Physics Unit 5- Waves

Unit Overview: In this unit students will learn about the characteristics and phenomena of waves. Students will be able to describe the characteristics of longitudinal and transverse waves. Students will compare and contrast mechanical and electromagnetic waves. Students will be able to apply the laws of superposition to waves. Students will be able to describe reflection, refraction, and diffraction. Students will be able to use Snell's Law and construct diagrams of refraction and reflection. Students will explain the Doppler effect.

Essential Questions:

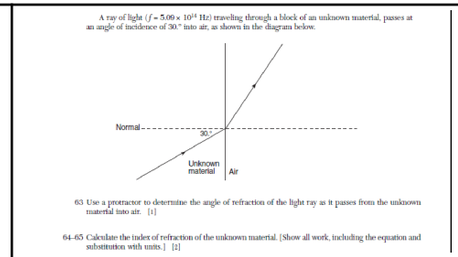
- How do we describe waves and pulses?
- How do waves propagate?
- How do we measure and analyze waves and their interactions?
- What happens to waves at boundaries?

MST Standard 4 - Science

Key Idea 4

Energy exists in many forms, and when these forms change energy is conserved.

Time Frame	Skills, Practices or Expectations	Specific Standards / Performance Indicators	Resources	Content Vocabulary	Measurement of Student Learning
3 weeks **3.06.23 - 3.24.23** **4 weeks** **3.27.23 - 4.28.23**	**Wave Characteristics** ● Describe the transfer of energy by pulses and/or periodic waves. ● Describe characteristics of waves. ● Compare and contrast transverse and longitudinal waves. ● Compare and contrast electromagnetic and mechanical waves. ● Apply the principle of superposition to the analysis of waves and/or pulses. ● Identify requirements and characteristics of standing waves **Wave Phenomena** ● Describe boundary phenomena. ● Draw and predict angles of incidence and reflection. ● Identify the category of electromagnetic radiation based on wavelength or frequency. ● Use Snell's law to draw ray diagrams to represent refraction and identify media. ● Identify the interaction between two vibrating bodies at a given frequency. ● Identify how waves propagate around corners and through openings. ● Identify the observed change in frequency resulting from relative motion between an observer and a wave source.	**4.3a-n**	Holt Textbook Chapters 11-15 Castle Learning Interactive Simulations: http://phet.colorado.edu	amplitude wavelength frequency period wave speed phase wave front angle of incidence angle of refraction angle of reflection pulse periodic principle of superposition light ray Doppler effect diffraction transmission absorption medium refraction crest trough condensation rarefaction oscillate resonance equilibrium **Higher Level Questions** **From June 2015 exam**	Ticket out the door Formative assessment using Castle Learning Unit test Weekly quizzes Homework using Castle Learning

Resources

http://ngss.nsta.org/Classroom-Resources.aspx

http://newyorkscienceteacher.com/sci/

English Language Learners (ELL) Enhancements To access hyperlinked material, you must be logged into your BPS Google Drive	**Listening** • **Cross- Linguistic Practices:** Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates.) • **Build background knowledge** • **Activating Prior Knowledge** Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content • **Activating Prior Knowledge** • **Visuals** - GIFs, pictures- will assist students in understanding what they are listening to. Use **visual thinking strategies** to set the lens for learning. • Video to review or introduce a topic – use **closed captioning** to help students see the words and	**Speaking** • **Sentence Frames** - to begin a sentence - such as *Evolution is…* or *I think that evolution is…* • **Academic Conversation Starters:** Have a visual of a list of academic sentence starters that students can refer to in a discussion. Examples include- I expect ____ to happen. My data shows that… This helps students have a more science focused dialogue. • **Choral Reading** - To build fluency, self-confidence and motivation with reading/speaking • Create **movement** to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading	**Reading** • **Supplementary Text** to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension. • **Visual Aids** - Pictures or models to support vocabulary words and concepts • Video to review or introduce a topic - use **closed captioning** to help students read along while they listen to the content • **4 Square / Frayer models** to help students gain a deeper understanding of vocabulary. • **Highlighting** important text to assist students in answering questions after the reading. • **Chunking**-Break reading of text into chunks or paragraphs • **Performance Level Descriptors** this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in	**Writing** • **Sentence Frames** - to begin a sentence- such as *Biodiversity is…* or *An example of competition is….* • **Cloze passages** with word banks • **Word banks** • **Graphic Organizers** to help break down the writing process and organize thoughts • **Standards-based sentence stems** • **Performance Level Descriptors** this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. Scroll for grades 9-12.	**Instructional Accommodations (depending on the student's needs)** • **Extended time** for tests in class, projects and assignments • **Directions read.** Broken down as necessary • **Model** how to complete the activity in the lesson • **Oral simplification** of directions or questions • **Translated version** of test when available. Student may have both version English and native language version • Use of **approved bilingual glossaries** from NYS in each subject

	pronunciations while they listen to the content. • **Word stretching / Vowel stretching** when instructing allows student to listen closely to the pronunciation of the word • **Performance Level Descriptors** this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening Scroll for grades 9-12.	while triggering brain function for optimal learning • **Performance Level Descriptors** This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. Scroll for grades 9-12	the modality of reading. Scroll for grades 9-12. • **Vocabulary Morphology**- Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student's vocabulary.		
Special Education Modifications **Special Education students must have accommodations as per Individual Educational Plan (IEP)**	**Instructional** • **Pre-teach** vocabulary • Use **picture vocabulary** • Scaffold **Depth of Knowledge** questions • Provide copy of notes/**notes in "cloze"** form • Use of **Think, Pair, and Share** strategy to help process information • **Scaffold** written assignments with the use of **graphic organizers** • Allow for **multiple ways to respond** (verbal, written, response board) • Provide **model of performance task** • **Modify informational text** to fit the needs of the students • Provide a digital or paper i**nteractive notebook** • Present complex **tasks in multiple ways** • Provide **mnemonic strategies** for Physics concepts		**Technology:** • **Audio** reading of text • **Text to type** functions • **Videos** to clarify/visualize Physics concepts • **Record class lecture/discussions** and make accessible to student • **Nearpod**- interactive presentations of notes • **Playposit** - show a video clip about the topic and add your own questions for them to answer as they watch • Allow students to type answers in chat on **Teams** **Other:** • Arrange seating for maximum engagement and minimum distraction • Accessible lab space (counter level)	**In Class Assessments** • Provide **review packet or review sheet** of concepts covered on the test • Practice similar questions prior to the test • Provide **multiple options** for projects • Give a **timeline** of when things are due and remind them of the process often. • **Use of timer** in class • Break all complex tasks into chunks	
BPS Science K-12 Schoology Group Resources Grades 9-12 Resources Physics Physics Curriculum Materials	**SUTW Strategies** • Informal Outline • Color-Coding – Informative/Explanatory Text • Two-column notes • I-V-F Topic Sentence progressing to Four Step Summary Paragraph • CUPS – Capitalization, Usage, Punctuation, Spelling • Transitions				