Mystery science

Anchor Layer Teacher Guide

A curriculum companion for Anchor Layer users

Grade 1

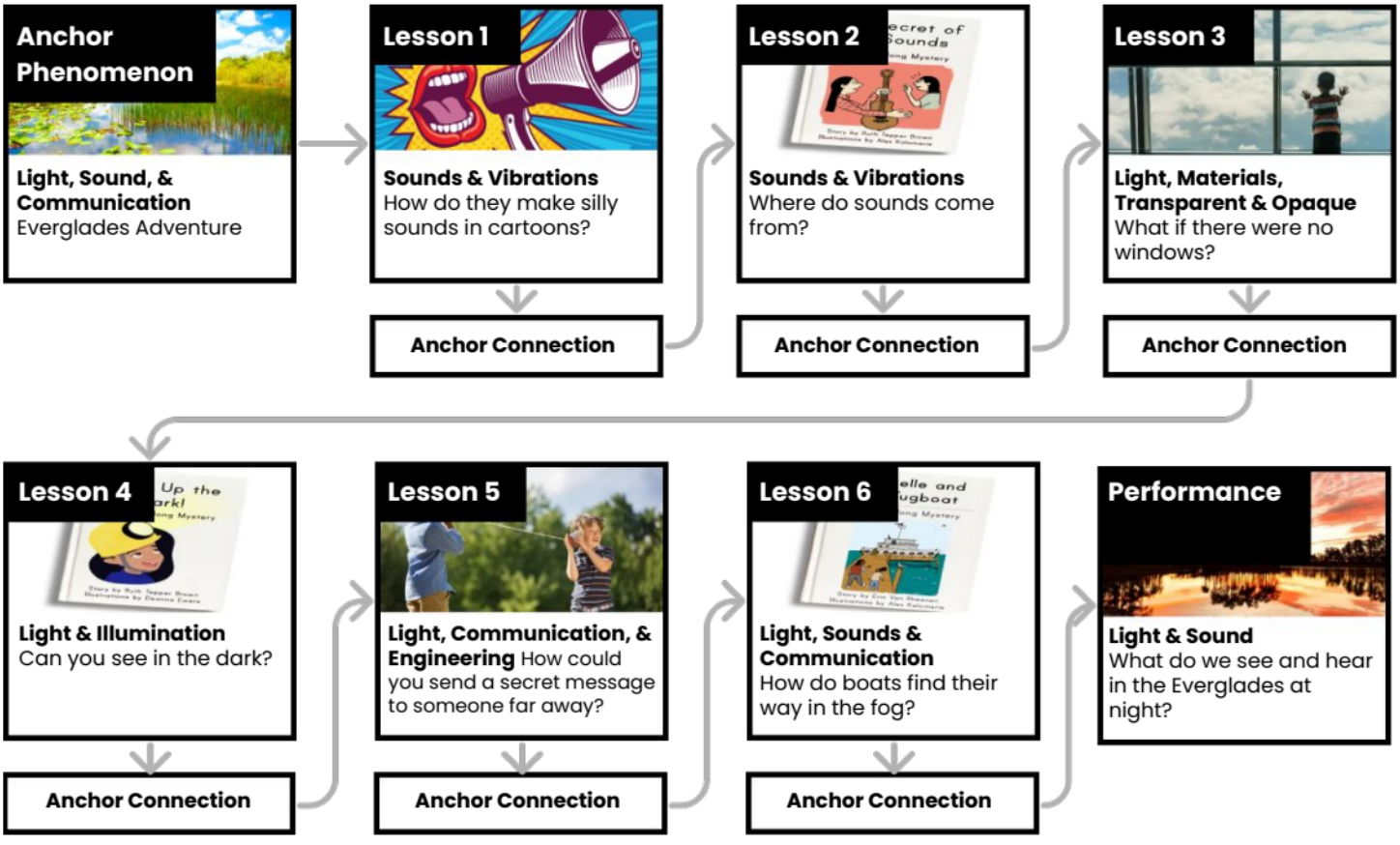
Light, Sound, & Communication

Unit Web Link • Pacing Guide • Other Units

Unit Summary

In this unit, students investigate light and sound! They explore how materials vibrate and how vibrating materials can make sounds. They also investigate light and illumination and use those investigations to create simple devices that allow them to communicate across a distance.

Performance Expectations	Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• 1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. • 1-PS4-2. Make observations to construct an evidence- based account that objects can be seen only when illuminated. • 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 • 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. • 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.	• Constructing Explanations and Designing Solutions • Planning and Carrying Out Investigations • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information	• PS4.A: Wave Properties • PS4.B: Electromagnetic Radiation • PS4.C: Information Technologies and Instrumentation • ETS1.B: Developing Possible Solutions	• Cause and Effect • Patterns



Anchor Phenomenon Background

How do animals communicate?

Animals, including humans, communicate in a wide variety of ways. From birds that sing to one another, to fireflies that flash light to each other, to humans having a conversation, there is a huge amount of diversity in how different animals communicate.

However, many examples within this huge range of different forms of communication have something in common: they rely on either light or sound. There are other forms of communication that rely on other senses, such as the sense of smell, but lights and sounds play a key role in many, many of the varied ways that animals communicate.

For animals to make sounds, they must vibrate one or more parts of their body. Indeed, all sounds are caused by vibrations. And for an animal to hear those vibrations, they must be able to detect those vibrations.

In this Anchor Layer, students will observe alligators making sounds. Alligators vibrate so strongly that the water around their bodies visibly splashes around. This helps students understand that sounds are caused by vibrations.

For animals to see anything around them, there must be light. In total darkness, animals cannot see. This means that visual communication is not possible for many animals at night. Some animals, however, are able to get around this problem by producing their own light. Fireflies are one example of animals that can do this.

By understanding the variety of ways that other animals communicate, humans can design new forms of communication. But even with those new forms of communication, they still rely on our senses. And frequently, our senses of sight and hearing play key roles.

Anchor Phenomenon: Everglades Adventure
Light, Sound, & Communication

Anchor Phenomenon
15 mins

Guided Inquiry
15 mins

Anchor Phenomenon Overview

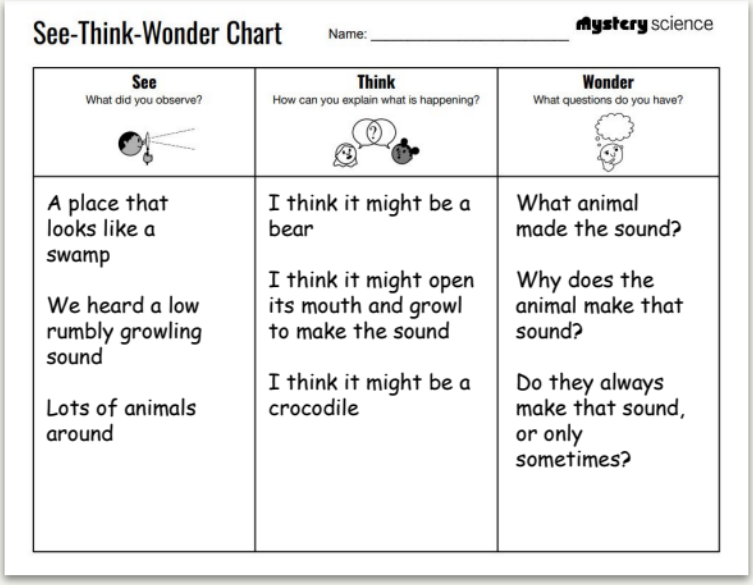
Note: This lesson is part of this unit's Anchor Layer. If you have the Anchor Layer turned on, we recommend teaching all of the lessons in this unit in order.

The anchor phenomenon for this unit is based around two animals that are found in the Everglades, and how each of them communicate.

During the introduction, students generate observations and questions about the phenomenon and create a list of possible explanations for the phenomenon. Students will use these initial ideas to track how their understanding grows throughout the unit.

Student Work Samples & Notes

Students will gather clues during and after each lesson in this unit to help them improve their understanding and explanations. It is important to encourage students to recognize that even if they don't know the perfect answer yet, they are going to learn a lot throughout the unit and will have an opportunity to revisit the phenomenon over time.



See-Think-Wonder Chart

Name: _____

See What did you observe?	Think How can you explain what is happening?	Wonder What questions do you have?
A place that looks like a swamp We heard a low rumbly growling sound Lots of animals around	I think it might be a bear I think it might open its mouth and growl to make the sound I think it might be a crocodile	What animal made the sound? Why does the animal make that sound? Do they always make that sound, or only sometimes?

Lesson 1: How do they make silly sounds in cartoons? (pg 1 of 2)
Sounds & Vibrations

Exploration
10 mins

Hands-On Activity
20 mins

Anchor Connection
15 mins

Assessment
20 mins

Overview

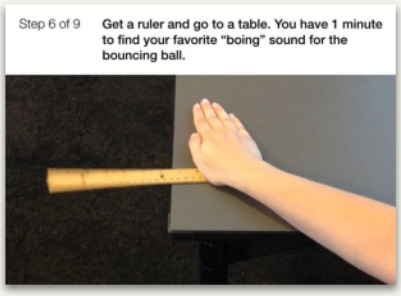
In this lesson, students investigate vibrations as a source of sound effects for movies.

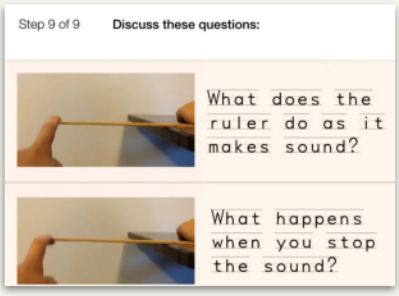
In the activity, Be a Sound Effects Artist, students use their hands and feet to create a "rainstorm," and then use rulers to create a “boing” sound for a cartoon bouncy ball.

Activity Notes

During the rainstorm activity, you may want a way to make thunder. It’s fun to add the rumble and crash of thunder and is another visible demonstration of vibration creating sound. Watch this video to see how to use the optional items to make thunder.

If you decide to add thunder to your rainstorm, decide who will be the Thunder Master, the maker of thunder. We suggest you let this person experiment before class so that they can create a great thunder sound for your rainstorm.





Anchor Connection on Next Page

Lesson 1: How do they make silly sounds in cartoons? (pg 2 of 2)
Sounds & Vibrations

Exploration
10 mins

Hands-On Activity
20 mins

Anchor Connection
15 mins

Assessment
20 mins

Anchor Connection

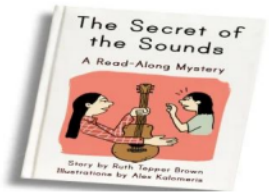
In this lesson, students made their first observations of how sounds are created. Whenever an object is making a sound, it is vibrating. This is also true for living things, such as alligators. They have to vibrate in order to make sounds.

Students revisit the See-Think-Wonder chart that they worked on during the Anchor Phenomenon. They should understand that all objects that make sound do so by vibrating. This is true for everything, from the sounds we hear in cartoons to the sounds of alligators in wetlands.

Connecting Storyline Question

How do the alligators make sound?

Lesson 2: Where do sounds come from?
Sounds & Vibrations



Digital Book (W/ Audio)
25 mins

Hands-On Activity
20 mins

Anchor Connection
15 mins

Assessment
20 mins

Overview
In this Read-Along lesson, Lin explores the sounds made by different kinds of instruments, and discovers what happens when vibrations start—and when they stop.

The lesson includes a short exercise where students experiment with a piece of paper to make the connection between vibrations and sound. You can extend the lesson with the optional activity, Head Harp, where students make simple musical instruments using only their heads and string.

Activity Notes
We recommend a simple sound experiment from San Francisco's Exploratorium that lets your students experiment with sound— without making a lot of noise. Follow the instructions here. Encourage students to experiment to figure out how to change the sound.

Anchor Connection
In this lesson, students observed additional examples of vibrations causing sounds. The alligators actually make their entire bodies vibrate when they make sounds.

Students revisit the See-Think-Wonder chart that they worked on during the Anchor Phenomenon. They should understand that some vibrations can only be heard, but some can be seen. By observing the entire alligator's body, we can see that it is completely vibrating.

Connecting Storyline Question
What other kinds of living things are there in the Everglades?

Lesson 3: What if there were no windows?
Light, Materials, Transparent & Opaque

Exploration
10 mins

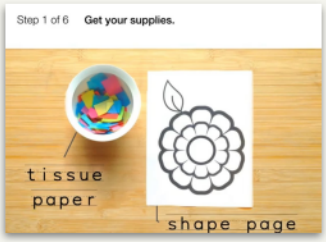
Hands-On Activity
20 mins

Anchor Connection
15 mins

Assessment
20 mins

Overview
In this lesson, students consider materials from the perspective of how much light they let through.

In the activity, Paper Stained Glass, they use these materials to create a work of art.



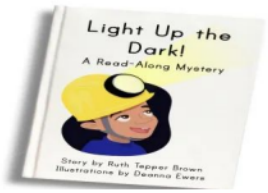
Activity Notes
For the main activity, Paper Stained Glass, you will need windows so you can display students' artwork. This lesson includes a "Seeing & Sorting" exercise to get students thinking about light and materials before they make their Paper Stained Glass. For more detailed prep details, see our lesson page.

Anchor Connection
In this lesson, students made observations of various materials to see whether they are transparent, translucent, or opaque. These observations help prepare students to explain the next animal that they will observe in the Everglades.

Students complete a new See-Think-Wonder. They should understand that some animals in the Everglades are silent, but they can somehow be seen when it is totally dark at night.

Connecting Storyline Question
How do we see the light from fireflies?

Lesson 4: Can you see in the dark?
Light & Illumination



Digital Book (W/Audio)
25 mins

Hands-On Activity
20 mins

Anchor Connection
15 mins

Assessment
20 mins

Overview
In this Read-Along lesson, Santiago visits a cave and discovers that when it's dark (really dark!) he can't see anything.

The lesson includes a short exercise where students find the sources of light around them. You can extend the lesson with the optional activity, Dark Box, where students experience what it's like to try to see in the dark.

Activity Notes
For the optional activity, we recommend making enough Dark Boxes prior to class so that students can work in pairs. If you only have enough materials to make one or two Dark Boxes, you can use this experiment as an activity station. For more detailed prep instructions, see the lesson page.

Anchor Connection
In this lesson, students learned that you cannot see things in total darkness. You need light to be able to see. And yet, the new animal introduced in the previous anchor connection was visible at night. This means it must be emitting its own light.

Students revisit the See-Think-Wonder chart that they worked on during Lesson 3. They should understand that in order to see objects, they must be illuminated. For most living things, we need external light to see them. Fireflies make their own light!

Connecting Storyline Question
Why do the fireflies glow?

Lesson 5: How could you send a secret message to someone far away?

Light, Communication, & Engineering

Exploration
17 mins

Hands-On Activity
25 mins

Wrap-Up
3 mins

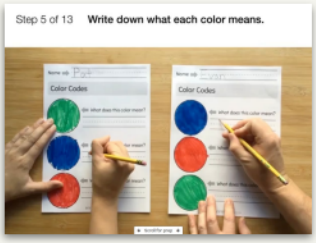
Anchor Connection
15 mins

Assessment
20 mins

Overview

In this lesson, students practice using light to communicate information.

In the activity, Secret Signals, students work in pairs to build a device that solves the problem of communicating over a distance. They send secret messages to one another using light and colored markers.



Activity Notes

Make sure you have enough space. Pairs of students will need to be at least 5 or 6 feet apart, and have a clear line of sight to each other.

You will need to do this activity in the dark with the lights off and curtains drawn.

Anchor Connection

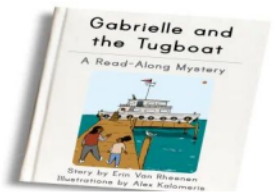
In this lesson, students sent messages using colored paper and lights. This is similar to how fireflies send messages to one another. They communicate via the flashes of light that they emit from their bodies.

Students revisit the See-Think-Wonder chart that they worked on during Lesson 3. They should understand that alligators use sound and fireflies use light to communicate. This is just like humans: we use light and sound to communicate, too!

Connecting Storyline Question

Why do animals make sounds and light?

Lesson 6: How do boats find their way in the fog?
Light, Sounds & Communication



Digital Book (W/Audio)
25 mins

Hands-On Activity
20 mins

Anchor Connection
15 mins

Assessment
20 mins

Overview
In this Read-Along lesson, Gabrielle sets sail with her aunt—the captain of a tugboat—and discovers how the sights and sounds on the bay can help boats find their way.

The lesson includes a short exercise where students get moving by pretending to be boats. You can extend the lesson with the optional activity, Navigating by Sights and Sounds, where students play games to practice listening for sound cues.

Activity Notes
We recommend two activities (Red Light/Green Light and Sound Card Challenge) that let students explore their own skills of watching and listening and practice some of the sound words they hear every day.

Anchor Connection
In this lesson, students learned how we can communicate with boats via lights and sounds. Animals, such as alligators and fireflies, communicate via lights and sounds, too!

Students revisit both See-Think-Wonder charts that they worked on during this unit. Students should understand how animals use light and sound to communicate, just like humans do.

Connecting Storyline Question
What's it like in the Everglades at night?

Performance Task: What do we see and hear in the Everglades at night?

Light & Sound

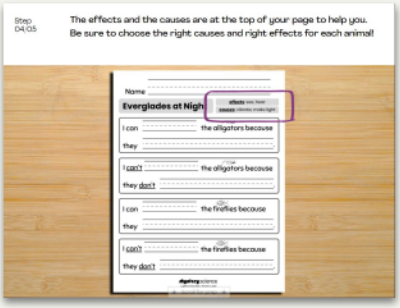
Unit Review
10 mins

Hands-On Activity
35 mins

Overview

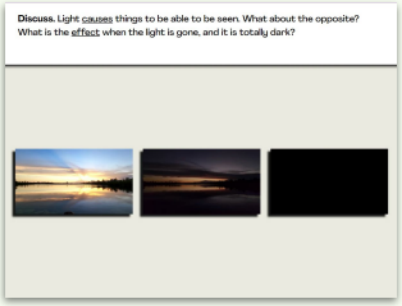
In this performance task, students will use observations to explain the cause and effect relationship behind the ways that fireflies and alligators appear and sound under the darkness of night.

After a review of the unit, students will make a final nighttime observation of the alligators and fireflies. They will use what they have learned over the course of the unit to explain the cause and effect relationship behind what they see and hear.



Performance Task Notes

Students can work individually, in pairs, or you may choose to work with small groups. Print as many copies of the Everglades at Night worksheet as you will need for your students. One copy will be needed for each individual, each pair, or each small group.

Crosscutting Concepts

Cause and Effect: Sounds are caused by vibrations. A lack of vibrations causes silence. This is a foundational concept in understanding the things that we hear. There is a similar concept with vision: light must be present in order for us to see things. A lack of light causes us to not be able to see.