



Marietta City Schools
District Unit Planner

Grade 4 Science

Theme	<i>Unit 5 Light and Sound Planner</i>	Unit duration	<i>7 weeks</i>
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Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GaDoE Standards/3D Science Elements

Georgia Standards:

S4P1. Obtain, evaluate, and communicate information about the nature of light and how light interacts with objects.

- Plan and carry out investigations to observe and record how light interacts with various materials to classify them as opaque, transparent, or translucent.
- 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.
- 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 and/or light can be used to communicate.

- Plan and carry out an investigation utilizing everyday objects to produce sound and predict the effects of changing the strength or speed of vibrations.
- Design and construct a device to communicate across a distance using light and/or sound.

Unit Objectives:

Use the words transparent, translucent, and opaque.
Investigate and shear instances of refraction and reflection.
Become aware that all visible things are seen because of reflected light.
Use mirrors to investigate reflections and how changing angles of reflection can change what is seen.
Investigate how sound changes if the vibrations are faster or slower pitch.
Investigate how sound changes if the vibrations are more or less forceful – amplitude.
Make a string telephone or instrument using common materials.
Design a way to communicate using light and/or sound across a noisy distance.

Unit Phenomena:



Storyline: Most of us are familiar with arching rainbows. However, there is another full-color spectrum that appears in the sky. The bands and colors of this phenomenon change or come and go as the clouds change.

Guiding Questions: Why do they form? How do they form? What type of cloud(s) would you expect to observe this phenomenon? When do they occur?

Teacher Note: This phenomenon about light can be connected with the 4th grade weather unit, students will observe the photo, discussing possible explanations.

Sound Phenomenon:

[Large Boom in Surprise, Arizona](#) (Be sure to remove ads before showing to class)

[Sonic Boom Video Compilation](#)

[Sonic Boom Picture](#) (Teacher Note: use this document to post in the classroom during the unit and/or post on the board while discussing the phenomenon)

Storyline: A sonic blast is the sound we hear when a supersonic airplane goes through the sound barrier, at a pace known as Mach 1

Guiding Questions:

- Why does the room shake when there is a sonic boom?
- What causes the sound?
- Why do we feel it at different intensities than others' further away?
- Why don't we hear a boom with every plane?
- Why does the sound come after the plane?
- Would weather (air pressure and humidity) affect the sound we hear from a sonic boom?
- Would we hear a sonic boom on the moon?

****Explain to students that they will be spending several days exploring these questions.**

Sound Waves (strength of speed and vibrations)

[Science World Resources: Sound](#)
[Sound & Light Travel in Waves](#)

Page Keeley Probes: Page Keeley probes can be used as phenomena. They are intended to elicit student understanding about science concepts. Starting a unit or lesson with a probe will help you uncover misconceptions and see what students already know about a topic. Using a probe at the beginning of a lesson and then at the end of the lesson serves the purposes of pretesting and then formatively evaluating student thinking. **Below is a list of probes from Page Keeley's book *Uncovering Student Ideas in Science*, that are appropriate for this unit.** This book has been purchased for your grade level by the Office of Academic Achievement and can be found in your media center.

- **Can It Reflect?** (Volume 1)
- **Mirror on the Wall** (Volume 3)
- **Birthday Candles** (Volume 1)
- **Making Sound** (Volume 1)

Science & Engineering Practices: • Asking questions and defining problems • Developing and using models • Construct explanations and designing solutions • Obtaining, evaluating, and communicating	Disciplinary Core Ideas: • Opaque, transparent, translucent • Reflection • Refraction • Strength and speed of sound vibration • Communication device	Crosscutting Concepts: • Energy and Matter • Structure and Function
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Misconceptions:

With respect to their understanding of light, students often associate it only with a source and they tend to consider only the instantaneous effects of light. Light sources are often considered only in respect to the objects or areas that they illuminate. There is frequently no recognition that light must move - between the source, the object, and the observer's eye. As students experiment with mirrors, lenses, and prisms, their understanding of light can gain depth.

Students often assume that sounds can be produced by using any material objects. They frequently believe that the sounds of the human voice are produced by a large number of vocal chords, each producing their own distinct sounds. Finally, they may think that you can alter the pitch of a sound by hitting the vibrating object harder or softer. As students experiment with tuning forks, rubber band guitars, drums, and other instruments, their understanding of sound deepens.

Math/ELA Connections/STEM Connections

ELAGSE4RI3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

ELAGSE4RI4: Determine the meaning of general academic language and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

ELAGSE4RI7: Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

ELAGSE4RI10: By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

ELAGSE4W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

ELAGSE4W4: Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

ELAGSE4W7: Conduct short research projects that build knowledge through investigation of different aspects of a topic.

MGSE4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

STEM:

[Using Sound for Sight](#)

[STEM Project Starters](#)

Discovery Education Science Techbook – (Log into your DE account using your Google credentials to access DE links) You will find station rotation activities such as leveled reading passages, interactives, hands-on labs, virtual labs, video clips, and more on the **Explore** page in each Techbook unit.

[Waves](#)

[Light Energy](#)

[Reflection](#)

[Refraction](#)

Hands-on Activities

[Hands-On Activity: Light Observations](#)

[Hands-On Activity: Distance and Brightness](#)

[Hands-On Activity: Prisms: Descriptive Investigation](#)

[Hands-On Activity: Light Speed](#)

[Hands-On Activity: Reflection](#)

[Hands-On Activity: Make a Telephone](#)

[Hands-On Activity: Television Signals](#)

[Hands-On Lab: Can You Hear Me Now?](#)

[Hands-On Lab: Baking in the Sun](#)

Below is a list of activities from the **AIMS 4th Grade Georgia Physical Science Book**: (most schools have a hard copy or digital version of this book in your building). Contact your Instructional Coach or Science Coordinator if you do not have access to the AIMS books.

Rainbow Rounds Around the Bend Prism Play

The Lowdown on Light Rainbow Disc Colortime Theater Light Energy

What's Blocking the Light? Foiled by Oil

Light Reflections

The Pharaoh's Chamber Light Rays Slow Down Prisms Paths
Prisms Periscope

Essential Questions

Factual—

How does light interact with various materials to classify them as opaque, transparent, or translucent?

Inferential—

Describe how the path light travels from a light source to a mirror and how it is reflected by the mirror using different angles.

Critical Thinking-

Design a device that communicates across a distance using light and/or sound.

Tier II Words- High Frequency Multiple Meaning

light, sound, loud, soft, color, rainbow

Tier III Words- Subject/ Content Related Words

Opaque, transparent, translucent, reflect, refract, vibration, amplitude, wave, prism, spectrum, ROY G BIV, rainbow, sound wave, pitch

Objective or Content	Learning Experiences	Differentiation Considerations
CLE 1-3: S4P1. Obtain, evaluate, and communicate information about the nature of light and how light interacts with objects. S4P2. Obtain, evaluate, and communicate information about how sound is produced and changed and how sound and/or light can be used to communicate.	GaDOE Light and Sound Instructional Segment Students will engage in developing an understanding of how sound interacts with various materials and objects. NSTA Article This article from <i>Science & Children</i> (NSTA) includes several activities about sound and sound waves. Magic Beads Use UV beads in an inquiry lab about ultraviolet light. Students string 10 beads each on a pipe cleaner or ribbon and make a bracelet, observe in the classroom, and then go outside to see the beads change color. MCS Model Lesson Students rotate through 5 sound stations. This lesson plan can be used in many ways. You may choose to do one station per day or do it all in one class. Some teachers have created sound classrooms, where each classroom is a station and students rotate through the classrooms.	Student Choice Performance Tasks Reflection and Goal Setting Learning Stations Choice Boards Formative Probes Science Journaling Multi-sensory activities Assistive Technology Flexible Grouping Multiple Means of Representation
Recommended High Quality Complex Text By Lexile Band		
<i>Step-By-Step Experiments With Light and Vision By Ryan Jacobson</i> <i>What are Sound Waves By Robin Johnson</i> <i>Explore Light and Optics By Anita Yasuda</i> <i>Understanding Sound By Tamra B. Orr</i> <i>Light Energy We Can See By Julie K. Lundgren</i> <i>What are Light Waves By Robin Johnson</i> <i>What are Shadows and Reflections By Robin Johnson</i>		