West Virginia Science Grade 5 Overview

FOSS Next Generation is the most engaging K-8 science program for the College- and Career-Readiness Standards (WVCCR). This document has been created to guide grade 5 teachers and evaluators through the FOSS components, local and relevant anchor phenomena, and a critical pathway through the modules.

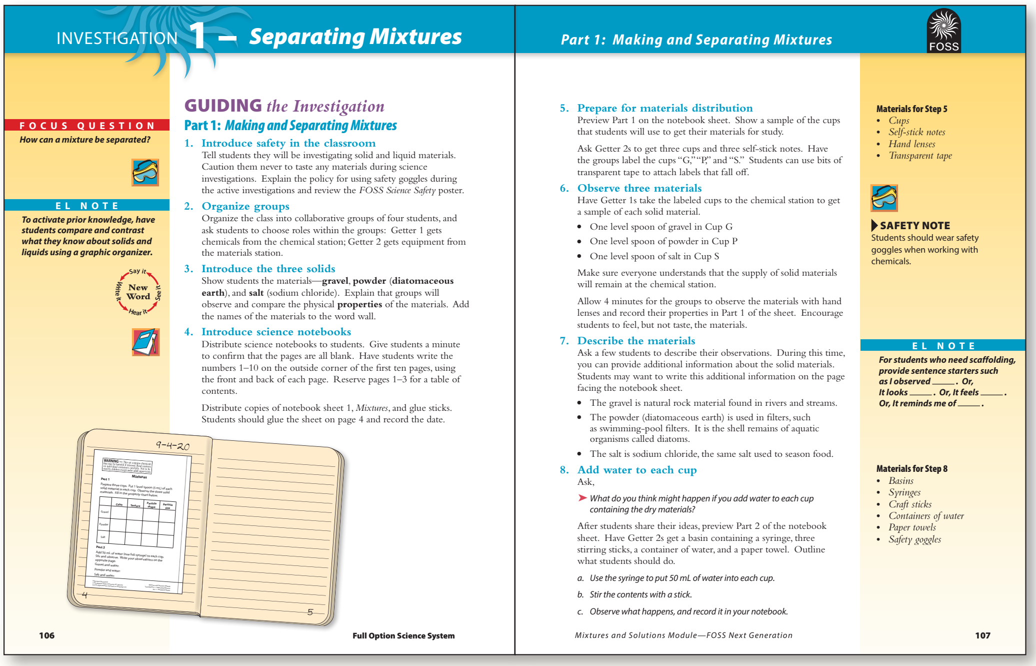
Navigation Guide

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



INVESTIGATION 1 — *Separating Mixtures*

FOCUS QUESTION

How can a mixture be separated?

EL NOTE

To activate prior knowledge, have students compare and contrast what they know about solids and liquids using a graphic organizer.

GUIDING *the Investigation*

Part 1: *Making and Separating Mixtures*

1. **Introduce safety in the classroom**
Tell students they will be investigating solid and liquid materials. Caution them never to taste any materials during science investigations. Explain the policy for using safety goggles during the active investigations and review the *FOSS Science Safety* poster.
2. **Organize groups**
Organize the class into collaborative groups of four students, and ask students to choose roles within the groups: Getter 1 gets chemicals from the chemical station; Getter 2 gets equipment from the materials station.
3. **Introduce the three solids**
Show students the materials—**gravel**, **powder** (**diatomaceous earth**), and **salt** (sodium chloride). Explain that groups will observe and compare the physical **properties** of the materials. Add the names of the materials to the word wall.
4. **Introduce science notebooks**
Distribute science notebooks to students. Give students a minute to confirm that the pages are all blank. Have students write the numbers 1–10 on the outside corner of the first ten pages, using the front and back of each page. Reserve pages 1–3 for a table of contents.
Distribute copies of notebook sheet 1, *Mixtures*, and glue sticks. Students should glue the sheet on page 4 and record the date.

106 Full Option Science System

Part 1: *Making and Separating Mixtures*

5. **Prepare for materials distribution**
Preview Part 1 on the notebook sheet. Show a sample of the cups that students will use to get their materials for study.
Ask Getter 2s to get three cups and three self-stick notes. Have the groups label the cups "G," "P," and "S." Students can use bits of transparent tape to attach labels that fall off.
6. **Observe three materials**
Have Getter 1s take the labeled cups to the chemical station to get a sample of each solid material.
   - One level spoon of gravel in Cup G
   - One level spoon of powder in Cup P
   - One level spoon of salt in Cup S

   Make sure everyone understands that the supply of solid materials will remain at the chemical station.
   Allow 4 minutes for the groups to observe the materials with hand lenses and record their properties in Part 1 of the sheet. Encourage students to feel, but not taste, the materials.
7. **Describe the materials**
Ask a few students to describe their observations. During this time, you can provide additional information about the solid materials. Students may want to write this additional information on the page facing the notebook sheet.
   - The gravel is natural rock material found in rivers and streams.
   - The powder (diatomaceous earth) is used in filters, such as swimming-pool filters. It is the shell remains of aquatic organisms called diatoms.
   - The salt is sodium chloride, the same salt used to season food.
8. **Add water to each cup**
Ask,
➤ *What do you think might happen if you add water to each cup containing the dry materials?*
After students share their ideas, preview Part 2 of the notebook sheet. Have Getter 2s get a basin containing a syringe, three stirring sticks, a container of water, and a paper towel. Outline what students should do.
   a. *Use the syringe to put 50 mL of water into each cup.*
   b. *Stir the contents with a stick.*
   c. *Observe what happens, and record it in your notebook.*

Materials for Step 5
- *Cups*
- *Self-stick notes*
- *Hand lenses*
- *Transparent tape*

SAFETY NOTE
Students should wear safety goggles when working with chemicals.

EL NOTE

For students who need scaffolding, provide sentence starters such as I observed ____. Or, It looks ____. Or, It feels ____. Or, It reminds me of ____.

Materials for Step 8
- *Basins*
- *Syringes*
- *Craft sticks*
- *Containers of water*
- *Paper towels*
- *Safety goggles*

Mixtures and Solutions Module—FOSS Next Generation 107

Start your review here:

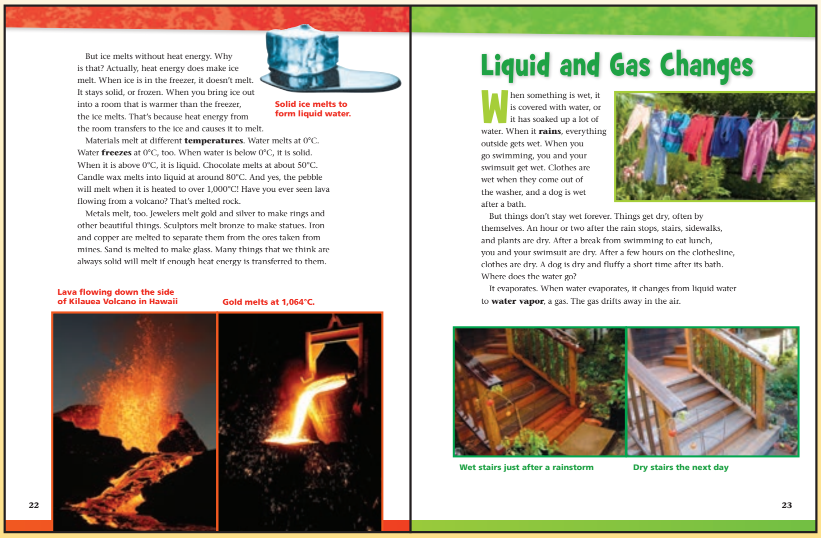
- **Earth and Sun:** pp. 1–5, 93–95, 110–115
- **Mixtures and Solutions:** pp. 1–5, 87–89, 106–111
- **Living Systems:** pp. 1–5, 79–81, 97–103

Teacher Resources (also online) contains teacher-support chapters on three-dimensional teaching and learning, 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



But ice melts without heat energy. Why is that? Actually, heat energy does make ice melt. When ice is in the freezer, it doesn't melt. It stays solid, or frozen. When you bring ice out into a room that is warmer than the freezer, the ice melts. That's because heat energy from the room transfers to the ice and causes it to melt.

Materials melt at different **temperatures**. Water melts at 0°C. Water **freezes** at 0°C, too. When water is below 0°C, it is solid. When it is above 0°C, it is liquid. Chocolate melts at about 50°C. Candle wax melts into liquid at around 80°C. And yes, the pebble will melt when it is heated to over 1,000°C! Have you ever seen lava flowing from a volcano? That's melted rock.

Metals melt, too. Jewelers melt gold and silver to make rings and other beautiful things. Sculptors melt bronze to make statues. Iron and copper are melted to separate them from the ores taken from mines. Sand is melted to make glass. Many things that we think are always solid will melt if enough heat energy is transferred to them.

Solid ice melts to form liquid water.

Lava flowing down the side of Kilauea Volcano in Hawaii

Gold melts at 1,064°C.

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Liquid and Gas Changes

When something is wet, it is covered with water, or it has soaked up a lot of water. When it **rains**, everything outside gets wet. When you go swimming, you and your swimsuit get wet. Clothes are wet when they come out of the washer, and a dog is wet after a bath.

But things don't stay wet forever. Things get dry, often by themselves. An hour or two after the rain stops, stairs, sidewalks, and plants are dry. After a break from swimming to eat lunch, you and your swimsuit are dry. After a few hours on the clothesline, clothes are dry. A dog is dry and fluffy a short time after its bath. Where does the water go?

It evaporates. When water evaporates, it changes from liquid water to **water vapor**, a gas. The gas drifts away in the air.

Wet stairs just after a rainstorm

Dry stairs the next day

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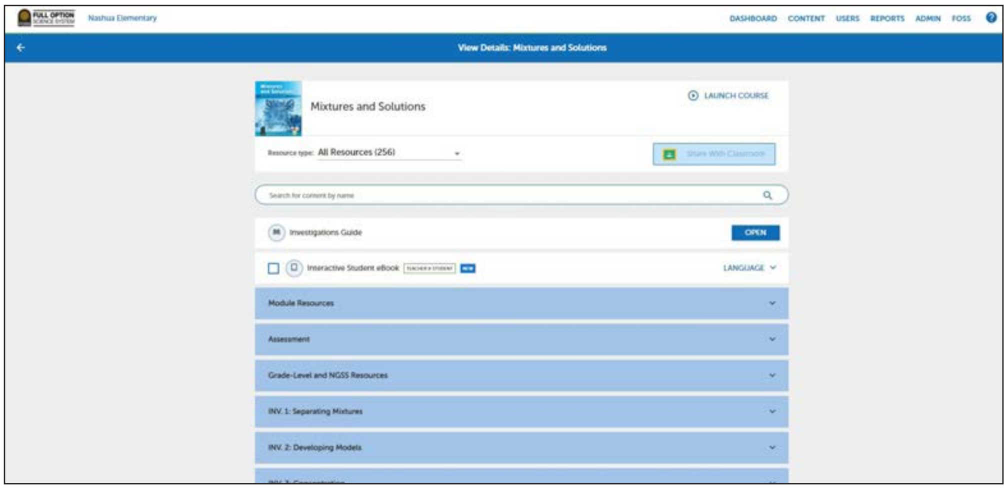
Also available in Spanish and as interactive eBooks.

FOSSweb on ThinkLink

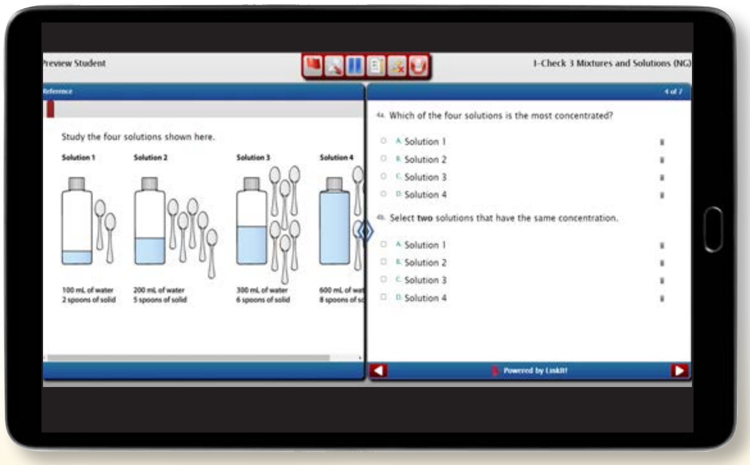
Technology for Learning Anywhere

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



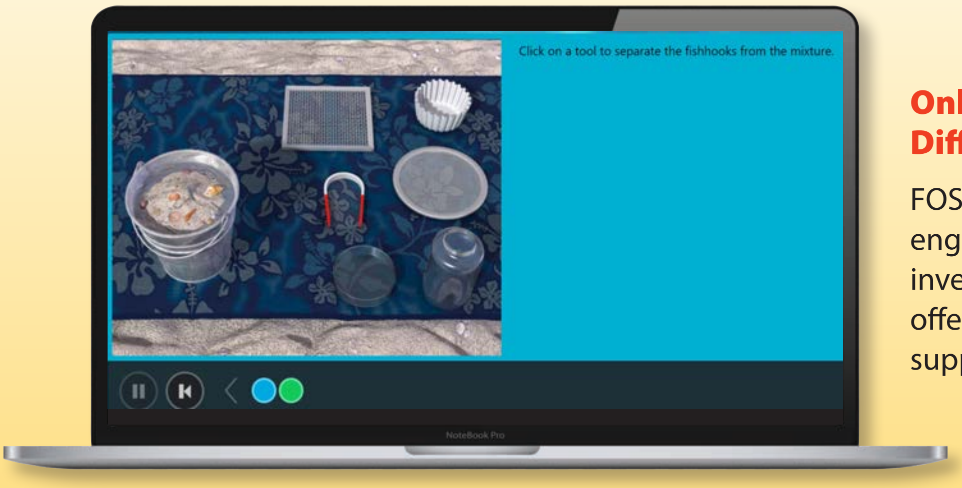
Access:

- 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

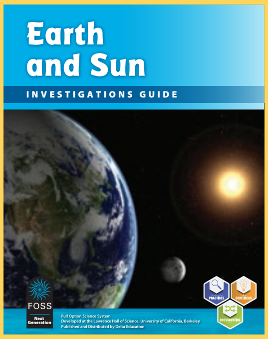
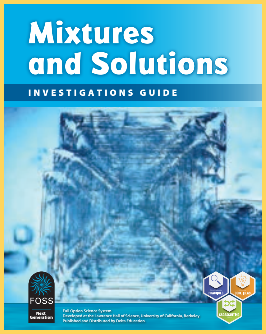
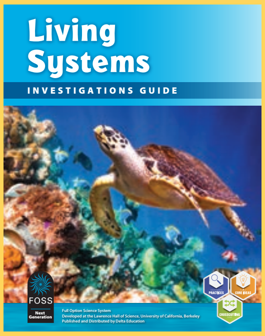
Students in grades 3–5 can take summative assessments online with automatic coding of most responses. Student and class level reports help you identify instructional next steps.



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 5

	Module Phenomenon and Driving Question	Module Overview/Bundled Performance Expectations
FOSS Module	**Earth and Sun Module** **Anchor phenomenon:** *Patterns observed in the sky over a day, a month, a year, and more, and their effects on Earth* **Module driving question:** • *How do Earth's geosphere, hydrosphere, atmosphere, and biosphere interact to create a sustainable environment for all life*  5 investigations **Critical Pathway:** 34 sessions**	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. Students investigate the properties of the atmosphere, energy transfer from the Sun to Earth, and the dynamics of weather and water cycling in Earth's atmosphere. 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. **Earth Sciences:** S.5.13, S.5.14, S.5.10, S.5.8, S.5.9 **Physical Sciences:** S.5.2, S.3.5* **ETAS:** S.5.16, S.5.17
FOSS Module	**Mixtures and Solutions Module** **Anchor phenomenon:** *Matter and its interactions in our everyday life , such as mixtures, solutions, and chemical reactions.* **Module driving question:** • *What is matter and what happens when samples of matter interact?*  5 investigations **Critical Pathway:** 27 sessions	Students engage with matter and its interactions in our everyday life—mixtures, solutions, solubility, concentration, and chemical reactions. They come to know that matter is made of particles too small to be seen and develop the understanding that matter is conserved when it changes state—from solid to liquid to gas—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. Knowing about properties and systems of substances, how things go together and are taken apart, enables us to develop models that explain phenomena too small to see directly. **Physical Sciences:** S.5.2, S.5.3, S.5.1, S.5.4 **ETAS:** S.5.15, S.5.16, S.5.17
FOSS Module	**Living Systems Module** **Anchor phenomenon:** *Ecosystems and organisms and their interacting parts* **Module driving question:** • *How can we describe Earth's biosphere as a system of interacting parts?*  4 investigations **Critical Pathway:** 33 sessions	Students start by looking at Earth as the interaction of four Earth systems or subsystems—the geosphere, the atmosphere, the hydrosphere, and the biosphere. They focus on the biosphere and investigate systems on different scales—nutrient and transport systems within an organism that moves matter and provides energy to the individual organism, and feeding relationships in ecosystems that move matter among plants, animals, decomposers, and the environment. They come to understand 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. Students explore how human activities in agriculture, industry, and everyday life can have major effects on these systems **Life Sciences:** S.5.6, S.5.5, S.4.9* **Physical Sciences:** S.5.6 **Earth Sciences:** S.5.10, S.5.8

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

The Core Topics of Science	The Practices of Scientists and Engineers	Science Connecting Concepts
Space Systems: Stars and the Solar System Earth's Systems Forces and Interactions Engineering Design	• 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
Structures and Properties of Matter Engineering Design	• 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
Matter and Energy in Organisms and Ecosystems Forces and Interactions Earth's 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 • Scale, proportion, and quantity • Systems and system models • Energy and matter • Structure and function • Stability and change

FOSS Phenomena Storylines

Earth and Sun
Applications of Science

ANCHOR PHENOMENON 1
INVESTIGATION 1

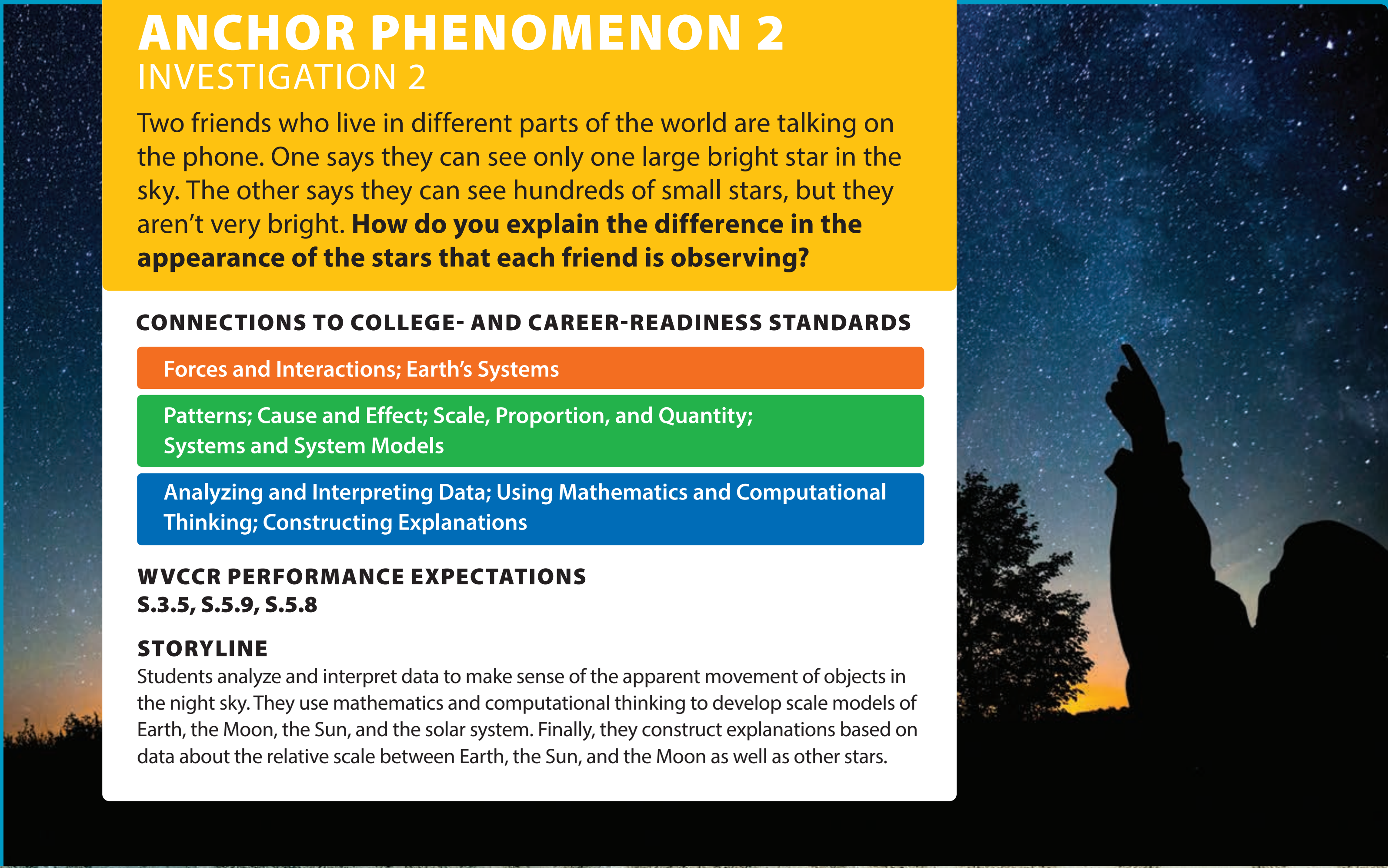
A family is planning on having lunch at the park on a clear, sunny day. When they arrive, they sit down at a table in the shade of a nearby tree. After an hour, their table is not in the shade anymore. **What causes a family's table to be in the shade for part of the day and in the sunlight the other part?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Earth's Systems
- Patterns, Cause and Effect; Systems and System Models
- Planning and Carrying Out Investigations; Developing and Using Models, Constructing Explanations

WVCCR PERFORMANCE EXPECTATION
S.5.14

STORYLINE
Students plan and carry out investigations examining patterns of shadows throughout the day. They develop and use models of Earth and the Sun to explain what causes changes such as day and night, and the size and direction of shadows. Finally, students construct an explanation using evidence about the Sun in the sky to answer the question.



ANCHOR PHENOMENON 2

INVESTIGATION 2

Two friends who live in different parts of the world are talking on the phone. One says they can see only one large bright star in the sky. The other says they can see hundreds of small stars, but they aren't very bright. **How do you explain the difference in the appearance of the stars that each friend is observing?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

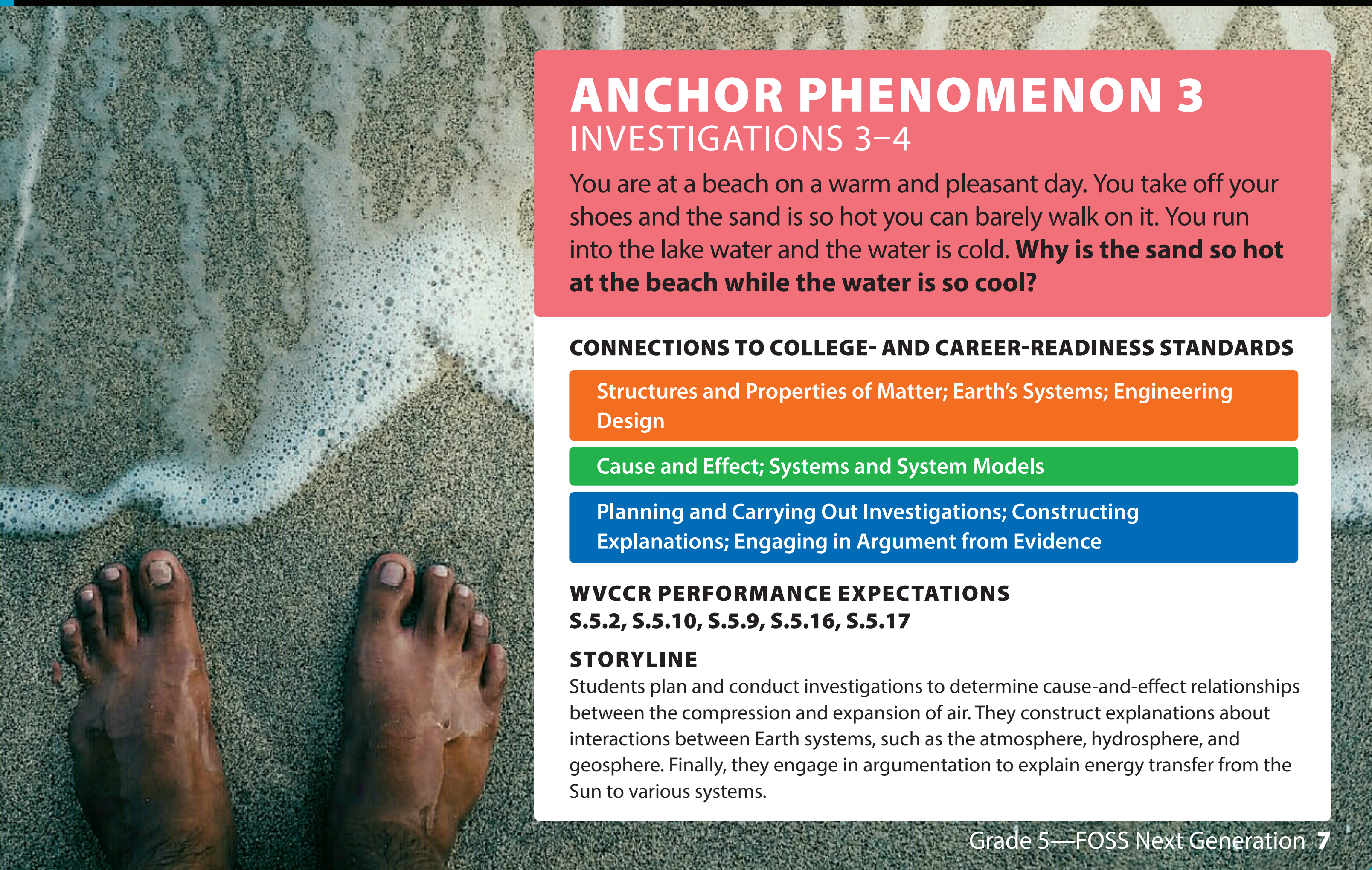
- Forces and Interactions; Earth's Systems
- Patterns; Cause and Effect; Scale, Proportion, and Quantity; Systems and System Models
- Analyzing and Interpreting Data; Using Mathematics and Computational Thinking; Constructing Explanations

WVCCR PERFORMANCE EXPECTATIONS

S.3.5, S.5.9, S.5.8

STORYLINE

Students analyze and interpret data to make sense of the apparent movement of objects in the night sky. They use mathematics and computational thinking to develop scale models of Earth, the Moon, the Sun, and the solar system. Finally, they construct explanations based on data about the relative scale between Earth, the Sun, and the Moon as well as other stars.



ANCHOR PHENOMENON 3

INVESTIGATIONS 3–4

You are at a beach on a warm and pleasant day. You take off your shoes and the sand is so hot you can barely walk on it. You run into the lake water and the water is cold. **Why is the sand so hot at the beach while the water is so cool?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Structures and Properties of Matter; Earth's Systems; Engineering Design
- Cause and Effect; Systems and System Models
- Planning and Carrying Out Investigations; Constructing Explanations; Engaging in Argument from Evidence

WVCCR PERFORMANCE EXPECTATIONS

S.5.2, S.5.10, S.5.9, S.5.16, S.5.17

STORYLINE

Students plan and conduct investigations to determine cause-and-effect relationships between the compression and expansion of air. They construct explanations about interactions between Earth systems, such as the atmosphere, hydrosphere, and geosphere. Finally, they engage in argumentation to explain energy transfer from the Sun to various systems.

FOSS Phenomena Storylines

Mixtures and Solutions
Applications of Science

ANCHOR PHENOMENON 1
INVESTIGATIONS 1–3

After a hard rain, some students noticed a small pond next to a construction site. The water was brown right after the rain. The next day, they saw the pond water was clearer, and rocks and mud were on the bottom. Near the edge of the pond, the plants started to turn brown and die. **What caused the formation of the pond and how do you explain the changes observed to the water and plants?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Structures and Properties of Matter; Engineering Design
- Cause and Effect; Scale, Proportion and Quantity
- Developing and Using Models; Engaging in Argument From Evidence

WVCCR PERFORMANCE EXPECTATIONS
S.5.2, S.5.3, S.5.15, S.5.16, S.5.17

STORYLINE
Students investigate the changes to water and plants in a pond after a hard rain. They begin to construct an explanation of the changes in the water by mixing three solid materials (gravel, powder, and salt) into cups of water to observe three types of mixtures, revealing a phenomenon—dissolving. Next, they use measurement tools to gather evidence that the dissolved material (salt) is still present, but not visible (conservation of matter), and develop a model for the dissolved salt in water. Then, they use evaporation to separate salt from water. They apply what they learned about separating mixtures to construct an explanation of the changes to the water that has ponded. Finally, they analyze solutions and develop a model for concentration and use this model to determine impact of concentration of solutions on plants.

ANCHOR PHENOMENON 2
INVESTIGATION 4

A teacher finds a white substance found in an unmarked container inside the classroom supply closet. The teacher wants to create a label for the container with the name of the substance and asks you to help figure out what the substance is using what you know about how different materials interact with water. **How can you identify the mystery substance safely?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Structures and Properties of Matter; Engineering Design
- Patterns; Scale, Proportion, and Quantity
- Planning and Carrying Out Investigations; Using Mathematics and Computational Thinking

WVCCR PERFORMANCE EXPECTATIONS

S.5.2, S.5.3, S.5.1, S.5.15, S.5.16

STORYLINE

Students are given a problem to determine a mystery substance. They compare the amount of different substances that dissolve in a given amount of water. They analyze the crystal signature of different substances and then plan and carry out investigations using the properties of solubility and crystal pattern to identify the mystery substance.

ANCHOR PHENOMENON 3
INVESTIGATION 5

When your stomach hurts, you might eat an antacid. A few minutes later, you burp and feel a little better. **What causes you to burp?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

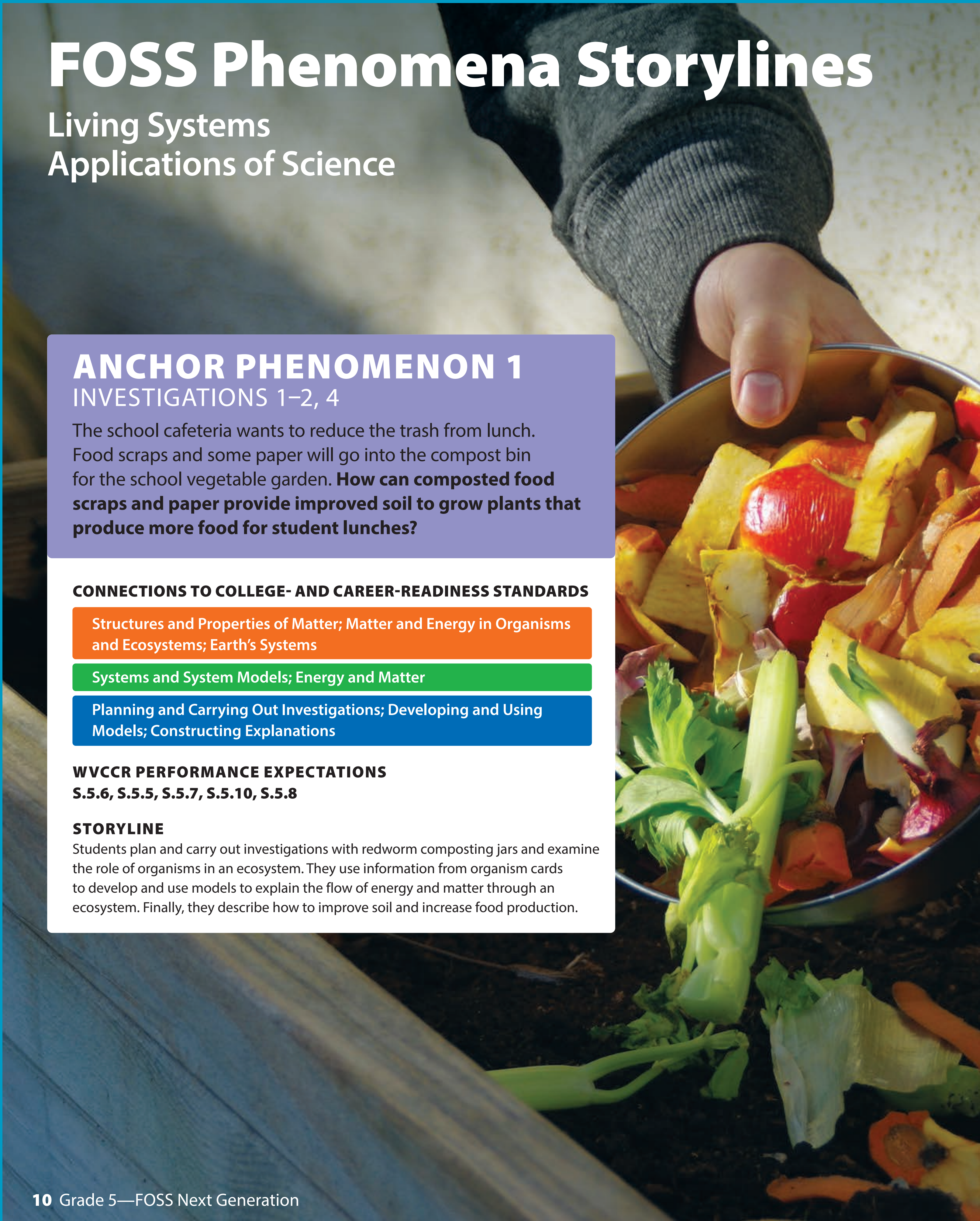
- Structures and Properties of Matter
- Planning and Carrying Out Investigations
- Cause and Effect; Energy and Matter

WVCCR PERFORMANCE EXPECTATIONS

S.5.2, S.5.3, S.5.1, S.5.4

STORYLINE

Students combine two substances with water to discover a chemical reaction. They collect and analyze data about the effects of mixing different combinations of substances with water to discover that new substances with different properties form. They construct explanations about the amount of a new substance produced in different chemical reactions and they apply these ideas to explain what causes a burp.



FOSS Phenomena Storylines

Living Systems
Applications of Science

ANCHOR PHENOMENON 1
INVESTIGATIONS 1–2, 4

The school cafeteria wants to reduce the trash from lunch. Food scraps and some paper will go into the compost bin for the school vegetable garden. **How can composted food scraps and paper provide improved soil to grow plants that produce more food for student lunches?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

Structures and Properties of Matter; Matter and Energy in Organisms and Ecosystems; Earth's Systems

Systems and System Models; Energy and Matter

Planning and Carrying Out Investigations; Developing and Using Models; Constructing Explanations

WVCCR PERFORMANCE EXPECTATIONS
S.5.6, S.5.5, S.5.7, S.5.10, S.5.8

STORYLINE
Students plan and carry out investigations with redworm composting jars and examine the role of organisms in an ecosystem. They use information from organism cards to develop and use models to explain the flow of energy and matter through an ecosystem. Finally, they describe how to improve soil and increase food production.

ANCHOR PHENOMENON 2
INVESTIGATIONS 2–3

A family wants to eat garden-fresh tomatoes, but they live in an apartment and don't have a garden. They try a technique without using soil. **How can tomatoes be grown without soil?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

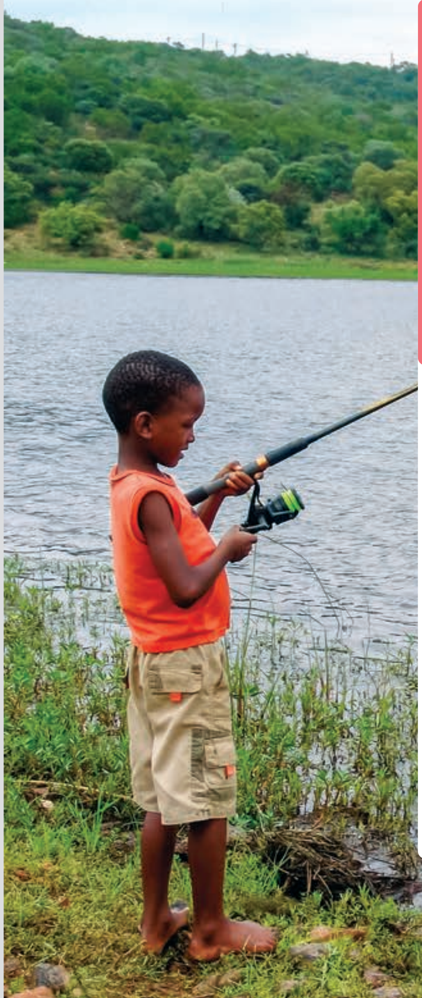
- Matter and Energy in Organisms and Ecosystems
- Cause and Effect; Systems and System Models; Energy and Matter
- Analyzing and Interpreting Data; Developing and Using Models; Constructing Explanations

WVCCR PERFORMANCE EXPECTATIONS

S.5.6, S.5.5, S.5.7

STORYLINE

Students analyze and interpret data from an investigation in which they grow wheat under different conditions to make sense of the processes of photosynthesis in plants and digestion in animals. They use models to explain how plants make their own food and transport it to all parts of the plant. Finally, they construct an explanation based on data about how organisms get nutrients to support life and how tomato plants grow without soil.



ANCHOR PHENOMENON 3
INVESTIGATIONS 1–4

A group of friends went fishing at a local pond when school was out in early June. The pond provides an environment for lots of healthy fish. The friends return to the pond in August after a hot summer to find dead fish and aquatic plants in the pond. **What ecosystem interactions might have caused the death of the fish and plants in a local pond over the summer?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Matter and Energy in Organisms and Ecosystems; Earth's Systems
- Systems and System Models; Energy and Matter
- Developing and Using Models; Constructing Explanations

WVCCR PERFORMANCE EXPECTATIONS

S.5.6, S.5.5, S.5.7, S.5.10, S.5.8

STORYLINE

Students obtain information and construct explanations to explain how aquatic ecosystems demonstrate interactions between Earth systems such as the atmosphere, hydrosphere, and biosphere. They consider Earth's four systems and determine possible causes of death of the fish and plants in the pond.

Critical Pathway

West Virginia 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 94 total sessions for grade 5.

EARTH AND SUN

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	Inv 1.1	Shadow Shifting, Steps 1–13	110–113
2	Inv 1.1	Shadow Shifting, Steps 14–18	113–115
3	Inv 1.2	Sun Tracking, Steps 1–12 *	119–121
4	Inv 1.2	Sun Tracking, Steps 13–19	122–124
5	Inv 1.2	Sun Tracking, Steps 20–25	125–128
6	Inv 1.3	Day and Night, Steps 1–13	132–136
7	Inv 1.3	Day and Night, Steps 14–12	136–140
8	Inv 1.3	Day and Night, Steps 23–27	141–142
9	Inv 1.3	Day and Night, Step 28 *(skip 29)*, Review, Steps 30–31	143–145
10	Inv 1.3	I-Check 1, Step 32	145
11	Inv 2.1	Night-Sky Observations, Steps 1–8 *(optional Step 4)*	174–177
12	Inv 2.1	Night-Sky Observations, Steps 9–11 *(optional Steps 12–13)*	177–178
13	Inv 2.1	Night-Sky Observations, Steps 14–18	180–182
	Inv 2.1	*Night-Sky Observations, Steps 19–22—Focus on Reading*	*177–185*
14	Inv 2.2	How Big and How Far?, Steps 1–9	188–191
	Inv 2.2	*How Big and How Far?, Steps 10-15—Focus on Readings*	*192*
	Inv 2.3	*Phases of the Moon, Steps 1–18—Focus on Computational Thinking*	*199–205*
	Inv 2.4	*The Solar System, Steps 1–16*	*208–211*
	Inv 2.4	*The Solar System, Steps 17–20—Focus on Readings*	*212–214*
15	Inv 2.4	The Solar System, Steps 21–27	214–217
16	Inv 2.4	The Solar System, Steps 31–32 *(skip Steps 28–30 video)*	218–219
17	Inv 2.5	Stars, Steps 1–5; 8–11 *(skip Steps 6–7)*	223–227
18	Inv 2.5	Stars, Steps 12–15	228–229
19	Inv 2.5	Stars, Steps 16–20, Review Steps 22 and 24	230–235
	Inv 2.5	*Stars, Steps 21 and 23—Focus on Two Readings*	*232 and 234*
20	Inv 2.5	I-Check 2, Step 25	235

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

EARTH AND SUN (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
21	**Inv 3.1**	**The Air Around Us, Steps 1–17**	**257–262**
	Inv 3.1	*The Air Around Us, Steps 18–21—Focus on Reading*	*263–264*
22	**Inv 3.2**	**The Atmosphere, Steps 1–2; 4–12** *(Skip Step 3, video)*	**267–273**
	Inv 3.2	*The Atmosphere, Steps 13–15—Focus on Discussion, Tutorial*	*273*
	Inv 3.3	*Local Weather, Steps 1–6; 10–15, Review Steps 19–20*	*279–287*
	Inv 3.3	*Local Weather, Steps 7–9 (tools); 16–18, 21—Focus on Media*	*281, 284-5, 287*
	Inv 3.3	*I-Check 3, Step 22*	*287*
23	**Inv 4.1**	**Heating Earth Materials, Steps 1–10**	**312–314**
24	**Inv 4.1**	**Heating Earth Materials, Steps 11–15**	**314–315**
25	**Inv 4.1**	**Heating Earth Materials, Steps 16–22**	**316–318**
26	**Inv 4.1**	**Heating Earth Materials, Steps 23–27**	**319–320**
27	**Inv 4.2**	**Conduction, Steps 1–13**	**324–328**
28	**Inv 4.2**	**Conduction, Steps 14–21**	**328–330**
29	**Inv 4.2**	**Conduction, Steps 22–29**	**331–334**
30	**Inv 4.3**	**Convection, Steps 1–23**	**337–343**
31	**Inv 4.3** **Inv 4.4**	**Convection, Steps 24–29,** **Review Steps 28–29**	**344–347** **361**
	Inv 4.4	*Color and Energy Transfer, Steps 1–27—Focus on Engineering*	*352–360*
32	**Inv 4.4**	**Investigation 4 I-Check, Step 30**	*362*
	Inv 5.1	*Condensation, Steps 1–23—Focus on Environmental Literacy*	*383–389*
	Inv 5.2	*Evaporation, Steps 1–10—Focus on Environmental Literacy*	*392– 395*
33	**Inv 5.3**	**Water Cycle, Steps 1–7**	**399–402**
34	**Inv 5.3**	**Water Cycle, Steps 8–25**	**402–408**
	Inv 5.3	*Water Cycle, Steps 26–29—Focus on Reading*	*409–411*
	Inv 5.4	*Climate, Steps 1–24—Focus on Environmental Literacy*	*415–423*
	Inv 5.4	*Postest, Step 25*	*423*

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

Optional short sessions within a critical pathway part

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MIXTURES AND SOLUTIONS

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	Inv 1.1	**Making and Separating Mixtures, Steps 1–13, 17** (clean up)	106–109
2	Inv 1.1	**Making and Separating Mixtures, Steps 14–16, 18–22**	109–111
3	Inv 1.2	**Separating a Salt Solution, Steps 1–13** (10 evaporate*)	114–117
4	Inv 1.2	**Separating a Salt Solution, Steps 14*–20**	117–118
5	Inv 1.2	**Separating a Salt Solution, Steps 21–25** (reading)	119–122
6	Inv 1.3	**Separating a Dry Mixture, Steps 1–13** (13 response sheet)	126–128
	Inv 1.3	*Separating a Dry Mixture, Steps 14–18—Readings, Online Activities*	*129–131*
7	Inv 1.3 Inv. 1.4	**Separating a Dry Mixture, Steps 19–23 (includes reading)** **Outdoor Solutions, Review, Steps 18–20**	132–133 142–143
	Inv. 1.4	*Outdoor Solutions, Steps 1–17—Focus on Environmental Literacy*	*137–141*
8	Inv. 1.4	**I-Check 1, Step 21**	143
	Inv. 2.1	*Black Boxes, Steps 1–31—Focus on Developing Models*	*163–170*
	Inv. 2.2	*Drought Stopper, Steps 1–13—Focus on Engineering and Design*	174–179
9	Inv 2.3	**Models for Change in Properties, Steps 1–7**	183–184
10	Inv 2.3	**Models for Change in Properties, Steps 8–13**	185–187
11	Inv 2.3	**Models for Change in Properties, Steps 14–17**	188–189
	Inv 2.3	*Models for Change in Properties, Steps 18–20—Review*	*190*
	Inv 2.3	*I-Check 2, Step 20—Assessment*	*191*
12	Inv 3.1	**Soft-Drink Recipes, Steps 1–17**	207–210
13	Inv 3.1	**Soft-Drink Recipes, Steps 18–22**	211–212
14	Inv 3.2	**Salt Concentration, Steps 1–14**	215–219
	Inv 3.2	*Salt Concentration, Steps 15–21—Focus on Computational Thinking*	*219–222*
	Inv 3.3	*Mystery Solutions, Steps 1–7—Focus on Experimentation*	*226–227*
15	Inv 3.3	**Mystery Solutions, Steps 8–11** (reading, online activities)	228–230
	Inv 3.3	*Mystery Solutions, Steps 12–14—Readings and Online Activities*	*231–232*

MIXTURES AND SOLUTIONS (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
	Inv 3.4	*Liquid Layers, Steps 1–13— Focus on Computational Thinking*	*236–240*
	Inv 3.4	*Liquid Layers, Steps 14–16, Review Step 19*	*241–243*
	Inv 3.4	*Liquid Layers, Steps 17–18—Reading on Environmental Literacy*	*242–244*
	Inv 3.4	*I-Check 3, Step 21—Assessment (slightly modified)*	*244*
16	**Inv 4.1**	**Salt Saturation, Steps 1–21**	**264–269**
	Inv 4.1	*Salt Saturation, Steps 22–25—Reading*	**270–273**
17	**Inv 4.2**	**Epsom Salts Saturation, Steps 1–19**	**276–279**
18	**Inv 4.3**	**The Saturation Puzzle, Steps 1–14**	**283–285**
19	**Inv 4.3**	**The Saturation Puzzle, Steps 15–19**	**286–287**
	Inv 4.3	*The Saturation Puzzle, Steps 20–24—Reading*	*288–290*
	Inv 4.4	*What's in Your Water?, Steps 1–8 (7 evaporate water *)*	*293–294*
	Inv 4.4	*What's in Your Water?, Steps 9*–15, Review, Steps 28–30*	*295, 301–02*
	Inv 4.4	*What's in Your Water?, Steps 16–27—Focus Environmental Engineering*	*299–300*
20	**Inv 4.4**	**Inv. 4 I-Check, Step 31**	**302**
21	**Inv 5.1**	**Chemical Reactions, Steps 1–6**	**321–322**
22	**Inv 5.1**	**Chemical Reactions, Steps 7–20**	**322–325**
	Inv 5.1	*Chemical Reactions, Steps 21–23—Reading*	*326*
23	**Inv 5.2**	**Reaction Products, Steps 1–8**	**329–330**
24	**Inv 5.2**	**Reaction Products, Steps 9–15**	**331–332**
25	**Inv 5.2**	**Reaction Products, Steps 16–21**	**333–336**
26	**Inv 5.3**	**Reactions in a Zip Bag, Steps 1–17** **Review, Steps 20–21**	**340–345, 347**
	Inv 5.3	*Reactions in a Zip Bag, Steps 18–19—Focus on Engineering Reading*	*346*
27	**Inv 5.3**	**Posttest, Step 22**	**347**

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

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LIVING SYSTEMS

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	Inv 1.1	**Everyday Systems, Steps 1–14** Note: Condense Steps 4–7 and focus on final question is Step 7	97–103
2	Inv 1.2	**The Earth System, Steps 1–3**	106
3	Inv 1.2	**The Earth System, Steps 4–6**	107–108
4	Inv 1.2	**The Earth System, Steps 7–23**	108–113
5	Inv 1.2	**The Earth System, Steps 24–30**	114–116
6	Inv 1.3	**Kelp Forest Food Web, Steps 1–14**	121–123
7	Inv 1.3	**Kelp Forest Food Web, Step 18 first, followed by Steps 15–17**	124–125
8	Inv 1.3	**Kelp Forest Food Web, Steps 19–21**	126
9	Inv 1.4	**Recycling, Steps 1–13*** (redwoom observations through Inv 4.4)	130–134
10	Inv 1.4	**Recycling, Steps 14–16, Review Steps 18–19**	135–137
11	Inv 1.4	**I-Check 1, Step 20 (Later plan self-assessment)**	138
12	Inv 2.1	**Yeast Nutrition, Steps 1–18**	157–161
13	Inv 2.1	**Yeast Nutrition, Steps 19–27 (Step 28 optional)**	161–165
14	Inv 2.2	**Plant Nutrition, Steps 1–6*** (Getting Ready schedule pp. 167)	169–170
15	Inv 2.2	**Plant Nutrition, Steps 7–11** (could do Step 10, then Steps 7–9, 11)	171–173
16	Inv 2.2	**Plant Nutrition, Steps 12–17**	174–175
17	Inv 2.2	**Plant Nutrition, Steps 18–20**	176
18	Inv 2.3	**Animal Nutrition, Steps 1–4*** (Getting Ready for larvae pp. 178)	181–182
19	Inv 2.3	**Animal Nutrition, Steps 5–7; Step 8, Chapters 2–7** (16 min)	183–185
20	Inv 2.3	**Animal Nutrition, Steps 9–10; Step 11, Chapters 2–3, 5–7 only**	186–187
21	Inv 2.3	**Animal Nutrition, Steps 13–17 (skip Step 12)**	188–190
22	Inv 2.3	**Animal Nutrition, Steps 18–24, Review Steps 25–26**	190–194
23	Inv 2.3	**I-Check 2, Step 27 (Later plan self-assessment)**	194

**Indicates the need to allow for growth time*

LIVING SYSTEMS (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
24	**Inv. 3.1**	**Plant Vascular Systems, Steps 1–10**	**215–217**
	Inv. 3.1	*Plant Vascular Systems, Steps 11–12—Focus on Reading*	*218*
25	**Inv. 3.1**	**Plant Vascular Systems, Steps 13–16**	**219–220**
26	**Inv. 3.1**	**Plant Vascular Systems, Steps 17–18**	**221**
	Inv. 3.1	*Plant Vascular Systems, Steps 19–26— Focus on Enviromental literacy*	*221–223*
	Inv. 3.1	*Plant Vascular Systems, Steps 27–29— Focus on Enviromental literacy*	*223–224*
27	**Inv. 3.1**	**Plant Vascular Systems, Steps 30–34, return to Step 29**	**225–27, 224**
	Inv. 3.1	*Plant Vascular Systems, Steps 35–36— Focus on Reading*	*228*
28	**Inv. 3.1**	**Plant Vascular Systems, Steps 37–41** (Step 38, Video, Ch. 5–7 only)	**229–231**
	Inv 3.2	*Circulatory Systems, Steps 1–23—Using Models and Engineering*	*234–244*
	Inv 3.3	*Respiratory Systems, Steps 1–23— Focus on Experimentation, Reading*	*248–258*
	Inv 4.1	*Stimulus/Response, Steps 1–32—Focus on Experimentation, Media*	*277–287*
	Inv 4.2	*Attention, Steps 1–21—Focus on Outdoor, Environmental Literacy*	*291–299*
	Inv 4.3	*Instinct and Learning, Steps 1–8—Focus on Systems and Modeling*	*303–305*
29	**Inv 4.4**	**Ecosystems, Steps 1–5*** (Redworm recycling jars observed)	**311–312**
30	**Inv 4.4**	**Ecosystems, Steps 6–9** (Step 7, focus on video chapters 2–7, 15 min.)	**312–313**
31	**Inv 4.4**	**Ecosystems, Steps 10–12**	**314–315**
32	**Inv 4.3** **Inv 4.4**	**Instinct and Learning, Steps 9–11; Step 12, 7 minute video only** **Review Step 13 (focus on last 2 bullets) and Step 15**	**306–307** **316–317**
33	**Inv 4.4**	**Posttest, Step 16**	**317**

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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

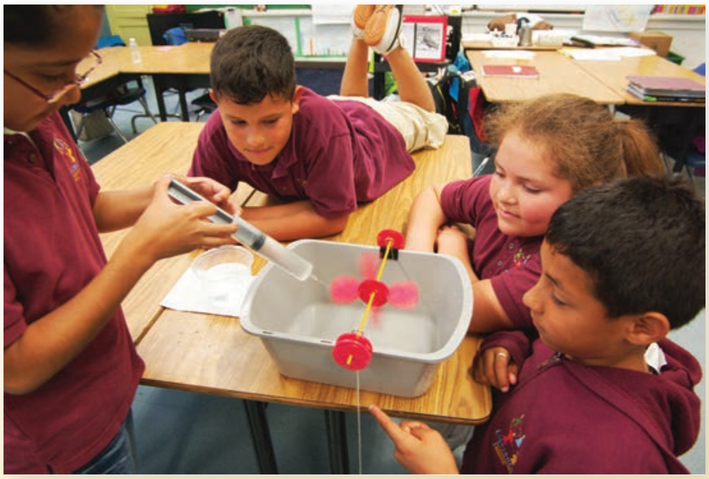
Engaging Students

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.

WEST VIRGINIA FOSS NEXT GENERATION K–8 SCOPE AND SEQUENCE

Grade	Integrated Middle Grades				
6–8	Heredity and Adaptation*	Chemical Interactions			
	Earth History	Diversity of Life	Human Systems Interactions*	Electromagnetic Force*	Gravity and Kinetic Energy*
	Planetary Science	Weather and Water	Populations and Ecosystems	Waves*	

*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		