Unit III: Light and Sound

Content Area: **Science**
Course(s):
Time Period:
Length: **5 weeks**
Status: **Published**

State Mandated Topics Addressed in this Unit

State Mandated Topics Addressed in this Unit	
N/A	N/A

Unit Summary

Waves transfer energy without transferring matter. Mechanical waves require a medium. A continuous wave is a regular repeating sequence of wave pulses. Interference occurs when two or more waves move through a medium at the same time. Sound is a pressure variation transmitted through matter as a longitudinal wave. Sound is produced by vibrating objects in matter.

Enduring Understanding

Core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world. An object's motion changes if a net force acts on the object. Energy causes change by affecting the movement and position of objects. Energy can be transformed from one form to another and transferred from object to object. Thermal energy can be transferred by conduction, radiation, and convection. Thermal energy also can be transformed into other forms of energy.

Learning Objectives

- How does light interact with matter?
- What are the properties of waves?
- What determines the pitch and loudness of sound?
- What kinds of waves make up the electromagnetic spectrum?

Essential Skills

- Define sound.
- Describe how animals and people are sound.

- Describe how reflection, refraction, and diffraction change a wave's direction.
- Describe the basic properties of waves.
- Describe the function of the human ear.
- Describe the types of images produced by plane, concave, and convex mirrors.
- Describe the waves that make up the electromagnetic spectrum.
- Describe what determines the color of an opaque, transparent, or translucent objects.
- Explain how a wave's speed is related to its wavelength and frequency.
- Explain how cameras, telescopes, and microscopes work.
- Explain how cell phones work.
- Explain how communications satellites work.
- Explain how electromagnetic waves are alike and how they are different.
- Explain how mixing pigments is different from mixing light.
- Explain how one sees objects.
- Explain how radio waves transmit information.
- Explain how standing waves form.
- Explain what causes mechanical waves.
- Explain what causes the Doppler effect.
- Explain why light rays bend when they enter a medium at an angle.
- Identify factors that affect the loudness of a sound.
- Identify factors that affect the speed of sound.
- Identify the kinds of reflection.
- Identify what determines the sound quality of a musical instrument.
- Identify what determines the types of images formed by convex and concave lenses.
- List and describe the models that explain the behavior of electromagnetic waves.
- List and describe three types of mechanical waves.
- State the different types of interference.
- State what an electromagnetic wave consists of.
- State what the pitch of a sound depends on.

Standards

SCI.HS-PS3-1	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
SCI.HS-PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).
SCI.HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
SCI.HS-PS4-2	Evaluate questions about the advantages of using a digital transmission and storage of information.

Instructional Tasks/Activities

- Brainpop
- Chapter Tests
- Foldables – organization of material
- Labs-inquiry based PHET lab on bending light.
- PowerPoint presentation of material Group discussion
- Review game
- Think, pair, share (read assigned section of text individually, discuss with a partner, present material in pairs to class – use PowerPoint as a reference)
- Vocabulary quizzes

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Appropriate Content Specific Online Resource
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Slides
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group

- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Assessment Procedure

- Characteristics of Waves
    - What are waves
    - Properties of waves
    - Interaction of waves
- Sound
    - The Nature of Sound
    - Properties of Sound
    - Music
    - Hearing
    - Using Sound
- Electromagnetic Waves
    - The nature of electromagnetic waves
    - Waves of Electromagnetic Spectrum
    - Wireless Communication
- Light
    - Light and Color
    - Reflection and Mirrors
    - Refraction of Lenses
    - Seeing Light
    - Using Light

- Characteristics of Waves:
- Classroom Total Participation Technique
- Classwork
- DBQ
- Electromagnetic Waves:
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Hearing
- Interaction of waves
- Journal / Student Reflection
- Kahoot
- Light and Color
- Light:
- Music
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Properties of Sound
- Properties of waves
- Quiz
- Reflection and Mirrors
- Refraction of Lenses
- Rubric
- Seeing Light
- Sound:
- Teacher Collected Data
- Test
- The nature of electromagnetic waves
- The Nature of Sound
- Using Light
- Using Sound
- Waves of Electromagnetic Spectrum
- What are waves
- Wireless Communication
- Worksheet

Resources

- https://www.brainpop.com
- www.//discoveryeducation.com
- https://phet.colorado.edu
- www.pbslearningmedia.org

- https://www.khanacademy.org/science/physics