

Content Area: Science (NJSL-S) Grades K - 12  
Grade: 4

Dev. Date:  
Established 2016-2017  
Revised 2018-2019  
Revised 2019-2020  
Revised 2020-2021  
Revised 2021-2022  
**Revised 2022-2023**

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## Grade 4

### Unit 3 Waves and Information Transfer

### New Jersey Learning Standards

Established 2016-2017  
Revised 2018-2019  
Revised 2019-2020  
Revised 2020-2021  
Revised 2021-2022  
**Revised 2022-2023**

Marking Period	Unit Title	Recommended Instructional Days
2	Waves and Information Transfer	23
<b>NJSLS - Science: Title</b>	<b>NJSLS - Science: Performance Expectations</b>	<b>Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSL-S within Unit</b>
Waves and their Applications in Technologies for Information Transfer	<ul style="list-style-type: none"> <li> <b>4-PS4-1</b> Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or </li> </ul>	

	<p>quantitative models of amplitude and wavelength.]</p> <ul style="list-style-type: none"><li>● <b>4-PS4-2.</b>Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.[Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]</li><li>● <b>4-PS4-3.</b>Generate and compare multiple solutions that use patterns to transfer information.*[Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]</li></ul>	
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<b>FOUNDATION Disciplinary: Core Idea</b>	<b>FOUNDATION Disciplinary: Statement</b>	
<ul style="list-style-type: none"> <li>● <b>PS3.A: Definitions of Energy</b></li> <li>● <b>PS3.B: Conservation of Energy and Energy Transfer</b></li> <li>● <b>PS3.C: Relationship Between Energy and Forces</b></li> <li>● <b>PS3.D: Energy in Chemical Processes and Everyday Life</b></li> <li>● <b>ETS1.A: Defining Engineering Problems</b></li> </ul>	<ul style="list-style-type: none"> <li>● The faster a given object is moving, the more energy it possesses. (4-PS3-1)</li> <li>● Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2), (4-PS3-3)</li> <li>● 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. (4-PS3-2), (4- PS3-3)</li> </ul>	<p><b><u>Essential Question/s:</u></b></p> <ul style="list-style-type: none"> <li>● What are waves?</li> <li>● How does light reflect?</li> <li>● How is information transferred from place to place?</li> </ul> <p><b><u>Activity Description:</u></b></p> <ul style="list-style-type: none"> <li>● You Solve It- Build a Wave Pool (Online Simulation) [21st Century, TECH, PE]</li> <li>● Hands-On Activity- Let’s Make Waves: Wave Parts (Pages 156-160) [21st Century, PE, MA]</li> <li>● Hands-On Activity- Let’s Make Waves: Waves Interact (Pages 161-164) [21st Century, PE, MA]</li> <li>● Hands-On Activity- Disappearing Coins (Pages 172-173) [21st Century, PE]</li> <li>● Hands-On Activity- Reflecting on Angles (Pages 182-184) [21st Century, PE, MA]</li> <li>● Hands- On Activity- Pixels to Pictures (Pages 208-209) [21st Century, ART]</li> <li>● Lego We Do 2.0- Send Messages [SCI, SEL, 21st Century, TECH, PE]</li> <li>● Unit Project- Reflecting Light [21st Century, ELA, SS]</li> </ul>

	<ul style="list-style-type: none"><li>• Light also transfers energy from place to place. (4-PS3-2)</li><li>• 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. (4- PS3-2), (4-PS3-4)</li><li>• When objects collide, the contact forces transfer energy so as to change the objects' motions. (4- PS3-3)</li><li>• The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)</li><li>• Possible solutions to a problem are limited by available materials and resources (constraints). The</li></ul>	<ul style="list-style-type: none"><li>• Scientist Spotlight- Farida Bedwei, Mark E. Dean, George Carruthers, and Dorothy Johnson Vaughan [SCI, 21st Century]</li></ul> <p><b>Interdisciplinary Connections: Content: NJSLS:</b> <i>Connections to NJSLS - English Language Arts</i></p> <ul style="list-style-type: none"><li>• <b>RI.4.1</b> Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS4-3)</li><li>• <b>RI.4.9</b> Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS4-3)</li><li>• <b>SL.4.5</b> Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-1), (4-PS4-2)</li></ul> <p><i>Connections to NJSLS - Mathematics</i></p> <ul style="list-style-type: none"><li>• <b>MP.4</b> Model with mathematics. (4-PS4-1), (4-PS4-2)</li><li>• <b>4.G.A.1</b> Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-1), (4-PS4-2)</li></ul>
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	<p>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 to 4-PS3- 4)</p>	
<p><b>FOUNDATION</b> <b>Science and Engineering Practices:</b> <i>Core Idea</i></p>	<p><b>FOUNDATION</b> <b>Science and Engineering Practices:</b> <i>Statement</i></p>	
<ul style="list-style-type: none"> <li>● <b>Developing and Using Models</b> Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.</li> </ul>	<ul style="list-style-type: none"> <li>● Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1)</li> <li>● Develop a model to describe phenomena. (4-PS4-2)</li> <li>● Generate and compare multiple solutions to a problem based on how well they meet the criteria and</li> </ul>	

<ul style="list-style-type: none"> <li>● <b>Constructing Explanations and Designing Solutions</b> Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.</li> </ul>	<p>constraints of the design solution. (4-PS4-3)</p>	
<p><b>FOUNDATION</b> <b>Crosscutting Concepts:</b> <i>Core Idea</i></p>	<p><b>FOUNDATION</b> <b>Crosscutting Concepts:</b> <i>Statement</i></p>	
<ul style="list-style-type: none"> <li>● <b>Patterns</b></li> <li>● <b>Cause and Effect</b></li> <li>● <b>Interdependence of Science, Engineering, and Technology</b></li> <li>● <b>Scientific Knowledge is Based on Empirical Evidence</b></li> </ul>	<ul style="list-style-type: none"> <li>● Similarities and differences in patterns can be used to sort and classify natural phenomena. (4- PS4-1)</li> <li>● Similarities and differences in patterns can be used to sort and classify designed products. (4- PS4-3)</li> <li>● Cause and effect relationships are routinely identified. (4-PS4-2)</li> <li>● Knowledge of relevant scientific concepts and research findings is</li> </ul>	

	<p>important in engineering. (4-PS4- 3)</p> <ul style="list-style-type: none"> <li>Science findings are based on recognizing patterns. (4-PS4-1)</li> </ul>	
<p><b>Social and Emotional Learning:</b> <i>Competencies</i></p>	<p><b>Social and Emotional Learning:</b> <i>Sub-Competencies</i></p>	
<ul style="list-style-type: none"> <li>Responsible Decision-Making</li> <li>Relationship Skills</li> </ul>	<ul style="list-style-type: none"> <li>Develop, implement, and model effective problem solving and critical thinking skills.</li> <li>Identify the consequences associated with one’s actions in order to make constructive choices.</li> <li>Evaluate personal, ethical, safety, and civic impact of decisions.</li> <li>Utilize positive communication and social skills to interact effectively with others.</li> </ul>	
<p><b>Assessments (Formative)</b> <i>To show evidence of meeting the standard/s, students will successfully engage within:</i></p>	<p><b>Assessments (Summative)</b> <i>To show evidence of meeting the standard/s, students will successfully complete:</i></p>	
		<p><b>Benchmarks:</b></p> <ul style="list-style-type: none"> <li>District Assessment</li> </ul>

<p><b><u>Formative Assessments:</u></b></p> <ul style="list-style-type: none"> <li>Unit Pretest, Lesson Check, Lesson Roundup, Lesson Quiz, and student responses in Ebook.</li> </ul>		<p><b><u>Summative Assessments:</u></b></p> <ul style="list-style-type: none"> <li>Unit 3 Performance Task- The Rainbow Show (pages 224-225)</li> <li>Unit 3 Test</li> <li>Written Reports based on hands-on activities and Lego WeDo 2.0</li> </ul>	
<p><b>Differentiated Student Access to Content: Teaching and Learning <i>Resources/Materials</i></b></p>			
<p><b>Core Resources</b></p>	<p><b>Alternate Core Resources <i>IEP/504/At-Risk/ESL</i></b></p>	<p><b>ELL Core Resources</b></p>	<p><b>Gifted &amp; Talented Core Resources</b></p>
<ul style="list-style-type: none"> <li>HMH Workbook</li> <li>HMH Science Dimension Kits</li> <li>Lego WeDo 2.0</li> <li>Student Chromebooks</li> <li>Video Based Projects for each Unit</li> </ul>	<ul style="list-style-type: none"> <li>Text to Speech Tool on HMH E-Book</li> <li>Read-Along Highlight Tool on HMH E-Book</li> <li>Leveled Readers</li> <li>Vocabulary Card Game for each unit</li> </ul>	<ul style="list-style-type: none"> <li>Multilingual Glossary on HMH Ed website</li> </ul>	<ul style="list-style-type: none"> <li>Leveled Readers</li> <li>Lego WeDo 2.0 Extension Activities</li> <li>You Solve It Simulations</li> <li>21st Century Skills-Technology and Coding</li> </ul>
<p><b>Supplemental Resources</b></p>			
<p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>HMH E-Book</li> <li>Schoology</li> <li>Kahoot!</li> <li>Quizlet/Quizlet Live</li> <li>Quizizz</li> <li>Newsela</li> <li>Readworks</li> </ul>			

<ul style="list-style-type: none"> <li>• NSTA Lesson Resource-Waves and Their Applications in Technologies for Human Transfer</li> <li>• Study Jams (Click to the Human Body then the Senses)</li> <li>• You Solve it Simulations</li> </ul> <p><b>Other:</b></p> <ul style="list-style-type: none"> <li>• Leveled Readers</li> <li>• Lego WeDo 2.0</li> </ul>			
<p><b>Differentiated Student Access to Content: Recommended <i>Strategies &amp; Techniques</i></b></p>			
Core Resources	Alternate Core Resources <i>IEP/504/At-Risk/ESL</i>	ELL Core Resources	Gifted & Talented Core
<ul style="list-style-type: none"> <li>• Promote an approach that benefits multiple learning styles exploring phenomena through readings, videos, and collaborative projects.</li> <li>• Establishing proper safety protocols for using specialized equipment and gathering materials.</li> <li>• Establishing communication protocols for collaborative activities to ensure all students properly communicate and involve every student.</li> <li>• Demonstrate that the Engineering Design Process is a</li> </ul>	<ul style="list-style-type: none"> <li>• Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review,</li> </ul>	<ul style="list-style-type: none"> <li>• Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual dictionary, and modified assessment and/or rubric.</li> </ul>	<ul style="list-style-type: none"> <li>• Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect students to related talent development opportunities.</li> </ul>

flexible cycle that allows for steps to be repeated.	restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.		
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<p><b>NJSLS CAREER READINESS, LIFE LITERACIES &amp; KEY SKILLS</b></p>	<p><b>Disciplinary Concept:</b></p>	
	<p><i>Core Ideas:</i></p>	<ul style="list-style-type: none"> <li>• Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative solutions.</li> <li>• Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.</li> <li>• The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.</li> </ul>
	<p><i>Performance Expectation/s:</i></p>	<ul style="list-style-type: none"> <li>• 9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).</li> <li>• 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7).</li> <li>• 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one’s thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).</li> <li>• 9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).</li> </ul>

		<ul style="list-style-type: none"> <li>9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).</li> <li>9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).</li> <li>9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.</li> <li>9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.Civics CM.3).</li> </ul>
	<b>Career Readiness, Life Literacies, &amp; Key Skills Practices</b>	
	<ul style="list-style-type: none"> <li>Hands-on activities provide opportunities for creativity and innovation. Working in small groups will allow students to collaborate with classmates who possess diverse perspectives for innovative solutions. Also, collaboration will enhance their ability to gather data, discover resources, and apply critical thinking skills to solve real-world problems.</li> </ul>	

New Jersey Legislative Statutes and Administrative Code  
(place an "X" before each law/statute if/when present within the curriculum map)

	X Amistad Law: <i>N.J.S.A. 18A 52:16A-88</i>		Holocaust Law: <i>N.J.S.A. 18A:35-28</i>		LGBT and Disabilities Law: <i>N.J.S.A. 18A:35-4.35</i>		X Diversity & Inclusion: <i>N.J.S.A. 18A:35-4.36a</i>		Standards in Action: <i>Climate Change</i>
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