

**FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 7**

Key:

Climate

Equity and Inclusion

SEL

Holocaust

Amistad

Career Readiness, Life Literacies, and Key Skills

Subject: Science	Grade Level: 7
Unit 1: Introduction to Matter; Solids, Liquids, and Gases	Pacing: 6 Weeks
Essential Questions	Enduring Understandings
How can we observe, measure, and use matter?	Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)
What is matter made of?	Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2)
What properties describe matter?	Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)
How can you classify different types of matter?	Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2)
How can matter be measured?	Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4)

<p>How are changes in matter related to changes in energy?</p> <p>What is the difference between a physical change and a chemical change?</p> <p>What are the similarities and differences between solids, liquids, and gases?</p> <p>How does thermal energy play a role in particle motion and changes of state?</p> <p>What happens to particles during changes of state between solids, liquids, and gases?</p> <p>How does pressure affect the change of state from liquid to gas?</p> <p>How do changes in particle motion of a</p>	<p>In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4)</p> <p>The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)</p> <p>The term “heat” as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (secondary to MS-PS1-4)</p> <p>The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system’s material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. (secondary to MS-PS1-4)</p>
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<p>gas affect physical properties?</p> <p>How are the temperature, pressure, and volume of a gas related?</p>	
<p>NJSL Standards</p>	<p>Classroom Applications</p>
<ul style="list-style-type: none"> ● MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures. ● 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-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and 	<p>Science Quests and activities:</p> <p>Students will classify physical and chemical properties</p> <p>Students will study the career of a Museum Technician</p> <p>Students will calculate the volume of an object</p> <p>Students will use yeast to investigate chemical changes in matter</p> <p>Students will design a model train that uses magnetic energy to move</p> <p>Students will change ice into water at different temperatures and record the data</p> <p>Students will test Charles's and Boyle's laws and graph the data</p> <p><u>Vocabulary:</u> matter, substance, mass, volume, weight, density, physical property, chemical property, atom, physical change, chemical change, element, molecule, compound, mixture, solid, liquid, surface tension, viscosity, gas, thermal energy, temperature, melting point, freezing point, vaporization, boiling point, evaporation, condensation, sublimation, pressure, charles's law, boyle's law,</p> <p><u>Teaching Strategies/Materials:</u></p> <p>Elevate Science</p>

state of a pure substance when thermal energy is added or removed.

Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure

Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects

Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations

Differentiation Strategies/Modifications

SWD/ Students at risk of failure: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework

Gifted/Enrichment: computer-based research, high level task, class presentation

Connections to other content areas, including Career Readiness, Life Literacies, and Key Skills :

Connections to NJSL – English Language Arts

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-PS1-2)
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table)(MS-PS1-1), (MS-PS1-2)

Connections to NJSL – Mathematics

- MP.2 Reason abstractly and quantitatively. (MS-PS1-1), (MS-PS1-2), (MS-PS1-5)
- MP.4 Model with mathematics. (MS-PS1-1), (MS-PS1-5)
- 6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-1), (MS-PS1-2)
- 8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. (MS-PS1-1)
- 6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (MS-PS1-2)

- 6.SP.B.5 Summarize numerical data sets in relation to their context (MS-PS1-2)
- 6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-PS1-4)

Career Readiness, Life Literacies, and Key Skills –

9.4.2.CI.1: Demonstrate openness to new ideas and perspectives.

9.4.2.CI.2: Demonstrate originality and inventiveness in work .

9.4.2.CT.1: Gather information about an issue, such as climate change and collaboratively brainstorm ways to solve the problem.

9.4.2.CT.2- Identify possible approaches and resources to execute a plan.

9.4.2.CT.3- Use a variety of types of thinking to solve problems (e.g. inductive, deductive).

Unit Resources:

Savvas Elevate Science for 7th Grade, Topic 1 : Introduction to Matter
Topic 2: Solids, Liquids, and Gases

STEM Quest PBL

Websites:

<https://www.fs.usda.gov/ccrc/index.php/>

<http://strandmaps.nsdl.org/?id=SMS-MAP-1332>

Science Refreshers

<http://nsdl.org/refreshers/science/>

Science Kids <http://www.sciencekids.co.nz/gamesactivities/gases.html>

<http://archive.fossweb.com/modulesK-2/SolidsandLiquids/activities/changeit.swf>

http://coolsciencelab.com/ice_cream.htm

Technology

8.1.5.A.1 to 3 - Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

- Understand and use technology systems.
- Select and use applications effectively and productively.

8.1.5.D.1 to 4 - Digital Citizenship : Students understand human, cultural, societal issues related to technology and practice legal and ethical behaviors

- Advocate and practice safe, legal, and responsible use of information and technology.
- Demonstrate personal responsibility for lifelong learning.
- Exhibit leadership for digital citizenship.

8.1.5.E.1 - Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.

- Plan strategies to guide inquiry.
- Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
- Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 7 Unit 2

Subject: Science	Grade Level: 7
Unit 2: Energy; Thermal energy	Pacing: 8 weeks
Essential Questions	Enduring Understandings
How does energy cause change?	Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1)
How is energy related to motion and force?	A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)
What are the relationships among energy, motion, force, and work?	When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5)
What determines an object's kinetic energy?	When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)
What factors affect potential energy?	
What is the relationship between potential and kinetic energy?	

How can different forms of energy be classified, quantified, and measured?

How is energy changed and transferred?

What happens when heat flows from one object to another?

What happens to a substance when it is heated?

What is the difference between thermal energy and temperature?

How is heat transferred?

How is energy conserved during transformations?

How do different materials respond to heat?

<p>How is friction related to thermal energy and temperature?</p>	
<p>NJSL Standards</p>	<p>Classroom Applications</p>
<ul style="list-style-type: none"> • 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. • MS-PS3-2 Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system • MS-PS3-5 Construct, use, and present arguments to support the claim that when the kinetic energy of an 	<p>Science quests and activities:</p> <p>Students will build and design a simple machine</p> <p>Students conduct an experiment to use energy to make an index card/playing card move</p> <p>Students will use mathematical formulas to calculate work and power, kinetic energy and gravitational potential energy</p> <p>Students will use rubber bands to experiment with potential energy</p> <p>Students will study prosthetics and design a prosthetic arm</p> <p>Students will classify different forms of energy in venn diagrams</p> <p>Students will study the career of an Energy Engineer</p> <p>Students will use tennis balls to find data on kinetic and potential energy</p> <p>Students will study the energy waves produce</p> <p>Students will compare and contrast US energy consumption of : renewable energy, coal, petroleum, natural gas, nuclear energy</p> <p>Students will build and design a rocket that can launch</p> <p>Students will use different materials to design a method to keep liquids hot</p>

<p>object changes, energy is transferred to or from the object.</p>	<p>Students will use senses to determine the temperature of water and compare predictions to a thermometer</p> <p>Students will take temperatures of water and graph the data</p> <p>Students will test thermal conductivity</p> <p>Vocabulary: energy, motion, force, work, power, kinetic energy, potential energy, gravitational potential energy, elastic potential energy, mechanical energy, nuclear energy, thermal energy, chemical energy, electrical energy, electromagnetic radiation, law of conservation of energy, thermal energy, heat, temperature, conduction, convection, convection current, radiation</p> <p>Teaching Strategies/Materials:</p> <p>Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure</p> <p>Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects</p> <p>Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations</p> <p>Differentiation Strategies/Modifications</p> <p>SWD/ Students at risk of failure: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework</p> <p>Gifted/Enrichment: computer-based research, high level task, class presentation</p>
<p>Connections to other content areas, including Career Readiness, Life Literacies, and Key Skills.</p>	
<p><u>Connections to NJSL – English Language Arts</u></p> <ul style="list-style-type: none"> • <i>RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the</i> 	

precise details of explanations or descriptions (MS-PS3-1), (MS-PS3-5)

- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS3-1)
- WHST.6-8.1 Write arguments focused on discipline content. (MS-PS3-5)
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-PS3-2)

Connections to NJSL – Mathematics

- MP.2 Reason abstractly and quantitatively. (MS-PS3-1), (MS-PS3-4), (MS-PS3-5)
- 6.RP.A.1 Understand the concept of ratio and use ratio language to describe a ratio relationship between two quantities. (MS-PS3-1), (MS-PS3-5)
- 6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. (MS-PS3-1)
- 7.RP.A.2 Recognize and represent proportional relationships between quantities. (MS-PS3-1), (MS-PS3-5)
- 8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. (MS-PS3-1)
- 8.EE.A.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational. (MS-PS3-1)
- 8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. (MS-PS3-1), (MS-PS3-5)

Readiness, Life Literacies, and Key Skills –

9.4.2.CI.1: Demonstrate openness to new ideas and perspectives.

9.4.2.CI.2: Demonstrate originality and inventiveness in work.

9.4.2.CT.1: Gather information about an issue, such as climate change and collaboratively brainstorm ways to solve the problem.

9.4.2.CT.2- Identify possible approaches and resources to execute a plan.

9.4.2.CT.3- Use a variety of types of thinking to solve problems (e.g. inductive, deductive).

Unit Resources:

Savvas Elevate Science for 7th Grade, Topic 3: Energy

Savvas Elevate Science for 7th Grade, Topic 4: Thermal Energy

Hands-on & Virtual Labs

STEM Quest PBL

List of books to be used:

*See media center for additional resources

Websites:

Education.com

Easyscienceforkids.org

Kidsgrowingstrong.org/Plant Needs

Ducksters.com/science/photosynthesis.php

Animalatlas.tv

Unit Assessment Opportunities:

- Journal Entries and Response Sheets
- Observations, Questioning, and discussions
- Comprehension Checks in literature
- Class Webs
- Presentations
- Collaboration
- Projects
- Rubrics (<http://www.nextgenscience.org/resources>)
- Unit Test
- Lesson Check
- Lesson Quiz
- Performance Expectations Activities
- Topic Tests

FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 7 Unit 3

Subject: Science	Grade Level: 7
Unit 3: Waves and Electromagnetic Radiation; Electricity and Magnetism;	Pacing: 8 Weeks
Essential Questions	Enduring Understandings
<p>What are the properties of mechanical and electromagnetic waves?</p> <p>How can you observe and describe the properties of waves?</p> <p>How do waves interact with other materials and each other?</p> <p>How are sound waves reflected, transmitted, or absorbed by materials?</p>	<p>A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1)</p> <p>A sound wave needs a medium through which it is transmitted. (MS-PS4-2)</p> <p>When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2)</p> <p>The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2)</p> <p>A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2)</p> <p>However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2)</p>

What factors affect the speed of sound waves?	Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. (MS-PS2-3)
What makes up an electromagnetic wave?	Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively). (MS-PS2-5)
What kinds of waves make up the electromagnetic spectrum?	A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)
What happens to light when it strikes different types of mirrors or passes through different types of lenses?	When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)
What causes electric fields and electric forces?	
How is potential energy affected by positions of charges?	
How is static electricity different from current?	
How can you detect and describe a magnetic field?	

<p>How does electricity relate to magnetism?</p> <p>What are the properties of a magnetic field, solenoids, and electromagnets?</p> <p>How can current be produced in a conductor?</p> <p>How do generators and transformers work?</p>	
<p>NJSL Standards</p>	<p>Classroom Applications</p>
<ul style="list-style-type: none"> • 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 	<p>Science quests and activities:</p> <p>Students will design an electromagnetic anti-theft system</p> <p>Students will model waves using rope and tape</p> <p>Students will use materials like jump ropes and slinkys to observe and learn about waves</p> <p>Students will use a flashlight and mirror to measure angles of reflection</p> <p>Students will design and build a simple camera</p> <p>Students will create and label a rainbow to show which colors have the highest and lowest frequency</p>

transmitted through various materials

- 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 arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

Students will study the career of a Lighting Designer

Students will experiment with mirrors and lenses

Students will design and build a device that can levitate objects

Students will use magnets to move toy cars

Students use a balloon and paper to investigate static electricity

Students will use a magnet to decipher between real and fake coins

Students will design and build a device that combines electric and magnetic force to play a game

Students will study the career of an Electrical Engineer

Students will build a simple magnetometer

Vocabulary: Wave, mechanical wave, medium, electromagnetic radiation, transverse wave, amplitude, longitudinal wave, wavelength, frequency, reflection, refraction, diffraction, absorption, interference, standing wave, resonance, loudness, intensity, decibel, pitch, Doppler effect, electromagnetic wave, electromagnetic spectrum, radio waves, microwaves, visible light, ultraviolet rays, infrared rays, x-rays, gamma rays, transparent, translucent, opaque, diffuse reflection, convex, focal point, concave, electron, electric force, electric field, electric current, conductor, static electricity, magnet, magnetism, magnetic force, magnetic pole, magnetic field, electromagnetism, solenoid, electromagnet, galvanometer, electric motor, electromagnetic induction, generator, transformer

Teaching Strategies/Materials:

Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure

Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects

Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations

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Gifted/Enrichment: computer-based research, high level task, class presentation

Connections to other content areas, including Career Readiness, Life Literacies, and Key Skills.

Connections to NJSLS – English Language Arts

- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-PS4-1), (MS-PS4-2)
- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-PS2-1), (MS-PS2-3)
- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS2-1), (MS-PS2-2), (MS-PS2-5)
- WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-PS2-1), (MS-PS2-2), (MS-PS2-5)

Connections to NJSLS – Mathematics

- MP.2 Reason abstractly and quantitatively. (MS-PS4-1)
- MP.4 Model with mathematics. (MS-PS4-1)

- 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-PS4-1)
- 6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS4-1)
- 7.RP.A.2 Recognize and represent proportional relationships between quantities. (MS-PS4-1)
- 8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. (MS-PS4-1)

Readiness, Life Literacies, and Key Skills –

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9.4.2.CT.1: Gather information about an issue, such as climate change and collaboratively brainstorm ways to solve the problem.

9.4.2.CT.2- Identify possible approaches and resources to execute a plan.

9.4.2.CT.3- Use a variety of types of thinking to solve problems (e.g. inductive, deductive).

Climate change activity:

<https://mysteryscience.com/lessons?query=climate>

Climate change lessons:

<https://www.brainpop.com/science/weather/climatechange/>

Holocaust

Amistad

African American & Differently abled/LGBTQ Scientists:

<https://www.brainpop.com/search/?keyword=scientists>

10 famous scientists with disabilities

- Thomas Edison. Born in 1847, Thomas Edison lost much of his hearing by his early twenties. ...
- Temple Grandin. ...
- Ralph Braun. ...
- Sang-Mook Lee. ...
- Stephen Hawking. ...

- Geerat Vermeij. ...
- Farida Bedwei. ...
- Richard Mankin.

<https://royalsociety.org/topics-policy/diversity-in-science/scientists-with-disabilities/>

<https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World>

PRIDE Day STEM Activity:

<https://prideinstem.org/lgbtstemday/>

Unit Resources:

Savvas Elevate Science for 7th Grade, Topic 5: Waves and Electromagnetic Radiation

Savvas Elevate Science for 7th Grade, Topic 6: Electricity and Magnetism

Hands-on & Virtual Labs

STEM Quest PBL

List of books to be used:

Websites:

<http://strandmaps.nsdl.org/?id=SMS-MAP-1332>

Science Refreshers

<http://nsdl.org/refreshers/science/>

<http://www.sciencekids.co.nz/earth.html>

<http://science.nationalgeographic.com/science/earth/>

Unit Assessment Opportunities:

- Journal Entries and Response Sheets
- Observations, Questioning, and Discussions
- Comprehension Checks in Literature
- Class Webs

- Presentations
- Collaboration
- Unit Test
- Lesson Check
- Lesson Quiz
- Performance Expectations Activities
- Topic Tests

FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 7 Unit 4

Subject: Science	Grade Level: 7
Unit 4: Atoms and the Periodic Table; Chemical reactions; forces and motion	Pacing: 10 weeks
Essential Questions	Enduring Understandings
How do atoms combine to form extended structures?	Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)
What parts make up an atom?	Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)
What is atomic theory?	Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2), (MS-PS1-3)
Why do elements need to be organized?	Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2), (MS-PS1-3), (MS-PS1-5)
How was the periodic table developed?	
What information about elements is provided by the periodic table?	The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)
What causes atoms to bond together?	Some chemical reactions release energy, others store energy. (MS-PS1-6)

<p>How are electrons involved in bond formation?</p>	<p>A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (secondary to MS-PS1-6)</p>
<p>What types of bonds form between atoms?</p>	<p>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)</p>
<p>How do bonds determine certain properties of compounds?</p>	<p>The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (MS-PS2-2)</p>
<p>What properties describe acids and bases?</p>	<p>All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (MS-PS2-2)</p>
<p>What happens when acids and bases interact?</p>	<p>Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (MS-PS2-4)</p>
<p>How can the properties of mixtures and solutions be used to classify them?</p>	<p>Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1)</p>
<p>What factors affect the rate at which a chemical change occurs?</p>	<p>A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)</p> <p>When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)</p>
<p>How are synthetic materials made from natural resources and</p>	

<p>how does it affect society?</p> <p>When is an object in motion?</p> <p>How do different types of forces affect motion?</p> <p>How is velocity related to speed and acceleration?</p> <p>What is Newton's Laws of Motion?</p> <p>How are gravity and friction related to motion and energy?</p>	
<p>NJSL Standards</p>	<p>Classroom Applications</p>
<ul style="list-style-type: none"> • MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures. • MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances 	<p>Science quests/activities:</p> <p>Students will create a model of an atom</p> <p>Students will use the periodic table to identify and describe atoms</p> <p>Students will categorize and model various bonds</p> <p>Students will use litmus paper to explore the properties of acids</p> <p>Students will use baking soda and vinegar to observe and record the chemical changes when they are mixed</p>

<p>interact to determine if a chemical reaction has occurred.</p> <ul style="list-style-type: none"> • MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society • 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. • MS-PS2-1 Apply Newton's Third Law to design a solution to a 	<p>students will use salt and water to explore the steps of how it dissolves</p> <p>Students will design and build a simple water filter</p> <p>Students will model chemical reactions</p> <p>Students will select a synthetic material and describe the impact it has on society</p> <p>Students will use a tennis ball to explore motion</p> <p>Students will use mathematical formulas to determine speed, distance, and time</p> <p>Students will use Mathematical formulas to find force, mass, and/or acceleration</p> <p>Students will use different types of surfaces to explore friction</p> <p>Vocabulary: Atom, electron, nucleus, proton, neutron, atomic number, isotope, mass number, atomic mass, periodic table, chemical symbol, period, group, compound, valence electron, reactivity, malleable, ductile, luster, semiconductor, ion, polyatomic ion, ionic bond, covalent bond, molecule, nonpolar bond, polar bond, acids, corrosive, indicator, base, neutralization, salt, mixture, colloid, suspension, solution, solvent, solute, solubility, physical change, chemical change, reactant, product, exothermic reaction, endothermic reaction, law of conservation of mass, open system, closed system, synthetic, natural resource, polymer, motion, reference point, force, newton, friction, gravity, net force, speed, slope, velocity, acceleration, inertia, weight</p> <p>Teaching Strategies/Materials:</p>
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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.
- 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.

Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure

Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects

Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations

Differentiation Strategies/Modifications

SWD/ Students at risk of failure: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework

Gifted/Enrichment: computer-based research, high level task, class presentation

SEL -

<https://www.brainpop.com/social-emotional-learning/>

SEL Biographies: <https://www.brainpop.com/social-emotional-learning/>

- MS-PS3-2 Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system

Connections to other content areas, including Career Readiness, Life Literacies, and Key Skills:

Connections to NJSLs – English Language Arts

- *RST.6–8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-PS1-2), (MS-PS1-3)*
- *RST.6–8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS1-6)*
- *RST.6–8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-1), (MS-PS1-2), (MS-PS1-4), (MS-PS1-5)*
- *WHST.6–8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-PS1-6)*
- *WHST.6–8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-PS1-3)*

Connections to NJSLs – Mathematics

- *MP.2 Reason abstractly and quantitatively. (MS-PS1-1), (MS-PS1-2), (MS-PS1-5)*
- *MP.4 Model with mathematics. (MS-PS1-1), (MS-PS1-5)*
- *6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-1), (MS-PS1-2), (MS-PS1-5)*

- 6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in realworld contexts, explaining the meaning of 0 in each situation. (MS-PS2-1)
- 6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers. (MS-PS2-1), (MS-PS2-2)
- 7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-PS2-1), (MS-PS2-2)
- 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-PS2-1), (MS-PS2-2)

Readiness, Life Literacies, and Key Skills –

9.4.2.CI.1: Demonstrate openness to new ideas and perspectives.

9.4.2.CI.2: Demonstrate originality and inventiveness in work .

9.4.2.CT.1: Gather information about an issue, such as climate change and collaboratively brainstorm ways to solve the problem.

9.4.2.CT.2- Identify possible approaches and resources to execute a plan.

9.4.2.CT.3- Use a variety of types of thinking to solve problems (e.g. inductive, deductive).

Unit Resources:

Savvas Elevate Science for 7th Grade, Topic 8: Atoms and the Periodic Table;

Savvas Elevate Science for 7th Grade, Topic 9: Chemical reactions;

Savvas Elevate Science for 7th Grade, Topic 10: forces and motion

Hands-on & Virtual Labs

STEM Quest PBL

List of Books to be read:

Websites:

Education.com

Easyscienceforkids.org
Kidsgrowingstrong.org/Plant Needs
Ducksters.com/science/photosynthesis.php
Animalatlas.tv

Technology

8.1.5.A.1 to 3 - Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

- Understand and use technology systems.
- Select and use applications effectively and productively.

8.1.5.D.1 to 4 - Digital Citizenship : Students understand human, cultural, societal issues related to technology and practice legal and ethical behaviors

- Advocate and practice safe, legal, and responsible use of information and technology.
- Demonstrate personal responsibility for lifelong learning.
- Exhibit leadership for digital citizenship.

8.1.5.E.1 - Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.

- Plan strategies to guide inquiry.
- Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
- Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

Unit Assessment Opportunities:

- Journal Entries and Response Sheets
- Observations, Questioning, and discussions
- Comprehension Checks in literature
- Class Webs
- Presentations
- Collaboration
- Projects
- Rubrics (<http://www.nextgenscience.org/resources>)
- Unit Test

- Lesson Check
- Lesson Quiz
- Performance Expectations Activities
- Topic Tests
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