Pacing Guide

Level 5 Module 1

Earth Features with Spotlight Lessons on Matter

Each *PhD Science® TEKS Edition* Level 5 lesson requires 45 minutes of instructional time. This guide is intended for teachers who are providing in-person instruction. This guide presents lesson objectives and activities by concept and multiple pacing options to allow teachers to maximize instructional time while remaining responsive to student needs. Choose one or more options for each lesson. Note that pacing options do not omit parts of lessons.

Pacing Option Key

Lesson Split: This symbol identifies single lessons teachers may split across 2 days.

Cross-Curricular Activity: This symbol identifies parts of lessons teachers may incorporate during instructional time for other content areas, such as English, math, social and emotional learning, and center time. Teachers may implement these parts before or after science instruction; for example, if the class reads a *PhD Science* core text during English instruction, students can discuss the core text during science instruction rather than reading the full text during that time.

Investigation Preparation: This symbol identifies preparation the teacher may do in advance of an investigation. This advance preparation does not interfere with student learning.

Instructional Routine: This symbol identifies opportunities to use alternative instructional routines. See the Implementation Guide for information on instructional routines.

Teacher Think Aloud: This symbol identifies activities that are appropriate for a teacher Think Aloud. Suggested primarily for use during station activities, this option allows completion of these activities as a class. During a teacher Think Aloud, the teacher assumes the role of a student and verbalizes the thought process of a student completing the activity to engage students with intentional questioning techniques. The teacher may also ask students to model appropriate procedures and participate in collaborative conversations.

Shared Media Experience: This symbol identifies media (e.g., videos, images) that the teacher may share with the whole class rather than having students view the media individually or in groups. After students observe the media as a class, they complete an activity.

Focal Point: This symbol identifies parts of lessons teachers should emphasize. For example, in an activity with multiple resources (e.g., videos, texts, charts), a focal point identifies the most important resources, thus ensuring the coherence of the lessons.

Instructional Note: This symbol identifies parts of lessons that have instructional notes that describe time-saving strategies. Examples of such instructional notes are Differentiation supports that provide sentence frames for writing assignments and Teacher Notes that suggest alternative activities.

Daily Video: This symbol identifies specific Level 3 and Level 4 lessons on the digital platform that review readiness standards for the module. Resources within the digital platform to support these lessons include the Learn Anywhere Plan, Daily Videos, Science Journal, and Science Journal Support.

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Module at a Glance

This module contains 28 lessons with 6 spotlight lessons on Matter. Even with lesson splits, this module should take no more than 49 days to complete. This maximum number of days ensures the implementation of all Level 5 modules within a school year that has 150 days of science instruction.

Earth Features

Anchor Phenomenon: Formation of the Grand Canyon's Features **Essential Question: How did the Grand Canyon's features form?**	**Recommended Number of Days**	**TEKS and ELPS Alignment**
Concept 1 (Lessons 1–5): Rock Layers **Focus Question:** What do Earth's rock layers reveal? Layers of rock and the fossils in those layers provide evidence of changes to Earth's surface over time.	6–9 days	5.2D, 5.3A,5.3B, 5.3C, 5.4, 5.7B, 5.9D ELPS: 3D, 3E, 4A
Concept 2 (Lessons 6–11): Weathering and Erosion **Focus Question:** How are Earth's rock layers uncovered? The processes of breaking down rock (weathering) and moving sediment (erosion) play a role in shaping the features of Earth's surface.	7–11 days	5.2A,5.2B, 5.2D, 5.2E, 5.2F, 5.3A, 5.3B, 5.7A, 5.7B ELPS: 2E, 3D, 4A, 5B
Application of Concepts (Lessons 12–17): Engineering Challenge **Phenomenon Question:** How can people reduce damage related to erosion? Designed solutions can reduce the impact of Earth's processes on humans.	6 days	5.2A, 5.2B, 5.2D, 5.2F, 5.2G, 5.7B ELPS: 2E, 3F, 5F
Concept 3 (Lessons 18–21): Patterns in Features and Processes **Focus Question:** How do canyons around the world form? Natural processes (e.g., earthquakes, volcanic activity) and features of Earth's surface (e.g., mountains) occur in global patterns.	5–6 days	3.7B, 5.2D, 5.2F, 5.2G, 5.3A, 5.3B, 5.4, 5.7A, 5.7B ELPS: 1C, 4A, 4G
Concept 4 (Lessons 22–25): Human Interactions with Earth **Focus Question:** How do humans interact with Earth's features and processes? Humans harness energy from Earth's features and processes, and the methods used to harness that energy can change Earth's features and processes.	5–8 days	4.7C, 5.2C, 5.2D, 5.3B, 5.6A, 5.7A ELPS: 2E, 3E, 4A, 4G
Application of Concepts (Lessons 26–28): End-of-Module Socratic Seminar, Assessment, and Debrief **Essential Question:** How did the Grand Canyon's features form? Earth's surface features change continually as a result of natural processes; some changes occur rapidly and others occur over long periods of time.	3 days	5.2D, 5.3A, 5.3B, 5.7A, 5.7B ELPS: 3F

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Spotlight Lessons on Matter

Lesson Sets	Recommended Number of Days	TEKS and ELPS Alignment
Lessons 1–3: Properties of Matter **Phenomenon Question:** How can we classify matter by its physical properties? People can use physical properties of matter to describe and classify it.	3 days	5.2C, 5.4, 5.5A ELPS: 3E
Lessons 4–6: Mixtures **Phenomenon Question:** What do we observe when mixtures form? Properties of materials can change when a mixture forms.	3 days	5.2D, 5.2F, 5.5A, 5.5B, 5.5C ELPS: 4A

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Year at a Glance

This year at a glance chart shows where all three modules fit in a year. To ensure completion of each module, it is recommended to teach science five days a week.

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Module 1			Module 2			Module 3				

Level 5 Considerations

Teacher Choice Days

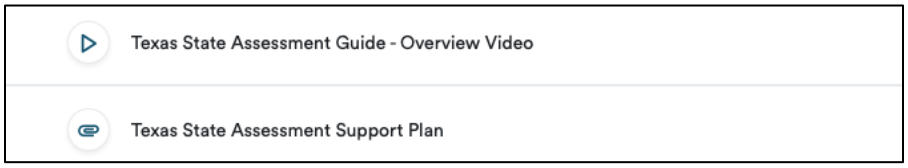
Teacher choice days are included in the pacing guide to reteach or review to help prepare students for the **Texas State Assessment for Level 5**.

TEKS and Texas State Assessment

The TEKS addressed in this module are included at the end of this document.

This symbol is used in the pacing guide to indicate lessons with review content to prepare students for the **Texas State Assessment for Level 5.**

Refer to the **Texas State Assessment Support Plan** for additional information on planning for the **Texas State Assessment for Level 5**. This plan as well as an overview video can be found on Great Minds' digital platform.



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Module 1: Earth Features

Concept 1: What do Earth's rock layers reveal? 6–9 days

Focus Standards

5.7B Recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, or ice.

5.9D Identify fossils as evidence of past living organisms and the nature of the environments at the time using models.

Lessons 1–2: Grand Canyon Features and Patterns		Lessons 3–5: Rock Layers	
Lesson 1: Ask questions about the Grand Canyon's distinctive features.	**Lesson 2:** Develop a class anchor model of the Grand Canyon's distinctive features.	**Lesson 3:** Use fossil evidence to determine that the Grand Canyon rock layers came from distinct environments.	**Lesson 4:** Explain how the relative position of rock layers indicates the order in which they formed.
Use Teacher Note in Launch. Think Aloud Powell's 1871 Expedition Team Photographs in Learn.	**Day 1:** Launch through Build a Driving Question Board **Day 2:** Develop an Initial Model of Grand Canyon Features through Land	Use a collaborative conversation routine in Identify Layers of the Grand Canyon.	**Day 1:** Launch through Interpret Patterns in Fossil Evidence **Day 2:** Model the Order that Rock Layers Formed through Land Use Differentiation note in Model the Order that Rock Layers Formed.

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Concept 1: What do Earth's rock layers reveal? (continued)

Lessons 3–5: Rock Layers	Teacher Choice Day
Lesson 5: Explain changes in the Grand Canyon landscape by using fossil evidence.	**Objective:** Support mastery of 5.7B and 5.9D.
Day 1: Launch through Revise Anchor Model **Day 2:** Conceptual Checkpoint through Land Complete Read and Discuss *Grand Canyon* by Jason Chin (2017) before the lesson.	**Reteach or review day to help prepare students for the Texas State Assessment for Level 5.**
Conceptual Checkpoint	

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Concept 2: How are Earth's rock layers uncovered? 7–11 days

Focus Standards

5.7A Explore the processes that led to the formation of sedimentary rocks and fossil fuels.

5.7B Recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, or ice.

Lessons 6–7: Weathering		Lessons 8–11: Erosion	
Lesson 6: Investigate how natural materials can break rock.	**Lesson 7:** Explain how natural materials weather rock.	**Lesson 8:** Prepare a stream table landscape for investigation.	**Lesson 9:** Investigate how sediment is moved.
Day 1: Launch through Prepare for Material Interaction Stations **Day 2:** Investigate Interactions of Materials through Land Think Aloud one material interaction station in Investigate Interactions of Materials.	Use an alternative instructional routine in Explain Weathering.	Measure sand and soil before the lesson.	**Day 1:** Launch through Investigate Causes of Erosion (Investigation 2) **Day 2:** Investigate Causes of Erosion (Investigation 3) through Land Finish Frayer model after the lesson.
Lessons 8–11: Erosion		**Teacher Choice Day**	
Lesson 10: Investigate rates of erosion.	**Lesson 11:** Explain how rocks in the Grand Canyon have been changed by weathering and moved by erosion.	**Objective:** Support mastery of 5.7A and 5.7B.	
Day 1: Launch through Plan Investigations About Rates of Erosion **Day 2:** Investigate Rates of Erosion through Land	**Day 1:** Launch through Revise Anchor Model **Day 2:** Conceptual Checkpoint through Land	**Reteach or review day to help prepare students for the Texas State Assessment for Level 5.**	
Use Differentiation note in Plan Investigations about Rates of Erosion.	**Conceptual Checkpoint**		

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Engineering Challenge: How can people reduce damage related to erosion? — 6 days

Focus Standards

5.7B Recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, or ice.

Lessons 12–17: Reducing Damage from Erosion			
Lesson 12: Apply the engineering design process to design a structure to reduce damage related to erosion.	**Lesson 13:** Apply the engineering design process to design a structure to reduce damage related to erosion.	**Lesson 14:** Apply the engineering design process to design a structure to reduce damage related to erosion.	**Lesson 15:** Apply the engineering design process to design a structure to reduce damage related to erosion.
Read *Who Were the Wright Brothers?* by James Buckley Jr. (2014) before the lesson.	**Engineering Challenge**	**Engineering Challenge**	**Engineering Challenge**

Lessons 12–17: Reducing Damage from Erosion	
Lesson 16: Apply the engineering design process to design a structure to reduce damage related to erosion.	**Lesson 17:** Apply the engineering design process to design a structure to reduce damage related to erosion.
Engineering Challenge	**Engineering Challenge**

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Concept 3: How do canyons around the world form? 5–6 days

Focus Standards

5.7A Explore the processes that led to the formation of sedimentary rocks and fossil fuels.

5.7B Recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, or ice.

Review Standards

3.7B Investigate rapid changes in Earth's surface such as volcanic eruptions, earthquakes, and landslides.

Lesson 18: Sedimentary Rocks	Lesson 19: Global Patterns of Mountain Ranges	Lessons 20–21: Global Patterns of Earthquakes and Volcanoes	
Lesson 18: Use a model to explain how sedimentary rocks form.	**Lesson 19:** Explain how mountains are carved by rivers to form canyons.	**Lesson 20:** Describe global patterns in locations of volcanoes, earthquakes, mountains, and canyons.	**Lesson 21:** Determine the most likely location of a canyon on a map based on analysis of natural features.
Use second Teacher Note in Draw Sedimentary Rock Formation Diagram.	**Day 1:** Launch through Investigate Different Canyons **Day 2:** Interpret a Relief Map through Land Think Aloud one difference between the canyons in Investigate Different Canyons.	**Day 1:** Launch through Investigate Earthquakes **Day 2:** Investigate Volcanoes through Land	**Conceptual Checkpoint**

Teacher Choice Day
Objective: Support mastery of 3.7B.
Use digital platform resources to review Level 3 Module 2 Lesson 9A and 9B Daily Videos.
Reteach or review day to help prepare students for the Texas State Assessment for Level 5.

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Concept 4: How do humans interact with Earth's features and processes? 5–8 days

Focus Standards

5.2C Collect and record information using detailed observations and accurate measuring.

5.3B Draw or develop a model that represents how something that cannot be seen such as the Sun, Earth, and Moon system and formation of sedimentary rock works or looks.

5.6A Explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy.

5.7A Explore the processes that led to the formation of sedimentary rocks and fossil fuels.

Review Standards

4.7C Identify and classify Earth's renewable resources, including air, plants, water, and animals, and nonrenewable resources, including coal, oil, and natural gas, and the importance of conservation.

Lessons 22–23: Lake Formation after the Addition of Dams		**Lessons 24–25: Renewable and Nonrenewable Energy Resource Use**	
Lesson 22: Create a model of the Colorado River.	**Lesson 23:** Identify the effects of dams on the environment.	**Lesson 24:** Interpret information to determine uses of dams.	**Lesson 25:** Describe how the use of renewable and nonrenewable energy resources impacts the environment.
Day 1: Launch through Explore Colorado River System Map **Day 2:** Model the Colorado River through Land	**Day 1:** Launch through Effects of a Dam on a River Investigation **Day 2:** Construct Explanations through Land	Read "The Hoover Dam: Controlling Water in the West" (Adapted) (Lusted 2016) before the lesson.	**Day 1:** Launch through Categorize Energy Resources **Day 2:** Discuss Similarities and Differences Among Energy Resources through Land
Use a collaborative conversation routine in Model the Colorado River.	Think Aloud similarities between the two maps in Compare Colorado River System Maps.		Complete Read About Energy Resources before the lesson.
			Think Aloud one text excerpt and topic notes in Read About Energy Resources.
			Conceptual Checkpoint

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Concept 4: How do humans interact with Earth's features and processes? (continued)
Teacher Choice Day
Objective: Support mastery of 4.7C.
Use digital platform resources to review Level 4 Module 3 Lesson 24 Daily Video.
Reteach or review day to help prepare students for the Texas State Assessment for Level 5.

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Application of Concepts: How did the Grand Canyon's features form?		3 days
Focus Standards		
5.7A	Explore the processes that led to the formation of sedimentary rocks and fossil fuels.	
5.7B	Recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, or ice.	
Lessons 26–28: Formation of the Grand Canyon's Features		
☆ **Lesson 26:** Explain how Earth's processes shape some of Earth's features.	**Lesson 27:** Explain how Earth's processes shape some of Earth's features.	**Lesson 28:** Explain how Earth's processes shape some of Earth's features.
Use English Language Development note in Engage in Socratic Seminar.		
Socratic Seminar	**End-of-Module Assessment**	**End-of-Module Debrief**

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Spotlight Lessons: Matter

Focus Standards: 6 days

5.5A Classify matter based on measurable, testable, and observed physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating using water as a reference point), solubility in water, and the ability to conduct or insulate thermal energy or electric energy.

5.5B Demonstrate that some mixtures maintain physical properties of their ingredients such as iron filings and sand and sand and water.

5.5C Identify changes that occur in the physical properties of the ingredients of solutions such as dissolving salt in water or adding lemon juice to water.

Lessons 1–3: Properties of Matter			Lessons 4–6: Mixtures
Lesson 1: Identify physical properties of matter for classification.	**Lesson 2:** Observe, measure, and record physical properties of matter.	**Lesson 3:** Classify matter by its physical properties.	**Lesson 4:** Compare properties of materials before and after mixing.
Prepare Properties of Matter chart with category headings in Develop a List of Properties before the lesson.	Think Aloud one object in Observe and Measure Properties of Matter.		Use Differentiation note in Explore Mixtures. Think Aloud oil and water mixture in Explore Mixtures.

Lessons 4–6: Mixtures	
Lesson 5: Compare properties of materials before and after mixing to identify solutions.	**Lesson 6:** Classify materials by whether they are soluble in water.
Think Aloud sugar and water in Identify Solutions. Use Teacher Note in Identify Solutions.	Think Aloud one station in Investigate Which Materials Are Soluble.

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Texas Essential Knowledge and Skills (TEKS)

Focus Standards	
3.7	Earth and space. The student knows that Earth consists of natural resources and its surface is constantly changing. The student is expected to:
	3.7B Investigate rapid changes in Earth's surface such as volcanic eruptions, earthquakes, and landslides.
4.7	Earth and space. The students know that Earth consists of useful resources and its surface is constantly changing. The student is expected to:
	4.7C Identify and classify Earth's renewable resources, including air, plants, water, and animals, and nonrenewable resources, including coal, oil, and natural gas, and the importance of conservation.
5.6	Force, motion, and energy. The student knows that energy occurs in many forms and can be observed in cycles, patterns, and systems. The student is expected to
	5.6A explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy.
5.7	Earth and space. The student knows Earth's surface is constantly changing and consists of useful resources. The student is expected to
	5.7A explore the processes that led to the formation of sedimentary rocks and fossil fuels; and
	5.7B recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, or ice.
5.9	Organisms and environment. The student knows that organisms have structures and behaviors that help them survive within their environments. The student is expected to
	5.9D identify fossils as evidence of past living organisms and the nature of the environments at the time using models.

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Investigation and Reasoning Standards
5.1 Scientific Investigation and Reasoning. The student conducts classroom and outdoor investigations, following home and school safety procedures and environmentally appropriate and ethical practices. The student is expected to
5.1A demonstrate safe practices and the use of safety equipment as outlined in Texas Education Agency–approved safety standards during classroom and outdoor investigations using safety equipment, including safety goggles or chemical splash goggles, as appropriate, and gloves, as appropriate; and
5.1B make informed choices in the conservation, disposal, and recycling of materials.
5.2 Scientific investigation and reasoning. The student uses scientific practices during laboratory and outdoor investigations. The student is expected to
5.2A describe, plan, and implement simple experimental investigations testing one variable;
5.2B ask well defined questions, formulate testable hypotheses, and select and use appropriate equipment and technology;
5.2C collect and record information using detailed observations and accurate measuring;
5.2D analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence;
5.2E demonstrate that repeated investigations may increase the reliability of results;
5.2F communicate valid conclusions in both written and verbal forms; and
5.2G construct appropriate simple graphs, tables, maps, and charts using technology, including computers, to organize, examine, and evaluate information.
5.3 Scientific investigation and reasoning. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to
5.3A analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing;
5.3B draw or develop a model that represents how something that cannot be seen such as the Sun, Earth, and Moon system and formation of sedimentary rock works or looks; and
5.3C connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.
5.4 Scientific investigation and reasoning. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to
5.4 collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, prisms, mirrors, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, and notebooks; timing devices; and materials to support observations of habitats or organisms such as terrariums and aquariums.

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Works Cited

Buckley, James, Jr. 2014. *Who Were the Wright Brothers?* New York: Grosset & Dunlap.

Chin, Jason. 2017. *Grand Canyon.* New York: Roaring Brook Press. [All references to *Grand Canyon* are from this source.]

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