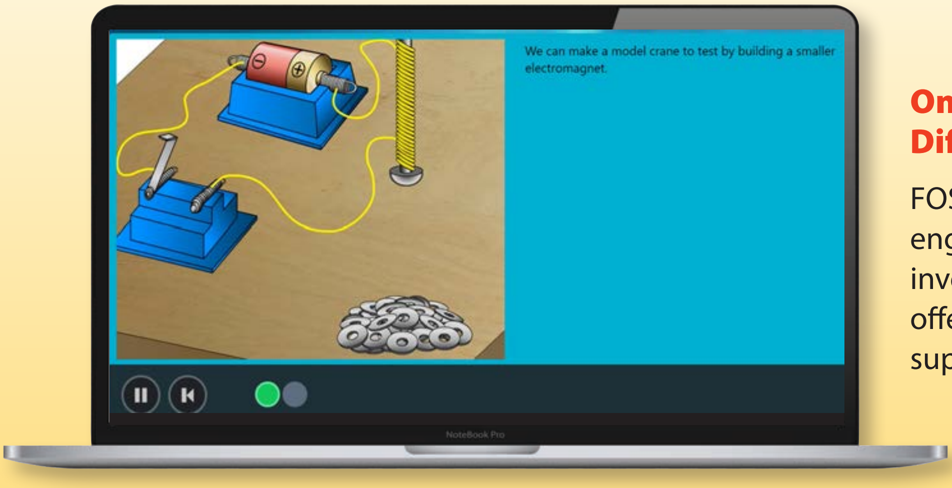
Access:

- Supports easy single sign-on and class management with Google classroom and learning management systems.
- Provides easy access to both teacher and student digital resources, including duplication masters, online activities, and streaming videos.

FOSSmap Online Assessment

Students in grades 3–5 can take summative assessments online with automatic coding of most responses. Student and class level reports help you identify instructional next steps.

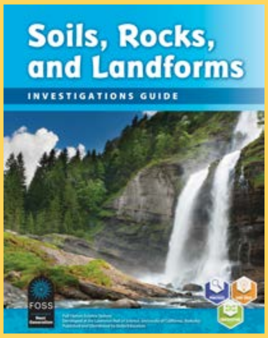
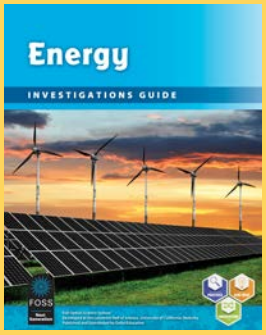
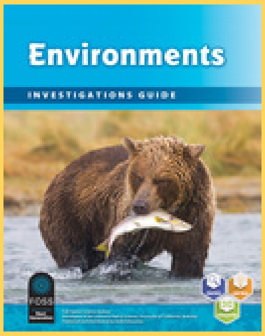




Online Activities for Differentiating Instruction

FOSSweb digital resources provide engaging, interactive virtual investigations and tutorials that offer additional content and skill support for students.

FOSS Modules—Grade 4

FOSS Module	Module Phenomenon and Driving Question	Module Overview /Bundled Performance Expectations
FOSS Module	**Soils, Rocks, and Landforms Module** **Anchor phenomenon:** *Earth's landscape—the shape and the composition of landforms* **Module driving questions:** • *What are Earth's land surfaces made of?* • *Why are landforms not the same everywhere?*  4 investigations **Critical Pathway:** 32 sessions**	Students have firsthand experiences with soils and rocks, and modeling experiences using tools such as topographic maps and stream tables. Students come to understand that weathering by water, ice, wind, living organisms, and gravity breaks rocks into smaller pieces, erosion transports earth materials to new locations, and deposition is the result of that transport process that builds new land. Students conduct controlled experiments to determine the impact of changing the variables of slope and amount of water in stream tables. Students interpret data from diagrams and visual representations to build explanations from evidence and make predictions of future events. **Earth Sciences:** 4-ESS1-1, 4-ESS2-1, 4-ESS2-2, 4-ESS3-1, 4-ESS3-2 **ETAS:** 3-5 ETS1-1, 3-5 ETS1-2
FOSS Module	**Energy Module** **Anchor phenomenon:** *Energy—motion, electric current, sound, light, or heat* **Module driving question:** • *How does energy transfer between systems?*  5 investigations **Critical Pathway:** 31 sessions	Students investigate electricity and magnetism as related effects and engage in engineering design while learning useful applications of electromagnetism in everyday life. They conduct controlled experiments to determine how to make an electromagnet stronger. They investigate how the amount of energy transfer changes when balls of different masses hit a stationary object. They explore energy transfer through waves that results in sound and motion. They gather information about fuels derived from natural resources that affect the environment, and explore alternative sources of energy that use renewal resources. **Physical Sciences:** 3-PS2-3 *, 4-PS3-1, 4-PS3-2, 4-PS3-3, | 4-PS3-4, 4-PS4-1, 4-PS4-2, 4-PS4-3 **ETAS:** 3-5 ETS1-1, 3-5 ETS1-2, 3-5 ETS1-3
FOSS Module	**Environments Module** **Anchor phenomenon:** *Animals and plants interact with their environment and with each other* **Module driving question:** • *How do the structures of terrestrial organisms function to support the survival of the organisms in that environment?*  4 investigations **Critical Pathway:** 32 sessions	The study of the structures and behaviors of organisms and the relationships between one organism and its environment builds knowledge of limits—important because humans can change environments. Students design investigations to study preferred environments, range of tolerance, and optimum conditions for growth and survival of terrestrial organisms, and aquatic organisms. They conduct controlled experiments to determine the range of tolerance for early growth of seeds and hatching of brine shrimp, and use these data to develop and use models to understand the impact of changes to the environment. Students explore how animals use their sense of hearing and develop models for detecting and interpreting sound. **Life Sciences:** 4-LS1-1, 4-LS1-2, 3-LS4-2 *, 3-LS4-4 * **Earth Sciences:** 5-ESS3-1 *

* These PEs are addressed in grade 3 and extended in grade 4 or are foundational for grade 5.
** A session is 45 minutes.

Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts
ESS1.C: The history of planet Earth ESS2.A: Earth materials and systems ESS2.B: Plate tectonics and large-scale systems interactions ESS2.E: Biogeology ESS3.A: Natural resources ESS3.B: Natural hazards ETS1.A: Defining and delimiting engineering problems ETS1.B: Developing possible solutions	• Asking questions and defining problems • 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	• Patterns • Cause and effect • Scale, proportion, and quantity • Systems and system models • Structure and function • Stability and change
PS2.B: Types of interactions PS3.A: Definitions of energy PS3.B: Conservation of energy and transfer PS3.C: Relationship between energy and forces PS3.D: Energy in chemical processes and everyday life PS4.A: Wave properties PS4.B: Electromagnetic radiation PS4.C: Informational technologies and instrumentation ESS3.A: Natural resources ETS1.A: Defining and delimiting engineering problems ETS1.B: Developing possible solutions ETS1.D: Optimizing the design solution	• Asking questions and defining problems • 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	• Patterns • Cause and effect • Systems and system models • Energy and matter
LS1.A: Structure and function LS1.D: Information processing LS2.C: Ecosystem dynamics, functioning, and resilience LS4.A: Evidence of common ancestry and diversity LS4.B: Natural selection LS4.D: Biodiversity and humans ESS3.C: Human impact on earth systems	• Asking questions and defining problems • 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	• Patterns • Cause and effect • Scale, proportion, and quantity • Systems and system models • Energy and matter

FOSS Phenomena Storylines

Soils, Rocks, and Landforms
Applications of Science

ANCHOR PHENOMENON 1
INVESTIGATIONS 1–2

On a walk around the schoolyard, students discover some changes at the edge of the playground. They observe a new pile of sand and “dirt” near the bottom of the small hill. **How do new, small landforms form in our schoolyard?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

ESS2.A: Earth Materials and Systems; **ESS2.B:** Plate Tectonics and Large-Scale System Interactions; **ESS2.E:** Biogeology

Patterns; Cause and Effect; Systems and System Models; Stability and Change

Developing and Using Models; Constructing Explanations; Engaging in Argument from Evidence

SCCCR PERFORMANCE EXPECTATION
4-ESS2-1

STORYLINE
On a walk around the schoolyard, students discover some changes at the edge of the playground, a new pile of sand and “dirt” near the bottom of a small hill. To figure out how the pile formed, students plan and conduct tests to determine the effects of different types of weathering on different materials, such as the rocks found near playgrounds. They use a stream table to model and construct explanations of erosion and deposition of earth materials. Finally, they engage in argument from evidence to determine where the sand and “dirt” came from and how it was deposited there.

ANCHOR PHENOMENON 2

INVESTIGATION 2 (PART 4)

Some students are exploring samples of sedimentary rocks and discover fossils. **How do fossils get in rocks and what can they tell us about the past?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

ESS1.C: The History of Planet Earth

Cause and Effect; Stability and Change

Developing and Using Models; Constructing Explanations

SCCCR PERFORMANCE EXPECTATION

4-ESS1-1

STORYLINE

Students are exploring samples of sedimentary rocks from basins and discovered fossils. To figure out how fossils got in the rocks, they use multimedia and text to obtain, evaluate, and communicate information about how fossils provide evidence of life and landscapes from the past. They demonstrate and use models of fossil formation to understand the process. Finally, they construct an explanation that organisms trapped in sediments become fossils.

ANCHOR PHENOMENON 3

INVESTIGATION 3

Two students compare maps of the same mountain location. One is dated before May 1980, and the other is dated after May 18, 1980. The students note some differences. What changed? **What could have caused the change to the mountain? How can engineers prepare for these types of changes?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

ESS1.C: The History of Planet Earth; **ESS2.B:** Plate Tectonics and Large-Scale System Interactions; **ESS3.B:** Natural Hazards; **ETS1.B:** Developing Possible Solutions

Cause and Effect; Scale, Proportion, and Quantity; Stability and Change

Planning and Carrying Out Investigations; Using Mathematics and Computational Thinking

SCCCR PERFORMANCE EXPECTATIONS

4-ESS2-2, 4-ESS3-2, 3-5-ETS1-2

STORYLINE

Students make observations of two maps of one famous mountain. One was taken before May 1980, and the other was taken after May 18, 1980. To figure out why the maps are different, students collect and analyze data to determine scale and change to a volcano after an eruption. They develop a model and explain the effect of natural hazards on the surface of Earth and what happened to Mt. St. Helens. Finally, they develop possible solutions to monitor and prepare for natural hazards.

FOSS Phenomena Storylines

Energy
Applications of Science

ANCHOR PHENOMENON 1
INVESTIGATIONS 1–3

A magician performed a trick by asking a small child to come on stage and lift a wooden box. The child did it easily. The magician secretly flipped a switch and then asked an adult to lift the same box. The adult tried and tried but could not lift the box. **How can a child lift a box that an adult cannot during a magic trick?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

PS3.A: Definitions of Energy; **PS3.B:** Conservation of Energy and Energy Transfer; **PS3.D:** Energy in Chemical Processes and Everyday Life

Cause and Effect; Systems and System Models; Energy and Matter

Planning and Carrying Out Investigations; Developing and Using Models; Constructing Explanations; Engaging in Argument from Evidence

SCCCR PERFORMANCE EXPECTATIONS
4-PS3-2, 4-PS3-4, 4-PS4-3, 3-5-ETS1-1, 3-5-EST1-2, 3-5-ETS1-3

STORYLINE
Students plan and carry out investigations examining cause-and-effect relationships with magnets and circuits separately to explain the force of attraction and the function of electricity in the magician's circuit. They engage in argumentation while developing a model of magnetic fields around an electric current and how the magnetic field can be strengthened. Finally, they construct an explanation of electromagnetism to explain the magician's trick.

ANCHOR PHENOMENON 2
INVESTIGATION 4

Two children are bowling. The older one uses a 12-pound ball and rolls the ball very quickly toward the 10 pins. The ball knocks down 9 pins. The younger child uses an 8-pound ball and rolls the ball slowly down the alley. Even though both balls were aimed the same, the 8-pound ball only knocks down 5 pins. **How does mass and speed affect the number of bowling pins that fall?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

PS3.A: Definitions of Energy; **PS3.B:** Conservation of Energy and Energy Transfer; **PS3.C:** Relationship between Energy and Forces

Patterns; Cause and Effect; Systems and System Models; Energy and Matter

Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations

SCCCR PERFORMANCE EXPECTATIONS
4-PS3-1, 4-PS3-2, 4-PS3-3, 4-PS3-4

STORYLINE
Students plan and carry out investigations with steel balls and ramps to collect data about mass, starting position, speed, and energy transfer. Next, they analyze the data to determine the patterns and cause-and-effect relationships. Then, they construct explanations based on evidence about different amounts of energy transfer when bowling or other collisions. Finally, students explain why mass and speed affect the number of pins that fall in bowling.

ANCHOR PHENOMENON 3
INVESTIGATION 5

A town installed parking meters powered by solar panels in a local park. The systems were installed properly, but not all of the parking meters are working well. **What's wrong with the solar-powered parking meters at the park?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

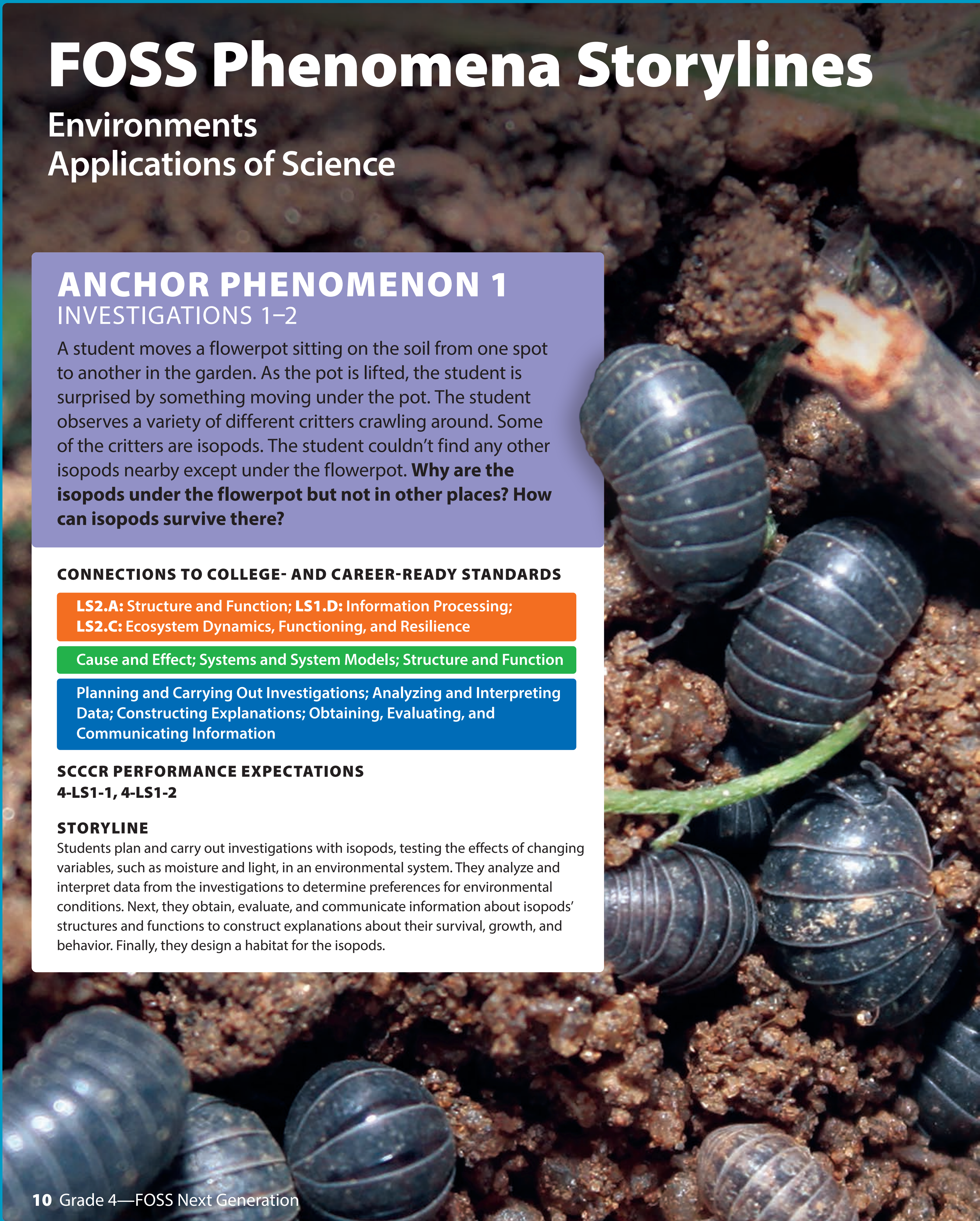
PS4.A: Wave Properties; **PS4.B:** Electromagnetic Radiation; **ETS1.A:** Defining and Delimiting Engineering Problems; **ETS1.B:** Developing Possible Solutions; **ETS1.C:** Optimizing the Design Solution

Cause and Effect; Systems and System Models

Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solution

SCCCR PERFORMANCE EXPECTATIONS
4-PS3-2, 4-PS3-4, 4-PS4-1, 4-PS4-2, 4-ESS3-1, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3

STORYLINE
Students identify possible reasons that not all parking meters are working. They design solutions by applying scientific ideas about waves and circuits to solve problems. They construct circuits with materials to test their ideas. They construct an explanation that includes a solution to the problem.



FOSS Phenomena Storylines

Environments
Applications of Science

ANCHOR PHENOMENON 1
INVESTIGATIONS 1–2

A student moves a flowerpot sitting on the soil from one spot to another in the garden. As the pot is lifted, the student is surprised by something moving under the pot. The student observes a variety of different critters crawling around. Some of the critters are isopods. The student couldn't find any other isopods nearby except under the flowerpot. **Why are the isopods under the flowerpot but not in other places? How can isopods survive there?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

LS2.A: Structure and Function; **LS1.D:** Information Processing; **LS2.C:** Ecosystem Dynamics, Functioning, and Resilience

Cause and Effect; Systems and System Models; Structure and Function

Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations; Obtaining, Evaluating, and Communicating Information

SCCCR PERFORMANCE EXPECTATIONS
4-LS1-1, 4-LS1-2

STORYLINE
Students plan and carry out investigations with isopods, testing the effects of changing variables, such as moisture and light, in an environmental system. They analyze and interpret data from the investigations to determine preferences for environmental conditions. Next, they obtain, evaluate, and communicate information about isopods' structures and functions to construct explanations about their survival, growth, and behavior. Finally, they design a habitat for the isopods.

ANCHOR PHENOMENON 2
INVESTIGATION 2

A fourth-grade student is startled late one night while sleeping by the sound of an owl hooting. The student's family said that owls are active at night and hunt for prey. The student wonders how animals can hunt at night when they don't have light to see. **How are owls able to locate small animals to eat and capture them in the dark?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

LS2.A: Structure and Function; **LS1.D:** Information Processing; **LS2.C:** Ecosystem Dynamics, Functioning, and Resilience

Cause and Effect; Systems and System Models

Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations; Obtaining, Evaluating, and Communicating Information

SCCCR PERFORMANCE EXPECTATIONS
4-LS1-1, 4-LS1-2

STORYLINE
Students plan and conduct investigations in the schoolyard and pretend to be animals who have poor vision or are active at night. The animals communicate with one unique sound and try to find others of their kind before being "captured" by a predator. Then, they analyze and interpret the collected data to determine structures that help organisms survive. They obtain, evaluate, and communicate information in order to construct explanations about various ways animals receive, process, and respond to sensory information gathered from their environment.

ANCHOR PHENOMENON 3
INVESTIGATIONS 3–4

Dr. Salina Bryan has been studying a population of brine shrimp that live in Mono Lake, a large salt lake. The size of the brine shrimp population and the amount of water in the lake has been decreasing in the last few years. **What is happening to cause the decrease in the number of brine shrimp, and what is the effect on the ecosystem?**

CONNECTIONS TO COLLEGE- AND CAREER-READY STANDARDS

LS2.A: Structure and Function; **LS2.C:** Ecosystem Dynamics, Functioning, and Resilience; **LS4.D:** Biodiversity and Humans

Cause and Effect; Systems and System Models; Structure and Function

Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations

SCCCR PERFORMANCE EXPECTATION
4-LS1-1

STORYLINE
Students plan and conduct investigations with brine shrimp and plants to collect data about the effects of changing variables on organisms. They analyze and interpret the data to serve as evidence for cause-and-effect relationships about brine shrimp survival. Finally, they construct explanations about how the organisms' structures and functions enable them to survive or not to survive when the natural system changes.

Critical Pathway

South Carolina Science

Today, many elementary educators face the reality that time for science instruction is limited. The FOSS developers have determined a Critical Pathway through each module that is faithful to the standards in the time you have to teach with the flexibility to expand or differentiate instruction. There are 95 total sessions for grade 4.

SOILS, ROCKS, AND LANDFORMS

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	Inv 1.1	Soil Composition, Steps 1–4 (including Survey)	101–102
2	Inv 1.1	Soil Composition, Steps 5–12	102–104
3	Inv 1.1	Soil Composition, Steps 13–19, 22	105–06, 109
	Inv 1.1	*Soil Composition, Steps 20–21—" Reading, What Is Soil?"*	*107–108*
4	Inv. 1.2	Physical Weathering, Steps 1–10	113–116
5	Inv. 1.2	Physical Weathering, Steps 11–15	116–119
6	Inv 1.3	Chemical Weathering, Steps 1–10	123–125
7	Inv 1.3	Chemical Weathering, Steps 11–14	125–126
8	Inv 1.3	Chemical Weathering, Steps 15–17	127–128
	Inv 1.3	*Chemical Weathering, Steps 18–20—Reading, "Weathering"*	*129–130*
9	Inv 1.3	Chemical Weathering, Steps 21–24	130–133
	Inv 1.4	*Schoolyard Soils, Steps 1–16—Focus on Environmental Literacy*	*137–141*
10	Inv 1.4	Review Step 17 (use readings, "What Is Soil?" and "Weathering")	142
11	Inv 1.4	I-Check 1, Step 18 (Later plan self-assessment)	143
12	Inv 2.1	Erosion and Deposition, Steps 1–7	162–164
13	Inv 2.1	Erosion and Deposition, Steps 8–17	164–167
14	Inv 2.1	Erosion and Deposition, Steps 18–21	168–169
15	Inv. 2.2	Stream-Table Investigations, Steps 1–8	173–175
16	Inv 2.2	Stream-Table Investigations, Steps 9–17	176–178
	Inv 2.2	*Stream-Table Investigations, Steps 18–26—Designing Investigations*	*179–181*
	Inv 2.2	*Stream-Table Investigations, Steps 27–29—Video and Online Activity*	*181–182*
17	Inv 2.3	Schoolyard Erosion and Deposition, Steps 1–13	186–189
18	Inv 2.4	Fossil Evidence, Steps 1–6	193–194
	Inv 2.4	Fossil Evidence, Steps 7–12—Modeling fossil formation	195–197

CONTACT YOUR SALES REPRESENTATIVE IF YOUR DISTRICT NEEDS A CUSTOMIZED CRITICAL PATHWAY.

SOILS, ROCKS, AND LANDFORMS (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
	Inv 2.4	Fossil Evidence, Steps 16–22—Reading, "Fossils Tell a Story"	198–200
19	Inv 2.4	Fossil Evidence, Steps 13–15, Review Step 23	196, 201
20	Inv 2.4	I-Check 2, Step 24 (Later plan self-assessment)	202
21	Inv 3.1	Making a Topographic Map, Steps 1–7	221–223
22	Inv 3.1	Making a Topographic Map, Steps 8–20	223–226
23	Inv 3.1	Making a Topographic Map, Steps 21–24	227–228
24	Inv 3.2	Drawing a Profile, Steps 1–12	232–237
25	Inv 3.2	Drawing a Profile, Steps 13–15	238–239
	Inv 3.2	*Drawing a Profile, Steps 16–19—Media: video and online activity*	*239–240*
26	Inv 3.3	Mount St. Helens Case Study, Steps 1–14	244–249
27	Inv 3.4	Rapid Changes, Steps 1–9, 13	253–55, 257
	Inv 3.4	Rapid Changes, Steps 10-12—Reading, "It Happened So Fast"	256
28	Inv 3.4	Rapid Changes, Review Step 14	258
29	Inv 3.4	I-Check 3, Step 15	259
30	Inv 4.1	Intro to Natural Resources, Steps 1–2 (self-assessment)	276–277
31	Inv 4.1	Introduction to Natural Resources, Steps 3–9	278–280
	Inv 4.1	*Introduction to Natural Resources, Steps 10–16—Readings, Media*	*281–283*
	Inv 4.2	*Making Concrete, Steps 1–8—Focus on Engineering*	*287–288*
	Inv 4.2	*Making Concrete, Steps 9–16—Reading and discussion*	*289–291*
	Inv 4.3	*Earth Materials in Use, Steps 1–11—Focus on Environmental Literacy*	*295–298*
	Inv 4.3	*Earth Materials in Use, Steps 12–16—Readings*	*299–300*
	Inv 4.3	*Earth Materials in Use, Steps 17–18—Review of Investigation 4*	*301*
32	Inv 4.3	Posttest, Step 19	302

Investigation sessions, with references to the pages and step numbers in the *Guide*

Optional short sessions within a critical pathway part

Entire parts of the investigation that are not included in this critical pathway; these activities provide additional opportunities to deepen the learning experience

ENERGY

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	**Inv 1.1**	**Lighting a Bulb, Steps 1–10**	120–123
2	**Inv 1.1**	**Lighting a Bulb, Steps 11–17**	123–126
	Inv 1.1	*Lighting a Bulb, Steps 18–21—Focus on Online and Readings*	*126–128*
3	**Inv 1.1**	**Lighting a Bulb, Steps 22–23**	129
4	**Inv 1.2**	**Conductors and Circuits, Steps 1–14; 18–22**	136–142
	Inv 1.2	*Conductors and Circuits, Steps 15–17—Focus on Engineering*	*140–141*
5	**Inv 1.2**	**Conductors and Circuits, Steps 23–28** Note: Step 23, Online Activity, Tutorial-Simple Circuits only	143–147
	Inv 1.3	*Series and Parallel Circuits, Steps 1–32—Focus on Engineering*	*150–159*
	Inv 1.4	*Solving the String of Lights Problem, Steps 1–19—Engineering*	*163–170*
6	**Inv 2.1**	**Magnets and Materials, Steps 1–19, 27**	190–194, 196
	Inv 2.1	*Magnets and Materials, Steps 20–26—Outdoor Application*	*194–195*
7	**Inv 2.2**	**Magnetic Fields, Steps 1–8**	200–202
8	**Inv 2.2**	**Magnetic Fields, Steps 9–23** (Could skip Step 18, p 206)	203–207
9	**Inv 2.2** **Inv 2.3**	**Magnetic Fields, Steps 24–27; Step 30** **Magnetic Force, Review Step 24**	208–211 224
	Inv 2.2	*Magnetic Fields, Steps 28–29—Focus on Online Activities*	*210*
	Inv 2.3	*Magnetic Force, Steps 1–23—Focus on Science/Mathematics*	*215–223*
10	**Inv 2.3**	**I-Check 1-2, Step 25 (Later plan self-assessment)**	225
11	**Inv 3.1**	**Building an Electromagnet, Steps 1–12**	245–248
12	**Inv 3.1**	**Building an Electromagnet, Steps 13–16**	248–249
13	**Inv 3.1**	**Building an Electromagnet, Steps 17–20**	250–251
	Inv 3.2	*Changing the Strength, Steps 1–11*	*254–256*
	Inv 3.2	*Changing the Strength, Step 12 (Electromagnet Exper only)*	*256*
	Inv 3.2	*Changing the Strength, Steps 13–17*	*258–260*
	Inv 3.3	*Reinventing the Telegraph, Steps 1–12*	*264–266*
	Inv 3.3	*Reinventing the Telegraph, Steps 13–16—Focus on Readings*	*267–268*

ENERGY (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
	Inv 3.3	*Reinventing the Telegraph, Steps 17–20, Review Step 21*	*269–271*
	Inv 3.3	*I-Check 3, Step 22 (Later plan self-assessment)*	*272*
14	**Inv 4.1**	**Presence of Energy, Steps 1–12**	**291–293**
15	**Inv 4.1**	**Presence of Energy, Steps 13–18**	**294–297**
16	**Inv 4.2**	**Rolling Balls Down Slopes, Steps 1–10, 12**	**300–303**
17	**Inv 4.2**	**Rolling Balls Down Slopes, Steps 11, 13–16**	**303, 304**
18	**Inv 4.2**	**Rolling Balls Down Slopes, Steps 17–20**	**305–306**
19	**Inv 4.3**	**Collisions, Steps 1–9**	**310–313**
20	**Inv 4.3**	**Collisions, Steps 10–16**	**313–315**
	Inv 4.3	*Collisions, Steps 17–22—Focus on Readings*	*316–318*
21	**Inv 4.3**	**Collisions, Steps 23–25 Step 26,** (Video, Ch 1–5 only, 8 min) **Review Step 27**	**318-320** **321–322**
22	**Inv 4.3**	**I-Check 4, Step 28 (Later plan self-assessment)**	**322**
23	**Inv 5.1**	**5.1 Forms of Waves, Steps 1–6**	**345–346**
24	**Inv 5.1**	**5.1 Forms of Waves, Steps 7–12** (Step 12 Video, Ch 2 only)	**347–350**
25	**Inv 5.1**	**Forms of Waves, Steps 13–22**	**351–355**
	Inv 5.1	*Forms of Waves, Steps 23–25*	*355–357*
26	**Inv 5.2**	**Light Travels, Steps 1–3; 9; 11–16** (Skip Outdoor Steps 4–8, 10)	**361-365**
27	**Inv 5.2**	**Light Travels, Step 17** (Video, Ch 2–3 only)**; Steps 18–20**	**366–367**
28	**Inv 5.2**	**Light Travels, Steps 21–24**	**367-368**
	Inv 5.2	*Light Travels, Steps 25–33—Readings, Online activities*	*369–372*
29	**Inv 5.3**	**Engineering with Solar Cells, Steps 1–11**	**377–379**
	Inv 5.3	**Engineering with Solar Cells, Steps 12–21—Engineering**	*379–381*
	Inv 5.3	*Engineering with Solar Cells, Step 25—Focus on Reading*	*383*
30	**Inv 5.3**	**Engineering with Solar Cells, Steps 22–24, Review 26–27**	**382–385**
31	**Inv 5.3**	**Posttest, Step 28**	**385**

Investigation sessions, with references to the pages and step numbers in the *Guide*

Optional short sessions within a critical pathway part

Entire parts of the investigation that are not included in this critical pathway; these activities provide additional opportunities to deepen the learning experience

ENVIRONMENTS

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	**Inv 1.1**	**Observing Mealworms, Steps 1–9**	**100–102**
2 *	**Inv 1.1**	**Observing Mealworms, Steps 10–16, 20 ***	**102–4, 106**
3	**Inv 1.1**	**Observing Mealworms, Steps 17–22 (21-22 important)**	**105–109**
4	**Inv 1.1**	**Observing Mealworms, Steps 23–25**	**110**
5 *	**Inv 1.1**	**Observing Mealworms, Step 26 (short observation)** **Later, when growth has proceeded, Steps 27–31, 33**	**111** **112–114**
6 *	**Inv 1.1**	**Observing Mealworms, Steps 34–37**	**115–116**
7 *	**Inv 1.2**	**Designing an Isopod Environment, Steps 1–13** **Steps 14–16 (Reading) ; Steps 17–19 (Long-term results) ***	**120–122** **123–124**
	Inv 1.2	*Designing an Isopod Environment, Steps 20–26, 30–33—Experiment*	*124–127*
8	**Inv 1.2**	**Designing an Isopod Environment, Steps 27–29, 34**	**126, 128**
9	**Inv 1.2**	**Designing an Isopod Environment, Steps 35–37**	**128–129**
10	**Inv 1.3**	**Leaf-Litter Critters, Steps 1–11**	**134–137**
11	**Inv. 1.3**	**Leaf-Litter Critters, Step 12–13**	**137–139**
	Inv. 1.3	*Leaf-Litter Critters, Steps 14–17—Focus on Reading*	*140–141*
12	**Inv 1.3**	**Leaf-Litter Critters, Step 18,** Video Ch 1–8**; Step 19, Review 20–21**	**142–146**
13	**Inv 1.3**	**I-Check 1, Step 22 (Later plan self assessment)** **Continue to observe terrariums Step 23 ***	**146**
14	**Inv 2.1**	**Designing an Aquarium, Steps 1–11 (could do 1 class aquarium)**	**167–169**
15 *	**Inv 2.1**	**Designing an Aquarium, Steps 12–15, 18 *, 19–25**	**169–174**
	Inv 2.2	*Food Chains and Food Webs, Steps 1–16*	*177–180*
	Inv 2.2	*Food Chains and Food Webs, Steps 17–24—Focus on Reading*	*181–184*
	Inv 2.2	*Food Chains and Food Webs, Steps 25–26*	*185–186*
	Inv 2.2	*Food Chains and Food Webs, Step 27*	*185–186*
	Inv 2.2	*Food Chains and Food Webs, Steps 28–31*	*186*
	Inv 2.2	*Food Chains and Food Webs, Steps 32–33—Argumentation*	*189*

**Indicates the need to allow for growth time*

ENVIRONMENTS (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
	Inv 2.3	*Population Simulation, Steps 1–24—Focus on Analyzing Data*	*193–198*
	Inv 2.3	*Population Simulation, Steps 25–27— Focus on Reading*	*200–201*
16	**Inv 2.4**	**Sound Off, Steps 1–13**	**206–208**
17	**Inv 2.4**	**Sound Off, Steps 14–22**	**209–213**
18	**Inv 2.4**	**Sound Off, Steps 23–24, Review Steps 25–26**	**213–216**
19	**Inv 2.4**	**I-Check 2, Step 27; Observe Aquaria, Step 28 (Later plan self assessment)**	**216**
20	**Inv 3.1**	**Setting Up the Experiment, Steps 1–13 (Video The Mono Lake Story, see sidebar page 237)**	**237–240**
21	**Inv 3.1**	**Setting Up the Experiment, Steps 14–17**	**241–242**
22*	**Inv 3.2**	**Determining Range of Tolerance, Steps 1-5 , 15–17*** (Note: Steps 10–13 are done in Session 27 below *)	**246, 250–1**
	Inv. 3.2	*Determining Range of Tolerance, Steps 6–9—Focus on Reading*	*246–248*
23*	**Inv 3.2**	**Determining Range of Tolerance, Steps 10–13***	**248-249**
24	**Inv 3.2**	**Determining Range of Tolerance, Steps 18–28; 30–31**	**252–255**
	Inv 3.3	*Determining Viability, Steps 1–8—Focus on Experimentation*	*258–259*
25	**Inv 3.3**	**Determining Viability, Steps 9–11, Step 16**	**259–60, 263**
	Inv 3.4	*Variation in a Population, Steps 1–16—Outdoor simulation*	*267–270*
26	**Inv 3.4**	**Variation in a Population, Steps 17–18, Review Steps 19–20**	**271–274**
27	**Inv 3.4**	**I-Check 3, Step 21 (Later plan self assessment)**	**274**
	Inv 4.1	*Water or Salt Tolerance and Plants, Steps 1–14 , 45–47, 50–51—Envt. Literacy*	*299–302*
28	**Inv 4.1**	**Water or Salt Tolerance and Plants, Steps 15–28**	**303–305**
29*	**Inv 4.1**	**Water or Salt Tolerance and Plants, Steps 32–34; Steps 48–49**	**307; 311**
30*	**Inv 4.1**	**Water or Salt Tolerance and Plants, Steps 35–54**	**308–309**
	Inv 4.2	*Plant Patterns, Steps 1–19—Environmental Literacy (Outdoor)*	*318–324*
31	**Inv 4.3**	**Plant Adaptations, Steps 1–6, Review Steps 7–9**	**327–330**
32	**Inv 4.3**	**Posttest, Step 10**	**330**

**Indicates the need to allow for growth time*

Investigation sessions, with references to the pages and step numbers in the *Guide*

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Diverse Learning Needs

Designed for All Learners

Access and Equity

The FOSS Program has been designed to maximize the science learning opportunities for all students, including those who have traditionally not had access to or have not benefited from equitable science experiences—students with special needs, ethnically diverse learners, English learners, students living in poverty, girls, and advanced and gifted learners. FOSS is rooted in a 30-year tradition of multisensory science education and informed by recent research on UDL and culturally and linguistically responsive teaching and learning. See the **Access and Equity** chapter on FOSSweb for strategies and suggestions.

English Language Development (ELD)

The FOSS active investigations, science notebooks, *FOSS Science Resources* articles, and formative assessments provide rich contexts in which students develop and exercise thinking and communication in both science and language arts. Students experience the natural world in real and authentic ways and use language to inquire, process information, and communicate their thinking about scientific phenomena.

Strategies for Effective Learning

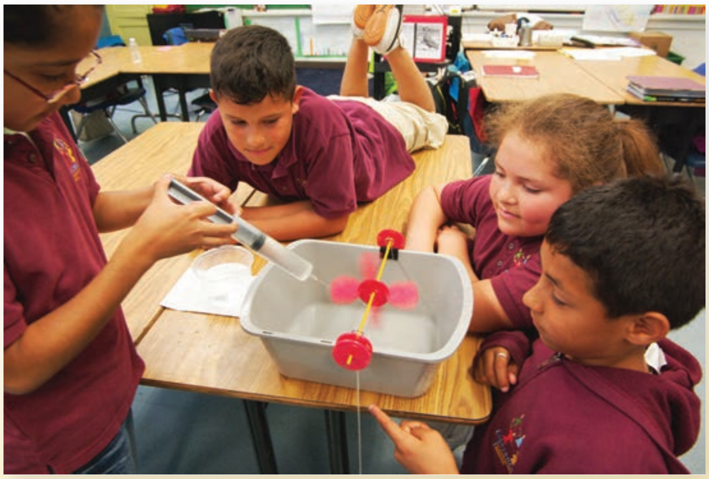
Engaging Students

English Language Art Connections

FOSS leverages the natural connection between science and language arts. Students read articles and think critically to enhance their understanding. Students practice ELA skills as well as scientific thinking by organizing their thoughts in a science notebook.

Engineering

FOSS provides meaningful engineering design challenges to students across the grade bands. Students take on the role of scientists to problem-solve and then take on the role of engineers to design and innovate.



Environmental Literacy

FOSS throws open the classroom door and takes students outdoors to apply scientific principles to natural systems.

Custom Professional Learning

FOSS can help you build a customized professional learning plan for your district, through its experienced network of consultants to facilitate workshops and sustain the progress of your implementation through ongoing support.

SOUTH CAROLINA FOSS NEXT GENERATION K–8 SCOPE AND SEQUENCE

Grade	Integrated Middle Grades				Digital Only Investigations
6–8	Heredity and Adaptation	Electromagnetic Force	Waves	Planetary Science	Diversity of Life Online (Investigation 6)
	Populations and Ecosystems	Chemical Interactions	Gravity and Kinetic Energy	Variables and Design	Earth History Online (Investigation 8)
	Weather and Water	Earth History	Diversity of Life	Human Systems Interactions	Wave Models

**Half-length courses*   *Physical Science content*   *Earth Science content*   *Life Science content*   *Engineering content*

Grade	Physical Science	Earth Science	Life Science
5	Mixtures and Solutions	Earth and Sun	Living Systems
4	Energy	Soils, Rocks, and Landforms	Environments
3	Motion and Matter	Water and Climate	Structures of Life
2	Solids and Liquids	Pebbles, Sand, and Silt	Insects and Plants
1	Sound and Light	Air and Weather	Plants and Animals
K	Materials and Motion	Trees and Weather	Animals Two by Two
PreK	Observing Nature		