



High School Physics Curriculum Pacing Guide

Waves

Crosscutting Concepts: Cause and Effect; Patterns; Energy and Matter

Topics: Types of Waves, Wave Behavior, Sound, Optics

8-week Instructional Segment

Anchoring Phenomenon	Standard	Instructional Segments	Disciplinary Core Ideas	Science and Engineering Practices	Instructional Notes
<p><i>When light is passed through a small slit, the light diffracts into predictable and measurable patterns. (An educational diffraction grating that has multiple windows of different slits/mm will be useful.)</i></p>	<p>SP4a SP4b SP4c SP4d SP4e SP4f SP4g</p>	<p>Part 1: Sound Part 2: Optics Part 3: Interference and Diffraction</p>	<p>From A Framework for K-12 Science Education:</p> <p><i>By the end of grade 12</i></p> <p>PS4A: Wave Properties</p> <ul style="list-style-type: none"> The wavelength and frequency of a wave are related to one another by the speed of travel of the wave. Speed of travel of the wave depends on the type of wave and the medium through which it is passing. The reflection, refraction, and transmission of waves at an interface between two media can be modeled on the basis of these properties. Combining waves of different frequencies can make a wide variety of patterns. 	<ul style="list-style-type: none"> Developing and Using Models Engaging in Argument from Evidence Planning and Carrying Out Investigations 	<p>Background:</p> <p>By the end of this unit, students are using the following language in their speaking and writing during EXPLAIN or ELABORATE.</p> <ul style="list-style-type: none"> Mechanical wave Electromagnetic wave Velocity Frequency Wavelength Interference Diffraction Single and double slit Doppler Effect

			<ul style="list-style-type: none"> ● Resonance is a phenomenon in which waves add up in phase in a structure, growing in amplitude due to energy input near the natural vibration frequency. ● Structures have particular frequencies at which they resonate. ● This phenomenon (e.g., waves in a stretched string, vibrating air in a pipe) is used in speech and the design of musical instruments. <p>PS4B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> ● Electromagnetic radiation can be modeled as a wave of changing electric and magnetic fields... ● The wave model is useful for explaining many features of electromagnetic radiation... ● Because a wave is not disturbed by objects that are small compared to its wavelength, visible light cannot be used to see such objects as individual atoms. ● All electromagnetic radiation travels through a vacuum at the same speed, called the speed of light. ● The speed of light in any other medium depends on its wavelength and the properties of that medium. 		<ul style="list-style-type: none"> ● Standing wave ● Amplitude ● Pitch ● Color ● Polarization ● Reflection ● Refraction ● Snell's Law
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This instructional segment will connect to Instructional Segment Five: Electricity and Magnetism.