West Virginia Science Grade 2 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 2 teachers and evaluators through the FOSS components, local and relevant anchor phenomena, and a critical pathway through the modules.

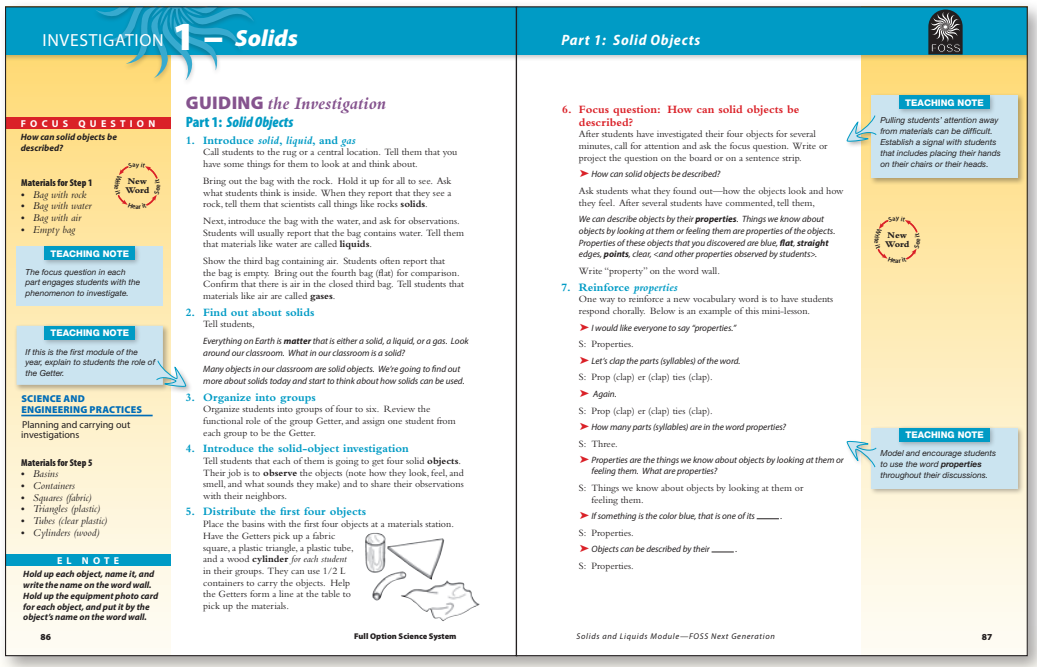
Navigation Guide

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 — *Solids*

FOCUS QUESTION

How can solid objects be described?

Materials for Step 1
- *Bag with rock*
- *Bag with water*
- *Bag with air*
- *Empty bag*

TEACHING NOTE

The focus question in each part engages students with the phenomenon to investigate.

TEACHING NOTE

If this is the first module of the year, explain to students the role of the Getter.

SCIENCE AND ENGINEERING PRACTICES

Planning and carrying out investigations

Materials for Step 5
- *Basins*
- *Containers*
- *Squares (fabric)*
- *Triangles (plastic)*
- *Tubes (clear plastic)*
- *Cylinders (wood)*

EL NOTE

Hold up each object, name it, and write the name on the word wall. Hold up the equipment photo card for each object, and put it by the object's name on the word wall.

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GUIDING *the Investigation*

Part 1: *Solid Objects*

1. **Introduce *solid*, *liquid*, and *gas***
Call students to the rug or a central location. Tell them that you have some things for them to look at and think about.

Bring out the bag with the rock. Hold it up for all to see. Ask what students think is inside. When they report that they see a rock, tell them that scientists call things like rocks **solids**.

Next, introduce the bag with the water, and ask for observations. Students will usually report that the bag contains water. Tell them that materials like water are called **liquids**.

Show the third bag containing air. Students often report that the bag is empty. Bring out the fourth bag (flat) for comparison. Confirm that there is air in the closed third bag. Tell students that materials like air are called **gases**.

2. **Find out about solids**
Tell students,

*Everything on Earth is **matter** that is either a solid, a liquid, or a gas. Look around our classroom. What in our classroom is a solid?*

Many objects in our classroom are solid objects. We're going to find out more about solids today and start to think about how solids can be used.

3. **Organize into groups**
Organize students into groups of four to six. Review the functional role of the group Getter, and assign one student from each group to be the Getter.

4. **Introduce the solid-object investigation**
Tell students that each of them is going to get four solid **objects**. Their job is to **observe** the objects (note how they look, feel, and smell, and what sounds they make) and to share their observations with their neighbors.

5. **Distribute the first four objects**
Place the basins with the first four objects at a materials station. Have the Getters pick up a fabric square, a plastic triangle, a plastic tube, and a wood **cylinder** *for each student* in their groups. They can use 1/2 L containers to carry the objects. Help the Getters form a line at the table to pick up the materials.

Full Option Science System

Part 1: Solid Objects

6. **Focus question: How can solid objects be described?**
After students have investigated their four objects for several minutes, call for attention and ask the focus question. Write or project the question on the board or on a sentence strip.

➤ *How can solid objects be described?*

Ask students what they found out—how the objects look and how they feel. After several students have commented, tell them,

*We can describe objects by their **properties**. Things we know about objects by looking at them or feeling them are properties of the objects. Properties of these objects that you discovered are blue, **flat**, **straight** edges, **points**, clear, <and other properties observed by students>.*

Write "property" on the word wall.

7. **Reinforce *properties***
One way to reinforce a new vocabulary word is to have students respond chorally. Below is an example of this mini-lesson.

➤ *I would like everyone to say "properties."*

S: Properties.

➤ *Let's clap the parts (syllables) of the word.*

S: Prop (clap) er (clap) ties (clap).

➤ *Again.*

S: Prop (clap) er (clap) ties (clap).

➤ *How many parts (syllables) are in the word properties?*

S: Three.

➤ *Properties are the things we know about objects by looking at them or feeling them. What are properties?*

S: Things we know about objects by looking at them or feeling them.

➤ *If something is the color blue, that is one of its ____.*

S: Properties.

➤ *Objects can be described by their ____.*

S: Properties.

TEACHING NOTE

Pulling students' attention away from materials can be difficult. Establish a signal with students that includes placing their hands on their chairs or their heads.

TEACHING NOTE

*Model and encourage students to use the word **properties** throughout their discussions.*

Solids and Liquids Module—FOSS Next Generation

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Start your review here:

- **Pebbles, Sand, and Silt:** pp.1–3, 72–75, 87–91
- **Solids and Liquids:** pp. 1–3, 71–73, 86–94
- **Insects and Plants:** pp. 1–5, 75–77, 93–102

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

Wood has good **properties** for making chairs. Wood is strong and rigid.

But wood is not a good material for making socks. What material has good properties for socks?

Fabric is a good material for socks. Fabric is soft and flexible. Fabric is a good material for shirts and blankets, too.

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Kick balls are solid objects. Rubber is a good material for kick balls. Rubber stretches, and it is strong.

Rubber is a good material for making tires and balloons, too.

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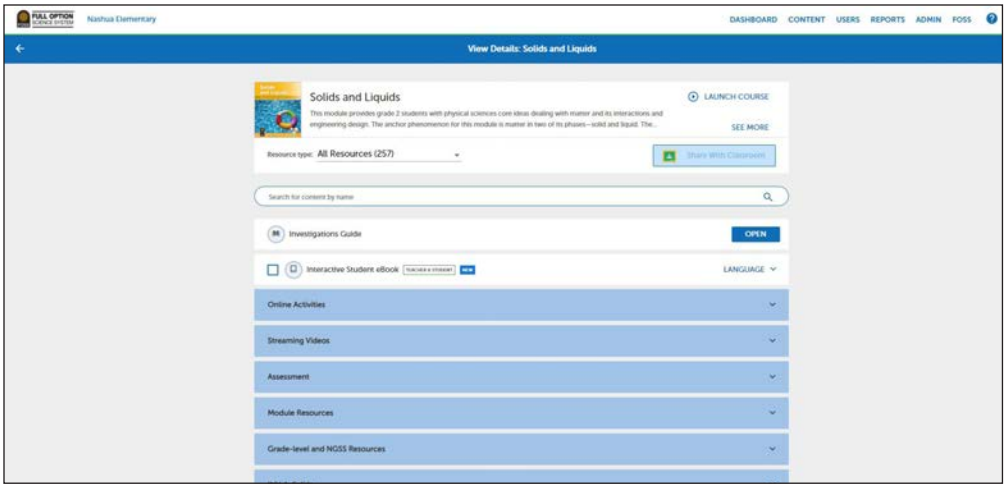
Also available in Spanish and as interactive eBooks.

FOSSweb on ThinkLink

Technology for Learning Anywhere

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

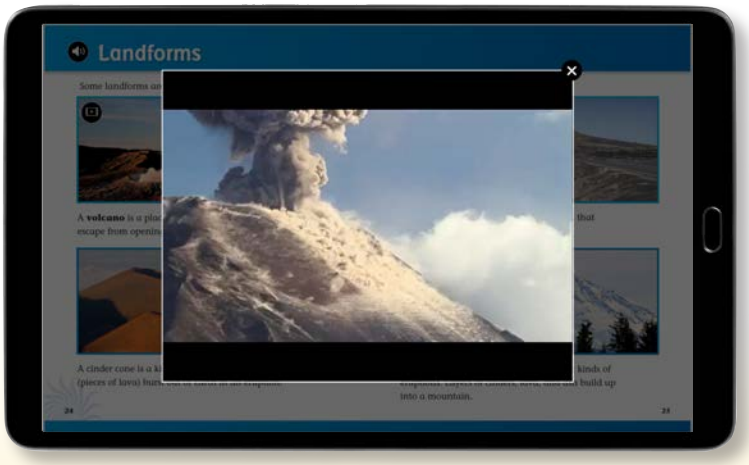


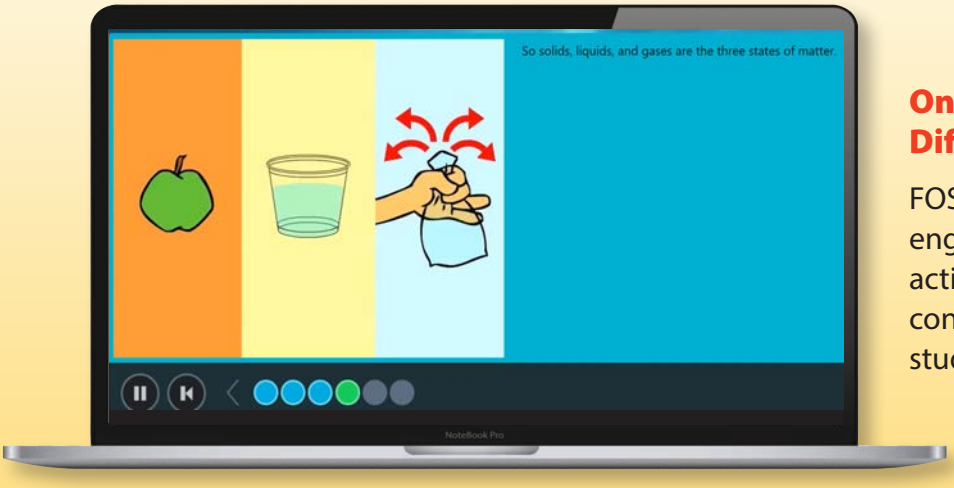
Access:

- 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.

Interactive eBooks

Keep your students engaged while teaching literacy skills with interactive *FOSS Science Resources* eBooks. The eBooks include integrated audio with text syncing and links to online activities and videos that bring the photos to life.

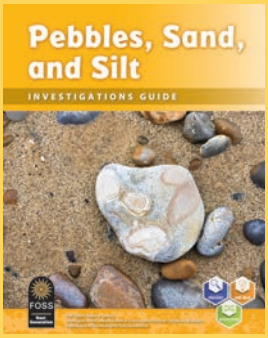
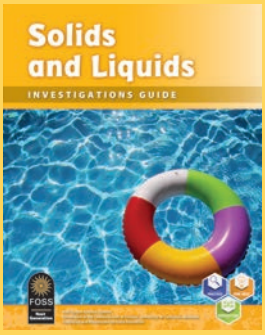
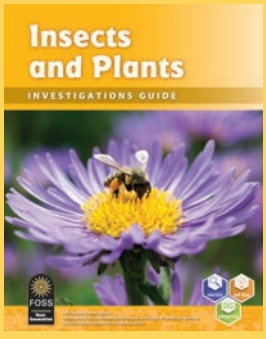




Online Activities for Differentiating Instruction

FOSSweb digital resources provide engaging, interactive online activities that offer additional content and skill support for students.

FOSS Modules—Grade 2

	Module Phenomenon and Driving Question	Module Overview/Bundled Performance Expectations
FOSS Module	**Pebbles, Sand, and Silt Module** **Anchor phenomenon:** *Earth materials cover the surface of our planet* **Module driving questions:** • *What are the properties of earth materials?* • *How do earth materials interact and change?*  4 investigations **Critical Pathway:** 30 sessions**	Students observe the properties of rocks and soil, study the results of weathering and erosion, locate natural sources of water, and determine how to represent the shapes and kinds of land and bodies of water on Earth. They use simple tools to observe, describe, analyze, and sort solid earth materials and learn how the properties of the materials are suited to different purposes. Students explore how wind and water change the shape of the land and compare ways to slow the process of erosion. The investigations complement the students' experiences in the **Solids and Liquids Module** with a focus on earth materials and the influence of engineering and science on society and the natural world. **Earth Sciences:** S.2.8, S.2.9, S.2.10, S.2.11 **Physical Sciences:** S.2.1, S.2.2 **ETAS:** S.2.12, S.2.13, S.2.14
FOSS Module	**Solids and Liquids Module** **Anchor phenomenon:** *Matter in two phase—solid and liquid* **Module driving questions:** • *How are solid and liquid materials similar and different?* • *How do the properties of solid and liquid materials relate to how they can be used and how they can change?*  4 investigations **Critical Pathway:** 32 sessions	Students engage with physical sciences core ideas dealing with matter and its interactions and engineering design. Students build on the science concepts of matter and its interactions developed in kindergarten using new tools to enrich observations. Students observe, describe, and compare properties of solids and liquids. They conduct investigations to find out what happens when solids and water are mixed and when liquids and water are mixed. They use their knowledge to conduct an investigation on an unknown material (toothpaste). They gain firsthand experience with reversible changes caused by heating or cooling, and read about changes caused by heating that are irreversible. **Physical Sciences:** S.2.1, S.2.2, S.2.3, S.2.4 **ETAS:** S.2.12, S.2.13, S.2.14
FOSS Module	**Insects and Plants Module** **Anchor phenomenon:** *Natural history of common insects and their interactions with plants* **Module driving question:** • *What is the natural history of some plants and animals in different habitats?*  5 investigations **Critical Pathway:** 36 sessions	In order to provide young students with indepth opportunities to experience the biodiversity on Earth, they will become naturalists and study insects and plants in and out of their classroom. Students build on their understanding of growth and development of plants and animals from grades K–1 by observing new organisms over time. Students see the life cycles of insects unfold in real time and compare the structures and functions exhibited by each species to reveal patterns. At the same time, students grow a flowering plant in the classroom. They gain experience with the ways that plants and insects interact in feeding relationships, pollination, and seed dispersal. **Life Sciences:** S.3.9*, S.2.5, S.2.6, S.2.7 **ETAS:** S.2.12, S.2.13, S.2.14

* These PEs are addressed in two kindergarten modules.

** A session is 30 minutes in kindergarten.

The Core Topics of Science	The Practices of Scientists and Engineers	Science Connecting Concepts
Earth's Systems: Processes that Shape the Earth 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 • Energy and matter • Stability and change
Structure 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 • Energy and matter • Structure and function • Stability and change
Interdependent Relationships in Ecosystems Inheritance and Variation of Traits: Life Cycles and Traits 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 • Structure and function • Stability and change

FOSS Phenomena Storylines

Pebbles, Sand, and Silt
Applications of Science

ANCHOR PHENOMENON 1
INVESTIGATIONS 1–2

Two children are on a family picnic near a creek. They walk to the water's edge with an empty bucket and wade in the water with bare feet. The creek bottom feels rough. They want to know what is under their feet. They use the bucket to scoop up the material and observe it. They notice rocks of different sizes, shapes, and textures. **Why are some rocks at the bottom of a creek rough and others are smooth?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

Earth's Systems: Processes that Shape the Earth; Structure and Properties of Matter

Patterns; Cause and Effect; Stability and Change

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

WVCCR PERFORMANCE EXPECTATIONS

S.2.8, S.2.9, S.2.10, S.2.11, S.2.1

STORYLINE

On a family picnic, two children walk to the water's edge of a creek with an empty bucket and wade in the water with bare feet. The creek bottom feels rough. They want to know what is under their feet. They use the bucket to scoop up the material and observe it. They notice rocks of different sizes, shapes, and textures. To figure out the differences in the rocks, students plan and carry out investigations to observe the effects of weathering on the properties of rocks. They ask questions and make observations of weathering rocks, the effect of washing rocks, and of a river rock mixture. Next, they develop a model of how water and wind change landforms. Finally, they construct explanations about why rocks from the bottom of the creek have different sizes and textures.

ANCHOR PHENOMENON 2
INVESTIGATIONS 3–4

A class makes regular visits to observe the creek near the school. The weather report predicts a big rainstorm for the weekend. The students know that the last storm washed away part of the creek bank. They want to find a way to protect the creek during the next storm. **How can we protect landforms from erosion?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

Earth's Systems: Processes that Shape the Earth; Structures and Properties of Matter; Engineering Design

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

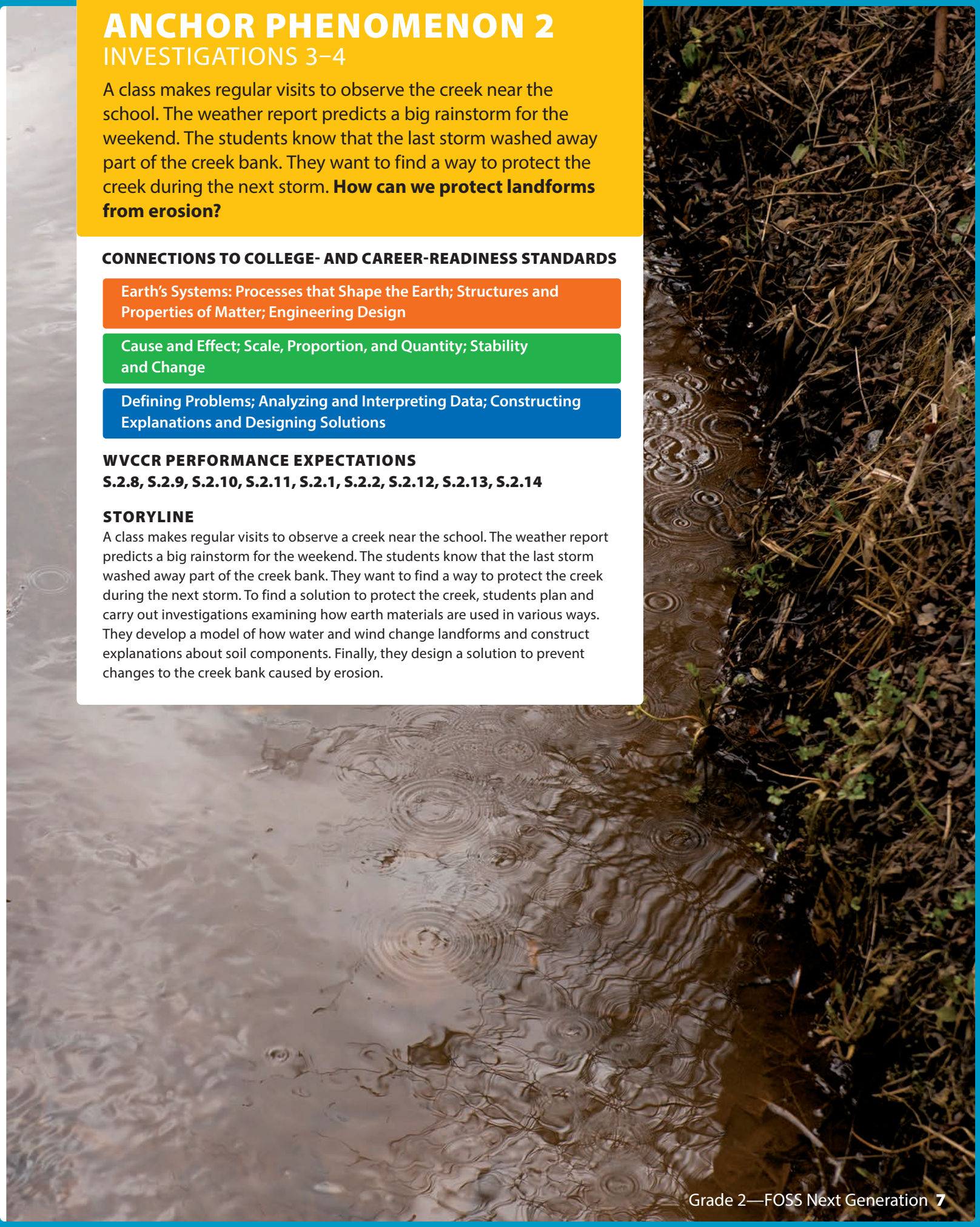
Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions

WVCCR PERFORMANCE EXPECTATIONS

S.2.8, S.2.9, S.2.10, S.2.11, S.2.1, S.2.2, S.2.12, S.2.13, S.2.14

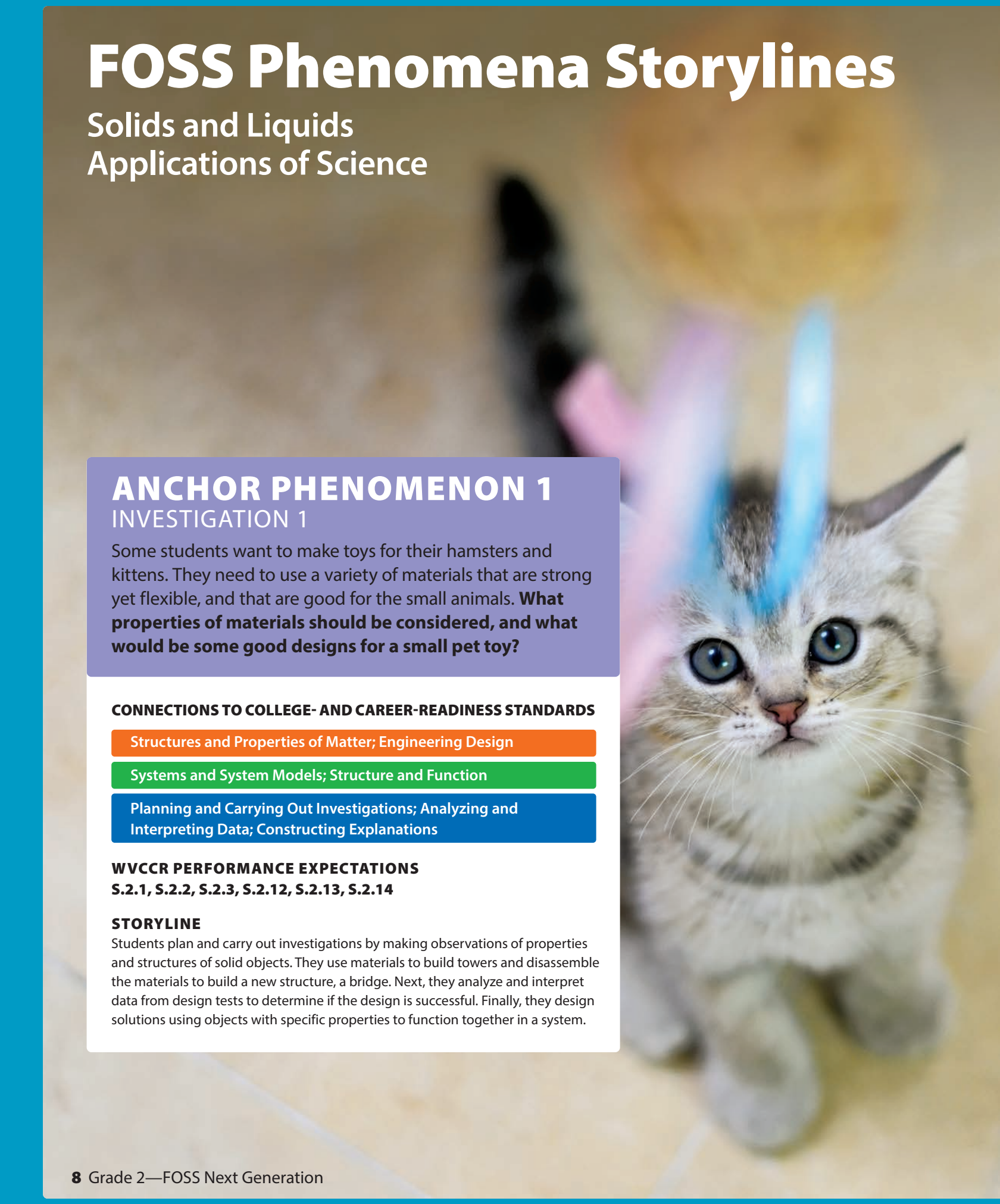
STORYLINE

A class makes regular visits to observe a creek near the school. The weather report predicts a big rainstorm for the weekend. The students know that the last storm washed away part of the creek bank. They want to find a way to protect the creek during the next storm. To find a solution to protect the creek, students plan and carry out investigations examining how earth materials are used in various ways. They develop a model of how water and wind change landforms and construct explanations about soil components. Finally, they design a solution to prevent changes to the creek bank caused by erosion.



FOSS Phenomena Storylines

Solids and Liquids
Applications of Science



ANCHOR PHENOMENON 1
INVESTIGATION 1

Some students want to make toys for their hamsters and kittens. They need to use a variety of materials that are strong yet flexible, and that are good for the small animals. **What properties of materials should be considered, and what would be some good designs for a small pet toy?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Structures and Properties of Matter; Engineering Design
- Systems and System Models; Structure and Function
- Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations

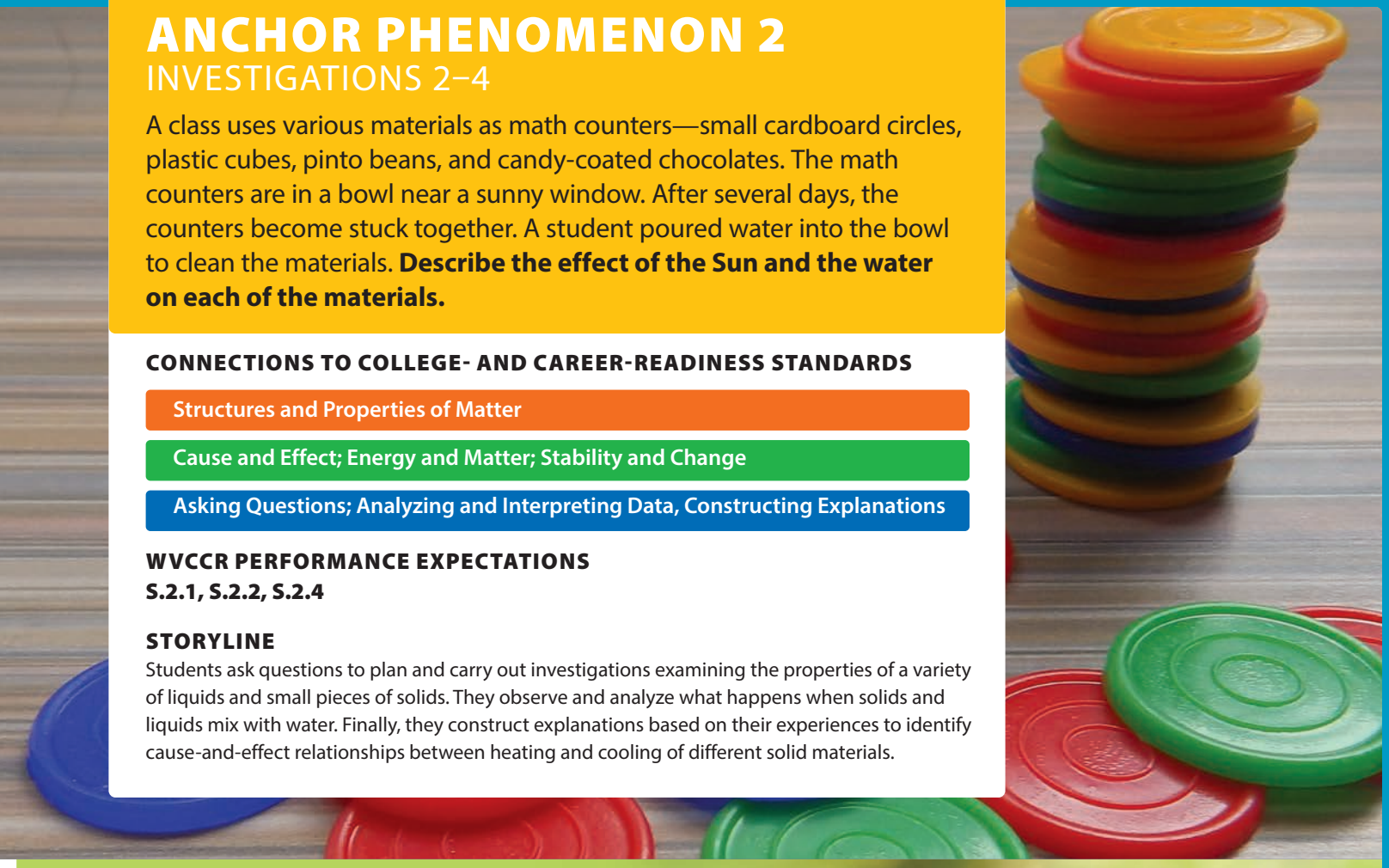
WVCCR PERFORMANCE EXPECTATIONS
S.2.1, S.2.2, S.2.3, S.2.12, S.2.13, S.2.14

STORYLINE

Students plan and carry out investigations by making observations of properties and structures of solid objects. They use materials to build towers and disassemble the materials to build a new structure, a bridge. Next, they analyze and interpret data from design tests to determine if the design is successful. Finally, they design solutions using objects with specific properties to function together in a system.

ANCHOR PHENOMENON 2
INVESTIGATIONS 2–4

A class uses various materials as math counters—small cardboard circles, plastic cubes, pinto beans, and candy-coated chocolates. The math counters are in a bowl near a sunny window. After several days, the counters become stuck together. A student poured water into the bowl to clean the materials. **Describe the effect of the Sun and the water on each of the materials.**



CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Structures and Properties of Matter
- Cause and Effect; Energy and Matter; Stability and Change
- Asking Questions; Analyzing and Interpreting Data, Constructing Explanations

WVCCR PERFORMANCE EXPECTATIONS

S.2.1, S.2.2, S.2.4

STORYLINE

Students ask questions to plan and carry out investigations examining the properties of a variety of liquids and small pieces of solids. They observe and analyze what happens when solids and liquids mix with water. Finally, they construct explanations based on their experiences to identify cause-and-effect relationships between heating and cooling of different solid materials.

ANCHOR PHENOMENON 3
INVESTIGATION 4

We brush our teeth with toothpaste. Is toothpaste a solid or a liquid? **How can we test a material to gather evidence that it is a solid or a liquid?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Structures and Properties of Matter
- Cause and Effect
- Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations; Engaging in Argument from Evidence

WVCCR PERFORMANCE EXPECTATIONS

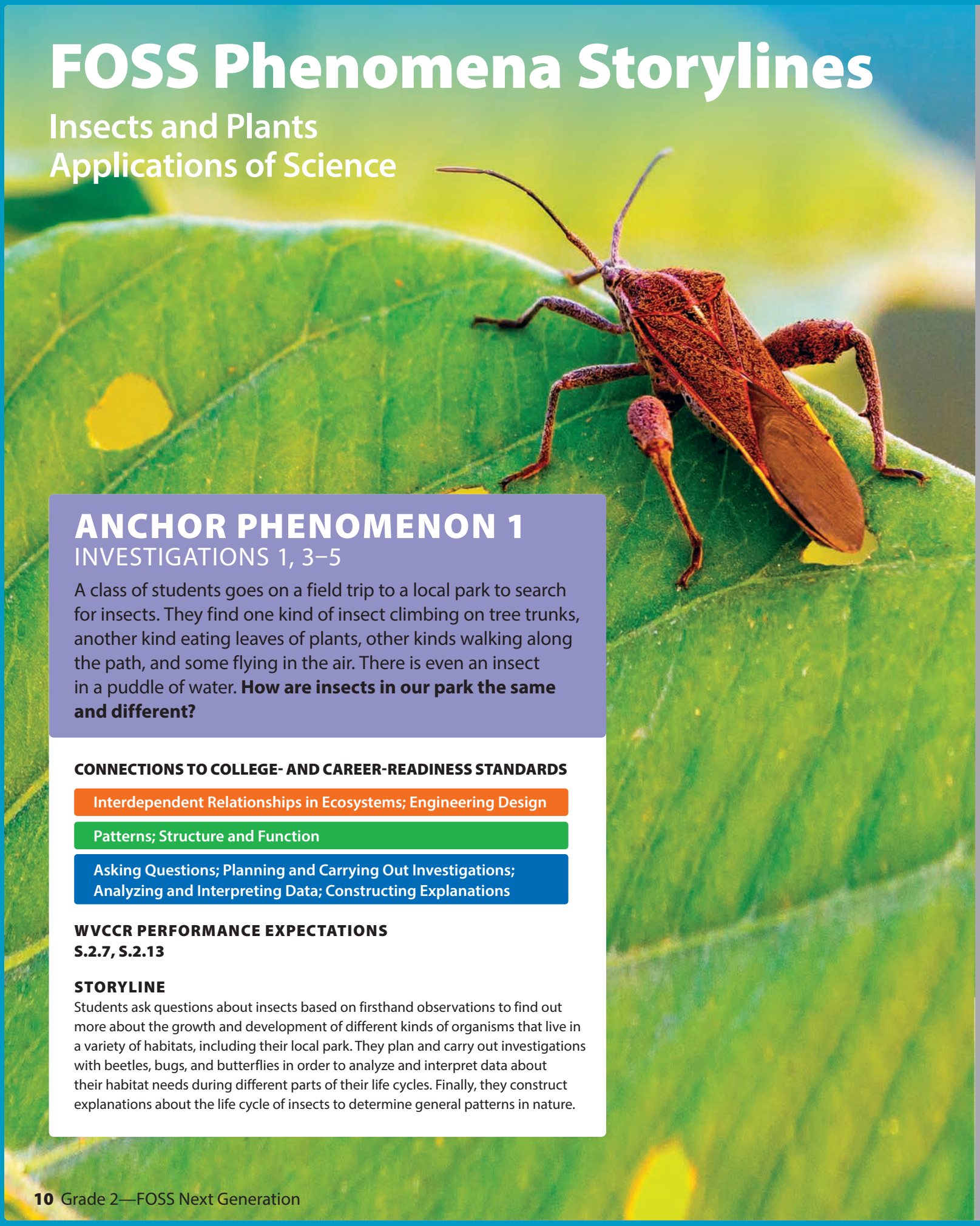
S.2.1, S.2.2, S.2.4

STORYLINE

Students make observations of toothpaste to identify evidence to support a claim. They analyze observations from investigations and engage in argument from evidence. Finally, they construct an explanation of whether a material (toothpaste) is a solid or liquid.

FOSS Phenomena Storylines

Insects and Plants
Applications of Science



ANCHOR PHENOMENON 1
INVESTIGATIONS 1, 3–5

A class of students goes on a field trip to a local park to search for insects. They find one kind of insect climbing on tree trunks, another kind eating leaves of plants, other kinds walking along the path, and some flying in the air. There is even an insect in a puddle of water. **How are insects in our park the same and different?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

Interdependent Relationships in Ecosystems; Engineering Design

Patterns; Structure and Function

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

WVCCR PERFORMANCE EXPECTATIONS
S.2.7, S.2.13

STORYLINE

Students ask questions about insects based on firsthand observations to find out more about the growth and development of different kinds of organisms that live in a variety of habitats, including their local park. They plan and carry out investigations with beetles, bugs, and butterflies in order to analyze and interpret data about their habitat needs during different parts of their life cycles. Finally, they construct explanations about the life cycle of insects to determine general patterns in nature.

ANCHOR PHENOMENON 2
INVESTIGATIONS 2, 5

Several students visit the school garden and observe bees and butterflies of different kinds flying over and around the plants. The students follow individual insects and notice that they land first on one flower and then on a second flower and so on. **Why are insects important to plants?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Interdependent Relationships in Ecosystems; Engineering Design
- Patterns; Structure and Function
- Developing and Using Models; Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations

WVCCR PERFORMANCE EXPECTATIONS

S.2.6, S.2.7, S.2.12

STORYLINE

Students develop and use models to represent how insects pollinate plants and how a plant starts from a seed and goes through its life cycle. Next, they analyze data and construct explanations by making observations of painted lady butterflies through their life cycle. Finally, they generate and design changes to classroom habitats as the needs of the organism changes during its life cycle.

ANCHOR PHENOMENON 3
INVESTIGATION 2

Students notice small plants growing in a crack in the sidewalk. They think this is a strange place to grow. **How can plants meet their needs and grow in cracks in sidewalks?**

CONNECTIONS TO COLLEGE- AND CAREER-READINESS STANDARDS

- Interdependent Relationships in Ecosystems; Engineering Design
- Patterns; Cause and Effect; Structure and Function
- Planning and Carrying Out Investigations; Analyzing and Interpreting Data; Constructing Explanations

WVCCR PERFORMANCE EXPECTATIONS

S.2.5, S.2.6, S.2.13

STORYLINE

Students develop models to represent how animals interact with plants by dispersing seeds from one location to another. They analyze data to determine the needs of plants. Finally, students construct an explanation of how a plant's needs can be met in the crack of a sidewalk.

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 98 total sessions for grade 2.

PEBBLES, SAND, AND SILT

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	Inv 1.1	Three Rocks, Steps 1–8	87–88
2	Inv 1.1	Three Rocks, Steps 9–15	89–91
3	Inv 1.2	Washing Three Rocks, Steps 1–13, 16	94–97
	Inv 1.2	*Washing Three Rocks, Steps 14–15—Focus on Video*	*96–97*
4	Inv 1.3	First Sorting, Steps 1–16	100–103
5	Inv 1.4	Start a Rock Collection, Steps 1–10	107–109
6	Inv 1.4	Start a Rock Collection, Steps 11–14	109
7	Inv 1.4	Start a Rock Collection, Steps 15–16, Review Step 17	110–111
	Inv 1.5	*Sorting Activity, Steps 1–9—Focus on Comparing Rock Properties*	*114–117*
8	Inv 1.5	I-Check 1, Step 10 (Later plan self-assessment)	117
9	Inv 2.1	Screening River Rocks, Steps 1–10	134–136
10	Inv 2.1	Screening River Rocks, Steps 11–19	137–138
11	Inv. 2.2	River Rocks by Size, Steps 1–7	142–143
12	Inv. 2.2	River Rocks by Size, Steps 8–12	144–147
13	Inv 2.3	Sand and Silt, Steps 1–10	150–151
14	Inv 2.3	Sand and Silt, Steps 11–21	152–154
15	Inv 2.4	Clay and Landforms, Steps 1–10	159–160
16	Inv 2.4	Clay and Landforms, Steps 11–20	161–162
17	Inv 2.4	Clay and Landforms, Steps 21–24	163–164
	Inv 2.4	*Clay and Landforms, Step 25—Focus on Video and Discussion*	*164–165*
18	Inv 2.4	Clay and Landforms, Steps 29–32, Review Steps 33–34	166–168
19	Inv 2.4	I-Check 2, Step 35 (Later plan self-assessment)	168

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

PEBBLES, SAND, AND SILT (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
20	Inv 3.1	Rocks in Use, Steps 1–10	186–188
21	Inv 3.1	Rocks in Use, Steps 11–14	189–190
	Inv 3.2	*Observing Sandpaper, Steps 1–15—Focus on Engineering **	*193–195*
	Inv 3.3	*Sand Sculptures, Steps 1–12—Focus on Engineering **	*199–201*
22	Inv 3.4	Clay Beads, Steps 1–6 *	205
23	Inv 3.4	Clay Beads, Steps 7–13 *	206–207
	Inv 3.5	*Making Bricks, Steps 1–11—Focus on Engineering **	*211–212*
24	Inv 3.5	Review, Steps 12–14 (Natural Resources)	213–214
	Inv 3.5	*I-Check 3, Step 15 (Could combined with I-Check 4 in Session 32)*	*214*
25	Inv 4.1 Inv 4.2	Homemade Soil, Steps 1–6 Local Soil, Step 23 (Video, Chapters 2, 3, 4 to 8:46 min, and 7)	232 245
	Inv 4.1	*Homemade Soil, Steps 7–26—Focus on Conducting Investigations*	*233–236*
	Inv 4.1	*Homemade Soil, Steps 19–26—Focus on Environment Literacy*	*235–236*
	Inv 4.2	*Local Soil, Steps 1–6—Focus on Environmental Literacy*	*240*
	Inv 4.2	*Local Soil, Steps 7–9—Focus on Reading and Riscussion*	*241–242*
	Inv 4.2	*Local Soil, Steps 10–16—Focus on Conducting Investigations*	*243–244*
	Inv 4.2	*Local Soil, Steps 17–22—Focus on Analyzing Local Data*	*244–245*
	Inv 4.2	*Local Soil, Steps 24–26—Focus on Information from Reading*	*246–247*
26	Inv 4.3	Natural Sources of Water, Steps 1–6	250–251
27	Inv 4.3	Natural Sources of Water, Steps 7–12	252–253
28	Inv 4.4	Land and Water, Steps 1–4	256–257
29	Inv 4.4	Land and Water, Steps 5–7	258–259
	Inv 4.4	*Land and Water, Step 8—Focus on Guiding Question*	*260*
30	Inv 4.4	I-Check 4, Step 9	260

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

SOLIDS AND LIQUIDS

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	Inv 1.1	**Solid Objects, Steps 1–16**	86–91
2	Inv 1.1	**Solid Objects, Steps 17–20**	92–94
3	Inv 1.2	**Solid Materials, Steps 1–13**	98–101
4	Inv 1.2	**Solid Materials, Steps 14–17** *(optional video Step 16)*	102–103
5	Inv 1.3	**Group Solid Objects, Steps 1–14**	106–109
6	Inv 1.4	**Construct with Solids, Steps 1–14**	113–116
7	Inv 1.4	**Construct with Solids, Steps 15–16** After Step 15, towers can be disassembled to reuse materials	117
8	Inv 1.4	**Construct with Solids, Steps 17–22** Steps 19–20, building bridges, can be done as centers**	117–118 118
9	Inv 1.4	**Construct with Solids, Steps 23–24**	119
10	Inv 1.5	**Outdoor Solids, Steps 1–13, 17, 20; Review Step 18**	122–126
	Inv 1.5	***Outdoor Solids, Steps 14–16; 19—Focus on Environmental Literacy and Argumentation***	*125–126*
11	Inv 1.5	**I-Check 1, Step 21 (Later plan self-assessment)**	126
12	Inv 2.1	**Liquids in Bottles, Steps 1–13**	147–149
13	Inv 2.2	**Properties of Liquids, Steps 1–20** Steps 10–14 is optional and can be set up as center activities.** *See Working at Centers for Inv 2, page 142–143*	153–157 155
14	Inv 2.3	**Liquid Level, Steps 1–8**	161–162
15	Inv 2.3	**Liquid Level, Steps 9–16**	163–164
16	Inv 2.3 Inv 2.4	**Liquid Level, Steps 17–20** **Review Step 16**	165–167 173
	Inv 2.4	***Puddles, Steps 1–15 —Focus on Environmental Literacy***	*170–173*
17	Inv 2.4	**I-Check 2, Step 17 (Later plan self-assessment)**	174

SOLIDS AND LIQUIDS (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
18	Inv 3.1	Solids in Containers, Steps 1–17	191–194
19	Inv 3.2	Separating Soup Mix, Steps 1–13	198–200
20	Inv 3.3	Solids in Bottles, Steps 1–13	204–207
	Inv 3.4	*Beads and Screens, Steps 1–6 —Focus on Using Tools *** *See Working at Centers for Inv 3, page 186–187*	*210–211*
21	Inv 3.4	Beads and Screens, Steps 8–9	212
		Spills, Steps 1–10—Focus on Outdoor Investigation	217–219
22	Inv 3.5	Spills, Steps 11–12, Review Step 13 I-Check 3, Step 14 (Later plan self-assessment)	220–221
23	Inv 3.5	Solids and Water, Steps 1–10	239–241
24	Inv 4.1	Solids and Water, Steps 11–17	241–243
25	Inv 4.1	Solids and Water, Steps 18–27	244–246
26	Inv 4.2	Liquids and Water, Steps 1–10	250–251
27	Inv 4.2	Liquids and Water, Steps 11–14	252
28	Inv 4.2	Liquids and Water, Steps 15–17	253–254
	Inv 4.3	*Toothpaste Investigation, Steps 1–6— Focus on Investigating*	*257–258*
	Inv 4.3	*Toothpaste Investigation, Steps 7–10—Focus on Analysis of Data* *Steps 11–13—Focus on Argumentation*	*258–259* *259–260*
29	Inv 4.4	Changing Properties, Steps 1–12	265–267
30	Inv 4.4	Changing Properties, Steps 13–21	260–270
31	Inv 4.4	Changing Properties, Steps 22–23, 26	270–272
	Inv 4.4	*Changing Properties, Steps 24–25—Focus on Multimedia*	*271–272*
	Inv 4.5	*Tea Time, Steps 1–9—Focus on Outdoor Activity*	*275–276*
32	Inv 4.5	Review, Step 10; I-Check 4, Step 11	277

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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INSECTS AND PLANTS

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	Inv 1.1	**Mealworms, Steps 1–7; Step 8,** use cups and lids for each student pair or group instead of vials, Step 13 (class calendar is important)	93–96
2	Inv 1.1	**Mealworms, Steps 14–17, 18** (teacher master 5, *Life of a Mealworm,* can be skipped if class calendar is kept Step 13)	96–99
3	Inv 1.1	**Mealworms, Steps 19–23** (Reading)	100–102
4*	Inv 1.2	**Larva, Pupa, Adult, Steps 1–9**	106–108
5*	Inv 1.2	**Larva, Pupa, Adult, Steps 10–14, 17–18**	108–109, 111
	Inv 1.2	***Larva, Pupa, Adult, Steps 15–16—Focus on Structure and Function***	*110*
6*	Inv 1.2	**Larva, Pupa, Adult, Steps 19–23** (Video Step 19) **Step 24** (Online activities as center activities)	112–13 114
7*	Inv 1.3	**Life Cycle, Steps 1–6; Steps 8–9** (can skip Step 10)	118–120
8*	Inv 1.3	**Review Steps 11–12, I-Check 1, Step 13** (at end of the module)	121
1	Inv 2.1	**Planting Brassica, Steps 1–14**	144–147
2	Inv 2.1	**Planting Brassica, Steps 15–19**	147–148
3	Inv 2.2	**Observing Brassica Growth, Steps 1–5**	152–153
4*	Inv 2.2	**Observing Brassica Growth, Steps 6–9**	153–154
5*	Inv 2.2	**Observing Brassica Growth, Steps 10–14** (Video Step 11)	154–156
6*	Inv 2.2	**Observing Brassica Growth 15–18**	157
7*	Inv 2.2	**Observing Brassica Growth, Steps 19–23** (Step 20 video)	158–159
8*	Inv 2.3	**Plant Life Cycle, Steps 1–2, Steps 9–12** (Reading Step 9)	162; 165–166
9*	Inv 2.3	**Plant Life Cycle, Steps 3–8, Step 14** (skip Step 13 Online acivity)	162–64; 168
	Inv 2.4	***Planting Outdoors, Steps 1–17—Focus on Outdoor Planting***	*173–176*
10*	Inv 2.4	**Planting Outdoors, Steps 18–20** (Reading Step 18)	177–178
	Inv 2.4	***Planting Outdoors, Steps 21–22—Focus on Video information***	*178*
11*	Inv 2.4	**I-Check 2, Step 23**	178

**Indicates the need to allow for growth time*

INSECTS AND PLANTS (continued)

SESSION	INV./PART	CRITICAL PATHWAY	IG PAGES
1	Inv 3.1	(Milkweed Bugs) Eggs, Steps 1–10	195–196
2*	Inv 3.2	(Milkweed Bugs) Habitats, Steps 1–14	201–204
3*	Inv 3.2	(Milkweed Bugs) Habitats, Steps 15–21 (Step 19 Reading)	204–206
4*	Inv 3.3	Growing Milkweed Bugs, Steps 1–6	209–211
5*	Inv 3.3	Growing Milkweed Bugs, Steps 7–9	211–212
6*	Inv 3.3	Growing Milkweed Bugs, Steps 10–11; Steps 12–15	212–213
7	Inv 3.4	Insect Search, Steps 1–12 (Video Step 1)	218–220
8	Inv 3.4	Insect Search, Steps 13–18, Steps 20–21 (Video Step 21)	221–223
	Inv 3.4	*Insect Search, Step 19—Focus on Engineerring a Habitat*	*223*
	Inv 3.4	*Insect Search, Step 22—Focus on Online Activity*	*223*
9	Inv 3.4	Review Step 23; I-Check 3, Step 24	224
	Inv 4.1	*(Silkworms) Eggs and Larvae, Steps 1–17—Focus on Observations*	*243–246*
	Inv 4.2	*Silkworm Structures, Steps 1–6—Focus on Setting up Habitats*	*250–251*
	Inv 4.2	*Silkworm Structures, Steps 7–18—Focus on Analysis and Reading*	*251–255*
	Inv 4.3	*(Silkworms) Pupae and Adults, Steps 1–8—Focus on Observations*	*261–263*
	Inv 4.3	*(Silkworms) Pupae and Adults, Steps 9–11—Focus on Reading*	*264–265*
	Inv 4.3	*Plant Eaters, Steps 1–20—Focus on Environmental Literacy and Video*	*270–275*
1	Inv 5.1	(Painted Lady) Caterpillars, Steps 1–8	292–293
2*	Inv 5.1	Caterpillars, Steps 9–16	294–295
3*	Inv 5.2	Chrysalises, Steps 1–7	299–300
4*	Inv 5.3	Adult Butterflies, Steps 1–14 (Video Step 14)	304–307
5*	Inv 5.3	Adult Butterflies, Steps 15–19 (Reading Step 15)	308–309
6	Inv 5.4	Flower Power, Steps 1–3 (Video Step 2)	314
7	Inv 5.4	Flower Power, Steps 4–17	314–318
8	Inv 5.4	Review, Steps 18–19, I-Check 5, Step 20	318

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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.

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		