FOSS® Pennsylvania Companion
Grade 4

FOSS Next Generation™

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Dear Pennsylvania Educator,

The purpose of the FOSS® Pennsylvania Companion is to provide you with a customized plan to implement FOSS® Next Generation modules with your students while addressing the Pennsylvania Eligible Content and Pennsylvania Science Framework.

The FOSS® (Full Option Science System) Next Generation™ Program is a researched-based science curriculum for grades K–8 developed at the Lawrence Hall of Science. The FOSS® Program has evolved from a philosophy of teaching and learning that has guided the development of successful active-learning science curricula for many years—engaging students with firsthand experiences they can use to construct explanations of the natural and designed worlds.

This Pennsylvania-specific companion has FOSS® Next Generation modules as its foundation, and integrates resources designed by the Pennsylvania Standards Aligned System (SAS) at appropriate places within the FOSS modules to ensure coverage of Pennsylvania Eligible Content. The document provides point-of-use guidance on Pennsylvania Objectives, alignment to Pennsylvania Eligible Content, a pacing guide for the FOSS investigation parts as lessons, integrated instructional materials specific to PA, and use of LPA standardized test items for student discussion. PA standardized test items are meant as a practice for your students and may match the content in the lesson directly, be an application of the knowledge gained in that lesson, or a review of prior content.

The "Nature of Science" eligible content standards are a significant portion of the PSAS Science exam. To help you and your student focus on these standards, Investigation Recording Sheets accompany some lessons. Requiring students to use these sheets when designing a fair test will help them think more concretely about the investigation and prepare them to discuss intentional experimental design.

We hope that you find this companion document a useful tool to support your teaching and your students' learning.

The FOSS® Next Generation Teams at the Lawrence Hall of Science and Delta Education

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SUGGESTED TEACHING SCHEDULE

Welcome to the ***FOSS® Pennsylvania Companion for Grade 4.*** The FOSS® Next Generation modules for grade 4 are **Environments; Soils, Rocks, and Landforms;** and **Energy.** FOSS modules are subdivided into investigations. Investigations are further subdivided into three to five parts. Each investigation has a general guiding question for the phenomenon students investigate, and each part of each investigation is driven by a focus question. The focus question, usually presented as the part begins, engages the student with the phenomenon and signals the challenge to be met, mystery to be solved, or principle to be uncovered. The focus question guides students' actions and thinking and makes the learning goal of each part explicit for teachers. Each part concludes with students recording an answer to the focus question in their notebooks.

The **PA Standardized Items** included in this companion are released items from the PA state science test. You can use them as a wrap-up for the lesson or a warm-up for the next lesson.

Below is a suggested teaching schedule for the grade level, which outlines at a glance the **FOSS Modules** and integrated **PA SAS** lessons. It is not necessary that you teach the three FOSS modules at a grade level in any particular order. For this grade, the recommended order is Environments (~10 weeks); Soils, Rocks, and Landforms (~7 weeks); and Energy (~10 weeks).

GRADE 4 SUGGESTED TEACHING SCHEDULE					
Week	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
1	Environments Lesson 1: *Survey* Assessment (Inv 1.1)	Environments Lesson 2: Steps 1–16 (Inv 1.1)	Environments ***Lesson 3: Steps 17–20**** (Inv 1.1)	Environments Lesson 4: Steps 21–22 (Inv 1.1)	Environments Lesson 9: Steps 1–16 (Inv 1.2)
2	Environments Lesson 5: Steps 23–25 (Inv 1.1)	Environments ***Lesson 10: Steps 17–19**** (Inv 1.2)	Environments ***Lesson 11: Steps 20–33**** (Inv 1.2)	Environments Lesson 12: Steps 34–37 (Inv 1.2)	Environments Lesson 13: Step 22 (Inv 1.3; omit Steps 1–21)
3	Environments Lesson 14: Steps 1–11 (Inv 2.1)	Environments Lesson 15: Steps 12–18 (Inv 2.1)	Environments Lesson 16: Steps 19–25 (Inv 2.1)	Environments Lesson 17: Steps 1–16 (Inv 2.2)	Environments Lesson 18: Steps 17–24 (Inv 2.2)
4	Environments ***Lesson 6: Step 26**** (Inv 1.1)	Environments Lesson 19: Steps 25–27 (Inv 2.2)	Environments Lesson 20: Steps 28–33 (Inv 2.2)	Environments Lesson 21: Steps 1–21 (Inv 2.3)	Environments Lesson 22: Steps 22–24 (Inv 2.3)
5	Environments Lesson 23: Steps 25–28 (Inv 2.3)	Environments Lesson 24: Steps 1–13 (Inv 2.4)	Environments Lesson 25: Steps 14–19 (Inv 2.4)	Environments Lesson 26: Steps 20–26 (Inv 2.4)	Environments Lesson 27: Step 27 (Inv 2.4)

These lessons are time sensitive. Refer to your FOSS Investigations Guide for specific information.

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Module A: FOSS Environments Module—*Investigation 1: Environmental Factors*

Part 2: Designing an Isopod Environment

Students observe isopods as a phenomenon. The class conducts two different investigations to find out how isopods respond to the environmental factors of water and light. Based on their findings, students design an isopod environment in a terrarium. Students obtain information about isopod structures and their functions in survival first-hand and through readings.

Focus Questions: What moisture conditions do isopods prefer? What light conditions do isopods prefer?

Lesson No.	FOSS Guiding Steps	FOSS Reading/Video	FOSS Assessment	PA Objective
9	Guiding Steps 1–16 (Inv 1.2)	**Science Resources Book** "Setting Up a Terrarium"	**Science Notebook Entry** *Isopod Investigation* *Isopod Environment Map*	Determine if moisture has an effect on isopod behavior by designing a controlled experiment.
10	***Guiding Steps 17–19**** (Inv 1.2)			Determine how the nonliving component of moisture affects the living isopods in their environment by conducting a controlled experiment.
11	***Guiding Steps 20–33**** (Inv 1.2)	**Science Resources Book** "Isopods"	**Embedded Assessment** Performance assessment	Test how a new nonliving component of an ecosystem affects the living organisms by conducting a controlled experiment.
12	Guiding Steps 34–37 (Inv 1.2)		**Embedded Assessment** Response sheet	Use the information collected about the relationship between living and nonliving parts of an ecosystem to design an appropriate isopod environment.
13	Guiding Step 22 (Inv 1.3; omit Steps 1–21)		**Benchmark Assessment** *Posttest*	

Eligible Content

S4.A.2.1.1–Generate questions about objects, organisms, or events that can be answered through scientific investigations.
S4.A.2.1.2–Design and describe an investigation (a fair test) to test one variable.
S4.A.2.1.3–Observe a natural phenomenon, record observations, and then make a prediction based on those observations.
S4.A.2.1.4–State a conclusion that is consistent with the information/data.
S4.A.3.1.2–Explain a relationship between the living and nonliving components in a system.
S4.A.3.1.3–Categorize the parts of an ecosystem as either living or nonliving and describe their roles in the system.

These lessons are time sensitive. Refer to your FOSS Investigations Guide for specific information.

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PA Standardized Items

Lesson 9

A dog opens its mouth and lets its tongue hang out. A human's body produces sweat. These are two ways that organisms may adjust to

- **A.** Cold temperatures
- **B.** Hot temperatures
- **C.** A shortage of food
- **D.** A shortage of drinking water

Lesson 10

One way animals usually respond to a sudden drop in temperature is by

- **A.** Sweating
- **B.** Shivering
- **C.** Blinking
- **D.** Salivating

Lesson 11

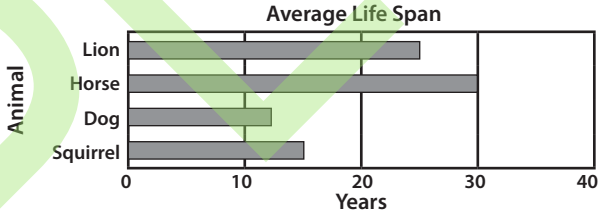
Plant Growth

Day	Plant Height (centimeters)
1	1.0
2	1.4
3	2.0
4	3.1
5	4.1
6	5.0
7	5.4
8	?

Using the data in the table above, how tall will the plant **most likely** be on day 8 if it continues to grow?

- **A.** Less than 5.6 centimeters
- **B.** More than 7.2 centimeters
- **C.** Between 5.8 and 6.5 centimeters
- **D.** Between 4.5 and 5.1 centimeters

Lesson 12



Which statement is supported by the data in the bar graph?

- **A.** The life span of a dog is longer than the life span of a squirrel.
- **B.** The life span of a lion is longer than the life span of a horse.
- **C.** The life span of a squirrel is longer than the life span of a lion.
- **D.** The life span of a horse is longer than the life span of a dog.

The life cycle of an animal is defined as the

- **A.** Change that occur as the animal develops
- **B.** Length of time from the animal's birth to its death
- **C.** Process by which the animal grows in size
- **D.** Transfer of specific traits to the animal's offspring

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Module C: PA SAS—*Shine On, Moon*

In this lesson, students will learn the basic information about the Earth's Moon and discover the effects the Moon has on humans by using models to explore the natural system.

Lesson No.	Lesson Resources	PA Objective
83	**Lesson Plan:** Shine On, Moon **Resources:** KWL Chart Lunar Calendar Observations	Recognize patterns of the lunar cycle and use those patterns to predict the shape of the Moon at a given time.
84		Construct a model of the Earth and Moon system to show how the Moon reflects light.
85		Describe the phases of the Moon and the amount of time a complete cycle takes.

Eligible Content

S3.D.3.1.2–Describe the predictable patterns of change that occur over time in the observable shape of the Moon.
S4.A.2.1.3–Observe a natural phenomenon, record observations, and then make a prediction based on those observations.
S4.A.3.2.1–Identify what different models represent.
S4.D.3.1.1–Describe motions of the Sun–Earth–Moon system.
S4.D.3.1.2–Explain how the motion of the Sun–Earth–Moon system relates to time.

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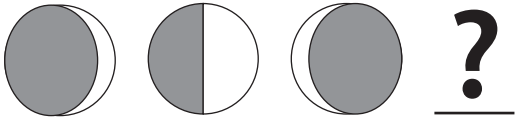
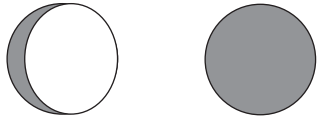
PA Standardized Items

Lesson 83

The phases of the Moon occur in a certain order. Three phases are shown here.

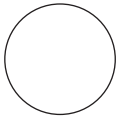


Which is the next phase in the sequence?

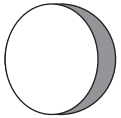


A.

B.



C.



D.

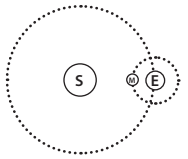
Lesson 84

One complete lunar cycle takes approximately

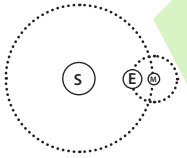
A. 28 days
B. 365 days
C. 29.5 days
D. 24 hours

Lesson 85

Which diagram correctly shows the orbits of Earth (E), the Moon (M), and the Sun (S)?



A.



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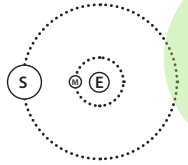

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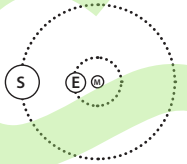

D.

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