01: Physical and Life Science (sound & life)

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

General Overview, Course Description or Course Philosophy

In the Life Science unit, students investigate structures and functions of the human body. Students explore how our bones and muscles are interconnected, how our eyes interact with light and impact our vision, and how our brain responds to stimuli in our environment.

In this Physical Science unit, students investigate the science of sound. Students construct physical devices to feel the vibrations that allow us to communicate across distances. Students also use digital devices to visualize the characteristics of different sound waves that cause us to hear different things.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives and Enduring Understandings:

- Students will gain understanding of various aspects of sound, including production, perception, properties, and characteristics.
- Students will also investigate how sound and light are used in communication.

Essential Questions:

- What makes a sound?
- What makes a sound loud or quiet?
- How does the movement of the object faster/slower create a different sound and release a different amount of energy?
- How does sound travel?
- What energy is released when objects collide and produce sound?
- How do we convert potential to kinetic energy when playing the guitar, drums or the cymbals?
- What does a sound wave look like?
- Can we create a model of a sound wave?
- How do we see information using our eyes?
- Can we see a sound wave?
- How can we send patterns using sound?

CONTENT AREA STANDARDS

SCI.3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
SCI.4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
SCI.4-LS1-2	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.
4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.
4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.
4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
4-PS4-1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

MA.4.OA.A.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
LA.RI.4.1	Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
LA.RI.4.3	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.
LA.RI.4.9	Integrate and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) information from two texts on the same topic in order to write or speak about the subject knowledgeably.
LA.W.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
LA.W.4.7	Conduct short research projects that build knowledge through investigation of different

	aspects of a topic.
LA.W.4.8	Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.
LA.W.4.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
MA.4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
LA.SL.4.5	Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.
TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
TECH.9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
TECH.9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- The faster a given object is moving, the more energy it possesses.
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
- Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.
- Possible solutions to a problem are limited by available materials and resources (constraints).
- The success of a designed solution is determined by considering the desired features of a solution (criteria).
- Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.(secondary)

Procedural Knowledge

Students will be able to:

- Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- Make observations to provide evidence that energy can be transferred from place to place by sound.
- Ask questions about the changes in energy that occur when objects collide.
- Predict outcomes about the changes in energy that occur when objects collide.
- Apply scientific ideas to design a device that converts energy from one form to another.
- Apply scientific ideas to test a device that converts energy from one form to another.
- Apply scientific ideas to refine a device that converts energy from one form to another.
- Develop a model of waves to describe patterns in terms of amplitude.
- Develop a model of waves to describe patterns in terms of wavelength.
- Develop a model of waves to describe patterns in terms that waves can cause objects to move.
- Generate multiple solutions that use patterns to transfer information.
- Compare multiple solutions that use patterns to transfer information.
- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
- demonstrate that sound is produced when vibrations are made.
- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- Make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
- 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.
- Integrate (e.g., practical knowledge, historical/cultural context, and background knowledge) information from two texts on the same topic in order to write or speak about the subject knowledgeably.
- Reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) information from two texts on the same topic in order to write or speak about the subject knowledgeably.
- Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.
- Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- Conduct short research projects that build knowledge through investigation of different aspects of a topic.
- Recall relevant information from experiences or gather relevant information from print and digital sources
- Take notes and categorize information, and provide a list of sources.
- Draw evidence from literary or informational texts to support analysis, reflection, and research.
- Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.
- Identify these in two-dimensional figures.
- Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted.
- Represent these problems using equations with a letter standing for the unknown quantity.
- Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

EVIDENCE OF LEARNING

Formative Assessments

- Lab Activities
- Student predictions, observations, and questions
- Teacher questions and discussion
- Observe students as they apply new concepts and skills
- Evidence of students changed thinking and behaviors
- Students answering questions using observations, evidence, and previous accepted explanations
- Students asking related questions that encourage future investigations
- Monitor students working in groups
- Listen to whole class conversations to check for understanding
- Completing tasks

Summative Assessments

Benchmark Assessments

- Multiple Choice Assessment administered at the end of each trimester (T1, T2, T3)

Alternative Assessments

- Oral Presentations
- Questions for Comprehension
- Performance Tasks
- Scientific Journals/Notebooks
- Self-Assessment
- WebQuests

RESOURCES (Instructional, Supplemental, Intervention Materials)

- Teacher Edition
- Student Lab Manual
- Student Science Notebook

- Graphic organizers
- Videos

INTERDISCIPLINARY CONNECTIONS

- Integrate quantitative or technical information expressed in words in a text. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
- Experimentation
- Social Emotional Learning
- Sustainability

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.

*In addition to IEP Accommodations & Modifications:

- Restate and review directions
- Student restates directions or information
- Oral responses
- Small group/ one to one
- Additional time
- Concrete examples
- Extra visuals
- Support auditory information with visuals
- Space for movement or breaks
- Extra verbal cues and prompts