

Winslow Township School District

Grade 8 Science

Unit 4: Understanding Waves

Overview: Students formulate an answer to the question, “What are the characteristic properties of waves and how can they be used?” Students are able to describe and predict characteristic properties and behaviors of waves when the waves interact with matter. Students can apply an understanding of waves as a means to send digital information. The crosscutting concepts of patterns and structure and function are used as organizing concepts for these disciplinary core ideas. The performance expectations in PS4 focus on students demonstrating proficiency in developing and using models, using mathematical thinking, and obtaining, evaluating and communicating information; and to use these practices to demonstrate understanding of the core ideas.

Overview	Standards for Science	Unit Focus	Essential Questions
<p>Unit 4</p> <p>Understanding Waves</p>	<ul style="list-style-type: none"> • MS-PS4-1 • MS-PS4-2 • MS-PS4-3 • WIDA 4 	<ul style="list-style-type: none"> • Wave Properties • Electromagnetic radiation 	<ul style="list-style-type: none"> • Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. • Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. • Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.
<p>Unit 5: <i>Enduring Understandings</i></p>	<ul style="list-style-type: none"> • How are sound waves produced? • Why does the speed of sound waves vary in different materials? • How are light waves different from sound waves? • What happens to light waves when they interact with matter? 		

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

Curriculum Unit 4	Standards		Pacing	
			Days	Unit Days
Unit 4: Understanding Waves	MS-PS4-1	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	10	35
	MS-PS4-2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	13	
	MS-PS4-3	Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	10	
	Assessment, Re-teach and Extension		2	

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

Unit 4 Grade 8

Disciplinary Core Ideas	Indicator #	Indicator
<p>PS4.A: Wave Properties</p> <p>A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1) A sound wave needs a medium through which it is transmitted. (MS-PS4-2)</p> <p>PS4.B: Electromagnetic Radiation</p> <p>When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object’s material and the frequency (color) of the light. (MS-PS4-2)</p>	<p>MS-PS4-1</p>	<p>Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.</p>

Winslow Township School District

Grade 8 Science

Unit 4: Understanding Waves

<p>The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2)</p> <p>A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2)</p> <p>However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2)</p> <p>PS4.C: Information Technologies and Instrumentation</p>	<p>MS-PS4-2</p>	<p>Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.</p>
<p>Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)</p>	<p>MS-PS4-3</p>	<p>Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.</p>

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

Unit 4 Grade 8

Assessment Plan

<ul style="list-style-type: none"> • Exploratory activities • Warm-up activities • Individual/Group Lab report • Class discussions • Student Participation • Teacher Observations 	<ul style="list-style-type: none"> • Quizzes • Tests • Authentic assessments and projects • Exploratory activities • Presentations
Resources	Activities
<ul style="list-style-type: none"> • Chromebooks • Textbook • Web Quests • Interactive notebooks • Science World • Virtual Labs • Edpuzzle • BrainPOP • IXL <p>Sound</p> <ul style="list-style-type: none"> • Newsela - How do you find a submarine in the seven seas? just listen • Cup telephone activity • Instrument Design Challenge • Brain Pop - Sound • Brain Pop - Waves <p>Light</p> <ul style="list-style-type: none"> • Brain Pop - electromagnetic spectrum • Read Works - Electromagnetic radiation • Glue in and label the electromagnetic spectrum into their interactive notebooks. 	<ul style="list-style-type: none"> • Students will correlate the degree of vibration to the observed sound. • Students will analyze a photo to determine their knowledge of sound and how they think sound is produced. • Students can analyze the use of sounds waves in everyday life. • Students will test to see if the type of material affects how sound travels in cup telephones. • Students will create two instruments that create two unique sounds to demonstrate an understanding of sound. • Students will observe how light waves are affected when traveling through a medium. • Students will explain what they already know about light. • Students will identify different parts of the electromagnetic spectrum. • Students will create a foldable using opaque, transparent and translucent materials to model and explain the three concepts. • Students will complete a virtual lab to demonstrate the law of reflection. • Students will observe how different the type of mirror lense affect the image produced. • Students will break white light into the different colors that make it up.

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

- Create a foldable in their interactive notebooks using a notecard, wax paper and transparency paper.
- [Law of Reflection E-Lab](#)
- [Prisms Experiment](#)

Diversity, Equity & Inclusion Educational Resources

<https://www.nj.gov/education/standards/dei/>

Instructional Best Practices and Exemplars

1. Identifying similarities and differences
2. Summarizing and note taking
3. Reinforcing effort and providing recognition
4. Homework and practice
5. Nonlinguistic representations

6. Cooperative learning
7. Setting objectives and providing feedback
8. Generating and testing hypotheses
9. Cues, questions, and advance organizers
10. Manage response rates

9.1 Personal Financial Literacy, 9.2 Career Awareness, Exploration, Preparation and Training & 9.4 Life Literacies and Key Skills

9.4.8.CI.2: Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).

9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

The implementation of the 21st Century skills and standards for students of the Winslow Township District is infused in an interdisciplinary format in a variety of curriculum areas that include, English language Arts, Mathematics, School Guidance, Social Studies, Technology, Visual and Performing Arts, Science, Physical Education and Health, and World Language.

Additional opportunities to address 9.1, 9.2 & 9.4:

Philadelphia Mint

<https://www.usmint.gov/learn/kids/resources/educational-standards>

Different ways to teach Financial Literacy.

<https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/>

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

Modifications for Special Education/504

Students with special needs: The students' needs will be addressed on an individual and grade level using a variety of modalities. Accommodations will be made for those students who need extra time to complete assignment. Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

- Small group instruction
- Audio books/ Text-to-speech platforms
- Leveled texts/Vocabulary Readers
- Leveled informational texts via online
- Modeling and guided practice
- Read directions aloud
- Repeat, rephrase and clarify directions
- Extended time as needed
- Break down assignments into smaller units
- Provide shortened assignments
- Modify testing format
- Repeat directions as needed
- Graphic organizers
- Study Guides, Study Aids and Re teaching as needed

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

Modifications for At-Risk Students

Formative and summative data will be used to monitor student success. At first signs of failure, student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations

- Audio books and Text-to-speech platforms
- Leveled texts/Vocabulary Readers
- Leveled informational texts via online
- Extended time as needed
- Read directions aloud
- Assist with organization
- Use of computer
- Emphasize/highlight key concepts
- Recognize success
- Provide timelines for work completion
- Break down multi-step tasks into smaller chunks
- Provide copy of class notes and graphic organizer

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

English Language Learners	Modifications for Gifted Students
<p>All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors</p> <p><input type="checkbox"/> Grades 6-8 WIDA Can Do Descriptors:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Listening <input type="checkbox"/> Speaking <input type="checkbox"/> Reading <input type="checkbox"/> Writing <input type="checkbox"/> Oral Language <p>Students will be provided with accommodations and modifications that may include:</p> <ul style="list-style-type: none"> • Relate to and identify commonalities in Science studies in student’s home country • Assist with organization • Use of computer • Emphasize/highlight key concepts • Teacher Modeling • Peer Modeling • Label Classroom Materials - Word Walls 	<p>Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic.</p> <ul style="list-style-type: none"> • Raise levels of intellectual demands • Require higher order thinking, communication, and leadership skills • Differentiate content, process, or product according to student’s readiness, interests, and/or learning styles • Provide higher level texts • Expand use of open-ended, abstract questions • Critical and creative thinking activities that provide an emphasis on research and in-depth study • Enrichment Activities/Project-Based Learning/ Independent Study <p>Additional Strategies may be located at the links:</p> <ul style="list-style-type: none"> ❖ Gifted Programming Standards ❖ Webb’s Depth of Knowledge Levels and/or Revised Bloom’s Taxonomy ❖ REVISED Bloom’s Taxonomy Action Verbs

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

Interdisciplinary Connections

ELA:

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

RST.6-8.10 read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

WHST.6-8.1 Write arguments focused on discipline-specific content.

WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.6-8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

WHST.6-8.9 Draw evidence from informational texts to support analysis reflection, and research.

WHST.6-8.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences

SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacherled) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly

SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Math:

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.

Winslow Township School District
Grade 8 Science
Unit 4: Understanding Waves

- 8.EE.A.3** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
- 6.NS.C.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- 7.EE.B.3** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
- 7.EE.B.4** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- 6.RP.A.1** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
- 6.RP.A.3** Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
- 7.RP.A.2** Recognize and represent proportional relationships between quantities.
- 8.F.A.3** Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.
- 6.SP.B.4** Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- 6.SP.B.5** Summarize numerical data sets in relation to their context
- MP.2** Reason abstractly and quantitatively.
- MP.4** Model with Mathematics

Integration of Computer Science and Design Thinking NJSL 8

- 8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.
- 8.1.8.DA.4: Transform data to remove errors and improve the accuracy of the data for analysis.
- 8.1.8.DA.5: Test, analyze, and refine computational models.
- 8.1.8.AP.6: Refine a solution that meets users' needs by incorporating feedback from team members and users