Subject: Conceptual Physics Grade: 8th Unit #: 1 Title: Waves

UNIT OVERVIEW

<table>
<tr><th colspan="3">STAGE ONE: Identify Desired Results</th></tr>
<tr><td rowspan="5">Established Goals/ Standards

Standards found within P.I. 4.1 “Waves” from the NYS Intermediate Level Science Standards.</td><td colspan="2">Long-Term Transfer Goal</td></tr>
<tr><td colspan="2">At the end of this unit, scholars will use what they have learned to independently…
Observe and describe the properties of waves such as light and sound. This will be transferred to students understanding of how they perceive both the music and light (colors) around them and how the properties of these wave types craft their reality.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>Enduring Understandings
Students will understand that…

A wave is a disturbance that travels through space and transfers only energy, not matter.

There are different properties of waves (wavelength, frequency, and amplitude) that impact its characteristics. These characteristics impact students’ perception of reality.

The direction of an object changes the apparent properties of a wave to the observer.

Objects look the color that they do because they reflect that color and absorb all others</td><td>Essential Questions
Students will consider such questions as…

• What are waves and how do we make them?
• What do they mean when they say “We don’t see objects, we see the light that comes from them”?
• Why can’t I hear or see certain waves?
• Do waves transfer energy? How can we tell?
• How can “see” waves?
• Do all living things see or hear waves the same way? How do the properties of sound transfer to light waves?
• What would the music you listen to look like as a painting?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>What knowledge will students learn as part of this unit?

● Different forms of electromagnetic energy have different wavelengths. Some examples of electromagnetic energy are microwaves, infrared light, visible light, ultraviolet light, X-rays, and gamma rays.

● Light passes through some materials, sometimes refracting in the process. Materials absorb and reflect light, and may transmit light. To see an object, light from that</td><td>What skills will students learn as part of this unit?
● Identify amplitude, wavelength on a wave diagram
● Measure the amplitude and wavelength on a wave diagram
● Describe a pitch increase or decrease with changing frequency
● Describe a volume or loudness increase with changing amplitude
● Describe an increase or decrease in pitch as a sound source moves towards or away from a listener
● Compare and contrast reflection and refraction
● Explain why objects look different colors</td></tr>
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	object, emitted by or reflected from it, must enter the eye. • Vibrations in materials set up wave-like disturbances that spread away from the source. Sound waves are an example. Vibrational waves move at different speeds in different materials. Sound cannot travel in a vacuum.	● Use an electromagnetic spectrum diagram to: Identify the approximate wavelength and frequency of a wave and locate an electromagnetic wave given the wavelength or frequency

STAGE TWO: Determine Acceptable Evidence	
	Assessment Evidence
Criteria to assess understanding: *(This is used to build the scoring tool.)* -Definition and description of waves and the different types. -Diagram and describe of different wave properties (amplitude, wavelength and frequency). - Diagram and describe of ways waves can be manipulated and changed by both movement and the materials they pass through. -Wave diagram with all components labeled and described of both the sound and light waves.	**Performance Task focused on Transfer:** The students will take a piece of popular music (and the characteristics of the waves that make up the sound waves) and create a representative painting that recreates the sound waves as a piece of visual art. This transfer shows students are able to transfer characteristics of waves between "wave types". **Other Assessment Evidence:** Unit ILST style quiz Daily Bridge Daily Summary/Closure Questions Daily Extended learning Activities Investigations & writeups Teacher observations

-Description of the sound waves observed properties and how this translates to their artistic piece and how the light waves that are absorbed by the piece compare and contrast to the sound.	

T, M, A *(Code for Transfer, Meaning Making and Acquisition)*	**STAGE THREE: Plan Learning Experiences**
A: Acquisition M: Meaning Making T: Transfer	Daily Evidence of learning: *(formative assessment)* Summary + Closure at end of each lesson utilizing the "Workshop Model". Investigation reports if applicable.
1. A, M 2. A, M 3. A, M 4. A,M 5. A,M 6. A,M, T 7. A,M 8. A,M,T 9. M,T 10. M,T 11. M,T	Learning Events: 1) What are waves and how do we make them? Introduction to the project and waves through multimodal station work. 2) What are waves and how do we make them? Slinky Waves lab that help students demonstrate the characteristics and properties of waves. 3) What do they mean when they say "We don't see objects, we see the light that comes from them"? Lab on absorption and refraction of light waves 4) What do they mean when they say "We don't see objects, we see the light that comes from them"? Lab on absorption and reflection of light waves 5) Why can't I hear or see certain waves? Sound Demo's that looks at the properties of sound waves and compare and contrast them to light waves. 6) Doppler effect web quests: An investigation into how sound and light waves can be distorted by motion 7) Evidence-based explanations: Transfer task day 1. Describing the sound waves from their clip of popular music. 8) Evidence-based explanations: Transfer task day 2. Plan to transfer the sound waves from their popular music to light waves in a drawing. 9) Painting sound transfer task: Paint a picture that represents the clip of popular sound 10) Review day metacognition review activity aimed at deconstructing diagrams. 11) Traditional unit assessment modeled after NYS assessment questions.