West Windsor-Plainsboro Regional School District
Course Title: Science
Grade: 6

The Mission of the West Windsor-Plainsboro Science Department

Our mission is to cultivate science learners who have the foundational knowledge to make ethical, scientifically literate decisions and the ability to apply scientific practices in order to contribute to the needs of society and a changing world.

- **Vision**

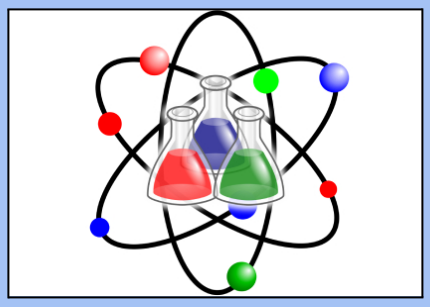
  We envision a K-12 science experience that supports and challenges every student in their science learning journey. We will:
  - *Capitalize on diversity by reaching and exciting students at all levels and interests by differentiating learning within classrooms and by offering a robust program of studies.*
  - *Emphasize authentic science and engineering practices and leverage the interdisciplinary nature of science with arts, technology, math, reading, and writing.*
  - *Integrate scientific knowledge and 21st century competencies to prepare students to make informed decisions and take action to address real world problems.*
  - *Cultivate an inclusive and diverse community where all learners are welcomed, valued, respected, and celebrated.*

6th Grade Science Storyboard

As student scientists, we will examine physical and biological aspects of the world around them to understand our role and impact.

Essential Questions:

- How does what is inside the Earth, on the Earth's surface, and the Sun impact what happens on Earth?
- What is matter and how can it be changed?
- How is energy transferred between organisms in an ecosystem?
- How is accelerated climate change affecting biotic and abiotic factors globally?

Unit 1: Earth Science: Unveiling Wonders of Our Planet	**Unit 2: Physical Science: Exploring How Matter Interacts and Changes**	**Unit 3: Life Science: Discovering How Living Things Connect, Energize, and Shape Our World**
		
THE FOCUS OF THE STORY	**THE FOCUS OF THE STORY**	**THE FOCUS OF THE STORY**

In our study of Earth science, we will uncover continental movement, and how that impacts what happens on Earth's crust. We will explore the sun's role in weather phenomena. We will also examine issues related to global warming and how students can make changes in order to mitigate its impacts.	In our study of Physical science, we will learn about atoms and molecules as we observe, through various hands-on experiences, how matter can change, and that matter can neither be created nor destroyed. Get ready to explore, question, and discover how atoms and molecules make up everything around us.	In our study of Life science, we will study biotic (living) and abiotic (non-living) factors in an ecosystem. We'll learn about food webs and how energy is transferred between organisms and how changes in an ecosystem, whether natural or man-made, disrupt the balance in the ecosystem. We'll investigate how accelerated climate change is impacting ecosystems and each of us will be challenged to find ways to reduce our negative impacts.
LEARNING TARGETS	**LEARNING TARGETS**	**LEARNING TARGETS**
I can analyze the characteristics of weather and climate, and through data collection make predictions about weather patterns. I can evaluate the steps in the water cycle and describe how water moves above, below, and on the Earth's surface. I can investigate and explain the reasons for accelerated climate change and the increased numbers of catastrophic events.	I can define and explain atoms, elements, and compounds and explain how atoms come together to form compounds. I can define different ways that heat transfers and give an example of each. I can evaluate the physical properties of compounds before and after a chemical reaction takes place. I can identify and provide examples of a solid, liquid, and gas, can investigate the relationship between properties of matter, and how	I can understand how organisms are both interrelated and interdependent within an ecosystem in predictable ways. I can explain how the structural and functional characteristics of an organism and changes in abiotic and biotic factors can affect the survival of individual organisms and entire species. I can apply this knowledge to explain how climate change affects both biotic and abiotic factors in an ecosystem.

	temperature affects the transition from one to another. I can analyze the difference between a physical and chemical change and give an example of each.	

Unit 1: Earth Science: Earth's Systems	
Content Area: Science	
Course & Grade Level: 6th Grade Science	
Summary and Rationale	
In this unit for Earth's Systems, students identify, understand, and connect important themes and patterns in the living and nonliving world. This earth science unit is taught integrated with the Matter and Its Interactions unit to build a connection between properties and changes of matter to changes in Earth's systems. Grasping the concept of density supports the exploration and understanding of heat transfer and convection currents, as related to storms, earthquakes, and volcanoes. Other geoscience processes like continental drift and rock cycle are also studied to understand the history of how Earth's surface has changed over time. Students learn how the sun and water influence weather and how ocean and air currents circulate. Students begin asking questions about the natural world and why changes in climate are happening today. This sets the stage for addressing climate change issues throughout the next upcoming units.	
Recommended Pacing	
45 days	
New Jersey Student Learning Standards for Science	
CPI #	**Cumulative Progress Indicator (CPI)**
MS-ESS1-4	**Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6 billion-year-old history.** *[Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.] [Assessment Boundary: Assessment does not include recalling the names of specific periods or epochs and events within them.]*
MS-ESS2-1	**Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.** *[Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.] [Assessment Boundary: Assessment does not include the identification and naming of minerals.]*
MS-ESS2-2	**Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.** *[Clarification Statement: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.]*
MS-ESS2-3	**Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.** *[Clarification Statement: Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches).] [Assessment Boundary: Paleomagnetic anomalies in oceanic and continental crust are not assessed.]*
MS-ESS2-4	**Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.** *[Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.] [Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.]*
MS-ESS2-5	**Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.** *[Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] [Assessment Boundary: Assessment does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations.]*

MS-ESS2-6	**Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates** *[Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.] [Assessment Boundary: Assessment does not include the dynamics of the Coriolis effect.]*
MS-ESS3-2	**Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects** *[Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and without any notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado prone regions or reservoirs to mitigate droughts).]*
MS-ESS3-5	**Ask questions to clarify evidence of the factors that have caused climate change over the past century** *[Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]*
New Jersey Student Learning Standards for English Language Arts Companion Standards	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-5),(MS-ESS3-5)
RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ESS2-5)
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-ESS2-5)
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS2-6)
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	**Cumulative Progress Indicator (CPI)**
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.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.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross-cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.DC.2	Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
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.GCA.2	Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
New Jersey Student Learning Standards for Computer Science and Design Thinking	
CPI #	**Cumulative Progress Indicator (CPI)**
8.1.2.DA.1	Collect and present data, including climate change data, in various visual formats.

8.1.5.DA.4	Organize and present climate change data visually to highlight relationships or support a claim.
8.2.5.ED.2	Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
Interdisciplinary Standards (Math and Social Studies)	
Mathematics	
CPI #	**Cumulative Progress Indicator (CPI)**
MP.2	Reason abstractly and quantitatively. (MS-ESS2-5) (MS-ESS3-5)
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-ESS2-5)
6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS3-5)
Social Studies	
CPI #	**Cumulative Progress Indicator (CPI)**
6.2	World History/Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.
6.3	Active Citizenship in the 21st Century: All students will acquire the skills needed to be active, informed citizens who value diversity and promote cultural understanding by working collaboratively to address the challenges that are inherent in living in an interconnected world.
Instructional Focus	
Unit Enduring Understandings	
● Heat transfers by conduction, convection, and radiation. The uneven heating of the earth, on the surface and in the interior, causes changes in the atmosphere, oceans, and lithosphere, which we observe as ocean currents, tectonic plate motion, and weather patterns. ● Climate is weather over a period of time and is defined by sustained patterns. ● The moderate temperatures of the earth, along with the thin layer of atmosphere, oceans, and land masses enable the planet to support life. ● Climate change is impacting the moderate temperatures of the Earth due to increased levels of CO_2. ● Factors of climate such as global temperature have been changing over long periods of time and can be studied using data and graphs. ● The sun is a major source of energy that drives weather patterns, the global ocean convection cycle, and winds. ● Movement of these convection currents are caused by behavior of atoms and molecules in response to changes in temperatures. ● The characteristics of geography cause certain places to have frequent catastrophic events. ● Natural Catastrophic events have a role in shaping the physical environments and the various populations on Earth. ● The movement of tectonic plates has an effect on the distribution of fossils and the formation of structures on earth. The placement of rock strata and fossils can give evidence to different age periods of earth's history. ● Preparation regarding rescue and rehabilitation efforts for people with disabilities after natural disasters (e.g.tsunamis) can be critical in ensuring the safety of all populations.	
Unit Essential Questions	
● How do the materials in and on Earth's crust change over time? ● How does the movement of tectonic plates impact the surface of Earth?	

- How does water influence weather, circulate in the oceans, and shape Earth's surface?
- What factors interact and influence weather?
- How have living organisms changed the Earth and how have Earth's changing conditions impacted living organisms?
- Why do catastrophic events happen? Why do some places have more catastrophic events than others?
- What causes weather and how does it travel?
- What is the sun's role in oceans, weather, and climate?
- How does matter change in the natural world?
- Why is the climate changing? What is happening to the Earth because of the changing climate?

Objectives

We are learning to/that:

- Analyze characteristics of and differentiate between weather and climate.
- Evaluate the steps in the water cycle and describe how water moves above, below, and on the Earth's surface
- Evaluate when hurricanes will occur based on atmospheric and oceanic conditions.
- Apply knowledge of weather patterns to predict characteristics of specific climate zones.
- Create models representing oceanic currents across the world and explain what these models are displaying.
- Investigate the reasons for accelerated climate change and increased numbers of catastrophic events.
- Predict weather patterns using an online simulation and through data collection.

Evidence of Learning

☑ **Formative Assessment:** Formative assessments can be teacher check ins, observing student groups, exit tickets, etc.

☑ **Summative Assessment:** Summative assessments can be in the form of performance tasks, writing assessments, labs, quizzes and CERs, etc.

☑ **Alternative Assessment -** Assessments will be differentiated in various ways based on the needs of the students. Differentiation could be in…

- Content (texts, phenomena, graphs, data tables, vocabulary, etc.)
- Process (scaffolding, guiding questions, small group instruction, etc.)
- Product (individual components, student choice in modality such as video, skit, etc)

☑ **Benchmark** The following 6th Grade Earth Science Common Assessment consists of a Go Formative Assessment to determine if students have learned what we intended them to learn, as well as an Earth Science Performance Task. This includes the addition of a climate change component that addresses the standard 8.1.5.DA.4.

(This common assessment also provides a solid foundation to begin preparing students to formulate CERs, and scaffolding for the redesigned 7th and 8th grade 2023 climate change common assessments.)

Assessment Statement for Science Curriculum

The assessment plan includes teacher-designed formative and summative assessments, including common assessments, self-assessments, and performance tasks aligned with the NJSLS-S and the NJSLS-S for Climate Change. During each common, formative, and summative assessment, teachers will provide alternative assessment opportunities that adhere to 504 and IEP requirements. Alternative assessments are individualized for the needs of all students.

Accommodations

Resources

Suggested Resources

Weather - BrainPOP

Climate Types - BrainPOP

Hurricanes - BrainPOP

What Is Weather | Facts About Weather For Kids | DK Find Out

Climate - Science for Kids

Earth Science for Kids: Weather - Hurricanes (Tropical Cyclones)

Inside the Megastorm | Full-Length Broadcast | PBS LearningMedia

Hurricanes and Climate | Center for Science Education

PBS Resources
- Clouds and Weather
- What is Climate?
- Changing Climate
- Measuring Changing Climate

Gizmo Resources
- Observing Weather
- Comparing Climates

Phenomenon Resource
- NGSS Phenomena

Unit 2: Physical Science: Matter and Its Interactions	
Content Area:Science	
Course & Grade Level: 6th grade	
Summary and Rationale	
In this physical science unit, students are introduced to the basic atomic and molecular interactions of matter. It is integrated with the Earth Systems unit to build a connection between properties and changes of matter to changes in Earth's systems. Students will learn that all matter is made of atoms and molecules. They will observe and measure properties of matter and study the changes that matter can undergo chemically or physically. When studying chemical and physical changes, students will investigate how mass is conserved no matter how the properties change, which is an important foundation for their study of photosynthesis in their Life Science unit. The water cycle and the sun's role in it can be directly linked to phase changes (like evaporation and condensation) and density (placement and movement of air and water). As a result, learning about ocean and air currents provides context for understanding chemical processes on the atomic level. Understanding how atoms and molecules behave also allows students to grasp how Earth's processes like convection currents and volcanic eruptions happen on a large scale. Students extend their understanding of matter through questioning and discussing ways that climate change is impacted by chemical factors like levels of CO_2 in the air and the effect of CO_2 on global temperatures.	
Recommended Pacing	
35 days	
New Jersey Student Learning Standards for Physical Science: Matter and Its Interactions	
CPI #	**Cumulative Progress Indicator (CPI)**
MS-PS1-1	**Develop models to describe the atomic composition of simple molecules and extended structures.** *[Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.] [Assessment Boundary: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete description of all individual atoms in a complex molecule or extended structure is not required.]*
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.** *[Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.] [Assessment boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.]*
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.** *[Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawing and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.]*
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.** *[Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.] [Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.]*
MS-ESS3-5	**Ask questions to clarify evidence of the factors that have caused climate change over the past century** *[Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]*
New Jersey Student Learning Standards for English Language Arts Companion Standards	

CPI #	Cumulative Progress Indicator (CPI)
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-ETS1-1),(MS-ETS1-2)
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)
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-ETS1-1)
WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research. (MS-ETS1-2)
RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ETS1-2),(MS-ETS1-3)
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-ETS1-2)
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	**Cumulative Progress Indicator (CPI)**
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.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.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross-cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
9.4.8.DC.2	Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
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.GCA.2	Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
New Jersey Student Learning Standards for Computer Science and Design Thinking	
CPI #	**Cumulative Progress Indicator (CPI)**
8.1.2.DA.4	Make predictions based on data using charts or graphs.
8.1.5.DA.5	Propose cause and effect relationships, predict outcomes, or communicate ideas using data.
8.2.5.ED.2	Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
Interdisciplinary Standards (Math and Social Studies)	
Mathematics	
CPI #	**Cumulative Progress Indicator (CPI)**
MP.2	Reason abstractly and quantitatively. (MS-PS2-1),(MS-PS2-2),(MS-PS2-3),(MS-ETS1-1),(MS-ETS1-2)
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 real-world 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)
7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), 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-ETS1-1),(MS-ETS1-2)

Social Studies

CPI #	**Cumulative Progress Indicator (CPI)**
6.2 World History/Global Studies:	All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.
6.3 Active Citizenship in the 21st Century:	All students will acquire the skills needed to be active, informed citizens who value diversity and promote cultural understanding by working collaboratively to address the challenges that are inherent in living in an interconnected world.

Instructional Focus

Unit Enduring Understandings

- Materials exist throughout our physical world. They can be categorized as mixtures, compounds, or elements. The structures of materials influence their physical properties, chemical reactivity and use.
- The atomic structures of materials determine their properties.
- There are several ways in which elements and compounds react to form new substances and each reaction involves the flow of energy.
- Characteristic properties describe substances rather than objects and are independent of the amount of the sample. (Density, boiling point, melting point).
- Heat, through movement on the molecular level, transfers from a hot place to a cooler place until both reach the same temperature and can cause phase changes in matter.
- Heat affects some characteristic properties of matter such as density.
- No matter how substances within a closed system interact, the total mass of the system remains the same.
- Different substances can be described by their physical and chemical properties such as density, mass, volume, and reactivity.

Unit Essential Questions

- How do materials differ from each other in terms of characteristics?
- What is a chemical reaction? How do materials change?
- What are materials made of?
- How does heat travel?
- What is the difference between different states of matter? Why does water change between different states and move to different locations on Earth in the water cycle?
- What happens to the atoms and its mass after a chemical or physical change?
- How does matter change in the natural world?
- How are convection currents caused by the movement of molecules and changes to density?

Objectives

We are learning to/that:

- Evaluate compounds before and after a chemical reaction takes place and analyze the different chemical properties
- Define the different ways that heat transfers and give an example of each
- Define and give examples of a solid, liquid, and gas
- Analyze the difference between a physical and chemical change and give an example of each
- Define atoms, elements, and compounds and explain how atoms come together to form compounds
- Investigate the relationship between properties of matter and how temperature affects the transition from one to another

Evidence of Learning

- ☑ **Formative Assessment:** Formative assessments can be teacher check ins, observing student groups, exit tickets, etc.
- ☑ **Summative Assessment:** Summative assessments can be in the form of performance tasks, writing assessments, labs, quizzes and CERs, etc. Here are a few examples below:
- ☑ **Alternative Assessment -** Assessments will be differentiated in various ways based on the needs of the students. Differentiation could be in…
  - Content (texts, phenomena, graphs, data tables, vocabulary, etc.)
  - Process (scaffolding, guiding questions, small group instruction, etc.)
  - Product (individual components, student choice in modality such as video, skit, etc)
- ☑ **Benchmark** Baking soda and vinegar in a balloon lab

Assessment Statement for Science Curriculum

The assessment plan includes teacher-designed formative and summative assessments, including common assessments, self-assessments, and performance tasks aligned with the NJSLS-S and the NJSLS-S for Climate Change. During each common, formative, and summative assessment, teachers will provide alternative assessment opportunities that adhere to 504 and IEP requirements. Alternative assessments are individualized for the needs of all students.

Accommodations

Resources

Suggested Resources:

Properties of Matter: Student Guide and Source Book (Carolina Curriculum for Science and Math)

How small is an atom?

Interactive Periodic Table

Mixtures and Pure Substances Interactive

States of Matter Simulation (CK-12)

Phase Change Simulation (CK-12)

Chemical and Physical Change/Law of Conservation of Mass Simulation (CK-12)

Air Composition Simulation (CK12)

Gizmo Resources

- Triple Beam Balance
- Measuring Volume
- Weight and Mass
- Phases of Water
- Density Laboratory
- Carbon Cycle

PhET

- States of Matter Simulation
- Build a Molecule

Climate Change Resources:

- CO2 Maps and Interactive
- Computing Carbon Dioxide Amounts: Student Activity

6th Grade- Matter and Its Interactions- NGSS Engineering Lesson Common Assessment:

Phenomenon Resource

- NGSS Phenomena

Unit 3: Life Science - Ecosystems: Interactions, Energy, and Dynamics	
Content Area: Science	
Course & Grade Level: 6th grade	
Summary and Rationale	
In this life science unit, students will build upon their knowledge of organisms, by studying the interactions of biotic and abiotic factors in an ecosystem. Students will build a connection between the structure and function of an organism and its ability to survive and fulfill a specific role in an ecosystem. Students will explain and visualize food web models, the cycling of matter, and the movement of energy in ecosystems. Students will also learn that ecosystems provide biotic and abiotic factors that organisms rely on in order to survive. Environmental changes, both natural and human driven, can impact the balance between the environment and the populations living within an ecosystem. Students will investigate ecosystems that are currently impacted by climate change to determine how specific changes in abiotic factors, such as increased CO_2 levels, ocean acidification, and rises in sea level, affect organisms' behaviors or ability to survive.	
Recommended Pacing	
60 days	
New Jersey Student Learning Standards for Life Science - Ecosystems: Interactions, Energy, and Dynamics	
CPI #	**Cumulative Progress Indicator (CPI)**
MS-LS2-1	**Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.** *[Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]*
MS-LS2-2	**Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.** *[Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]*
MS-LS2-3	**Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.** *[Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]*
MS-LS2-4	**Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.** *[Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]*
MS-ESS3-5	**Ask questions to clarify evidence of the factors that have caused climate change over the past century.** *[Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]*
New Jersey Student Learning Standards for English Language Arts Companion Standards	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-LS2-1) (MS-LS2-2) (MS-ESS3-5)
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-LS2-1)
WHST.6-8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS2-2)

WHST.6-8.9	Draw evidence from literary or informational texts to support analysis, reflection, and research. (MS-LS2-2)
SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. (MS-LS2-2)
SL.8.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (MS-LS2-2)
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS2-3)
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	**Cumulative Progress Indicator (CPI)**
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross-cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
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.DC.2	Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
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.GCA.2	Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
New Jersey Student Learning Standards for Computer Science and Design Thinking	
CPI #	**Cumulative Progress Indicator (CPI)**
8.1.2.DA.1	Collect and present data, including climate change data, in various visual formats.
8.1.2.DA.3	Identify and describe patterns in data visualizations.
8.1.5.DA.4	Organize and present climate change data visually to highlight relationships or support a claim.
Interdisciplinary Standards (Math and Social Studies)	
Mathematics	
CPI #	**Cumulative Progress Indicator (CPI)**
6.EE.C.9	Use variables to represent quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. **(MS-LS2-3) (MS-ESS3-5)**
6.SP.B.5	Summarize numerical data sets in relation to their context. **(MS-LS2-2)**
MP.2	Reason abstractly and quantitatively. **(MS-ESS3-5)**
Social Studies	
CPI #	**Cumulative Progress Indicator (CPI)**
6.2 World History/	All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures.

Global Studies	Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.
6.3 Active Citizenship in the 21st Century	All students will acquire the skills needed to be active, informed citizens who value diversity and promote cultural understanding by working collaboratively to address the challenges that are inherent in living in an interconnected world.

Instructional Focus

Unit Enduring Understandings

- All organisms transfer matter and convert energy from one form to another.
- Energy is transferred between organisms to build and maintain structures within the organism.
- The structural and functional characteristics of an organism determine their continued survival over time under changing environmental conditions.
- Organisms interrelate and are interdependent within an ecosystem in predictable ways.
- All organisms must be able to obtain and use resources, to grow, reproduce and maintain stable internal conditions within the ecosystem.
- Changes in abiotic and biotic factors can affect the survival of individual organisms and entire species.
- Climate change causes changes to abiotic factors in an ecosystem such as increasing temperature, rising sea levels, and ocean acidification.
- Energy, entering ecosystems as sunlight, is transferred by producers into chemical energy through photosynthesis.
- Food webs show the flow of energy in a community.
- Students should consider solutions to the inaccessibility (or perceived accessibility) of various global ecosystems.

Unit Essential Questions

- How is energy transferred between living systems?
- How do changes in an ecosystem affect populations?
- What are the various kinds of relationships between organisms?
- How do adaptations of organisms affect its niche within an ecosystem?
- How is the structure and function of an organism connected to the role it plays within an ecosystem?
- How do changes in abiotic and biotic factors caused by climate change affect ecosystems?

Objectives

Students will be able to:

- Evaluate the process of photosynthesis and examine how energy from the Sun passes through various ecosystems
- Analyze the transfer of energy throughout various ecosystems by examining food webs and food chains
- Define biotic and abiotic factors in an environment and give examples of each in different ecosystems
- Investigate how changes in biotic and abiotic factors affect ecosystems around the world
- Analyze how plants and animals use physical and behavioral adaptations to survive and thrive in their environment
- Analyze the interaction between biotic and abiotic factors in an ecosystem and explain how organisms are interconnected and rely on each other to sustain a healthy ecosystem

Evidence of Learning (include sample assessments in each corresponding check box row)

☑ **Formative Assessment:** Formative assessments can be teacher check ins, observing student groups, exit tickets, etc.

☑ **Summative Assessment:** Summative assessments can be in the form of performance tasks, writing assessments, labs, quizzes and CERs, etc. Here are a few examples below:

☑ **Alternative Assessment -** Assessments will be differentiated in various ways based on the needs of the students. Differentiation could be in…

- Content (texts, phenomena, graphs, data tables, vocabulary, etc.)
- Process (scaffolding, guiding questions, small group instruction, etc.)
- Product (individual components, student choice in modality such as video, skit, etc)

☑ **Benchmark** Owl Pellet Lab Reflection

Assessment Statement for Science Curriculum

The assessment plan includes teacher-designed formative and summative assessments, including common assessments, self-assessments, and performance tasks aligned with the NJSLS-S and the NJSLS-S for Climate Change. During each common, formative, and summative assessment, teachers will provide alternative assessment opportunities that adhere to 504 and IEP requirements. Alternative assessments are individualized for the needs of all students.

Accommodations

Resources

Suggested Resources

Organisms—From Macro to Micro Student Guide and Source Book (Carolina Curriculum for Science and Math)

Gizmo Resources

- Coral Reefs 1 - Abiotic Factors
- Coral Reefs 2 - Biotic Factors
- Food Chain
- Forest Ecosystem
- Prairie Ecosystem Ecosystem Stem Case

Climate Change Resources

Science Bulletins: Climate Change Affects Ecosystems

Climate Change Affects Ecosystems Graphic Organizer/Lesson

Declining Sea Ice Affects Caribou

Polar Bear Diet Changes as Sea Ice Melts

Warm Forecast for Coral Reefs

How Corals Hold Centuries of Ocean Climate Data

NJ Climate Change Phenomenon (Atlantic White Cedar)

Ecosystems Common Assessment:

Phenomenon Resource

- NGSS Phenomena