CCPS Science Unit Plan

Grade	4	Subject	Science	Unit #	4
Unit Name	Unit 4: Light and Sound		Timeline	5 Weeks	
How to use the Framework	This Framework should be used to implement daily science instruction. The resources and instructional strategies reflected in the Framework will provide a foundation for effective implementation and student mastery of standards. Please see the hyperlinked abbreviation document to ensure understanding of all abbreviations used with this framework. CCPS Department of Science Website for access to all unit frameworks				
Unit Overview	*All resources related to this Framework are embedded in this document or can be located via the Science Department website. **Background Information:** Physical science is the study of matter and energy. In 4th grade, students will investigate light, sound, force, and motion. Students will learn that light waves transfer energy and travel in straight lines until they interact with objects or pass through different materials. Light can also be absorbed, redirected (refracted), bounced back (reflected), or allowed to pass through a material. Students will learn that depending on the amount of light that an object allows to pass through, an object can be classified as opaque, transparent, or translucent. Student will then learn how light can be manipulated through refraction or reflection. Sound waves also transfer energy causing vibrations. Sound, like light, can be manipulated. Weak vibrations make soft sounds and strong vibrations make loud sounds. You can also change how high or low a sound is (pitch) by changing the rate of vibration of the object making the sound. Both light and sound can be used to communicate in several ways - especially when there is distance involved. **Prerequisites:** First Grade - Unit 3:Light and Sound (Standards: S1P1 a/b/c/d/e) **By the end of this unit the student will be able to**: ● *plan and carry out investigations* to investigate the nature of light and sound and how they interact with various objects ● *design* a device to communicate across various distances. **By the end of this unit the teacher should:** ● *guide* students in planning and executing investigations to answer questions or test solutions, advancing from basic to more controlled inquiries. ● *advise* students in the practice of constructing and utilizing models, encouraging the use of various tools such as diagrams, physical replicas, and computer simulations to represent scientific concepts or engineering solutions. **Science-4th-Teacher-Notes.pdf**				
Lesson Plan guidance document and template	Link the following : https://drive.google.com/file/d/1dDFitw1NesctodMZ9XAr7zc0-S5GZKPB/view?usp=drive_link				

Standards

GSE	Science and Engineering Practices	Crosscutting Concepts
S4P1. Obtain, evaluate, and communicate information about the nature of light and how light interacts with objects. **a**. Plan and carry out investigations to observe and record how light interacts with various materials to classify them as opaque, transparent, or translucent. **b.** Plan and carry out investigations to describe the path light travels from a light source to a mirror and how it is reflected by the mirror using different angles. **c.** Plan and carry out an investigation utilizing everyday materials to explore examples of when light is refracted. (Clarification statement: Everyday materials could include prisms, eyeglasses, and a glass of water.) **S4P2. Obtain, evaluate, and communicate information about how sound is produced and changed and how sound or light can be used to communicate.** **a.** Plan and carry out an investigation utilizing everyday objects to produce sound and predict the effects of changing the strength or speed of vibrations. **b.** Design and construct a device to communicate across a distance using light and/or sound	**Planning and carrying out investigations-**Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K– 2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. **Develop and Using Models** A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations**.**	**Patterns** Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. **Cause and Effect** Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts. **Systems and System Models** Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering. **Energy and matter** Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations. **Stability and Change** For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.

NGSS Alignment

NGSS Alignment to Disciplinary Core Ideas

Anchoring Phenomena	Learning Targets
S4P1a - **Cardboard Box**	The students will plan and carry out investigations to observe and record how light interacts with various materials to classify them as opaque, transparent, or translucent.
S4P1b - **Funhouse Mirror**	The students will plan and carry out investigations to describe the path light travels from a light source to a mirror and how it is reflected by the mirror using different angles.
S4P1b - **Amazing Arrow (Video Link)**	The students will plan and carry out an investigation utilizing everyday materials to explore examples of when light is refracted.
S4P2a - **Frog in a Pond (Video Link)**	The students will plan and carry out an investigation utilizing everyday objects to produce sound and predict the effects of changing the strength or speed of vibrations.
S4P2b - **Signal on a Playground**	The students will design and construct a device to communicate across a distance using light and/or sound.

Weekly Lesson Tasks

Week 1

GSE: S4P2.a

Focused Concept:
- **How sound is produced by changing the strength or speed of vibrations**

Learning Target — The students will plan and carry out investigations to describe how changing the strength or speed of vibrations affects sound

Lab Safety Protocol:
1. **Materials and tools should not come into contact with a person, only other materials**
2. **Water must stay on the table and should not hit the floor - this would indicate rough use of the materials**
3. **General Safety Practices for the Elementary Science Classroom- TOC.docx**

Materials:

Index Cards (suggested) drawing paper (suggested) colored pencils (consider) cups of water assortment of ropes assortment of long springs	measuring tape stopwatch or timer string Rulers Rice Bowls Plastic Wrap

Phenomenon: Frog in a Pond (video link)

Driving Question: "Why does the water move in different ways around the toad?"

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomena Introduction Show students the phenomenon card : Frog in a Pond (video	**Introduce the Driving Question:** Have students review the	**Graphic Organizer** Students will need and use the student lab sheet for "How does	**Text Annotation Strategy** Have students read and annotate the following text:	**Claim-Evidence-Reasoning** Students will write a response to the following driving question

link)

Use the See-Think-Wonder protocol to guide student thinking.

Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson.

Inquiry Activity

Savvas uInvestigate Lab
"How Do We Describe Waves?"
Graphic Organizer:
uInvestigate Lab_ How d…
How do we describe waves?

Objective: Students will make a model to teach younger students about waves.

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Plan and Carry Out Inves…

Have students follow the procedure provided in the lab and answer the Analyze and Interpret question.

The students should use this graphic organizer to record their observations:
uInvestigate Lab_ How d…

driving question:

"Why does the water move in different ways around the toad?"

Use the strategy to support students with making connections and understanding the driving question (DQ).

Visualizing the Driving Question

Click here to access question words reference chart

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.
****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to

a wave carry energy?" provided in their consumable book or the access to the student handout for "How does a wave carry energy?"
uInvestigateLab_ How D…

Materials
assortment of ropes
assortment of long springs (slinkys)
measuring tape
stopwatch or timer
string

Investigation Facilitation
uInvestigation lab
How does a wave carry energy?

Objective: Students will make models of a wave and describe how energy moves along the wave.

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Plan and Carry Out Inves…

Students will need to work in partner pairs. The teacher should assign partners prior to the beginning of the lesson.

Have students follow the procedure provided in the lab.

The lab for this week's lesson can be found by accessing **SAVVASGrade 4, Waves and Information Unit, Lesson 1**

Properties of Waves

The text for this week's lesson can be found by accessing **SAVVAS Grade 4 Waves and Information, Topic: Properties of Waves**

The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy:

3-5 Text Annotation Prot…

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)
3-5 Information Analysis…

During the teacher-led discussion, the teacher should ask the following questions:

1. How could you use waves to send a message across the room?
2. How could you demonstrate the difference between amplitude and frequency?
3. How do patterns in waves change in different mediums?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

in the CER format.

Why does the water move in different ways around the toad?

Review the claim-evidence-reasoning poster with the students

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Rea…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

The lab for this week's lesson can be found by accessing **SAVVAS Grade 4, Waves and Information Unit, Topic Launch**

**TEACHER NOTE:
The students should decide on their model. However, consider guiding the students to use the following opportunities to model waves:

1. Providing students with cups of water and having them tap the table at various strengths

or

2. Provide students with a ruler on the desk or hanging slightly off the desk and have students tap the ruler

or

3. Wrap an empty plastic bowl with plastic tightly across the opening, pour dry rice on the plastic wrap over the bowl and have have students tap on the table around the bowl; sand can be used instead of rice

This will provide a visual of waves caused by various sounds for the lab activity.

Ask students the following questions:
What did you See, Think, or Wonder when creating your waves? What happens to the water when you tap on the table…why do you think that happens? How does your model represent a wave? How is your model related to the video of the frog?

review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

Student CER Sample

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reasoni… (PDF)

1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.

2. Identify the student's evidence in the sample and have the

Properties of Waves

As students work, the teacher should prompt them with the following questions: *what are you going to have to do with your own body to create a wave that continues for at least 10 seconds? what is the difference in creating the wave for the slinky, rope, and string… do the waves look different… did you have to move your body differently? How can you change how the waves look while still keeping it as a wave? what makes a wave… how do you know when you look at it? What characteristics did all of your waves have? how are the waves that we are creating now related to the waves that the frog created?*

**TEACHER NOTE:
Students may not have the background knowledge to create steps from scratch or original thought. Consider providing the following steps to students to place in any order. Allow students an opportunity to test multiple times.

Procedures and Data Graphic Organizer

Allow students time to work in groups to develop the order of steps if they are unable to generate steps from scratch. The digital version above can be printed front and back to differentiate for different students

The teacher may guide discussion on filling in the

Vocabulary Strategy

Vocabulary Words:
wavelength, amplitude, frequency, pitch, volume, vibrations, speed, strength, sound waves,

ONLY PICK ONE OF THE STRATEGIES BELOW

Vocabulary Strategy: Vocabulary Connect Two Strategy
Provide students with the graphic organizer (editable) or pdf handout.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. Allow students to research the word using reference tools (google, research options, peer discussion, etc.). The teacher should model researching the word and using the information gathered to decide on another term that creates connections between the vocabulary word and another term/word.

Allow students to work in collaborative groups to discuss and research the other provided vocabulary terms and repeat the modeled instructional strategy.

Have students collaborate, in groups, to complete the strategy for the other vocabulary terms.

Allow groups to share their

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:

S4P2a Properties of Waves

As students are sharing ideas, the teacher should capture student words that are related to the vocabulary they will be expected to use by the end of the week: **wavelength, amplitude, frequency, pitch**; student words can be displayed on an anchor chart to refer to throughout the week. **NOTE: The teacher does not need to teach the vocabulary words at this time; only provide students an opportunity to connect meaning. (For example: The teacher should make a list to record words similar to: *ripples, rippled a lot, a big wave, little waves, tapped the table lightly, etc.)* **Materials:** Index Cards (suggested) drawing paper (suggested) colored pencils (consider) cups of water	*teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reasoni… **Teacher Note: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	**blanks for the procedures with small groups or in whole groups, allowing students to develop ideas themselves.** In this lab, students will begin to notice that the distance between the peaks gets smaller as the rope is shaken harder. In other words, the frequency is higher with more energy. The vocabulary word "peak" is used in student questioning. The teacher should be prepared to have students explain what they think the "peak" of the wave is and why; clarify any misconceptions about the definition. Students should have the opportunity to try creating waves with all materials. Note that waves can be created in various waves, but there will be a pattern created from each as seen in student drawings For the teacher's reference, please view the videos below that show how waves can be made with the various materials: Slinky String/Rope Following the investigation	thinking through academic dialogue and compare their completed task with members of other groups.	

Week 2	
GSE: S4P2.a	**Focused Concept:** ● **Students will use everyday objects to plan and carry out investigations to make sound** ● **Students will predict how changing the strength or speed of vibrations affects sound**

Learning Target	I can plan and carry out an investigation to predict how the strength or speed of vibrations affects sound			
Lab Safety Protocol: 1. **Materials and tools should not come into contact with a person, only other materials** 2. **Ropes should be gripped firmly on both ends before shaking** 3. **When not in use, ropes should be on the ground** 4. **General Safety Practices for the Elementary Science Classroom- TOC.docx**			**Materials:** Scientist Notebook/Journal Graphic Organiser (link) Clothesline or Jump Rope (12ft) per group	
Phenomenon: Frog in a Pond (video link)			**Driving Question: "Why does the water move in different ways around the toad?"**	
Day 1: Opening	**Day 2 : Guided Practice/ Transition**	**Day 3: Independent Practice**	**Day 4: Independent Practice**	**Day 5: Assessment / Summary**
Phenomena Introduction Show students the phenomenon card : Frog in a Pond (video link) Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to review observations/questions from the previous week and discuss any changes or additions they would make. Students may have additional questions. Teacher should record all observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity** **Chrome Music Lab** **Sound Waves** Chrome Music Lab: Sound Waves **Objective:** Students will plan and carry out an investigation to discover how sound is a wave and how pitch affects that wave	**Introduce the Driving Question:** Have students review the driving question: *Why does the water move in different ways around the toad?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer. Be sure to create a reference for students to have throughout the week. **TEACHER NOTE: Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the	**Graphic Organizer** Students will need and use the student lab sheet for the **Mystery Science** activity that they complete on day 1: "Why are some sounds high and some sounds low?" **Materials** Graphic Organizer (link) Clothesline or Jump Rope (12ft) per group Chrome Music Lab: Sound Waves **Investigation Facilitation** **Mystery Science Lesson** **Why are some sounds high and some sounds low?** **Objective:** Students will plan and carry out an investigation to demonstrate how sound is a wave and how pitch affects that wave **SEP TEACHER TIP:** To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:	**Text Annotation Strategy** Have students read and annotate the following text: ReadWorks - Now Hear This The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysis… During the teacher-led discussion, the teacher should ask the following questions: 1. How does the ear hear sound? 2. Why can't humans hear some sounds? 3. How are pitch, frequency, and amplitude related?	**Claim-Evidence-Reasoning** Students will write a response to the following driving question in the CER format. ***Why does the water move in different ways around the toad?*** Review the claim-evidence-reasoning poster with the students **TEACHER NOTE: Provide students with sentence starters by sharing on the board: 3-5 Claim-Evidence-Rea… Have students write their claim-evidence-reasoning **writing a claim** Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Plan and Carry Out Inves…

The teacher can display the Chrome Music Lab website on the board for students or share the link with them to access on their own computers. Suggestion: allow students to use headphones if available

Chrome Music Lab

Mystery Science Graphic Organizer: "Why are some sounds high and some sounds low?"

**TEACHER NOTE:
The students will use the Chrome Music Lab to prepare for the Mystery Science Activity on day 3 by allowing students to complete the Mystery Science Graphic Organizer with the Chrome Music Lab app.

Students need to investigate Pitch in order to prepare for the investigation on Day 3. The teacher should provide students with the Graphic Organizer and discuss the following questions: *based on the information in the first box, how will you know if a sound will have a high pitch or a low pitch? What do you think the wave will look like if the pitch is low… why? If its high? How will you investigate pitch using the ChromeLab Piano?*

phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

Student CER Sample

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol.

Plan and Carry Out Inves…

The lab for this activity can be found by accessing **Mystery Science, Waves of Sound Unit, Lesson 4**

Students will need to work in groups. The teacher should assign groups prior to the beginning of the lesson.

Allow students time to review the lab's graphic organizer. Allow students to work in groups to discuss how they would like to approach the lab with the materials they will have available, the objective and the lab sheet. Provide guidance on approaches to the lab where necessary.

Have students follow the procedure provided in the lab. Remember to review lab safety rules.

The teacher should ask the following questions throughout the investigations: *how do you know that the pitch is high or low? what is the difference in the way the wave looks between pitches? how can you determine what is needed to create a higher pitch sound or lower pitch sound?*

**TEACHER NOTE:

Students should be *constructing explanations* as a goal of their investigation. This should look like students capturing their observations through picture evidence then using that

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy

Vocabulary Words:
pitch
frequency
Hertz
wavelength
amplitude
oscilloscope

Vocabulary Strategy:
Four Square
Provide students with the graphic organizer (editable) or pdf handout, explaining its four sections: word, meaning, picture, and sentence.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words.

Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate to complete the four square strategy for the other vocabulary terms.

Monitor student progress, sharing new ideas for class discussion, and help students

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:

What are two steps that you will take to complete the graphic organizer? What is wavelength? How will you measure it? **ADDITIONAL ACTIVITY** Savvas Interactivity: Sound **Objective**: Students will develop an understanding of the components of waves and their relationships to one another Interactivity can be assigned individually, in student groups, or guided by the teacher. The teacher should take time following the activity to discuss vocabulary words that students encountered. Write down student understandings of the vocabulary to refer to through the unit The teacher should ask the following questions through the lesson: *what is wavelength? what is the relationship between wavelength and pitch? What is amplitude? what is the relationship between amplitude and volume? How is frequency related to all of these? Where have you heard or used the word frequency before? How is that use related to what you see in this simulation? Can you have a high amplitude and a low wavelength? Why or why not?* **Materials:** Scientist Notebook/Journal	Ask students to use the CER observations chart to complete the following analysis protocol: Claim-Evidence-Reasoning Record Observations Document (google doc) Claim-Evidence-Reasoni… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reasoni… ****Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	evidence to explain any the difference between high and low pitched sounds Activity may need to be done in a larger space than the classroom to allow enough room for each group to make their waves with their ropes Remember to review the lab safety rules.	distinguish essential from non-essential characteristics. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	S4P2.a Pitch (Mystery S…

Week 3

GSE: S4P1.a	**Focused Concept:** • **Students will observe how light interacts with various materials** • **Students will classify materials as opaque, transparent, or translucent**
Learning Target	The students will plan and carry out an investigation to determine how light interacts with various materials in order to classify the materials

Lab Safety Protocol:

1. **Materials and tools should not come into contact with a person, only other materials**
2. **Do not shine light at anyone's face, directly or indirectly.**
3. **General Safety Practices for the Elementary Science Classroom- TOC.docx**

Materials:

light source black construction paper white construction paper scissors tape mirror	protractor string Flashlight (operable) Various materials to shine light through (eg. tinfoil, wax paper, saran wrap, wood, cellophane, glass)

Phenomenon: Cardboard Box

Driving Question : "Why can't we see what is inside a cardboard box?"

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomena Introduction Show students the phenomenon card : Cardboard Box Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson.	**Introduce the Driving Question:** Have students review the driving question: *Why can't we see what is inside a cardboard box?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question	**Graphic Organizer** Students will need and use the student lab sheet for the GaDOE lab "Light" provided on the Inspire site and linked here: How Much Light Graphic Organizer **Materials** Flashlight (operable) Various materials to shine light through (eg. tinfoil, wax paper, saran wrap, wood, cellophane, glass) **Investigation Facilitation** **GaDOE Inspire Task: Light**	**Text Annotation Strategy** Have students read and annotate the following text: Waves and the Electromagnetic Spectrum The text for this week's lesson can be found by accessing **SAVVAS Waves and Information, Lesson: Waves and the Electromagnetic Spectrum** The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided	**Claim-Evidence-Reasoning** Students will write a response to the following driving question in the CER format. ***Why can't we see what is inside a cardboard box?*** Review the claim-evidence-reasoning poster with the students **TEACHER NOTE: Provide students with sentence starters by sharing on the board: 3-5 Claim-Evidence-Rea…

Inquiry Activity

Savvas uInvestigate
"How is Light Reflected"

Objective: Students will develop a model that explains how light is reflected

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Plan and Carry Out Inves…

The text for this week's lesson can be found by accessing **SAVVAS Waves and Information, Lesson: Waves and the Electromagnetic Spectrum**

Graphic Organizer

Students will need and use the student lab sheet for "How is Light Reflected?" provided in their consumable book or the access to the student handout for "How is Light Reflected?"

Allow students time to review the lab's graphic organizer. Allow students to work in groups to discuss how they would like to approach the lab with the materials they will have available, the objective and the lab sheet. Provide guidance on approaches to the lab where necessary.

**TEACHER NOTE:
words reference chart

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.
****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

What makes an object translucent, transparent, or opaque?

Objective: Students will plan and carry out investigations to determine how light interacts with various materials to classify the materials as translucent, transparent, or opaque

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Plan and Carry Out Inves…

Students will need to work in groups. The teacher should assign groups prior to the beginning of the lesson.

Have students follow the procedure provided in the lab task: GaDOE Inspire Task: Light.
Remember to review lab safety rules.

**TEACHER NOTE:
The task is modified to allow students to use their own terminology and definition to explain how light interacts with objects. The teacher should NOT explicitly teach vocabulary on this day. Instead, guide students thinking by asking the following questions: *Does light pass through the object at all? how much light passes through the object? can you compare the amount of light passing through one object to* in the following strategy:

3-5 Text Annotation Prot…

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)
3-5 Information Analysis…

During the teacher-led discussion, the teacher should ask the following questions:

1. How can the path of light be changed?
2. What is the difference between transparent, translucent, and opaque?
3. How can we manipulate the path of light using various materials?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy

Vocabulary Words:
ray, reflect, absorb, mirror, transparent, translucent, opaque, light, energy

Vocabulary Strategy:
Four Square
Provide students with the

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students'

The teacher should encourage students to use all materials that are listed in their investigation plan. Students will investigate how the path of light can be manipulated using various objects. **If students need guided support,** the teacher can follow the Guided Inquiry instructions and prepare the "T" paper in advance. Have students consider what the light will do when hitting the white paper versus the black paper. The horizontal slit in the black paper should be long enough to shine the light through but should not cut the black paper totally in half. The students will observe how the angle of the split affect how the light hits the mirror The teacher should ask the following questions of students during the planning and investigation phase: *how do you think the light will interact with both papers (black and white)? With that understanding, what can you do to change how the light travels? how can the mirror affect the way the light travels? what is the difference in how the papers affect the light versus the mirror?* **Materials:**	Review the claim-evidence-reasoning poster with students. As a class or in student groups, provide students with this week's claim-evidence-reasoning sample. The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names. The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol: Claim-Evidence-Reasoning Record Observations Document (google doc) Claim-Evidence-Reasoni… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the	*another?* Ensure students are given multiple types of materials to interact with. Students should be *constructing explanations* as a goal of their investigation. This should look like students capturing their observations through picture evidence then using that evidence to explain how the light responded to each material In student groups, it may help to assign specific materials to each student so that time is not spent allowing all students to test all materials. Remember to review the lab safety rules.	graphic organizer (editable) or pdf handout, explaining its four sections: word, meaning, picture, and sentence. Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term. Have students collaborate to complete the four square strategy for the other vocabulary terms. Monitor student progress, sharing new ideas for class discussion, and help students distinguish essential from non-essential characteristics. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	samples. Ask the following questions: *How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?* **Assessment for Learning:** **S4P1a Light Interactio…**

light source black construction paper white construction paper scissors tape small mirror protractor string	student samples: Claim-Evidence-Reasoni… **Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.			

Week 4				
GSE: S4P1.b, S4P1.c		**Focused Concept:** • **Investigate the path that light takes** • **Investigate how light can be reflected or refracted using different materials including a mirror**		
Learning Target	Students will plan and carry out investigations to describe the path that light takes as it is reflected or refracted			
Lab Safety Protocol: 4. **Materials and tools should not come into contact with a person, only other materials** 5. **Do not shine light at anyone's face, directly or indirectly.** 6. **General Safety Practices for the Elementary Science Classroom- TOC.docx**			**Materials:** Scientist Notebook/Journal transparent glass with water pencil card with an arrow on it flashlights various prisms mirrors spoons	
Phenomenon: Funhouse Mirrors & Amazing Arrow (video link)			**Driving Questions: "How does a funhouse mirror change your appearance?" & "Why does the arrow change direction?"**	
Day 1: Opening	**Day 2 : Guided Practice/ Transition**	**Day 3: Independent Practice**	**Day 4: Independent Practice**	**Day 5: Assessment / Summary**
Phenomena Introduction Show students the phenomenon	**Introduce the Driving Question:**	**Graphic Organizer** Students will need and use the	**Text Annotation Strategy** Have students read and	**Claim-Evidence-Reasoning** Students will write a response to

card : Funhouse Mirrors & Amazing Arrow **(video link)**

Use the See-Think-Wonder protocol to guide student thinking.

Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson.

Discuss with students the difference between how the images look in the mirror or through the glass and why

Inquiry Activity
Savvas Interactivity
"Light Energy and Vision"

Objective: Students will learn about how light is split into colors of the rainbow based on their wavelengths

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Plan and Carry Out Inves…

The teacher will review each of the videos relating to visible light and how the eye refracts light for vision; students will answer and discuss the question at the end of the slides

Have students review the driving question:

How does a funhouse mirror change your appearance?" & "Why does the arrow change direction

Use the strategy to support students with making connections and understanding the driving question (DQ).

Visualizing the Driving Question

Click here to access question words reference chart

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.
****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to

student lab sheet for the GaDOE lab "Refraction, Reflection" provided on the Inspire site and linked here:
GADOEInspire_phenom…

Materials
transparent glass with water
pencil
card with an arrow on it
flashlights
various prisms
mirrors
spoons

Investigation Facilitation
GaDOE Inspire Task: Refraction, Reflection

How does light move when it interacts with water, prisms, and various lenses?

Objective: Students will plan and carry out investigations to determine what causes light to reflect or refract?

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Plan and Carry Out Inves…

Students will need to work in groups. The teacher should assign groups prior to the beginning of the lesson.

Have students follow the procedure provided in the lab task: GaDOE Inspire Task - Refraction, Reflection
Remember to review lab safety

annotate the following text:
Readworks Objects and …
There are multiple texts in this reading.

View the following facilitation directions:

The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy:

3-5 Text Annotation Prot…

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)
3-5 Information Analysis…

During the teacher-led discussion, the teacher should ask the following questions:

1. What is the difference between reflection and refraction?
2. How can objects be used to refract light?
3. Why would light need to be refracted to communicate?

****TEACHER NOTE:** Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

the following driving question in the CER format.

How does a funhouse mirror change your appearance?" & "Why does the arrow change direction?

Review the claim-evidence-reasoning poster with the students

****TEACHER NOTE:** Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Rea…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

The lab for this week's lesson can be found by accessing **SAVVAS Waves and Information, Lesson: Waves and the Electromagnetic Spectrum**

**TEACHER NOTE:
The teacher should asking the following questions throughout the video, pausing where necessary:

1. Light rays are forms of electromagnetic radiation like what other waves?
2. How are wavelength and frequency related to light waves?
3. Why do we only see certain colors of objects?
4. What are the three ways that light can interact with an object?
5. What does the lens of the eye do with light?

Materials:
Scientist Notebook/Journal

claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reasoni… (PDF)

1. Identify the student's claim in

rules.

The teacher should review the following questions with students during the investigation: *how will you use the various materials to move the light around the room? how will the light interact differently with the various materials?*

**TEACHER NOTE:
The task can be modified to allow for students to plan their own investigation.

Students should be *constructing explanations* as a goal of their investigation. This should look like students capturing their observations through picture evidence then using that evidence to explain how the light responded to each material. Their explanation should include that the light energy is bouncing off an object during reflection and that it passes through {albeit in a changed direction} an object during refraction.

In student groups, it may help to assign specific materials to each student so that time is not spent allowing all students to test all materials.

Remember to review the lab safety rules.

Vocabulary Strategy

Vocabulary Words:
ray, reflect, refract, absorb, mirror, light, energy

Vocabulary Strategy:

Vocabulary Connect Two Strategy
Provide students with the graphic organizer (editable) or pdf handout.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. Allow students to research the word using reference tools (google, research options, peer discussion, etc.). The teacher should model researching the word and using the information gathered to decide on another term that creates connections between the vocabulary word and another term/word.

Allow students to work in collaborative groups to discuss and research the other provided vocabulary terms and repeat the modeled instructional strategy.

Have students collaborate, in groups, to complete the strategy for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:

S4P1b Reflection and Re…

	the sample and have the teacher or students write their observations or questions. *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reasoni… ****Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.			

Week 5	
GSE: S4P2.b	**Focused Concept:** ● **Make a string telephone using common materials.** ● **Design a way to communicate across long distances using common materials**
Learning Target	Students will design a device that uses light and sound to communicate long distances
Lab Safety Protocol: 7. **Materials and tools should not come into contact with a person, only other materials** 8. **Do not shine light at anyone's face, directly or indirectly.** 9. **General Safety Practices for the Elementary Science Classroom- TOC.docx**	**Materials:** various size and type of cups, various size cans and/or containers, various types of string,

			paper clips, tape	
Phenomenon: Signal on a Playground			**Driving Questions: "How can I design a device to communicate across distances?"**	
Day 1: Opening	**Day 2 : Guided Practice/ Transition**	**Day 3: Independent Practice**	**Day 4: Independent Practice**	**Day 5: Assessment / Summary**
Phenomena Introduction Show students the phenomenon card : Signal on a Playground Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity** **GaDOE Inspire** **"Exploring Sound Devices"** **Objective:** Students will discover that they can communicate through homemade devices. **SEP TEACHER TIP:** To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Develop and Use Models… Students will need and use the	**Introduce the Driving Question:** Have students review the driving question: *How can I design a device to communicate across distances?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer. Be sure to create a reference for students to have throughout the week. **TEACHER NOTE: Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning	**Graphic Organizer** Students will need and use the student lab sheet for the lab "Communicate with Light and Sound" provided on the Inspire site and linked here: Communicate with Light and Sound GA_4P2B_Communicati… **Materials** **Consumable** 1 Dark sheet of paper (per student) Device building materials (can vary) *Suggested materials: Colored transparent sheets Construction paper Toilet paper tubes Tape Rubber bands Sand paper Plastic forks **Reusable** 1 Flashlight (per pair) Device building materials (can vary) *Suggested materials: Laser pointers Hand lenses **Printed Material** 1 Student Guide (per group) 1 Student Journal (per student)	**Text Annotation Strategy** Have students read and annotate the following text: **GA_4P2B_Communicati…** The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysis… During the teacher-led discussion, the teacher should ask the following questions: *How do you communicate with your classmates?* *What senses do you use to communicate?* *Define "communication" in your own words.* *Give three to five examples of forms of communication that use light.* *Why do you think emergency vehicles communicate their*	**Claim-Evidence-Reasoning** Students will write a response to the following driving question in the CER format. ***How can I design a device to communicate across distances?"*** Review the claim-evidence-reasoning poster with the students **TEACHER NOTE: Provide students with sentence starters by sharing on the board: 3-5 Claim-Evidence-Rea… Have students write their claim-evidence-reasoning **writing a claim** Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question. **writing evidence** Students should provide observational or numerical data as their evidence from their investigation and write a short

student lab sheet for the GaDOE lab "Exploring Sound Devices" provided on the Inspire site and linked here:

GaDOEInspire - Explori…

The teacher should discuss the following questions with students: *how will you use your knowledge of sound and light waves to build your device? how will amplitude, pitch, frequency, reflection, and refraction be used to make your device work?*

**TEACHER NOTE:
The GaDOE task uses the word "hypothesis", but the teacher must ensure that the word is being used interchangeably with "claim", "prediction", or "initial idea"

The teacher should guide students through the graphic organizer to answer questions, develop a plan and construct the cup telephone.

Students may need support with creating a graph to collect data. If they do, the teacher can provide students with the following guidance document: Exploring Sound Devices Data Chart

Materials:
Graphic Organizer
various size and type of cups,
various size cans and/or containers,
various types of string,
paper clips,
tape

format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Investigation Facilitation
Communicate with Light and Sound

How is light and sound used to communicate?

Objective: Students will investigate communication through the use of Morse code to understand how signals travel long distances.

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Develop and Use Models…

Students will need to work in groups. The teacher should assign groups prior to the beginning of the lesson.

Have students follow the procedure provided in the lab task: **STEMscopes: Communicate with Light and Sound**
GA_4P2B_Communicati…

Remember to review lab safety rules.

The teacher should discuss the following questions with students as they move through the investigation: *What makes a device effective at sending messages across distances? How do the materials used to send messages using light differ from those used to send messages with sound? What challenges exist when creating warnings with both light and sound? How would you improve the bell and alarm system at the school to make it more effective inside and outside the building?*

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy

Vocabulary Words:
communicate, distance, strength, echo, decibels, volume

Vocabulary Strategy:

Vocabulary Terms Chart
Provide students with the graphic organizer (editable) or pdf handout, explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:

S4P2b Communication …

	Claim-Evidence-Reasoning Record Observations Document (google doc) Claim-Evidence-Reasoni… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reasoni… **Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	*devices that can be used to communicate across long distances? How have scientists overcome those challenges?* **TEACHER NOTE: Use the Teacher Guidance Document: GA_4P2B_Communicati… Students should be *planning and investigating* on their own in this activity. The teacher will teach students Morse Code, exposing them to the ways that light and sound are already used to communicate across distances. They will use what they've experienced in the Opening and their knowledge of Morse Code to design their communication device. The teacher should mark spots in the classroom that students will stand on in order to test their designs as the standard requires students to communicate across distances Students should be encouraged to create both a sound and light device. Remember to review the lab safety rules.	should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term. Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	

Assessment Prep

Prepare students for assessment by reviewing the following Assessment Prep Presentation.

Provide the following guidance:
Ask the students to use what they know about the tasks completed to answer the provided assessment prep question.

- What is the question asking you?
- What do you know about the vocabulary or concept in the question?
- Is this question similar to any investigations or tasks we've completed?
- How can what you've done help you answer this question?
- Just view the assessment question: What is the question asking you?

Guide students to think about how their experience connects to the question.
Using the answer choices provided, ask the students the following:

- Identify a wrong answer: How do I know this answer is incorrect?
- Identify the right answer: How do we know this answer is correct?

Allow the students time to discuss in collaborative groups.

TEACHER NOTE: If students struggle with the question, review it the next day. Do not rush to the next question; instructional time is the only time they have to prepare for the end-of-year assessment.

Labs / Investigations

Mandatory Labs	Mystery Science	Gizmo/PhET
Savvas: How do we describe waves? **Savvas: How does a wave carry energy?** **GaDOE: How Much Light** **Savvas: How is Light Reflected** **Savvas: Light Energy and Vision** **GaDOE: Refraction, Reflection** **GaDOE: Exploring Sound Devices** **GaDOE: Communicate with Light and Sound**	**Why are some sounds high and some sounds low?**	

Additional- Resources/Tasks

Supplemental Labs	

Culminating Performance Task	CER *Why does the water move in different ways around the toad?* *CER Why does the water move in different ways around the toad?* *CER Why can't we see what is inside a cardboard box?* *CER How does a funhouse mirror change your appearance?" & "Why does the arrow change direction* *CER How can I design a device to communicate across distances?*
STEM Activities	