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

Grade 4

Unit 3 Energy

New Jersey Learning Standards

Established 2016-2017
Revised 2018-2019
Revised 2019-2020
Revised 2020-2021
Revised 2021-2022
Revised 2022-2023
Revised 2023-2024
Revised 2024-2025

Content Area: Science (NJSLS-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

Trimester	**Unit Title**	**Recommended Instructional Days**
Trimester 1	Energy	45

NJSLS - Science: ***TItle***	**NJSLS - Science:** ***Performance Expectations***	**Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-S within Unit**
Energy	• **4-PS3-1**.Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary:Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.] • **4-PS3-2**.Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements	

	of energy.] • **4-PS3-3.** Ask questions and predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement: Emphasis is on the change of energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.] • **4-PS3-4**.Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*[Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound;and,a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to	

	design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.] • **4-PS4-1** 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 quantitative models of amplitude and wavelength.]	

	• **4-PS4-2**.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.] • **4-PS4-3**.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.]	
FOUNDATION **Disciplinary:** ***Core Idea***	**FOUNDATION** **Disciplinary:** ***Statement***	

• **PS3.A: Definitions of Energy** • **PS3.B: Conservation of Energy and Energy Transfer** • **PS3.C: Relationship Between Energy and Forces** • **PS3.D: Energy in Chemical Processes and Everyday Life** • **ETS1.A: Defining Engineering Problems** • **PS4.A Wave Properties** • **4-PS4-2 Waves and Their Applications in Technologies for Information Transfer** • **4-PS4-3 Waves and Their Applications in Technologies for Information Transfer**	• The faster a given object is moving, the more energy it possesses.(4-PS3-1) • Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) • 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) • Light also transfers energy from place to place.(4-PS3-2) • Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion,	**Essential Question/s:** • What is energy? • How is energy transferred? • How do collisions show energy? • What are waves? • How does light reflect? • How is information transferred from place to place? **Activity Description:** • You Solve It-Crash Course (Online Simulation) [SCI, 21st Century, TECH, PE] • Hands-On Activity- Full of Energy [SCI, 21st Century, PE, ELA] • Hands-On Activity- Light a Bulb [SCI, ELA] • Hands-On Activity- Test It! Stored Energy in a Rubber Band [SCI, SEL, 21st Century, PE, MA, ELA] • Hands-On Activity- Speed and Energy [SCI, PE, MA, ELA] • Hands-On Activity- Let's Make Waves [21st Century, PE, MA] • Hands-On Activity- Bobbing and Waving [ELA, PE, MA] • Hands-On Activity- Engineer It: Communication Solutions [SCI, 21st Century, SEL, PE, ELA] • Hands- On Activity- Pixels to Pictures [21st Century, ART] • Unit Project- Wave Patterns [SCI, 21st Century, TECH, ELA, ART] • Unit Performance Task- Colliding Objects [SCI, SEL, 21st Century, TECH, PE, MA, ELA, ART] • Scientist Spotlight- Guion Bluford, Victor J. Glover, Jr., Mae C. Jemison, Farida Bedwei, Mark E. Dean, George Carruthers, and Dorothy Johnson Vaughan [SCI, 21st Century]

	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) ● When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3) ● The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) ● Possible solutions to a problem are limited by available materials and resources (constraints).The 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	**Interdisciplinary Connections: Content: NJSLS:** *Connections to NJSLS - English Language Arts* • **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1) • **RI.4.3** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. (4-PS3-1) • **RI.4.9** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1) • **W.4.2** Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4- PS3-1) • **W.4.7** Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2), (4-PS3-3), (4-PS3-4) • **W.4.8** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources. (4-PS3-1), (4-PS3-2), (4- PS3-3), (4-PS3-4) • **W.4.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. (4- PS3-1) • **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (4-PS3-4)

	constraints into account. (secondary to 4-PS3-4) ● Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (PS4.A) ● Waves in the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (PS4.A) ● An object can be seen when light reflected from its surface enters the eyes (PS4.B) ● Digitized information can be transmitted over long distances without significant degradation. High tech devices, such as computers or cell phones, can receive and decode information–	

	convert it from digitized form to voice- and vice versa. (PS4.C)	
FOUNDATION **Science and Engineering Practices:** ***Core Idea***	**FOUNDATION** **Science and Engineering Practices:** ***Statement***	
• **Asking Questions and Defining Problems** Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. • **Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support	• Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3) • Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2) • Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1) • Apply scientific ideas to solve design problems. (4-PS3-4) • Develop a model using an analogy, example, or abstract representation to	

explanations or design solutions. ● **Constructing Explanations and Designing Solutions** 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. ● **Developing and Using Models** 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.	describe a scientific principle. (4-PS4-1) ● Develop a model to describe phenomena. (4-PS4-2) ● Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3)	
FOUNDATION **Crosscutting Concepts:** ***Core Idea***	**FOUNDATION** **Crosscutting Concepts:** ***Statement***	

• **Energy and Matter** • **Influence of Science, Engineering, and Technology on Society and the Natural World** • **Science is a Human Endeavor** • **Patterns**	• Energy can be transferred in various ways and between objects. (4-PS3-1), (4-PS3-2), (4-PS3-3), (4-PS3-4) • Engineers improve existing technologies or develop new ones. (4-PS3-4) • Most scientists and engineers work in teams. (4-PS3-4) • Science affects everyday life. (4-PS3-4) • Similarities and differences in patterns can be used to sort and classify designed products. (4- PS4-3)	
Social and Emotional Learning: ***Competencies***	**Social and Emotional Learning:** ***Sub-Competencies***	
• Responsible Decision-Making • Relationship Skills	• Develop, implement, and model effective problem solving and critical thinking skills. • Identify the consequences associated with one's actions in order to make constructive choices.	

	• Evaluate personal, ethical, safety, and civic impact of decisions. • Utilize positive communication and social skills to interact effectively with others.	

Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***	**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
Formative Assessments: • Unit Pretest, Lesson Check, Lesson Roundup, Lesson Quiz, and student responses in Ebook.	**Benchmarks:** • District Assessment **Summative Assessments:** • Unit 3 Performance Task- Colliding Objects • Unit 3 Project- Wave Patterns • Unit 3 Test

Differentiated Student Access to Content:
Teaching and Learning *Resources/Materials*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**
• HMH Workbook • HMH Into Science Kits • Student Chromebooks • Video Based Projects for each Unit	• Text to Speech Tool on HMH E-Book • Read-Along Highlight Tool on HMH E-Book • Leveled Readers • Language Development	• Multilingual Glossary on HMH Ed website	• Leveled Readers • You Solve It Simulations

	Worksheet for each unit		

Supplemental Resources

Technology:

- HMH E-Book
- Schoology
- Kahoot!
- Quizlet/Quizlet Live
- Quizizz
- Readworks
- Mystery Science
- NSTA Lesson Resource-Engineering Design
- You Solve it Simulations

Other:

- Leveled Readers

Differentiated Student Access to Content:
Recommended *Strategies & Techniques*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core**
• Promote an approach that benefits multiple learning styles exploring phenomena through readings, videos, and collaborative projects. • Establishing proper safety protocols for using specialized	• Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations,	• Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an	• Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based

equipment and gathering materials. ● Establishing communication protocols for collaborative activities to ensure all students properly communicate and involve every student. ● Demonstrate that the Engineering Design Process is a flexible cycle that allows for steps to be repeated.	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, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks	online bilingual dictionary, and modified assessment and/or rubric.	extension activities, and connect students to related talent development opportunities.

NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	**Disciplinary Concept:**	
	Core Ideas:	● Collaboration with individuals with diverse perspectives can result in new ways of thinking and/or innovative solutions. ● Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills. ● The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.
	Performance Expectation/s:	● 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). ● 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). ● 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). ● 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). ● 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). ● 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). ● 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. ● 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).
	Career Readiness, Life Literacies, & Key Skills Practices	
	● 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.	

New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)									
	X Amistad Law: *N.J.S.A. 18A*		Holocaust Law: *N.J.S.A. 18A:35-28*		LGBT and Disabilities Law: *N.J.S.A.*		X Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*		Standards in Action: *Climate Change*

	52:16A-88				*18A:35-4.35*				