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Unit Synopsis

Students take on the role of light and sound engineers as they are challenged with a design problem to design, build, and then project a scene for a puppet show. As light engineers, they tackle the question How do we make different parts of a surface brighter or darker? by investigating cause-and-effect relationships. Students apply their new knowledge to create a background scene for a puppet theater, using patterns of light to create the effects they want. After using light to create a scene, students learn that sound also travels from a source and that vibrations cause sound. Finally, students take on the role of sound engineers to create sound sources for their puppet-show scene. By the end of the unit, students will have engaged in several engineering design cycles in which they learn, plan, make, and test different solutions to a problem.

Amplify Unit Level 3D Statement

Students investigate and construct explanations about **how blocking more or less light from getting from a source to a surface** and controlling vibrations to control sound can be used to create solutions for a puppet-theater company (**cause and effect**). Students apply what they learn in order to **design solutions** to create shadow scenery and sound effects for a puppet-theater show (patterns).

Key: Targeted 3D Learning Objectives
Science and Engineering Practices
Disciplinary Core Ideas
Crosscutting Concepts

***Reference your Scope and Sequence on Curriculum Corner to create your Long-Term Plan to determine your time frame for teaching the unit.**

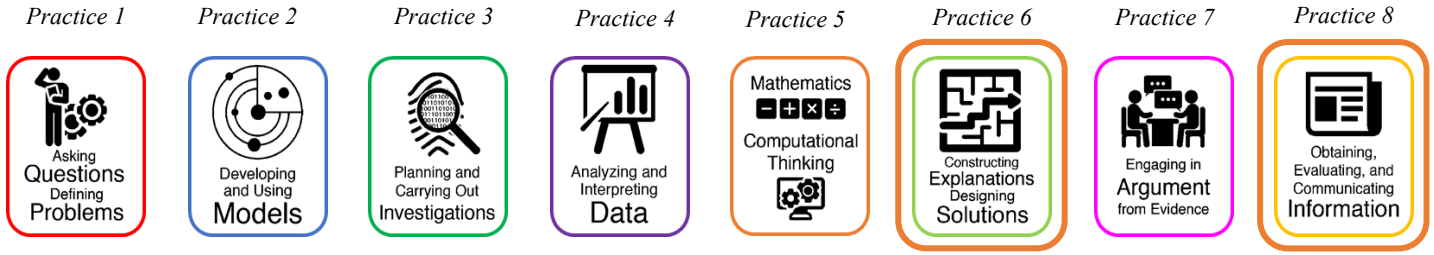
Depending on your Long-Term Plan, you could have 1-3 flex days during the unit. Flex Days are recommended:

- After a Critical Juncture in lessons 1.5, 2.4, 3.4 and 4.4
- Campus based activities day
- Review centers for the End of Unit Exam

DISCIPLINARY LITERACY

Focus on Disciplinary Literacy

In science, disciplinary literacy is synonymous with the science and engineering practices (SEPs). The SEPs are the context through which all science concepts should be taught. In the lessons, you will find the Science and Engineering practices icons when the SEPs are being explicitly used by students. The two focus SEPs for this unit are Constructing Explanations and Designing Solutions and Obtaining, Evaluating, and Communicating Information.



UNIT 1: ADVANCED TEACHER PREPARATION

Step	Action	Resource
1	Internalize the unit by following steps on the Unit Internalization Protocol	Unit Internalization Protocol Curriculum Corner > State > Early Childhood > Grade > Instructional Resources
	Watch the Unit Overview Video/ TIPS	Grade 1 Unit 2 Overview Video
	Review the visual flow of the unit	Coherence Flowchart
	Gain science background knowledge and identify student and teacher preconceptions	Amplify Science Background Knowledge
2	Prepare for each day of instruction by following the Lesson Internalization Protocol for each lesson	Lesson Internalization Protocol Curriculum Corner > State > Early Childhood > Grade > Instructional Resources

PROGRESS BUILD

Below describes the way in which students' explanations of the central phenomenon should develop and deepen over the course of this unit.

Light and Sound Progress Build	
In the *Light and Sound* unit, students will learn to construct scientific explanations of how light from a single light source interacts differently with different materials to produce areas with varying levels of brightness. In addition to the ideas in the Progress Build, students learn that when audible sound is heard, it is because part of the sound source is vibrating. **Prior knowledge (preconceptions):** There is no significant prior knowledge assumed. Students have likely had some direct or indirect experience with turning on and off overhead lights, lamps, or flashlights. They may also have some experience observing or creating shadows.	
Level 1	
Light from a source makes surfaces visible and look brighter.	Anything that is visible has light getting to it from a source. If no light from a source is present, there is no light to get to anything, so nothing is visible (you can't see anything). When light from a source gets to a surface, it looks brighter than without the light.
Level 2	
Some materials can block light from reaching a surface.	Anything that is visible has light getting to it from a source. If no light from a source is present, there is no light to get to anything, so nothing is visible (you can't see anything). When light from a source gets to a surface, it looks brighter than without the light. **If an object is between the source and a surface, the light from the source may not pass through, and the surface is not as bright (darker) as when the light reaches it.**
Level 3	
Some materials allow all or some light to pass through them.	Anything that is visible has light getting to it from a source. If no light from a source is present, there is no light to get to anything, so nothing is visible (you can't see anything). When light from a source gets to a surface, it looks brighter than without the light. If an object is between the source and a surface, the light from the source may not pass through, and the surface is not as bright (darker) as when the light reaches it. **Different materials can allow different amounts of light to pass through them to reach a surface beyond. They can allow almost all light, some light, or no light to pass through. If they allow some light through, the surface looks brighter, but not as bright as with all the light.**

CONTENT STANDRDS

Below are the standards **taught** and **assessed** in this unit.

<table>
<tr><th colspan="2">Standards</th></tr>
<tr><td colspan="2">Next Generation Science Standards (NGSS)

Focal Performance Expectations

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]

1-PS4-2. Make observations to construct an evidence-based account that objects can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]

1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).]

1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drumbeats.]

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.</td></tr>
<tr><td colspan="2">Texas Alignment (TEKS)

K.8A communicate the idea that objects can only be seen when a light source is present and compare the effects of different amounts of light on the appearance of objects; and

K.8.B demonstrate and explain that light travels through some objects and is blocked by other objects, creating shadows.

2.8.A demonstrate and explain that sound is made by vibrating matter and that vibrations can be caused by a variety of means, including sound;

2.8.B explain how different levels of sound are used in everyday life such as a whisper in a classroom or a fire alarm; and

2.8.C design and build a device using tools and materials that uses sound to solve the problem of communicating over a distance.</td></tr>
<tr><td>Ohio Alignment (Ohio’s Learning Standards)
K.PS.2: Some objects and materials can be made to vibrate to produce sound. Sound is produced by touching, blowing or tapping objects. The sounds that are produced vary depending on the properties of objects. Sound is produced when objects vibrate.</td><td>Florida Alignment (NGSSS)

K.P.10.1 Observe things that make sound vibrate.
1.N.1.2 Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.
1.E.6.3 Recognize that some things in the world around us happen fast and some happen slowly.
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</table>

ROADMAP

Below is the recommended sequence of instruction for this unit.

At a Glance Unit 2: Light and Sound								
Day	**Lesson**	**Date**	**Day**	**Lesson**	**Date**	**Day**	**Lesson**	**Date**
1	1.1A		16	2.4 A*		31	4.1 A	
2	1.1 B		17	2.4 B*		32	4.1 B	
3	1.2 A		18	Optional Flex Day		33	4.2 A	
4	1.2 B		19	2.5		34	4.2 B	
5	1.3		20	3.1 A		35	4.3	
6	1.4 A		21	3.1 B		36	4.4 A*	
7	1.4 B		22	3.2 A		37	4.4 B	
8	1.5 A*		23	3.2 B		38	4.5 A	
9	Optional Flex Day		24	3.3		39	4.5 B	
10	1.5 B		25	3.4 A*		40	Review	
11	2.1 A		26	3.4 B*		41	Review	
12	2.1 B		27	Optional Flex Day		42	4.6 A	
13	2.2 A		28	3.5		43	4.6 B	
14	2.2 B		29	3.6 A		44	4.6 C	
15	2.3		30	3.6 B				

* Critical Juncture in lesson

Formative Checks: Each lesson includes a formative check to gauge student progress, using varied, differentiated methods. Examples include: anecdotal records, oral and written explanations with evidence, illustrations with labels, physical models, presentations. Notice that we are moving away from exit tickets and multiple-choice questions. As you review responses, you will need to look for patterns of strength and areas that the teacher needs to make adjustments and provide more support.

- See Scope and Sequence for Scanning Deadline, Link
- **Allow 5 business days BEFORE the scanning deadline for grading responses and entering grades.**