A Teacher Planning Guide for

Elevate Science
Physical ©2019

To the

Wisconsin Standards for Science
Physical Science, Grades 6-8

Prepared by Savvas Learning Company, formerly Pearson K12 Learning

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Introduction

The following document demonstrates how the ***Elevate Science* *©2019*** program supports the Wisconsin Standards for Science.

Savvas Learning Company is proud to introduce ***Elevate Science: Life, Earth, and Physical*** for Middle Grades – where exploration is the heart of science! Designed to address the rigors of new science standards, students will experience science up close and personal, using real-world, relevant phenomena to solve project-based problems. Our newest program prepares students for the challenges of tomorrow, building strong reasoning skills and critical thinking strategies as they engage in explorations, formulate claims, and gather and analyze data that promote evidence-based arguments. The blended print and digital curriculum covers all Next Generation Science Standards at every grade level.

Elevate Science helps teachers transform learning, promote innovation, and manage their classroom.

Transform science classrooms by immersing students in active, three-dimensional learning.
Elevate Science engages students with real-world phenomena, open-ended Quests, uDemonstrate performance-based tasks, and in the engineering/design process with uEngineer It! investigations.

- A new 3-D learning model enhances best practices.
- Engineering-focused features infuse STEM learning.
- Phenomena-based activities put students at the heart of a Quest for knowledge.

Innovate learning by focusing on 21st century skills.
Students are encouraged to think, collaborate, and innovate! With ***Elevate Science***, students explore STEM careers, experience engineering activities, and discover our scientific and technological world. The content, strategies, and resources of Elevate Science equip the science classroom for scientific inquiry and science and engineering practices.

- Problem-based learning Quests put students on a journey of discovery.
- STEM connections help integrate curriculum.
- Coding and innovation engage students and build 21st century skills.

Manage the classroom with confidence.
Teachers will lead their class in asking questions and engaging in argumentation. Evidence-based assessments provide new options for monitoring student understanding.

- Professional development offers practical point-of-use support.
- Embedded standards in the program allow for easy integration.
- ELL and differentiated instruction strategies help instructors reach every learner.
- Interdisciplinary connections relate science to other subjects.

Designed for today's classroom, preparing students for tomorrow's world. ***Elevate Science*** promises to:

- Elevate thinking.
- Elevate learning.
- Elevate teaching.

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Topic 1: Introduction to Matter	
Quest Kickoff: Lights! Camera! Action!, pp. 2-3	
Performance Indicators	**MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
Science and Engineering Practices	**SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.
uConnect Lab: The Nuts and Bolts of Formulas, pp. 3A-3B	
Performance Indicators	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.

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Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Lesson 1: Describing and Classifying Matter, pp. 4-13	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter. **MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms. **SCI.SEP5.A.m.5** Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS3.C.m.i** A theory is an explanation of some aspect of the natural world. Scientists develop theories by using multiple approaches. Validity of these theories and explanations is increased through a peer review process that tests and evaluates the evidence supporting scientific claims. **SCI.ETS3.C.m.ii** Theories are explanations for observable phenomena based on a body of evidence developed over time. A hypothesis is a statement that can be tested to evaluate a theory. Scientific laws describe cause and effect relationships among observable phenomena. **MS-ETS3-3** Mathematically evaluate products of chemical and physical changes to support ideas of atomic theory (PS1.A.m).

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Lesson 2: Measuring Matter, pp. 14-21	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. **SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP5.A.m.5** Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions.

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Case Study: An Epic Disaster, pp. 22-23	
Science and Engineering Practices	**SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s). **SCI.SEP8.A.m.2** Clarify claims and findings by integrating text-based qualitative and quantitative scientific information with information contained in media and visual displays.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.i** All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.
Lesson 3: Changes in Matter, pp. 24-32	
Performance Indicators	**SCI.PS1.B.m** Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy. **MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **SCI.PS3.D.m** Sunlight is captured by plants and used in a chemical reaction to produce sugar molecules for storing this energy. This stored energy can be released by respiration or combustion, which can be reversed by burning those molecules to release energy.

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Science and Engineering Practices	**SCI.SEP1.A.m.1** Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify or seek additional information. **SCI.SEP1.A.m.5** Ask questions that require sufficient and appropriate empirical evidence to answer. **SCI.SEP1.A.m.7** Ask questions that challenge the premise(s) of an argument or the interpretation of a data set. **SCI.SEP5.A.m.5** Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data. **SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability. **SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Engineering, Technology, and the Application of Science	**MS-ETS3-3** Mathematically evaluate products of chemical and physical changes to support ideas of atomic theory (PS1.A.m).

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uEngineer it! Lab: Gathering Speed with Superconductors, p. 33	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP6.B.m.3** Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting. **SCI.SEP7.A.m.5** Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

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Engineering, Technology, and the Application of Science	**MS-ETS1-3** 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. **MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions. **SCI.ETS3.B.m.iii** Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical manner that requires honesty, fairness and dedication to public health, safety and welfare. **SCI.ETS3.C.m.iii** Engineers develop solutions using multiple approaches and evaluate their solutions against criteria such as cost, safety, time and performance. This evaluation often involves trade-offs between constraints to find the optimal solution.

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Evidence-Based Assessment, pp. 36-37	
Performance Indicators	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms. **SCI.SEP6.A.m.2** Construct an explanation using models or representations.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.i** A solution needs to be tested and then modified on the basis of the test results in order to improve it. **SCI.ETS1.C.m.i** 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. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.

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uDemonstrate Lab: Help Out the Wildlife, pp. 38-41	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.
Science and Engineering Practices	**SCI.SEP3.A.m.3** Evaluate the accuracy of various methods for collecting data. **SCI.SEP4.A.m.6** Consider limitations of data analysis (e.g., measurement error), and seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials). **SCI.SEP5.A.m.6** Use digital tools and mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation. **SCI.SEP7.A.m.2** Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail. **SCI.SEP7.A.m.5** Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.i** A solution needs to be tested and then modified on the basis of the test results in order to improve it. **MS-ETS1-1** Define the criteria 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.

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Topic 2: Solids, Liquids, and Gases	
Quest Kickoff: Getting a Lift, pp. 44-45	
Performance Indicators	**MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP2.A.m.1** Evaluate limitations of a model for a proposed object or tool. **SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP6.B.m.3** Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **SCI.ETS1.B.m.i** A solution needs to be tested and then modified on the basis of the test results in order to improve it.

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uConnect Lab: Solid, Liquid, or Gas?, pp. 45A-46B	
Performance Indicators	**MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Science and Engineering Practices	**SCI.SEP2.A.m.1** Evaluate limitations of a model for a proposed object or tool.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Lesson 1: States of Matter, pp. 46-54	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter. **MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data. **SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.

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Continued:	**Continued:** **SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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.
uEngineer it! Lab: From Ink to Objects: 3D Printing, p. 55	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter. **MS-PS1-3** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. **MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP7.A.m.5** Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.

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Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **MS-ETS1-1** Define the criteria 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. **MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward.
Lesson 2: Changes of State, pp. 56-65	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter. **MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

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Science and Engineering Practices	**SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions.
Lesson 3: Gas Behavior, pp. 66-75	
Performance Indicators	**MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

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Science and Engineering Practices	**SCI.SEP4.A.m.2** Use graphical displays (e.g., maps, charts, graphs, and tables) of large data sets to identify temporal and spatial relationships. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability. **SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Engineering, Technology, and the Application of Science	**SCI.ETS3.C.m.ii** Theories are explanations for observable phenomena based on a body of evidence developed over time. A hypothesis is a statement that can be tested to evaluate a theory. Scientific laws describe cause and effect relationships among observable phenomena.
Case Study: Rising to the Occasion, pp. 76-77	
Performance Indicators	**MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Science and Engineering Practices	**SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS3.C.m.ii** Theories are explanations for observable phenomena based on a body of evidence developed over time. A hypothesis is a statement that can be tested to evaluate a theory. Scientific laws describe cause and effect relationships among observable phenomena.
Evidence-Based Assessment, pp. 80-81	
Performance Indicators	**MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Science and Engineering Practices	**SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.iii** Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. **SCI.ETS1.C.m.i** 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.

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uDemonstrate Lab: Melting Ice, pp. 82-85	
Performance Indicators	**MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Science and Engineering Practices	**SCI.SEP2.A.m.1** Evaluate limitations of a model for a proposed object or tool. **SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. **SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations. **SCI.CC4.m** Students understand systems may interact with other systems: they may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study. **SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.

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Topic 3: Energy	
Quest Kickoff: Outrageous Energy Contraptions, pp. 88-89	
Performance Indicators	**MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy). **MS-PS3-5** 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.
Science and Engineering Practices	**SCI.SEP5.A.m.4** Create algorithms (a series of ordered steps) to solve a problem. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.3** Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

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Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.
uConnect Lab: What Would Make a Card Jump, pp. 89A-89B	
Performance Indicators	**MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy). **MS-PS3-5** 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.
Science and Engineering Practices	**SCI.SEP5.A.m.4** Create algorithms (a series of ordered steps) to solve a problem. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
Lesson 1: Energy, Motion, Force, and Work, pp. 90-99	
Performance Indicators	**SCI.PS3.B.m** Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter. **SCI.PS3.C.m** When two objects interact, each one exerts a force on the other, and these forces can transfer energy between the interacting objects.

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Science and Engineering Practices	**SCI.SEP1.A.m.5** Ask questions that require sufficient and appropriate empirical evidence to answer. **SCI.SEP6.A.m.1** Construct an explanation that includes qualitative or quantitative relationships between variables that predict and describe phenomena.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.
Lesson 2: Kinetic Energy and Potential Energy, pp. 100-106	
Performance Indicators	**SCI.PS3.A.m** Kinetic energy can be distinguished from the various forms of potential energy. **MS-PS3-1** 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 (emphasis on qualitative descriptions of relationships). **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy).
Science and Engineering Practices	**SCI.SEP4.A.m.1** Construct, analyze, or interpret graphical displays of data and large data sets to identify linear and nonlinear relationships. **SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP4.A.m.7** Analyze and interpret data to determine similarities and differences in findings. **SCI.SEP4.A.m.8** Analyze data to define an optimal operational range for a proposed object, tool, process, or system that best meets criteria for success.

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Continued:	**Continued:** **SCI.SEP5.A.m.1** Decide when to use qualitative vs. quantitative data. **SCI.SEP6.A.m.1** Construct an explanation that includes qualitative or quantitative relationships between variables that predict and describe phenomena. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP8.A.m.2** Clarify claims and findings by integrating text-based qualitative and quantitative scientific information with information contained in media and visual displays.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.

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uEngineer It!: Prosthetics on the Move, p. 107	
Performance Indicators	**SCI.PS3.A.m** Kinetic energy can be distinguished from the various forms of potential energy.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP2.A.m.1** Evaluate limitations of a model for a proposed object or tool. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

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Engineering, Technology, and the Application of Science	**MS-ETS1-4** 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. **SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions. **SCI.ETS3.B.m.iii** Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical manner that requires honesty, fairness and dedication to public health, safety and welfare. **SCI.ETS3.C.m.iii** Engineers develop solutions using multiple approaches and evaluate their solutions against criteria such as cost, safety, time and performance. This evaluation often involves trade-offs between constraints to find the optimal solution.

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Lesson 3: Other Forms of Energy, pp. 108-117	
Performance Indicators	**SCI.PS3.A.m** Kinetic energy can be distinguished from the various forms of potential energy. **SCI.PS3.D.m** Sunlight is captured by plants and used in a chemical reaction to produce sugar molecules for storing this energy. This stored energy can be released by respiration or combustion, which can be reversed by burning those molecules to release energy. **MS-PS3-5** 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.
Science and Engineering Practices	**SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
Engineering, Technology, and the Application of Science	**SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas.
Lesson 4: Energy Change and Conservation, pp. 118-125	
Performance Indicators	**SCI.PS3.A.m** Kinetic energy can be distinguished from the various forms of potential energy. **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy). **MS-PS3-5** 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.

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Science and Engineering Practices	**SCI.SEP5.A.m.5** Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
Crosscutting Concepts	**SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.
Case Study: U.S. Energy Consumption, pp. 126-127	
Science and Engineering Practices	**SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s). **SCI.SEP8.A.m.2** Clarify claims and findings by integrating text-based qualitative and quantitative scientific information with information contained in media and visual displays.

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Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.i** All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.
Evidence-Based Assessment, pp. 130-131	
Performance Indicators	**SCI.PS3.A.m** Kinetic energy can be distinguished from the various forms of potential energy. **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy). **MS-PS3-5** 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.
Science and Engineering Practices	**SCI.SEP5.A.m.4** Create algorithms (a series of ordered steps) to solve a problem. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.

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Crosscutting Concepts	**SCI.CC4.m** Students understand systems may interact with other systems: they may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study. **SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Engineering, Technology, and the Application of Science	**SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.
uDemonstrate Lab: 3, 2, 1…Liftoff!, pp. 132-135	
Performance Indicators	**MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy). **MS-PS3-5** 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.

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Science and Engineering Practices	**SCI.SEP1.A.m.3** Ask questions to determine relationships between independent and dependent variables and relationships in models. **SCI.SEP2.A.m.7** Develop and use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales. **SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. **SCI.SEP3.A.m.4** Collect data under a range of conditions that serve as the basis for evidence to answer scientific questions or test design solutions. **SCI.SEP3.A.m.5** Collect data about the performance of a proposed object, tool, process, or system under a range of conditions. **SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.

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Topic 4: Thermal Energy	
Quest Kickoff: Keep Hot Liquids Hot, pp. 138-139	
Performance Indicators	**MS-PS3-3** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
Science and Engineering Practices	**SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.i** A solution needs to be tested and then modified on the basis of the test results in order to improve it. **SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.

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uConnect Lab: How Cold is the Water, pp. 139A-139B	
Performance Indicators	**MS-PS3-4** 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.
Science and Engineering Practices	**SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
Lesson 1: Thermal Energy, Heat, and Temperature, pp. 140-147	
Performance Indicators	**SCI.PS3.B.m** Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter.
Science and Engineering Practices	**SCI.SEP6.A.m.1** Construct an explanation that includes qualitative or quantitative relationships between variables that predict and describe phenomena. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.

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Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability. **SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Lesson 2: Heat Transfer, pp. 148-154	
Performance Indicators	**SCI.PS3.B.m** Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter. **MS-PS3-3** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. **MS-PS3-4** 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.

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Science and Engineering Practices	**SCI.SEP1.A.m.2** Ask questions to identify and clarify evidence and the premise(s) of an argument. **SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. **SCI.SEP5.A.m.1** Decide when to use qualitative vs. quantitative data. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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.

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uEngineer it! Lab: Shockwave to the Future, p. 155	
Performance Indicators	**MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. **SCI.PS3.B.m** Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP6.B.m.3** Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting. **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions. **MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **MS-ESS3-3** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society.
Case Study: Earth Power, pp. 156-157	
Science and Engineering Practices	**SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.i** All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.
Lesson 3: Heat and Materials, pp. 158-165	
Performance Indicators	**SCI.PS3.A.m** Kinetic energy can be distinguished from the various forms of potential energy. **MS-PS3-3** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. **MS-PS3-5** 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.
Science and Engineering Practices	**SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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.
Evidence-Based Assessment, pp. 168-169	
Performance Indicators	**MS-PS3-4** 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. **MS-PS3-5** 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.
Science and Engineering Practices	**SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.
uDemonstrate Lab: Testing Thermal Conductivity, pp. 170-173	
Performance Indicators	**SCI.PS3.B.m** Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter. **MS-PS3-3** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. **MS-PS3-4** 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.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Science and Engineering Practices	**SCI.SEP3.A.m.2** Conduct an investigation. Evaluate and revise the experimental design to produce data that serve as the basis for evidence to meet the goals of the investigation. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation. **SCI.SEP7.A.m.2** Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Engineering, Technology, and the Application of Science	**MS-ETS1-3** 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. **MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions. **SCI.ETS3.B.m.iii** Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical manner that requires honesty, fairness and dedication to public health, safety and welfare. **SCI.ETS3.C.m.iii** Engineers develop solutions using multiple approaches and evaluate their solutions against criteria such as cost, safety, time and performance. This evaluation often involves trade-offs between constraints to find the optimal solution.

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Topic 5: Waves and Electromagnetic Radiation	
Quest Kickoff: Design to Stop a Thief, pp. 176-177	
Performance Indicators	**SCI.PS4.B.m** The construct of a wave is used to model how light interacts with objects. **MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP6.B.m.3** Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **SCI.ETS1.B.m.i** A solution needs to be tested and then modified on the basis of the test results in order to improve it. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.

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Continued:	**Continued:** **MS-ETS1-4** 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. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions.
uConnect Lab: What Are Waves?, pp. 177A-177B	
Performance Indicators	**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.
Science and Engineering Practices	**SCI.SEP6.A.m.2** Construct an explanation using models or representations.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
Lesson 1: Wave Properties, pp. 178-185	
Performance Indicators	**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.\ **SCI.PS4.A.m** A simple wave model has a repeating pattern with a specific wavelength, frequency, and amplitude, and mechanical waves need a medium through which they are transmitted. This model can explain many phenomena including sound and light. Waves can transmit energy.

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Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP5.A.m.3** Use mathematical representations to describe and support scientific conclusions and design solutions. **SCI.SEP6.A.m.1** Construct an explanation that includes qualitative or quantitative relationships between variables that predict and describe phenomena. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability. **SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations. **SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.

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Continued:	**Continued:** **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.
Case Study: Sound and Light at the Ballpark, pp. 186-187	
Performance Indicators	**MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Science and Engineering Practices	**SCI.SEP6.A.m.1** Construct an explanation that includes qualitative or quantitative relationships between variables that predict and describe phenomena. **SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.

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Lesson 2: Wave Interactions, pp. 188-196	
Performance Indicators	**MS-PS3-1** 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 (emphasis on qualitative descriptions of relationships). **SCI.PS4.A.m** A simple wave model has a repeating pattern with a specific wavelength, frequency, and amplitude, and mechanical waves need a medium through which they are transmitted. This model can explain many phenomena including sound and light. Waves can transmit energy. **MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Science and Engineering Practices	**SCI.SEP5.A.m.3** Use mathematical representations to describe and support scientific conclusions and design solutions. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions.
uEngineer It! Lab: Say "Cheese!," p. 197	
Performance Indicators	**MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. **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.

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Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP6.B.m.3** Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society.

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Continued:	**Continued:** **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions. **SCI.ETS3.B.m.iii** Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical manner that requires honesty, fairness and dedication to public health, safety and welfare. **SCI.ETS3.C.m.iii** Engineers develop solutions using multiple approaches and evaluate their solutions against criteria such as cost, safety, time and performance. This evaluation often involves trade-offs between constraints to find the optimal solution.
Lesson 3: Sound Waves, pp. 198-207	
Performance Indicators	**MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Science and Engineering Practices	**SCI.SEP5.A.m.3** Use mathematical representations to describe and support scientific conclusions and design solutions. **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

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Lesson 4: Electromagnetic Waves, pp. 208-217	
Performance Indicators	**SCI.PS4.A.m** A simple wave model has a repeating pattern with a specific wavelength, frequency, and amplitude, and mechanical waves need a medium through which they are transmitted. This model can explain many phenomena including sound and light. Waves can transmit energy. **SCI.PS4.B.m** The construct of a wave is used to model how light interacts with objects. **MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Science and Engineering Practices	**SCI.SEP5.A.m.3** Use mathematical representations to describe and support scientific conclusions and design solutions. **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions.

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Lesson 5: Light, pp. 218-227	
Performance Indicators	**SCI.PS4.B.m** The construct of a wave is used to model how light interacts with objects. **MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Science and Engineering Practices	**SCI.SEP5.A.m.3** Use mathematical representations to describe and support scientific conclusions and design solutions. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.
Evidence-Based Assessment, pp. 230-231	
Performance Indicators	**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. **MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

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Science and Engineering Practices	**SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions.
uDemonstrate Lab: Making Waves, pp. 232-235	
Performance Indicators	**SCI.PS4.B.m** The construct of a wave is used to model how light interacts with objects. **MS-PS4-2** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Science and Engineering Practices	**SCI.SEP5.A.m.3** Use mathematical representations to describe and support scientific conclusions and design solutions. **SCI.SEP7.A.m.2** Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

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Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions. **MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **MS-ETS1-3** 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.
Topic 6: Electricity and Magnetism	
Quest Kickoff: Light as a Feather, pp. 238-239	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy).
Science and Engineering Practices	**SCI.SEP3.A.m.2** Conduct an investigation. Evaluate and revise the experimental design to produce data that serve as the basis for evidence to meet the goals of the investigation.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

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Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **SCI.ETS1.B.m.i** A solution needs to be tested and then modified on the basis of the test results in order to improve it. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. **MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region.
uConnect Lab: Magnetic Poles, pp. 239A-239B	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
Science and Engineering Practices	**SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.

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Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Lesson 1: Electric Force, pp. 240-249	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. **SCI.PS3.C.m** When two objects interact, each one exerts a force on the other, and these forces can transfer energy between the interacting objects. **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy).
Science and Engineering Practices	**SCI.SEP1.A.m.6** Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. **SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas.
Lesson 2: Magnetic Force, pp. 250-257	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. **SCI.PS3.C.m** When two objects interact, each one exerts a force on the other, and these forces can transfer energy between the interacting objects. **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy).
Science and Engineering Practices	**SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.

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Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data. **SCI.CC4.m** Students understand systems may interact with other systems: they may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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.
Lesson 3: Electromagnetic Force, pp. 258-264	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
Science and Engineering Practices	**SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena.

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Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability. **SCI.CC4.m** Students understand systems may interact with other systems: they may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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.
uEngineer It!: Electromagnetic in Action, p. 265	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

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Engineering, Technology, and the Application of Science	**MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions. **SCI.ETS3.B.m.iii** Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical manner that requires honesty, fairness and dedication to public health, safety and welfare. **SCI.ETS3.C.m.iii** Engineers develop solutions using multiple approaches and evaluate their solutions against criteria such as cost, safety, time and performance. This evaluation often involves trade-offs between constraints to find the optimal solution.

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Lesson 4: Electric and Magnetic Interactions, pp. 266-275	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
Science and Engineering Practices	**SCI.SEP1.A.m.1** Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify or seek additional information. **SCI.SEP1.A.m.4** Ask questions to clarify or refine a model, an explanation, or an engineering problem. **SCI.SEP5.A.m.5** Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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.
Case Study: The X-57 Maxwell, pp. 276-277	
Performance Indicators	**MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
Science and Engineering Practices	**SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP5.A.m.5** Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions.
Evidence-Based Assessment, pp. 280-281	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. **SCI.PS3.C.m** When two objects interact, each one exerts a force on the other, and these forces can transfer energy between the interacting objects. **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy).
Science and Engineering Practices	**SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions.
uDemonstrate Lab: Planetary Detective, pp. 282-285	
Performance Indicators	**SCI.PS2.B.m** Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. **SCI.PS3.C.m** When two objects interact, each one exerts a force on the other, and these forces can transfer energy between the interacting objects. **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy).
Science and Engineering Practices	**SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.

Elevate Science: Physical ©2019	**Wisconsin Standards for Science Physical Sciences, Grades 6-8**
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.
Topic 7: Information Technologies	
Quest Kickoff: Testing, Testing…1, 2, 3, pp. 288-289	
Performance Indicators	**SCI.PS4.C.m** Waves can be used to transmit digital information. Digitized information is comprised of a pattern of 1s and 0s. **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.
Science and Engineering Practices	**SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC4.m** Students understand systems may interact with other systems: they may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study.
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

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uConnect Lab: Continuous or Discrete, pp. 289A-289B	
Performance Indicators	**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.
Science and Engineering Practices	**SCI.SEP4.A.m.1** Construct, analyze, or interpret graphical displays of data and large data sets to identify linear and nonlinear relationships. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Lesson 1: Electric Circuits, pp. 290-298	
Performance Indicators	**SCI.PS3.B.m** Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter.
Science and Engineering Practices	**SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. **SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

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Continued:	**Continued:** **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s). **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS3.C.m.ii** Theories are explanations for observable phenomena based on a body of evidence developed over time. A hypothesis is a statement that can be tested to evaluate a theory. Scientific laws describe cause and effect relationships among observable phenomena.
uEngineer It!: A Life-Saving Mistake, p. 299	
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.

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Engineering, Technology, and the Application of Science	**MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions. **SCI.ETS3.B.m.iii** Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical manner that requires honesty, fairness and dedication to public health, safety and welfare. **SCI.ETS3.C.m.iii** Engineers develop solutions using multiple approaches and evaluate their solutions against criteria such as cost, safety, time and performance. This evaluation often involves trade-offs between constraints to find the optimal solution.

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Lesson 2: Signals, pp. 300-309	
Performance Indicators	**SCI.PS4.C.m** Waves can be used to transmit digital information. Digitized information is comprised of a pattern of 1s and 0s. **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.
Science and Engineering Practices	**SCI.SEP5.A.m.5** Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. **SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s). **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region.
Case Study: Super Ultra High Definition, pp. 310-311	
Performance Indicators	**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.
Science and Engineering Practices	**SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

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Lesson 3: Communication and Technology, pp. 312-321	
Performance Indicators	**SCI.PS4.C.m** Waves can be used to transmit digital information. Digitized information is comprised of a pattern of 1s and 0s. **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.
Science and Engineering Practices	**SCI.SEP1.A.m.1** Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify or seek additional information. **SCI.SEP1.A.m.4** Ask questions to clarify or refine a model, an explanation, or an engineering problem. **SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

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Evidence-Based Assessment, pp. 324-325	
Performance Indicators	**SCI.PS4.C.m** Waves can be used to transmit digital information. Digitized information is comprised of a pattern of 1s and 0s. **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.
Science and Engineering Practices	**SCI.SEP4.A.m.1** Construct, analyze, or interpret graphical displays of data and large data sets to identify linear and nonlinear relationships. **SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP5.A.m.3** Use mathematical representations to describe and support scientific conclusions and design solutions. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

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uDemonstrate Lab: Over and Out, pp. 326-329	
Performance Indicators	**SCI.PS4.C.m** Waves can be used to transmit digital information. Digitized information is comprised of a pattern of 1s and 0s. **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.
Science and Engineering Practices	**SCI.SEP2.A.m.1** Evaluate limitations of a model for a proposed object or tool. **SCI.SEP4.A.m.6** Consider limitations of data analysis (e.g., measurement error), and seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials). **SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
Crosscutting Concepts	**SCI.CC4.m** Students understand systems may interact with other systems: they may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.iii** Technology use varies over time and from region to region.

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Topic 8: Atoms and the Periodic Table	
Quest Kickoff: Dessert Disaster, pp. 332-333	
Performance Indicators	**SCI.PS1.B.m** Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy. **MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP3.A.m.4** Collect data under a range of conditions that serve as the basis for evidence to answer scientific questions or test design solutions. **SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS3.B.m.i** Science asks questions to understand the natural world and assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. Science carefully considers and evaluates anomalies in data and evidence.
uConnect Lab: Modeling Mater, p. 333A-333B	
Performance Indicators	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena.

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Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Lesson 1: Atomic Theory, pp. 334-343	
Performance Indicators	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms. **SCI.SEP5.A.m.5** Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. **SCI.SEP6.A.m.2** Construct an explanation using models or representations. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s). **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.

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Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS3.C.m.i** A theory is an explanation of some aspect of the natural world. Scientists develop theories by using multiple approaches. Validity of these theories and explanations is increased through a peer review process that tests and evaluates the evidence supporting scientific claims. **SCI.ETS3.C.m.ii** Theories are explanations for observable phenomena based on a body of evidence developed over time. A hypothesis is a statement that can be tested to evaluate a theory. Scientific laws describe cause and effect relationships among observable phenomena.
Case Study: Unlocking the Power of the Atom, pp. 344-345	
Performance Indicators	**SCI.PS1.B.m** Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy. **MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.

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Science and Engineering Practices	**SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s). **SCI.SEP8.A.m.2** Clarify claims and findings by integrating text-based qualitative and quantitative scientific information with information contained in media and visual displays.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.B.m.iii** Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical manner that requires honesty, fairness and dedication to public health, safety and welfare.

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Lesson 2: The Periodic Table, pp. 346-357	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.
Science and Engineering Practices	**SCI.SEP4.A.m.2** Use graphical displays (e.g., maps, charts, graphs, and tables) of large data sets to identify temporal and spatial relationships. **SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas.
Lesson 3: Bonding and the Periodic Table, pp. 358-366	
Performance Indicators	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.

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Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.i** All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.
uEngineer it! Lab: When Particles Collide, p. 367	
Performance Indicators	**MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
Science and Engineering Practices	**SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

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Lesson 4: Types of Bonds, pp. 368-377	
Performance Indicators	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.
Lesson 5: Acids and Bases, pp. 378-385	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.

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Science and Engineering Practices	**SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP8.A.m.2** Clarify claims and findings by integrating text-based qualitative and quantitative scientific information with information contained in media and visual displays.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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.
Evidence-Based Assessment, pp. 388-389	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter. **MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.

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Science and Engineering Practices	**SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP7.A.m.3** Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
uDemonstrate Lab: Shedding Light on Ions, pp. 390-393	
Performance Indicators	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.
Science and Engineering Practices	**SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Topic 9: Chemical Reactions	
Quest Kickoff: Hot and Cool Chemistry, pp. 396-397	
Performance Indicators	**MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
Science and Engineering Practices	**SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints.

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Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.C.m.i** 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. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. **MS-ETS1-3** 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. **MS-ETS1-4** 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.

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Continued:	**Continued:** **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions.
uConnect Lab: What Happens when Chemicals React?, pp. 397A-397B	
Performance Indicators	**MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
Science and Engineering Practices	**SCI.SEP2.A.m.2** Develop or modify a model—based on evidence—to match what happens if a variable or component of a system is changed. **SCI.SEP2.A.m.3** Use and develop a model of simple systems with uncertain and less predictable factors.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.

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Lesson 1: Mixtures and Solutions, pp. 398-406	
Performance Indicators	**MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
Science and Engineering Practices	**SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. **SCI.SEP4.A.m.2** Use graphical displays (e.g., maps, charts, graphs, and tables) of large data sets to identify temporal and spatial relationships. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.C.m.i** 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. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.

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uEngineer It!: Making Water Safe to Drink, p. 407	
Science and Engineering Practices	**SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **MS-ESS3-3** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
Lesson 2: Chemical Change, pp. 408-419	
Performance Indicators	**SCI.PS1.B.m** Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy. **MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

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Science and Engineering Practices	**SCI.SEP1.A.m.1** Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify or seek additional information. **SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP2.A.m.6** Develop a model to describe unobservable mechanisms. **SCI.SEP5.A.m.1** Decide when to use qualitative vs. quantitative data. **SCI.SEP6.A.m.1** Construct an explanation that includes qualitative or quantitative relationships between variables that predict and describe phenomena. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP8.A.m.2** Clarify claims and findings by integrating text-based qualitative and quantitative scientific information with information contained in media and visual displays.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.

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Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.C.m.i** 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. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.
Lesson 3: Modeling Chemical Reactions, pp. 420-427	
Performance Indicators	**SCI.PS1.A.m** The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter. **SCI.PS1.B.m** Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy. **MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **MS-PS1-5** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction, and thus, mass is conserved. **MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
Science and Engineering Practices	**SCI.SEP5.A.m.4** Create algorithms (a series of ordered steps) to solve a problem. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints.

Elevate Science: Physical ©2019	**Wisconsin Standards for Science Physical Sciences, Grades 6-8**
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.C.m.i** 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. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. **MS-ETS3-3** Mathematically evaluate products of chemical and physical changes to support ideas of atomic theory (PS1.A.m).
Lesson 4: Producing Useful Materials, pp. 428-435	
Performance Indicators	**MS-PS1-3** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. **MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

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Science and Engineering Practices	**SCI.SEP5.A.m.1** Decide when to use qualitative vs. quantitative data. **SCI.SEP6.A.m.1** Construct an explanation that includes qualitative or quantitative relationships between variables that predict and describe phenomena. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP8.A.m.2** Clarify claims and findings by integrating text-based qualitative and quantitative scientific information with information contained in media and visual displays. **SCI.SEP8.A.m.3** Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication. Describe how they are supported or not supported by evidence and evaluate methods used.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.

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Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.C.m.i** 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. **SCI.ETS1.C.m.ii** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. **SCI.ETS2.B.m.i** All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.
Case Study: Is Plastic Really So Fantastic?, pp. 436-437	
Performance Indicators	**MS-PS1-3** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
Science and Engineering Practices	**SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s). **SCI.SEP8.A.m.3** Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication. Describe how they are supported or not supported by evidence and evaluate methods used.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.

Elevate Science: Physical ©2019	Wisconsin Standards for Science Physical Sciences, Grades 6-8
Engineering, Technology, and the Application of Science	**SCI.ETS2.B.m.i** All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.
Evidence-Based Assessment, pp. 440-441	
Performance Indicators	**MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **MS-PS1-5** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction, and thus, mass is conserved. **MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
Science and Engineering Practices	**SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data. **SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.C.m.i** 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.

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uDemonstrate Lab: Evidence of Chemical Change, pp. 442-445	
Performance Indicators	**MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
Science and Engineering Practices	**SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.
Crosscutting Concepts	**SCI.CC1.m** Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.
Engineering, Technology, and the Application of Science	**MS-ETS1-3** 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. **MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society.

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Topic 10: Forces and Motion	
Quest Kickoff: Build a Better Bumper Car, pp. 448-449	
Performance Indicators	**MS-PS2-1** Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP2.A.m.5** Develop and use a model to predict and describe phenomena. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.2** Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. **SCI.SEP6.B.m.3** Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting.
Crosscutting Concepts	**SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **SCI.ETS1.B.m.i** A solution needs to be tested and then modified on the basis of the test results in order to improve it. **SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions.

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uConnect Lab: Identifying Motion, pp. 449A-449B	
Performance Indicators	**MS-PS2-2** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
Science and Engineering Practices	**SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. **SCI.SEP3.A.m.2** Conduct an investigation. Evaluate and revise the experimental design to produce data that serve as the basis for evidence to meet the goals of the investigation. **SCI.SEP3.A.m.4** Collect data under a range of conditions that serve as the basis for evidence to answer scientific questions or test design solutions. **SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP4.A.m.7** Analyze and interpret data to determine similarities and differences in findings.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Lesson 1: Describing Motion and Force, pp. 450-457	
Performance Indicators	**MS-PS2-1** Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.

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Crosscutting Concepts	**SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
Lesson 2: Speed, Velocity, and Acceleration, pp. 458-467	
Performance Indicators	**SCI.PS2.A.m.i** Motion and changes in motion can be qualitatively described using concepts of speed, velocity, and acceleration (including speeding up, slowing down, and/or changing direction). **MS-PS2-1** Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects.
Science and Engineering Practices	**SCI.SEP4.A.m.1** Construct, analyze, or interpret graphical displays of data and large data sets to identify linear and nonlinear relationships. **SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena.
Crosscutting Concepts	**SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Engineering, Technology, and the Application of Science	**SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions.

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Case Study: Finding Your Way with GPS, pp. 468-469	
Performance Indicators	**SCI.PS2.A.m.i** Motion and changes in motion can be qualitatively described using concepts of speed, velocity, and acceleration (including speeding up, slowing down, and/or changing direction).
Science and Engineering Practices	**SCI.SEP8.A.m.1** Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s).
Crosscutting Concepts	**SCI.CC4.m** Students understand systems may interact with other systems: they may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system under study.
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.
Lesson 3: Newton's Laws of Motion, pp. 470-478	
Performance Indicators	**SCI.PS2.A.m.ii** The role of the mass of an object must be qualitatively accounted for in any change of motion due to the application of a force (Newton's first and second law). **SCI.PS2.A.m.iii** For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). **MS-PS2-1** Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects.

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Science and Engineering Practices	**SCI.SEP1.A.m.2** Ask questions to identify and clarify evidence and the premise(s) of an argument. **SCI.SEP4.A.m.1** Construct, analyze, or interpret graphical displays of data and large data sets to identify linear and nonlinear relationships. **SCI.SEP4.A.m.4** Analyze and interpret data to provide evidence for explanations of phenomena. **SCI.SEP4.A.m.7** Analyze and interpret data to determine similarities and differences in findings. **SCI.SEP4.A.m.8** Analyze data to define an optimal operational range for a proposed object, tool, process, or system that best meets criteria for success. **SCI.SEP8.A.m.5** Communicate scientific and technical information (e.g., about a proposed object, tool, process, or system) in writing and through oral presentations.
Crosscutting Concepts	**SCI.CC2.m** Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.
Engineering, Technology, and the Application of Science	**SCI.ETS3.C.m.ii** Theories are explanations for observable phenomena based on a body of evidence developed over time. A hypothesis is a statement that can be tested to evaluate a theory. Scientific laws describe cause and effect relationships among observable phenomena.
uEngineer It!: Generating Energy from Potholes, p. 479	
Performance Indicators	**SCI.PS2.A.m.iii** For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). **MS-PS2-1** Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects. **SCI.PS3.C.m** When two objects interact, each one exerts a force on the other, and these forces can transfer energy between the interacting objects.

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Science and Engineering Practices	**SCI.SEP2.A.m.3** Use and develop a model of simple systems with uncertain and less predictable factors. **SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena.
Crosscutting Concepts	**SCI.CC5.m** Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system. **SCI.CC6.m** Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. **SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Engineering, Technology, and the Application of Science	**MS-ETS1-4** 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. **SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.

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Lesson 4: Friction and Gravitational Interactions, pp. 480-489	
Performance Indicators	**MS-PS2-4** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. **SCI.PS3.C.m** When two objects interact, each one exerts a force on the other, and these forces can transfer energy between the interacting objects. **MS-PS3-2** Develop a model to describe that when the distance between two objects changes, different amounts of potential energy are stored in the system (e.g., gravitational, magnetic or electrostatic potential energy).
Science and Engineering Practices	**SCI.SEP4.A.m.1** Construct, analyze, or interpret graphical displays of data and large data sets to identify linear and nonlinear relationships. **SCI.SEP6.A.m.4** Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real world phenomena, examples, or events.
Crosscutting Concepts	**SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.
Engineering, Technology, and the Application of Science	**MS-ETS1-1** Define the criteria 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. **MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **SCI.ETS3.C.m.ii** Theories are explanations for observable phenomena based on a body of evidence developed over time. A hypothesis is a statement that can be tested to evaluate a theory. Scientific laws describe cause and effect relationships among observable phenomena.

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Evidence-Based Assessment, pp. 492-493	
Performance Indicators	**MS-PS2-1** Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects. **MS-PS2-2** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **MS-PS2-4** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
Science and Engineering Practices	**SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation.
Crosscutting Concepts	**SCI.CC3.m** Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.
Engineering, Technology, and the Application of Science	**SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.ii** The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas.

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uDemonstrate Lab: Stopping on a Dime, pp. 494-497	
Performance Indicators	**SCI.PS2.A.m.i** Motion and changes in motion can be qualitatively described using concepts of speed, velocity, and acceleration (including speeding up, slowing down, and/or changing direction). **MS-PS2-1** Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects. **MS-PS2-2** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **MS-PS2-4** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
Science and Engineering Practices	**SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP3.A.m.4** Collect data under a range of conditions that serve as the basis for evidence to answer scientific questions or test design solutions. **SCI.SEP3.A.m.5** Collect data about the performance of a proposed object, tool, process, or system under a range of conditions. **SCI.SEP7.A.m.2** Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.
Crosscutting Concepts	**SCI.CC7.m** Students explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time.

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Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **MS-ETS1-3** 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. **MS-ETS1-4** 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. **SCI.ETS2.A.m.i** Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. **SCI.ETS2.A.m.ii** Science and technology drive each other forward. **SCI.ETS2.B.m.iii** Technology use varies over time and from region to region. **SCI.ETS3.A.m.ii** Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. **SCI.ETS3.A.m.iii** Science and engineering are influenced by what is valued in society. **SCI.ETS3.B.m.ii** Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions. **SCI.ETS3.B.m.iii** Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical manner that requires honesty, fairness and dedication to public health, safety and welfare.

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Science and Engineering Practices Handbook, pp. 498-509	
Science and Engineering Practices	**SCI.SEP1.A.m.2** Ask questions to identify and clarify evidence and the premise(s) of an argument. **SCI.SEP1.A.m.4** Ask questions to clarify or refine a model, an explanation, or an engineering problem. **SCI.SEP1.A.m.7** Ask questions that challenge the premise(s) of an argument or the interpretation of a data set. **SCI.SEP1.B.m** Students define a design problem that can be solved through the development of an object, tool, process, or system, and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. **SCI.SEP2.A.m.1** Evaluate limitations of a model for a proposed object or tool. **SCI.SEP2.A.m.4** Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. **SCI.SEP2.A.m.7** Develop and use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales. **SCI.SEP3.A.m.1** Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. **SCI.SEP3.A.m.3** Evaluate the accuracy of various methods for collecting data. **SCI.SEP3.A.m.4** Collect data under a range of conditions that serve as the basis for evidence to answer scientific questions or test design solutions. **SCI.SEP3.A.m.5** Collect data about the performance of a proposed object, tool, process, or system under a range of conditions. **SCI.SEP4.A.m.2** Use graphical displays (e.g., maps, charts, graphs, and tables) of large data sets to identify temporal and spatial relationships.

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Continued:	**Continued:** **SCI.SEP6.A.m.3** Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **SCI.SEP6.A.m.5** Apply scientific reasoning to show why the data or evidence is adequate for the explanation. **SCI.SEP6.B.m.1** Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. **SCI.SEP6.B.m.3** Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting. **SCI.SEP7.A.m.1** Compare and critique two arguments on the same topic. Analyze whether they emphasize similar or different evidence and interpretations of facts. **SCI.SEP7.A.m.2** Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail. **SCI.SEP7.A.m.5** Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. **SCI.SEP8.A.m.3** Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication. Describe how they are supported or not supported by evidence and evaluate methods used. **SCI.SEP8.A.m.4** Evaluate data, hypotheses, and conclusions in scientific and technical texts in light of competing information or accounts.

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Engineering, Technology, and the Application of Science	**SCI.ETS1.A.m** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. **SCI.ETS1.B.m.i** A solution needs to be tested and then modified on the basis of the test results in order to improve it. **SCI.ETS1.B.m.ii** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **SCI.ETS1.B.m.iii** Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. **SCI.ETS1.B.m.iv** Models of all kinds are important for testing solutions. **MS-ETS1-1** Define the criteria 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. **MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **SCI.ETS3.B.m.i** Science asks questions to understand the natural world and assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. Science carefully considers and evaluates anomalies in data and evidence. **SCI.ETS3.C.m.i** A theory is an explanation of some aspect of the natural world. Scientists develop theories by using multiple approaches. Validity of these theories and explanations is increased through a peer review process that tests and evaluates the evidence supporting scientific claims.