Pacing Guide

Level 1 Module 3

Sound

Each *PhD Science® TEKS Edition* Level 1 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 29 lessons and 6 spotlight lessons on Earth Materials. Even with lesson splits, this module should take no more than 46 days to complete. This maximum number of days ensures the implementation of all Level 1 modules within a school year that has 150 days of science instruction.

Sound

Anchor Phenomenon: The Recycled Orchestra of Cateura **Essential Question: How does the Recycled Orchestra make music?**	**Recommended Number of Days**	**TEKS and ELPS Alignment**
Concept 1 (Lessons 1–10): Making Sound **Focus Question:** What causes sound? Sound is caused by vibrating objects.	10–14 days	1.1B, 1.2A, 1.2B, 1.2C, 1.2D, 1.2E, 1.4A, 1.5A, 1.6A, 1.6C ELPS: 1C, 2E, 3E, 3F, 3H, 4A
Concept 2 (Lessons 11–17): Effects of Sound **Focus Question:** What are the effects of sound? Sound can cause objects to vibrate	7–10 days	1.2A, 1.2B, 1.2D, 1.2E, 1.3A, 1.3B, 1.4A, 1.6A, 1.6C ELPS: 2E, 3E, 3H, 3J
Application of Concepts (Lessons 18–25): Engineering Challenge **Phenomenon Question:** How can we help a teacher communicate with students at recess? People can solve some communication problems by designing devices that make sound.	8–10 days	1.2A, 1.2B, 1.2C, 1.2D, 1.2E, 1.3A, 1.3C, 1.4A, 1.6A, 1.6C ELPS: 3H
Application of Concepts (Lessons 26–29): End-of-Module Socratic Seminar, Assessment, and Debrief **Essential Question:** How does the Recycled Orchestra make music? Sound is caused by vibrating objects, and sound can cause objects to vibrate.	4 days	1.2A, 1.2B, 1.2E, 1.3B, 1.3C, 1.4A, 1.5A, 1.6A, 1.6C ELPS: 3E, 3H

Spotlight Lessons on Earth Materials

Lesson Sets	Recommended Number of Days	TEKS and ELPS Alignment
Lessons 1–3: Mata Ortiz Pottery **Phenomenon Question:** What is pottery made of? Pottery is made of clay that potters make wet and shape.	3 days	1.2A, 1.4A, 1.4B, 1.5A, 1.5C, 1.7A, 1.7C ELPS: 1C, 2E
Lesson 4: Natural Sources of Water **Phenomenon Question:** How can we identify a natural source of water? Water has a variety of natural sources including streams, lakes, and oceans.	1–2 days	1.2E, 1.4A, 1.7B, 1.7C ELPS: 3H
Lesson 5: Making Paint **Phenomenon Question:** How do the potters in Mata Ortiz make paint? People can use rocks, soil, and water to create human-made resources.	1–2 days	1.4A, 1.4B, 1.5C, 1.7C ELPS: 4A
Lesson 6: Humans' Use of Natural Resources **Phenomenon Question:** How can location affect what objects people make? The natural resources in an area can influence the kinds of human-made resources that people make.	1 day	1.2E, 1.5C, 1.7C ELPS: 1A

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: Sound

Concept 1: What causes sound? 10–14 days

Focus Standards

1.5A Classify objects by observable properties such as larger and smaller, heavier and lighter, shape, color, and texture.

1.6A Identify and discuss how different forms of energy such as light, thermal, and sound are important to everyday life.

1.6C Demonstrate and record the ways that objects can move such as in a straight line, zig zag, up and down, back and forth, round and round, and fast and slow.

Lessons 1–3: The Recycled Orchestra of Cateura			Lessons 4–6: Vibrating Instruments
Lesson 1: Identify musical instruments and explain that people use them to make music.	**Lesson 2:** Describe similarities between recycled instruments and ordinary instruments.	**Lesson 3:** Begin developing a class model that shows how the Recycled Orchestra makes music.	**Lesson 4:** Observe the pattern that instruments must be touched or moved to make sound.
Day 1: Launch through Sort Cards by Sound **Day 2:** Learn About the Recycled Orchestra through Land	Think aloud one matching set of cards in Compare Recycled and Ordinary Instruments. Use a timer to pace group work in Compare Recycled and Ordinary Instruments.	**Day 1:** Launch through Develop Initial Models **Day 2:** Develop Initial Models (continued) through Land Use a timer to pace student work in Develop Initial Models.	Think aloud one instrument in Explore Instruments. Prepare class chart by affixing illustrations on chart paper in Discuss Methods of Playing Instruments.

Concept 1: What causes sound? (continued)

Lessons 4–6: Vibrating Instruments		Lesson 7: Vibrating Objects	Lessons 8–9: Recycled Instruments
Lesson 5: Use observations as evidence to make a claim that some instruments make sound by vibrating.	**Lesson 6:** Use evidence from additional observations to support the claim that all instruments make sound by vibrating.	**Lesson 7:** Investigate common objects to determine that objects make sound by vibrating.	**Lesson 8:** Use evidence from observations to identify objects that make a particular sound.
 Think aloud one station in Visit Instrument Stations to Look for Shaking.	 **Day 1:** Launch through Visit Instrument Stations to Feel for Vibrations (groups visit four stations) **Day 2:** Visit Instrument Stations to Feel for Vibrations (groups visit remaining two stations) through Land  Prepare class chart by affixing illustrations on chart paper in Land.	 Use first suggestion in first Teacher Note in Observe a Straw Making Sound.  Use a timer to pace group work in Observe Common Objects to Look for Patterns.	

Lessons 8–9: Recycled Instruments	Lesson 10: Making Sound
Lesson 9: Confirm that objects that look similar, feel similar, and move in similar ways can make similar sounds.	**Lesson 10:** Use observations to explain that a music box must vibrate to make sound.
 **Day 1:** Launch through Create and Test Shakers **Day 2:** Share Recycled Shakers through Land	**Conceptual Checkpoint**

Concept 2: What are the effects of sound? 7–10 days

Focus Standards

1.6A Identify and discuss how different forms of energy such as light, thermal, and sound are important to everyday life.

1.6C Demonstrate and record the ways that objects can move such as in a straight line, zig zag, up and down, back and forth, round and round, and fast and slow.

<table>
<tr><th colspan="3">Lessons 11–13: The Way Sound Travels</th><th>Lesson 14: The Eardrum</th></tr>
<tr><td>Lesson 11: Observe a model orchestra to determine that people can hear sound on all sides of a vibrating object.</td><td>Lesson 12: Compare observations to determine that sound travels away from a vibrating object in all directions.</td><td>Lesson 13: Identify the pattern that sound gets quieter as distance from a vibrating object increases.</td><td>Lesson 14: Use evidence from observations to explain that sound causes the eardrum to vibrate.</td></tr>
<tr><td>Use an alternative instructional routine in Develop Initial Models of Sound in a Concert Hall.

Use Teacher Note in Prepare to Model Sound in a Concert Hall.</td><td>Day 1: Launch through Investigate Sound Outside a Door
Day 2: Draw a Model of Sound in a Concert Hall through Land</td><td>Day 1: Launch through Investigate Sound Outdoors
Day 2: Analyze Results through Land</td><td>Display eardrum model under document camera while students make observations.</td></tr>
<tr><th colspan="2">Lessons 15–16: Feeling Sound</th><th>Lesson 17: Effects of Sound</th><td rowspan="3"></td></tr>
<tr><td>Lesson 15: Observe that sound can cause balloons to vibrate.</td><td>Lesson 16: Determine that people can feel objects vibrate in response to loud, nearby sounds.</td><td>Lesson 17: Predict that sound from an airplane causes a nearby house to vibrate.</td></tr>
<tr><td>Day 1: Launch through Make a Prediction
Day 2: Test a Prediction through Land

Read designated pages from Moses Goes to a Concert (Millman 1998) in Make a Prediction before the lesson.</td><td></td><td>Use an alternative collaborative conversation routine in Land.

Conceptual Checkpoint</td></tr>
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Engineering Challenge: How can we help a teacher communicate with students at recess? 8–10 days

Focus Standards

1.6A Identify and discuss how different forms of energy such as light, thermal, and sound are important to everyday life.

1.6C Demonstrate and record the ways that objects can move such as in a straight line, zig zag, up and down, back and forth, round and round, and fast and slow.

Lessons 18–19: Preparation for Engineering Challenge (Talking Drums)		**Lesson 20: Preparation for Engineering Challenge (Communication Devices)**	**Lessons 21–25: Engineering Challenge**
Lesson 18: Explain how people can use instruments to communicate.	**Lesson 19:** Make a claim about which instruments people can use to communicate.	**Lesson 20:** Use observations to explain that devices can use sound, light, and color to help people communicate over a distance.	**Lesson 21:** Apply the engineering design process to create a device that helps a teacher communicate with students over a long distance.
	Day 1: Launch through Visit Message Stations (groups visit 3 stations) **Day 2:** Visit Message Stations (groups visit remaining 3 stations) through Land	**Day 1:** Launch through Visit Communication Device Stations (groups visit 4 stations) **Day 2:** Visit Communication Device Stations (groups visit remaining 2 stations) through Land Share photos and videos of communication devices while students record observations in Visit Communication Device Stations.	**Engineering Challenge**

Engineering Challenge: How can we help a teacher communicate with students at recess? (continued)

Lessons 21–25: Engineering Challenge

Lesson 22: Apply the engineering design process to create a device that helps a teacher communicate with students over a long distance.	**Lesson 23:** Apply the engineering design process to create a device that helps a teacher communicate with students over a long distance.	**Lesson 24:** Apply the engineering design process to create a device that helps a teacher communicate with students over a long distance.	**Lesson 25:** Apply the engineering design process to create a device that helps a teacher communicate with students over a long distance.
Use second Teacher Note in Imagine a Communication Device. Use Differentiation note in Imagine a Communication Device. **Engineering Challenge**	**Engineering Challenge**	**Engineering Challenge**	Use an alternative collaborative conversation routine in Share Communication Devices. **Engineering Challenge**

Application of Concepts: How does the Recycled Orchestra make music? 4 days

Focus Standards

1.5A Classify objects by observable properties such as larger and smaller, heavier and lighter, shape, color, and texture.

1.6A Identify and discuss how different forms of energy such as light, thermal, and sound are important to everyday life.

1.6C Demonstrate and record the ways that objects can move such as in a straight line, zig zag, up and down, back and forth, round and round, and fast and slow.

Lessons 26–29: The Recycled Orchestra of Cateura

Lesson 26: Explain how the Recycled Orchestra makes music.	**Lesson 27:** Use observations to predict whether people can use a cup telephone to communicate.	**Lesson 28:** Explain how a cup telephone works as a communication device.	**Lesson 29:** Explain how objects make sound and how sound can affect objects.
Use Teacher Note in Engage in Socratic Seminar. **Socratic Seminar**	**End-of-Module Assessment**	**End-of-Module Assessment**	**End-of-Module Debrief**

Spotlight Lessons: Earth Materials

Focus Standards: 6–8 days

1.5A Classify objects by observable properties such as larger and smaller, heavier and lighter, shape, color, and texture.

1.5C Classify objects by the materials from which they are made.

1.7A Observe, compare, describe, and sort components of soil by size, texture, and color.

1.7B Identify and describe a variety of natural sources of water, including streams, lakes, and oceans.

1.7C Identify how rocks, soil, and water are used to make products.

Lessons 1–3: Mata Ortiz Pottery			**Lesson 4: Natural Sources of Water**
Lesson 1: Begin a class model to explain how people make Mata Ortiz pottery.	**Lesson 2:** Describe and compare properties of soil parts.	**Lesson 3:** Explore how to use clay and water to make pottery.	**Lesson 4:** Observe photographs to describe and identify natural sources of water.
Use first sidebar Teacher Note in Read About Mata Ortiz Pottery.	Use Differentiation note in Compare Soil Sample Parts.		**Day 1:** Launch through Visit Natural Sources of Water Posters **Day 2:** Describe Natural Sources of Water through Land

Lesson 5: Making Paint	**Lesson 6: Humans' Use of Natural Resources**
Lesson 5: Model how to make paint from natural resources.	**Lesson 6:** Classify human-made resources by the natural resources people use to create each object.
Day 1: Launch through Make Paint **Day 2:** Discuss Making Paint through Land Use Teacher Note in Discuss Making Paint	Use alternative instructional routine in Identify Location of Human-Made Resources

Texas Essential Knowledge and Skills (TEKS)

Focus Standards	
1.5	Matter and energy. The student knows that objects have properties and patterns. The student is expected to
1.5A	classify objects by observable properties such as larger and smaller, heavier and lighter, shape, color, and texture.
1.5C	classify objects by the materials from which they are made.
1.6	Force, motion, and energy. The student knows that force, motion, and energy are related and are a part of everyday life. The student is expected to
1.6A	identify and discuss how different forms of energy such as light, thermal, and sound are important to everyday life; and
1.6C	demonstrate and record the ways that objects can move such as in a straight line, zig zag, up and down, back and forth, round and round, and fast and slow.
1.7	Earth and space. The student knows that the natural world includes rocks, soil, and water that can be observed in cycles, patterns, and systems. The student is expected to
1.7A	observe, compare, describe, and sort components of soil by size, texture, and color;
1.7B	identify and describe a variety of natural sources of water, including streams, lakes, and oceans; and
1.7C	identify how rocks, soil, and water are used to make products.

Investigation and Reasoning Standards	
1.1	Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and uses environmentally appropriate and responsible practices. The student is expected to
	1.1A identify, discuss, and demonstrate safe and healthy 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; and
	1.1B identify and learn how to use natural resources and materials, including conservation and reuse or recycling of paper, plastic, and metals.
1.2	Scientific investigation and reasoning. The student develops abilities to ask questions and seek answers in classroom and outdoor investigations. The student is expected to
	1.2A ask questions about organisms, objects, and events observed in the natural world;
	1.2B plan and conduct simple descriptive investigations;
	1.2C collect data and make observations using simple tools;
	1.2D record and organize data using pictures, numbers, and words; and
	1.2E communicate observations and provide reasons for explanations using student-generated data from simple descriptive investigations.
1.3	Scientific investigation and reasoning. The student knows that information and critical thinking are used in scientific problem solving. The student is expected to
	1.3A identify and explain a problem and propose a solution;
	1.3B make predictions based on observable patterns; and
	1.3C describe what scientists do.
1.4	Scientific investigation and reasoning. The student uses age-appropriate tools and models to investigate the natural world. The student is expected to
	1.4A collect, record, and compare information using tools, including computers, hand lenses, primary balances, cups, bowls, magnets, collecting nets, notebooks, and safety goggles or chemical splash goggles, as appropriate; timing devices; non-standard measuring items; weather instruments such as demonstration thermometers and wind socks; and materials to support observations of habitats of organisms such as aquariums and terrariums.
	1.4B measure and compare organisms and objects using nonstandard units.