

Pacing Guide

Level 2 Module 3

Sky

Each *PhD Science® TEKS Edition* Level 2 lesson requires 35 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.

Module at a Glance

This module contains 25 lessons. Even with lesson splits, this module should take no more than 33 days to complete. This maximum number of days ensures the implementation of all Level 2 modules within a school year that has 150 days of science instruction.

Sky

Anchor Phenomenon: Polynesian Navigation Essential Question: How did the Polynesians use observations of the Sun, stars, and the Moon to navigate from island to island?	Recommended Number of Days	TEKS and ELPS Alignment
Concept 1 (Lessons 1–8): The Sun Focus Question: What changes in our observations of the Sun throughout the day? The Sun moves across the sky in a predictable way.	8–12 days	2.2A, 2.2B, 2.2C, 2.2D, 2.2E, 2.3B, 2.4A, 2.8C ELPS: 1A, 1C, 2E, 3J, 4A
Application of Concepts (Lessons 9–13): Science Challenge Phenomenon Question: How can we explain why different kinds of strawberry plants grow flowers during different months? Daytime length changes in a predictable way each year, which causes different kinds of plants to grow flowers during different months.	5–6 days	2.2A, 2.2C, 2.2D, 2.2E, 2.8B, 2.8C, 2.9A, 2.9B ELPS: 3H
Concept 2 (Lessons 14–18): Stars Focus Question: What changes in our observations of stars throughout the night? Most stars move across the sky in a predictable way.	5–6 days	2.2A, 2.2B, 2.2C, 2.2D, 2.2E, 2.3B, 2.8C ELPS: 2E, 3H, 4E
Concept 3 (Lessons 19–22): The Moon Focus Question: What changes in our observations of the Moon throughout the day or night? The Moon moves across the sky in a predictable way.	4–6 days	2.2A, 2.2C, 2.2D, 2.2E, 2.3B, 2.8C ELPS: 1E, 3E, 3H
Application of Concepts (Lessons 23–25): End-of-Module Socratic Seminar, Assessment, and Debrief Essential Question: How did the Polynesians use observations of the Sun, stars, and the Moon to navigate from island to island? People can see the Sun, stars, and the Moon in the sky in predictable locations and at predictable times.	3 days	2.2E, 2.8C, 2.9B ELPS: 3E, 3F








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				





Module 3: Sky





Concept 1: What changes in our observations of the Sun throughout the day?			8–12 days
Focus Standards			
2.8C Observe, describe, and record patterns of objects in the sky, including the appearance of the Moon.			
Lessons 1–3: Polynesian Navigation			Lessons 4–6: Observing the Sun
Lesson 1: Observe directions on a compass to understand how they can help people navigate.	Lesson 2: Identify the parts of the environment the Polynesians observed to navigate from island to island.	Lesson 3: Develop a class model that shows which objects the Polynesians observed in the day sky and the night sky.	Lesson 4: Observe the sky to determine that the location of the Sun changes throughout the day.
 Use fourth Teacher Note in Launch.	 Day 1: Launch through Make Observations Through Reading (read <i>Island Below the Star</i> [Rumford 2022]) Day 2: Make Observations Through Reading (display map from book) through Land  Read <i>Island Below the Star</i> in Make Observations Through Reading before lesson.	 Day 1: Launch through Model Observations of the Sky Day 2: Develop Anchor Model through Land	 Use first Teacher Note in Observe the Morning Sky.  Use Differentiation note in Observe the Morning Sky.  Use first Teacher Note in Observe the Afternoon Sky.




Concept 1: What changes in our observations of the Sun throughout the day? (continued)			
Lessons 4–6: Observing the Sun		Lessons 7–8: The Sun	
<p>Lesson 5: View photographs and a video to describe how the Sun’s location changes throughout the day.</p>	<p>Lesson 6: Use observations as evidence to determine that the Sun follows a similar path across the sky each day.</p>	<p>Lesson 7: Use observations of the Sun’s path across the sky to explain how the Polynesians navigated from island to island.</p>	<p>Lesson 8: Explain that the Polynesians used their observations of the Sun’s path to navigate in different directions.</p>
<p> Day 1: Launch through Examine Photographs of the Sun</p> <p>Day 2: Analyze a Video of the Sun through Land</p>	<p> Share videos while students record observations in Observe the Sun’s Path.</p>	<p> Day 1: Launch through Conceptual Checkpoint</p> <p>Day 2: Debrief Conceptual Checkpoint through Land</p>	
<p> Complete Launch before lesson.</p> <p> Use first sidebar Teacher Note in Launch.</p>		<p>Conceptual Checkpoint</p>	

<p>Science Challenge: How can we explain why different kinds of strawberry plants grow flowers during different months?</p> <p style="text-align: right;">5–6 days</p> <p>Focus Standards</p> <p>2.8B Identify the importance of weather and seasonal information to make choices in clothing, activities, and transportation.</p> <p>2.8C Observe, describe, and record patterns of objects in the sky, including the appearance of the Moon.</p> <p>2.9A Identify the basic needs of plants and animals.</p> <p>2.9B Identify factors in the environment, including temperature and precipitation, that affect growth and behavior such as migration, hibernation, and dormancy of living things.</p>			
Lessons 9–13: Science Challenge			
<p>Lesson 9: Observe that different kinds of strawberry plants grow flowers during months with different daytime lengths.</p>	<p>Lesson 10: Compare observations to identify the pattern that daytime length changes in the same way each year.</p>	<p>Lesson 11: Make observations to notice the relationship between changing daytime length and sunrise and sunset times.</p>	<p>Lesson 12: Use evidence to support a claim about when a short-day plant and a long-day plant will grow flowers.</p>
<p> Fold observation chart in Observe Strawberry Plant Growth before the lesson.</p> <p> Think aloud observations of Plant A in Observe Strawberry Plant Growth.</p>	<p> Use Differentiation note in Observe Daytime Length During Different Months.</p> <p> Use first Teacher Note in Discuss Daytime Length During Different Months.</p>	<p> Day 1: Launch through Examine a Farmer’s Daily Schedule</p> <p>Day 2: Identify Evidence through Land</p>	<p> Use Differentiation note in Make Claims.</p> <p> Use first Teacher Note in Land.</p>
Science Challenge	Science Challenge	Science Challenge	Science Challenge
Lessons 9–13: Science Challenge			
<p>Lesson 13: Use patterns in daytime length as evidence to present claims about when different kinds of plants will grow flowers.</p>			
Science Challenge			

Concept 2: What changes in our observations of stars throughout the night?			5–6 days
Focus Standards			
2.8C Observe, describe, and record patterns of objects in the sky, including the appearance of the Moon.			
Lessons 14–16: Observing Stars			Lessons 17–18: Stars
Lesson 14: Observe photographs to notice that the locations of different stars change in the same way throughout the night.	Lesson 15: Observe additional photographs and watch videos to describe how stars move across the sky each night.	Lesson 16: Use evidence from observations to predict how a star will move throughout the night.	Lesson 17: Observe photographs to describe the path of Arcturus across the sky.
	 Think aloud one of the star observation photographs in Observe Additional Stars.	Use Differentiation note in Analyze Evidence About Star Movement.	Conceptual Checkpoint
Lessons 17–18: Stars			
Lesson 18: Use observations as evidence to explain how a group of Polynesians could use Arcturus to navigate to Hawaii.			
 Day 1: Launch through Conceptual Checkpoint Part C Day 2: Debrief Conceptual Checkpoint Part B and Part C through Land			
Conceptual Checkpoint			



Concept 3: What changes in our observations of the Moon throughout the day or night?			4–6 days
Focus Standards			
2.8C Observe, describe, and record patterns of objects in the sky, including the appearance of the Moon.			
Lessons 19–21: Observing the Moon			Lesson 22: The Moon
Lesson 19: View videos to observe and describe how the Moon moves across the sky each day and night.	Lesson 20: Analyze data to determine that because the Moon rises and sets later on each date, it appears in the sky at different times.	Lesson 21: Use evidence that supports a claim to construct an argument about when on a given date the Moon is in the sky.	Lesson 22: Use observations of the Moon’s path across the sky as evidence to explain how the Polynesians navigated from island to island.
 Share videos from Moon observation stations while students make observations in Observe the Moon’s Appearance.	 Use an alternative collaborative conversation routine in Analyze Moonrise and Moonset Data.	 Day 1: Launch through Analyze Evidence Day 2: Develop an Argument through Land	 Day 1: Launch through Conceptual Checkpoint Day 2: Debrief Conceptual Checkpoint through Land
			Conceptual Checkpoint

<p>Application of Concepts: How did the Polynesians use observations of the Sun, stars, and the Moon to navigate from island to island? 3 days</p> <p>Focus Standards</p> <p>2.8C Observe, describe, and record patterns of objects in the sky, including the appearance of the Moon.</p> <p>2.9B Identify factors in the environment, including temperature and precipitation, that affect growth and behavior such as migration, hibernation, and dormancy of living things.</p>		
<p>Lessons 23–25: Polynesian Navigation</p>		
<p>Lesson 23: Explain how the Polynesians used observations of the Sun, stars, and the Moon to navigate from island to island.</p>	<p>Lesson 24: Describe how some plants and animals respond to patterns in the movement of the Sun, stars, and the Moon.</p>	<p>Lesson 25: Explain how people can observe, describe, and predict patterns in the movement of the Sun, stars, and the Moon.</p>
<p> Use Differentiation note in Launch.</p> <p> Use Differentiation note in Land.</p>	<p> Use Differentiation note in Complete End-of-Module Assessment.</p>	<p>End-of-Module Debrief</p>
<p>Socratic Seminar</p>	<p>End-of-Module Assessment</p>	

Texas Essential Knowledge and Skills (TEKS)

Focus Standards

- 2.8 Earth and space. The student knows that there are recognizable patterns in the natural world and among objects in the sky. The student is expected to
- 2.8B** identify the importance of weather and seasonal information to make choices in clothing, activities, and transportation; and
 - 2.8C** observe, describe, and record patterns of objects in the sky, including the appearance of the Moon.
- 2.9 Organisms and environments. The student knows that living organisms have basic needs that must be met for them to survive within their environment. The student is expected to
- 2.9A** identify the basic needs of plants and animals; and
 - 2.9B** identify factors in the environment, including temperature and precipitation, that affect growth and behavior such as migration, hibernation, and dormancy of living things.

Investigation and Reasoning Standards

- 2.1 Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures. The student is expected to
- 2.1A** identify, describe, and demonstrate safe practices as outlined in Texas Education Agency-approved safety standards during classroom and outdoor investigations, including wearing safety goggles or chemical splash goggles, as appropriate, washing hands, and using materials appropriately.
- 2.2 Scientific investigation and reasoning. The student develops abilities necessary to do scientific inquiry in classroom and outdoor investigations. The student is expected to
- 2.2A** ask questions about organisms, objects, and events during observations and investigations;
 - 2.2B** plan and conduct descriptive investigations;
 - 2.2C** collect data from observations using scientific tools;
 - 2.2D** record and organize data using pictures, numbers, and words; and
 - 2.2E** communicate observations and justify explanations using student-generated data from simple descriptive investigations.
- 2.3 Scientific investigation and reasoning. The student knows that information and critical thinking, scientific problem solving, and the contributions of scientists are used in making decisions. The student is expected to
- 2.3B** make predictions based on observable patterns.
- 2.4 Scientific investigation and reasoning. The student uses age-appropriate tools and models to investigate the natural world. The student is expected to
- 2.4A** collect, record, and compare information using tools, including computers, hand lenses, rulers, plastic beakers, magnets, collecting nets, notebooks, and safety goggles or chemical splash goggles as appropriate; timing devices; weather instruments such as thermometers, wind vanes, and rain gauges; and materials to support observations of habitats of organisms such as terrariums and aquariums.

Works Cited

Rumford, James. (2016) 2022. *Island Below the Star: How the First People Came to Hawai'i*. Honolulu: Mānoa Press and Washington, DC: Great Minds Press.
[All references to *Island Below the Star* are from this source.]