

Lower Cape May Regional School District

Physical Science

8th Grade

Interdisciplinary Connections

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

RL.8.1. Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.

Integration of Technology

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).

9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

9.4.8.TL.4: Synthesize and publish information about a local or global issue or event (e.g., MSLS4-5, 6.1.8.CivicsPI.3).

9.4.8.TL.5: Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration. •

9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem.

21st Century Skills

9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).

9.4.8.CI.2: Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).

9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).

9.4.8.CI.4: Explore the role of creativity and innovation in career pathways and industries.

9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).

- 9.4.8.CT.3: Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.
- 9.4.8.DC.1: Analyze the resource citations in online materials for proper use.
- 9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
- 9.4.8.DC.3: Describe tradeoffs between allowing information to be public (e.g., within online games) versus keeping information private and secure.
- 9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
- 9.4.8.DC.5: Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure. •
- 9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation.
- 9.4.8.DC.7: Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.
- 9.4.8.DC.8: Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities).
- 9.4.8.GCA.1: Model how to navigate cultural differences with sensitivity and respect (e.g., 1.5.8.C1a). •
- 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
- 9.4.8.IML.1: Critically curate multiple resources to assess the credibility of sources when searching for information.
- 9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.
- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b).
- 9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations. •
- 9.4.8.IML.5: Analyze and interpret local or public data sets to summarize and effectively communicate the data.
- 9.4.8.IML.6: Identify subtle and overt messages based on the method of communication.
- 9.4.8.IML.7: Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH.IPRET.8).
- 9.4.8.IML.8: Apply deliberate and thoughtful search strategies to access high-quality information on climate change (e.g., 1.1.8.C1b).
- 9.4.8.IML.9: Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2).
- 9.4.8.IML.10: Examine the consequences of the uses of media (e.g., RI.8.7).
- 9.4.8.IML.11: Predict the personal and community impact of online and social media activities.
- 9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.
- 9.4.8.IML.13: Identify the impact of the creator on the content, production, and delivery of information (e.g., 8.2.8.ED.1).
- 9.4.8.IML.14: Analyze the role of media in delivering cultural, political, and other societal messages. •
- 9.4.8.IML.15: Explain ways that individuals may experience the same media message differently.

Career Education

- 9.2.8.CAP.1: Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.
- 9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.
- 9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.

- 9.2.8.CAP.4: Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement.
- 9.2.8.CAP.5: Develop a personal plan with the assistance of an adult mentor that includes information about career areas of interest, goals and an educational plan.
- 9.2.8.CAP.6: Compare the costs of postsecondary education with the potential increase in income from a career of choice.
- 9.2.8.CAP.7: Devise a strategy to minimize costs of postsecondary education.
- 9.2.8.CAP.8: Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.
- 9.2.8.CAP.9: Analyze how a variety of activities related to career preparation (e.g., volunteering, apprenticeships, structured learning experiences, dual enrollment, job search, scholarships) impacts postsecondary options.
- 9.2.8.CAP.10: Evaluate how careers have evolved regionally, nationally, and globally.
- 9.2.8.CAP.11: Analyze potential career opportunities by considering different types of resources, including occupation databases, and state and national labor market statistics.
- 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
- 9.2.8.CAP.13: Compare employee benefits when evaluating employment interests and explain the possible impact on personal finances.
- 9.2.8.CAP.14: Evaluate sources of income and alternative resources to accurately compare employment options.
- 9.2.8.CAP.15: Present how the demand for certain skills, the job market, and credentials can determine an individual's earning power.
- 9.2.8.CAP.16: Research different ways workers/ employees improve their earning power through education and the acquisition of new knowledge and skills.
- 9.2.8.CAP.17: Prepare a sample resume and cover letter as part of an application process.
- 9.2.8.CAP.18: Explain how personal behavior, appearance, attitudes, and other choices may impact the job application process.
- 9.2.8.CAP.19: Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level
- 9.2.8.CAP.20: Identify the items to consider when estimating the cost of funding a business.

Lower Cape May Regional School District (Physical Science) Curriculum	
Content Area: Science	
Course Title: Physical Science	Grade level: 8th
Unit 1: Foundations <ul style="list-style-type: none"> ● Nature of Science Inquiry ● Observations and Measurement ● Experiments and Communicating Results 	Dates for Units: 25 days and year-long application
Unit 2: Chemistry <ul style="list-style-type: none"> ● Properties of Matter ● Structure of Matter ● Classifying Elements ● Compounds ● How Matter Changes 	Dates for Units: 80 days
Unit 3: Physics <ul style="list-style-type: none"> ● Motion, Forces, and Energy ● Wave Properties and Electromagnetic Radiation 	Dates for Unit: 75 days

Lower Cape May Regional School District (8th grade Science) Curriculum Unit 1 Overview
Content Area: Science
Unit Title: Foundations of Science
Target Course/Grade Level: Physical/Earth 8th
Unit Summary: <ul style="list-style-type: none"> ● This unit explores the nature of science and the scientific method of discovery. ● This unit also describes how scientists use models and mathematics to describe the world around them. ● Science skills, mathematics, and units of measurement focusing on The Standard International Units of Measurement and the use of the Metric system. ● The different ways data is organized and presented to others is covered. ● The knowledge and skills gained in this chapter will serve as a foundation for the study of science throughout the year.
Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit	
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.	
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.	
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Analyzing and Interpreting Data Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. Analyze and interpret data to determine similarities and differences in findings. (MS-PS1-2)</p>	<p>ETS1.B: Developing Possible Solutions 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>ETS1.C: Optimizing the Design Solution 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 the characteristics may be incorporated into the new design. (secondary to MS-PS1-6)</p> <p>The iterative process of testing the most promising solutions and modifying what is</p>	<p>Patterns Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2) Cause and Effect Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4)</p> <p>Scale, Proportion, and Quantity Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1)</p> <p>Connections to Engineering, Technology, and Applications of Science</p> <p>Interdependence of Science, Engineering, and Technology Engineering advances have led to important discoveries in virtually</p>

	<p>proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (secondary to MS-PS1-6)</p> <p>ETS1.A: Defining and Delimiting Engineering Problems 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 is likely to limit possible solutions. (secondary to MS-PS3-3)</p> <p>ETS1.B: Developing Possible Solutions A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem. (secondary to MS-PS3-3)</p>	<p>every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-PS1-3)</p> <p>Connections to Nature of Science Scientific Knowledge is Based on Empirical Evidence Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS1-2)</p>
<p>Unit Enduring Questions:</p> <ul style="list-style-type: none"> ● What are the branches of Physical and Earth Science? ● How does science take place? ● How do we use scientific methods? ● What are science skills? ● Why do scientists use scientific notation and SI units. ● Why is the metric system used as international units of measurement? 		<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> ● Science takes place through observation, descriptions, and experimentation. ● Scientific methods guides our thinking and actions when learning about natural phenomena. ● The metric system is a base ten system of measurement used by scientists all around the world.

<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> • How many branches of science is organized. • Students will know that science takes a systematic and an interdisciplinary approach to learning about the world around them. • Science skills include ability to observe, make measurements, infer connections, and present information in a universal manner. 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> • Describe how science takes place. • Identify and classify the main branches of science and explain the interdisciplinary nature of science. • Design experiments to solve hypothetical problems. Confirm results by designing and repeating experiments. • Interpret data from graphs; determine trends and draw predictions, hypotheses, and draw conclusions. • Organize and display data in tables, graphs, and charts.

<p>Lower Cape May Regional School District (8th grade Science) Curriculum Unit 2 Overview</p>
<p>Content Area: Science</p>
<p>Unit Title: Chemistry</p>
<p>Target Course/Grade Level: Physical/Earth Science 8th</p>
<p>Unit Summary:</p> <ul style="list-style-type: none"> • The Properties of Matter - Chemical and physical properties are investigated. The concept of density and calculations involving density are introduced. Difference between mass and weight explained and examples given. Measuring the mass and volume of a liquid, and volume of solid objects and using the data to identify unknown objects. • The Structure of Matter - Atoms, elements, molecules and compounds are investigated. The

development of atomic history is examined. Identifying elements based on sub-atomic structures is shown and practiced.

- **Classifying Matter - Using the Periodic Table to organize matter into groups in order to recognize patterns between the elements and properties. Metals, Non-metals, and Noble Gases will be investigated.**

- **Compounds - Characteristics of Compounds will be investigated. How compounds form along recognizing and writing chemical formulas will be presented and practiced. Acids and Bases will also be investigated and properties between each will be identified.**

- **Changes in Matter - Types of chemical reactions will be investigated. Using Chemical Equations will be taught to show reactions. Nuclear Process are introduced.**

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit
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-PS1-3	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.
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-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-PS3-3	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.	
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	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.</p> <p>Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 6–8 builds on K–5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or design solutions.</p> <p>Analyzing and Interpreting Data Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.</p> <p>Constructing Explanations and Designing Solutions Constructing explanations and</p>	<p>PS1.A: Structure and Properties of 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) 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) Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4) 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) Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1) The</p>	<p>Patterns Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2)</p> <p>Cause and Effect Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4)</p> <p>Systems and System Models Models can be used to represent systems and their interactions such as inputs, processes, and outputs – and energy and matter flows within systems. (MS-PS3-2)</p> <p>Scale, Proportion, and Quantity Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1)</p> <p>Energy and Matter Matter is conserved because atoms are conserved in physical and chemical processes. (MS-PS1-5) The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS1-6)</p>

designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Engaging in Argument from Evidence Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed worlds.

Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.

changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)

PS1.B: Chemical Reactions 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) The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5) Some chemical reactions release energy, others store energy. (MS-PS1-6)

PS3.A: Definitions of Energy 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) 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

Structure and Function Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS1-3)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology 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. (MS-PS1-3)

Influence of Science, Engineering and Technology on Society and the Natural World The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus, technology use varies from region to region and over time. (MS-PS1-3)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence Science knowledge is based upon logical and conceptual connections between

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)

PS3.B: Conservation of Energy and Energy Transfer When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5) The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4) Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3)

PS3.C: Relationship Between Energy and Forces 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)

ETS1.A: Defining and Delimiting Engineering

evidence and explanations. (MS-PS1-2)

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena Laws are regularities or mathematical descriptions of natural phenomena. (MS-PS1-5)

	<p>Problems 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 is likely to limit possible solutions. (secondary to MS-PS3-3)</p> <p>ETS1.B: Developing Possible Solutions 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>ETS1.C: Optimizing the Design Solution 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 the characteristics may be incorporated into the new design. (secondary to MS-PS1-6) 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. (secondary to MS-PS1-6)</p>	
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Unit Enduring Questions:

- How is the periodic table arranged?

Unit Enduring Understandings:

- Matter is neither created nor

<ul style="list-style-type: none"> ● What are the parts of an atom and how do they bond? ● What are covalent and ionic bonds? ● How do covalent and ionic bonds differ? ● How is matter conserved in a reaction? ● How is a chemical equation written to show conservation of mass/matter? ● What makes substances different from one another? ● How to use a substances physical and chemical properties to identify a substance? ● How to determine if a chemical reaction has occurred based on the substances properties? ● What happens to a pure substance when thermal energy is added or removed? ● When atoms get close to each other how do their valence electrons react to form a covalent or ionic bond? ● How are simple (ionic) compounds named? ● How are simple (covalent) molecules named? ● How have atomic models changed throughout history with the introduction of new evidence? ● How is thermal energy transferred from one object to another? ● How energy is transformed from one type to another? ● How is energy released or stored in a chemical reaction? 	<p>destroyed in a chemical reaction, the atoms simply rearrange.</p> <ul style="list-style-type: none"> ● Chemical reactions change the identity of a substance and can be recognized by four signs. ● All matter is composed of atom. ● Atoms are divisible onto 3 subatomic particles. ● The periodic table is a working arrangement of elements; known and unknown. ● The position of an element on the periodic table determines its properties. ● In nature, atoms bond by gaining, losing or sharing electrons to attain a state of highest stability. ● Chemical equations are balanced by applying the law of conservation of mass. ● Chemical reactions can be recognized by four signs. ● The products of a chemical reaction can be predicted by applying a set of rules. ● Every chemical or physical changes involves a change in energy.
<p>Unit Objectives: <i>Students will know....</i></p> <ul style="list-style-type: none"> ● 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. The total number of each type of atom is conserved, and thus the mass does not change. ● Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and rearrangements of atoms into new molecules, with consequent changes in total binding energy (i.e., the sum of all bond energies in the set of molecules) that are matched by changes in 	<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> ● Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms ● Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical

kinetic energy. In many situations, a dynamic and condition-dependent balance between a reaction and the reverse reaction determines the numbers of all types of molecules present.

- The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe, and predict chemical reactions. Chemical processes and properties of materials underlie many important biological and geophysical phenomena.

properties.

- Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
- Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs
- Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

**Lower Cape May Regional School District (8th grade Science) Curriculum
Unit 3 Overview**

Content Area: Science

Unit Title: Physics

Target Course/Grade Level: Physical/Earth Science 8th

Unit Summary:

- Describing Motion – Kinematics - Differences between distance and displacement are investigated and various graphs, distance-time graphs and positions time graphs are used to represent motion. Students will participate in the 40m dash and use their data to for distance, displacement, and speed calculations.
- Speed and Acceleration - Differences in constant speed, instantaneous, and average speed are examined. Students will make calculations determining positive and negative acceleration using real time data and computer simulations.
- Representing Forces - Students will examine different type of contact forces, (applied, spring, elastic, and chemical) and field forces (electrical and magnetic forces) and how they originate from the four fundamental forces; Strong Nuclear, Weak Nuclear, Electromagnetic, and Gravitational forces.
- Forces and Motion - Students will plan an investigation to show how an object's motion depends on the sum of the forces on the objects and mass of the object. Balanced and unbalanced forces can change or maintain the motion of an object. Newton's Laws of Motion are examined through actual real time investigations and using computer simulations.
- Forms of Energy - The different forms of energy will be identified and investigated and will include mechanical and non-mechanical forms. Students will investigate the transfer and transformation from one kind of energy to another using the roller coaster to investigate mechanical forms of energy. Students will also design and build a basic still to evaporate and collect freshwater from salt water.
- Conservation of Energy - The question, "Why doesn't a roller coaster go forever and why a ball doesn't bounce to its original height will drive the student investigation why energy doesn't last forever, or at least not in the form it originated from.

Wave/EMS

Describing Mechanical Waves - Students will investigate the difference between mechanical wave by comparing ocean waves with sound waves. How sounds are produced and how they are measured will be identified.

- Properties of Waves - Students will investigate the physical properties of waves by learning how sound waves are used to discover oil and used to diagnose and heal the body. Investigating other uses of waves in our world.
- Electromagnetic Waves - Students will investigate how new discoveries are made in space using the different types of electromagnetic waves. The various uses of all the different types of electromagnetic waves used in our everyday world be be recognized. How radar is used to predict weather, keep track of airplanes in the air and ships at sea will be compared.
- Waves and Magnetism - Understanding how electromagnetic waves are a more reliable way to encode and transmit information than analog signals will drive learning. Investigating how data is stored and transmitted will be highlighted.
- Dual Nature of Light - Through learning about renewable energy resources such as solar power, students will investigate the photoelectric effect and the dual nature of electromagnetic radiation. The students will also look to see how electromagnetic radiation is used in the medical profession, in addition to different career paths there in associated with radiation.

Learning Targets

CPI #	Cumulative Progress Indicators (CPI) for Unit	
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-PS2-3	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	
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-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-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.	
• 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	Disciplinary Core Ideas	Crosscutting Concepts
<p>Asking Questions and Defining Problems Asking questions and defining problems in grades 6–8 builds from grades K–5 experiences and progresses to specifying relationships between variables and clarifying arguments and models.</p> <p>Constructing Explanations and Designing Solutions</p>	<p>PS2.A: Forces and Motion 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) The motion of an object is determined by the sum of the</p>	<p>Cause and Effect Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS2-3), (MS-PS2-5)</p> <p>Systems and System Models Models can be used to represent systems and their interactions— such as inputs, processes and outputs—and energy and matter flows within systems.</p>

Constructing explanations and designing solutions in 6–8 builds from grades K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds from grades K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world.

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)

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)

PS2.B: Types of Interactions

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)

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)

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,

(MS-PS2-1), (MS-PS2-4),

Stability and Change Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales.

(MS-PS2-2)

Patterns

Graphs and charts can be used to identify patterns in data. (MS-PS4-1)

Structure and Function

Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS4-2)

Structures can be designed to serve particular functions. (MS-PS4-3)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS2-2), (MS-PS2-4)

Influence of Science, Engineering, and Technology on Society and the Natural World

Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations. (MS-PS4-3)

or a ball, respectively).
(MS-PS2-5)

PS4.A: Wave Properties

A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.
(MS-PS4-1)

A sound wave needs a medium through which it is transmitted. (MS-PS4-2)

PS4.B: Electromagnetic Radiation

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)

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)

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)

However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2)

PS4.C: Information Technologies and Instrumentation

Digitized signals (sent as wave pulses) are a more reliable way to encode and

	transmit information. (MS-PS4-3)	
<p>Unit Enduring Questions:</p> <ul style="list-style-type: none"> • How can one explain and predict interactions between objects and within systems of objects? • How do Newton’s Laws explain the nature of physics? • How can one predict an object’s continued motion, changes in motion, or stability? • How do the laws of physics apply to a rollercoaster? • How does energy change form? • How can energy be transferred from one material to another? • How are different kinds of mechanical waves different from each other? • How are waves used to transfer energy and send and store information? • What is electromagnetic radiation? • What are the different uses of the different types of waves in the electromagnetic spectrum? 		<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> • Motion can be modeled, explained, predicted, and described through their components. • Balanced forces keep motion unchanged, unbalanced forces create acceleration. • Every force has an equal and opposite force. • Kinetic energy and several types of potential energy has the ability to do work. • Energy is conserved- all energy transfers are governed by the law of conservation of energy. • Momentum is conserved during collisions. • Mechanical waves are a type of energy which use matter as a medium. • Sound is formed through vibrations and travel as mechanical waves. • Energy can come in various forms and it can be transferred from one form to another when work is done. • The amount of energy before a transformation is equal to the amount of energy after the transformation.
<p>Unit Objectives: <i>Students will know....</i></p>		<p>Unit Objectives: <i>Students will be able to.....</i></p> <ul style="list-style-type: none"> • Use mathematical

- 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).
- 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. Forces on an object can also change its shape or orientation. 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.
- Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.
- Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. In any system, total momentum is always conserved. If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.
- The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is passing.
- Information can be digitized (e.g., a picture stored as the values of an array of pixels); in this form, it can be stored reliably in computer memory and sent over long distances as a series of wave pulses.
- Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. The wave model is useful for explaining many features of electromagnetic radiation, and the particle model explains other features.
- When light or longer wavelength electromagnetic radiation is absorbed in matter, it is generally converted into thermal energy (heat). Shorter wavelength electromagnetic radiation (ultraviolet, X-rays, gamma

representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. ● Evaluate questions about the advantages of using a digital transmission and storage of information. ● Evaluate the claims, evidence, and the reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. ● Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter

- Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

rays) can ionize atoms and cause damage to living cells.

- Multiple technologies based on the understanding of waves and their interactions with matter are part of everyday experiences in the modern world (e.g., medical imaging, communications, scanners) and in scientific research. They are essential tools for producing, transmitting, and capturing signals and for storing and interpreting the information contained in them.

Assessments

Summative Assessment

- **End of unit test: may include, but not limited to: consists of multiple choice, matching, fill in the blank, open-ended questions, reading and interpreting data**
- **Final projects: Research project, poster display**

Formative Assessments

- Exit Tickets
- Labs
- Mini Quizzes
- Homework
- Classwork

Benchmark Assessments

- Quarterly exams (STAR)

Alternative Assessments

- Self-assessments, peer review, optional retakes/test corrections, problem based learning, modified lab reports, oral presentations

Modifications for ELL's

Speak slowly, clearly, and use gestures

Simplify language; avoid idioms, slang, and sarcasm

Pair student with a buddy

Give preferential seating

Maintain routines with consistent signals

Write clearly and legibly

Provide a graphic organizer in advance of a new topic/vocabulary/chapter

Present information in a variety of ways (pictures, videos, manipulatives)

Rephrase questions, directions, and explanations

Have tests read orally

Highlight or bold key words in classwork, homework, and tests

Allow extra time for assignments

Modifications for Special Education

- Provide a lab partner.
- Allow extra time for set up and completion of lab work.
- Use a combination of written, verbal, and pictorial instructions with scaffolding.
- Demonstrate procedures and allow students to practice. (modeling)
- Build-in frequent brief breaks.
- Give preferential seating to avoid distractions.
- Written and verbal instructions
- Highlight or bold key words in classwork, homework, and tests
- Provide graphic organizers
- Chunk larger assignments

Modifications for 504

- Provide a lab partner.
- Allow extra time for set up and completion of lab work.
- Use a combination of written, verbal, and pictorial instructions with scaffolding.
- Demonstrate procedures and allow students to practice. (modeling)
- Build-in frequent brief breaks.

Modifications for Gifted and Talented Students:

- Teacher tutoring
- Peer tutoring
- Cooperative Learning Groups

Gifted And Talented

- Provide advance reading level books
- Provide opportunities for Project-based learning
- Extended learning opportunities when classroom assignments are finished early

At Risk of Failure

- Opportunity to make up missing work
- Opportunity to retest
- Parent/Teacher Log

Project-based Learning Tasks:

- A debate, speech, social media campaign, or multimedia presentation on a current science topic

Vocabulary:

- In-text vocabulary should be incorporated into every unit. Word journals, vocabulary walls, and/or various other activities should be utilized by the instructor to teach vocabulary.

The Research Process:

- The research process must be integrated within each course curriculum. Students will be provided with opportunities to investigate issues from thematic units of study. As the NJSLs indicate, students will develop proficiency with MLA or APA format as applicable.

Technology:

- Students must engage in technology applications integrated throughout the curriculum. Applicable technology utilized in this curricula are included below:
 - Books online
 - Laptops/Chromebooks
 - Ipads/Ipods as per IEP
 - Mimio/Smartboard
 - Internet
 - Safari Montage
 - Brain Pop
 - History Channel
 - CNN – Student News
 - PBS
 - You Tube/Netflix/Hulu
 - ICivics
 - Google Classroom/Zoom/Google Meet
 - Additional resources will be utilized as needed
 - We the People
 - Eagle Eye
 - Google Earth
 - Google Culture
 - Gizmo's

Resources:

- Ancillary resources and materials used to deliver instruction are included below:
 - Founding documents: Declaration of Independence, Constitution, Bill of Rights and the Articles of Confederation.
 - Teacher created materials
 - Media Center resources (books/videos)
 - Safari Montage
 - Various internet sites for informational text, online museums, webquests, pictures, maps, and videos
 - Teachers Pay Teachers
 - School/Teacher owned activity books

Curriculum development Resources/Supplemental Instructional Materials:

List or Link Ancillary Resources and Curriculum Materials Here:

- VCR/DVD, You Tube, BrainPop
- Gizmos
- Lab materials

- Text-support materials (tests, quizzes ...)
- Teacher Generated Materials (worksheets, tests, projects, activities (independent & group, internet research, note taking, and scavenger hunts).
- Current Events and online resources as needed within curriculum topics

Board of Education Approved Text(s)/Core Material

Science Explorer Pearson