

Grade 6  
Trimester 1  
Unit 1 Energy  
Unit 2 Energy Transfer

New Jersey Student Learning Standards

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

Marking Period	Unit Title		Recommended Instructional Days
Trimester 1	Unit 1 Energy Unit 2 Energy Transfer		<b>60 days (including Science Inquiry, Lab Skills, and Science Safety)</b>
NJSL-S - Science: Title	NJSL-S - Science: Performance Expectations	Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSL-S within Unit	
<b>MS-PS3: Energy</b>	<p><b>MS-PS3-1.</b> Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.</p> <p><b>MS-PS3-2.</b> Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.</p> <p><b>MS-PS3-3.</b> Apply scientific</p>	<p><b><u>Essential Question/s:</u></b></p> <ol style="list-style-type: none"> <li>1. What are the factors that cause objects to move?</li> <li>2. What is the relationship between kinetic and potential energy?</li> <li>3. How does energy relate to the mass and speed of an object?</li> <li>4. How can energy be transferred from one <u>system</u> to another?</li> <li>5. How can energy be transferred from one <u>material</u> to another?</li> <li>6. What happens to an object when energy is transferred to it?</li> <li>7. How does energy transfer relate to the law of conservation of energy/matter?</li> <li>8. How is energy transformed from one form to another? (mechanical, chemical, heat, etc)</li> </ol> <p><b><u>Activity Description:</u></b></p> <ul style="list-style-type: none"> <li>❖ Lesson Phenomenon</li> <li>❖ Unit Opener: Can you Explain it?</li> </ul>	

	<p>principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*</p> <p><b>MS-PS3-4.</b> Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.</p> <p><b>MS-PS3-5.</b> Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.</p> <p><b>MS-ETS1-1.</b> Define the criteria</p>	<p>❖ “Take it Further” activities</p> <p><u>Unit 1: Energy</u></p> <ul style="list-style-type: none"><li>❖ Hands on Lab: Investigate Energy in a Rollback Can</li><li>❖ Hands on Lab: Ramping Up Transfers of Energy</li><li>❖ Hands on Lab: Analyze Energy in Systems</li><li>❖ Hands on Lab: Design an Energy Toy</li><li>❖ Hands on Lab: Optimize an Energy Toy</li></ul> <p><u>Unit 2: Energy Transfer</u></p> <ul style="list-style-type: none"><li>❖ Hands on Lab: Keeping Warm in Winter: Storing the Sun’s Energy</li><li>❖ Hands on Lab: Part 1 - Research Materials for an Insulated Container</li><li>❖ Hands on Lab: Part 2 - Design and test an insulated container</li><li>❖ Virtual Lab: How are temperatures and kinetic energy related?</li><li>❖ Virtual Lab: Temperature and thermal energy</li></ul> <p><b>Lab and engineering activities will incorporate these skills:</b></p> <ul style="list-style-type: none"><li>● Planning and Organization</li><li>● Critical Thinking</li><li>● Communication in a group</li></ul>
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	<p>and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p> <p><b>MS-ETS1-2.</b> Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p> <p><b>MS-ETS1-3.</b> Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.</p>	<ul style="list-style-type: none"><li>● Decision Making</li><li>● Reflection on activity and participation</li></ul> <p><b>Spotlight on scientists and their accomplishments</b> Example: Angela Clayton - Nuclear Physicist Annie Easley - Rocket Scientist Steve Okamoto- Mechanical Engineering; Roller Coaster Designer</p> <p><b>Human Impacts on Earth</b> Demonstrate how thermal energy drives weather patterns and creates conditions for climate change through energy transfers and transformations. (conduction, radiation, convection and Greenhouse Effect)</p> <p><b><u>Interdisciplinary Connection: Content: (NJSL#)</u></b></p> <p><b><u>Connections to Mathematics:</u></b></p> <ul style="list-style-type: none"><li>● Reason abstractly and quantitatively. <b>(MP.2)</b></li><li>● Understand the concept of a unit rate <math>a/b</math> associated with a ratio <math>a:b</math> with <math>b \neq 0</math>, and use rate language in the context of a ratio relationship. <b>(6.RP.A.2)</b></li><li>● Recognize and represent proportional relationships between quantities. <b>(7.RP.A.2)</b></li><li>● Model with mathematics <b>(MP.4)</b></li></ul>
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	<p><b>MS-ETS1-4.</b> Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.</p>	<ul style="list-style-type: none"> <li>● Write, read, and evaluate expressions in which letters stand for numbers.(<b>6.EE.A.2</b>)</li> <li>● Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities (<b>6.RP.A.3.d</b>)</li> </ul>
<p><b>FOUNDATION</b> <b>Disciplinary:</b> <i>Core Idea</i></p>	<p><b>FOUNDATION</b> <b>Disciplinary:</b> <i>Statement</i></p>	<p><b><u>Connections to Language Arts:</u></b></p> <ul style="list-style-type: none"> <li>● Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (<b>SL.8.5</b>)</li> <li>● Integrate information expressed in words with a version expressed visually (e.g., in a flowchart, diagram, model, graph, or table) (<b>RST 6-8.7</b>)</li> <li>● 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. (<b>WHST.6-8.7</b>)</li> <li>● Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (<b>WHST.6-8.2</b>)</li> <li>● Draw evidence from informational texts to support</li> </ul>
<p><b>PS3.A Definitions of energy</b></p>	<p>Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed.(MS-PS3-1)</p> <p>A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)</p> <p>Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types,</p>	

<p><b>PS3.B Conservation of Energy and Energy Transfer</b></p> <p><b>PS3.C Relationship Between Energy and Forces</b></p> <p><b>ETS1.A Defining and delimiting an Engineering</b></p>	<p>states, and amounts of matter present. (MS-PS3-3),(MS-PS3-4)</p> <p>When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5)</p> <p>The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4)</p> <p>Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3)</p> <p>When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)</p> <p>The more precisely a design task's criteria and constraints can be defined, the more likely it is</p>	<p>analysis, reflection, and research. <b>(WHST.6-8.9)</b></p>
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<p><b>Problem</b></p>          <p><b>ETS1.B Developing Possible Solutions</b></p>          <p><b>ETS1.C Optimizing the Design Solution</b></p>	<p>that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions. (secondary to MS-PS3-3)</p> <p>A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem. (secondary to MS-PS3-3)</p> <p>Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design.</p>	
<p><b>FOUNDATION</b></p>	<p><b>FOUNDATION</b></p>	

<b>Science and Engineering Practices:</b> <i>Core Idea</i>	<b>Science and Engineering Practices:</b> <i>Statement</i>	
<b>Asking Questions and Defining Problems</b>	Asking questions and defining problems in 6–8 builds on K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.	
<b>Planning and Carrying Out Investigations</b>	Planning and carrying out investigations to answer questions or test solutions to problems in 6–8 builds on K–5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or design solutions.	
<b>Developing and Using Models</b>	Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena design systems.  Analyzing data in 6–8 builds	

<p><b>Analyzing and Interpreting Data</b></p>	<p>on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.</p>	
<p><b>Constructing Explanations and Designing Solutions</b></p>	<p>Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.</p>	
<p><b>Engaging in Argument from Evidence</b></p>	<p>Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed worlds.</p>	

<b>FOUNDATION</b> <b>Crosscutting Concepts:</b> <i>Core Idea</i>	<b>FOUNDATION</b> <b>Crosscutting Concepts:</b> <i>Statement</i>	
<b>Scale, Proportion, and Quantity</b>	<p>Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. (MS-PS3-1), (MS-PS3-4)</p>	
<b>Systems and System Models</b>	<p>Models can be used to represent systems and their interactions – such as inputs, processes, and outputs – and energy and matter flows within systems. (MS-PS3-2)</p>	
<b>Energy and Matter</b>	<p>Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion). (MS-PS3-5)</p> <p>The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS3-3)</p>	

<p><b><i>Connections to Nature of Science</i></b> <b>Scientific Knowledge is Based on Empirical Evidence</b></p>	<p>Science knowledge is based upon logical and conceptual connections between evidence and explanations (MS-PS3-4), (MS-PS3-5)</p>	
<p><b>Social and Emotional Learning:</b> <b><i>Competencies</i></b></p>	<p><b>Social and Emotional Learning:</b> <b><i>Sub-Competencies</i></b></p>	
<p>Responsible Decision-Making</p> <p>Relationship Skills</p> <p>Self-Management</p> <p>Social Awareness</p> <p>Social Awareness</p>	<ul style="list-style-type: none"> <li>● Develop, implement, and model effective problem-solving and critical thinking skills</li> <li>● Utilize positive communication and social skills to interact effectively with others</li> <li>● Recognize the skills needed to establish and achieve personal and educational goals</li> <li>● Demonstrate an understanding of the need for mutual respect when viewpoints differ.</li> </ul>	

Social Awareness	<ul style="list-style-type: none"> <li>• Demonstrate an awareness of the expectations for social interactions in a variety of ways.</li> <li>• Recognize the importance of self-confidence in handling daily tasks and challenges</li> </ul>		
<p align="center"><b>Assessments (Formative)</b> <i>To show evidence of meeting the standard/s, students will successfully engage within:</i></p>		<p align="center"><b>Assessments (Summative)</b> <i>To show evidence of meeting the standard/s, students will successfully complete:</i></p>	
<p><b><u>Formative Assessments:</u></b></p> <ul style="list-style-type: none"> <li>• Diagnostic tests used to modify teaching and learning activities to improve student attainment</li> </ul>		<p><b><u>Benchmarks:</u></b></p> <ul style="list-style-type: none"> <li>• District Assessment</li> </ul> <p><b><u>Summative Assessments:</u></b></p> <ul style="list-style-type: none"> <li>• End of unit/chapter tests/lesson quizzes</li> </ul>	
<p align="center"><b>Differentiated Student Access to Content: Teaching and Learning Resources/Materials</b></p>			
<p align="center"><b>Core Resources</b></p>	<p align="center"><b>Alternate Core Resources <i>IEP/504/At-Risk/ESL</i></b></p>	<p align="center"><b>ELL Core Resources</b></p>	<p align="center"><b>Gifted &amp; Talented Core Resources</b></p>
<ul style="list-style-type: none"> <li>• <b>Interactive Worktext</b></li> <li>• <b>Equipment Kits</b></li> <li>• <b>Online Simulations</b></li> <li>• <b>Lab Safety Handbook</b></li> </ul>	<ul style="list-style-type: none"> <li>• Multilingual Glossary</li> <li>• Online Science Tools (Scientific Calculator, Graphing)</li> </ul>	<ul style="list-style-type: none"> <li>• Multilingual Glossary</li> <li>• Online Science Tools (Scientific Calculator, Graphing)</li> </ul>	<ul style="list-style-type: none"> <li>• Online Simulations</li> <li>• Virtual Labs</li> <li>• Webquests</li> <li>• Video-Based Projects</li> </ul>

			<ul style="list-style-type: none"> <li>● Take It Further</li> <li>● You Solve It !</li> <li>● Unit Performance Tasks</li> <li>● Unit Projects</li> <li>● Online Science Tools (Scientific Calculator, Graphing)</li> </ul>
<b>Supplemental Resources</b>			
<p><b>Technology: 8.1.8.A.1, 8.1.8.A. 2, 8.1.8.A.3, 8.1.8.A. 4, 8.1.8.A. 5</b></p> <p><b>Other: Career Education</b></p> <ul style="list-style-type: none"> <li>● CRP4 Communicate clearly and effectively and with reason.</li> <li>● CRP6 Demonstrate creativity and innovation</li> <li>● CRP7 Employ valid and reliable research strategies</li> <li>● CRP11 Use technology to enhance productivity</li> </ul>			
<b>Differentiated Student Access to Content: <i>Recommended Strategies &amp; Techniques</i></b>			
<b>Core Resources</b>	<b>Alternate Core Resources <i>IEP/504/At-Risk/ESL</i></b>	<b>ELL Core Resources</b>	<b>Gifted &amp; Talented Core Resources</b>

<ul style="list-style-type: none"> <li>● <b>Large group instruction</b></li> <li>● <b>Small group instruction</b></li> <li>● <b>Think Pair Share</b></li> <li>● <b>Peer editing</b></li> <li>● <b>Cooperative group work</b></li> <li>● <b>Multimedia presentations</b></li> <li>● <b>Choice Boards/Learning Menus</b></li> <li>● <b>Manipulatives</b></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, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.</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 student to related talent development opportunities.</li> </ul>
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<p>NJSLS CAREER READINESS, LIFE LITERACIES &amp; KEY SKILLS</p>	<p><b>Disciplinary Concept: 1.Career Awareness and Planning, 2.Creativity and Innovation, 3.Critical Thinking and Problem Solving, 4.Global and Cultural Awareness 5. Digital Citizenship 6. Information and Media Literacy 7. Technology Literacy</b></p>	
	<p><i>Core Ideas:</i></p>	<p>1. There are a variety of resources available to help navigate the career planning process.</p>

		<ol style="list-style-type: none"><li>2. Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.</li><li>3. Multiple solutions often exist to solve a problem.</li><li>4. Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.</li><li>5. Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.</li><li>6. Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.</li><li>7. Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others</li></ol>
	<i>Performance Expectation/s:</i>	<ol style="list-style-type: none"><li>1. 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.</li><li>2. 9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).</li><li>3. 9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).</li><li>4. 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.</li><li>5. 9.4.8.DC.1: Analyze the resource citations in online materials for proper use.</li><li>5. 9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).</li></ol>

		<p>6. 9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations.</p> <p>7. 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).</p> <p>7. 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).</p>
	<p>Career Readiness, Life Literacies, &amp; Key Skills Practices</p>	
	<ul style="list-style-type: none"> <li>● Act as a responsible and contributing community member and employee.</li> <li>● Demonstrate creativity and innovation.</li> <li>● Utilize critical thinking to make sense of problems and persevere in solving them.</li> <li>● Consider the environmental, social and economic impacts of decisions.</li> <li>● Use technology to enhance productivity, increase collaboration and communicate effectively.</li> <li>● Work productively in teams while using cultural/global competence.</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>	X	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>	X	Standards in Action: <i>Climate Change</i>

Content Area: Science (NJSL-S) Grades K - 12  
Grade: 6

Dev. Date:  
September  
2024

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