Science

Grade 6

Prepared by:

Nicole Marino

Superintendent of Schools:

Marie C. Cirasella, Ed.D.

Approved by the Midland Park Board of Education on

August 23, 2022

Born on **August 22, 2022**

6th Grade Science Curriculum

Course Description:

The sixth-grade science curriculum is aligned with the New Jersey Student Learning Standards and focuses on the science content and practices that are essential for college and career readiness. Understanding science requires individuals to integrate a complex structure of many types of knowledge. These knowledge types include the ideas of science, the relationship between the ideas, the reasons for these relationships, and the ways to use these ideas to complete the following tasks: explain and predict other phenomena, interpret situations, solve problems, and participate productively in scientific practices and discourse. Students will display an understanding of the application of core principles and an integration of that knowledge with the processes that are necessary for practicing science. These practices emphasize the importance of students independently creating scientific arguments and explanations for observations made during investigations. Students will form the ability to examine their own knowledge and conceptual frameworks, to evaluate them in relation to new information or competing alternative frameworks, and to alter them by a deliberate and conscious effort is key scientific practices.

The sixth-grade science curriculum becomes a sense-making enterprise for students in which they will be provided with ongoing opportunities to interact directly with the natural and designed world using tools, data-collection techniques, models, and theories of science including; actively participating in scientific investigations by using cognitive and manipulative skills associated with the formulation of scientific explanations, and using evidence, applying logic, and constructing arguments for their proposed explanations.

The sixth-grade science curriculum is taught in seven units throughout the school year. The science curriculum is a hands-on, open-ended, and sequential process of investigating the biological and physical world. As part of the spiraling curriculum, aspects of physical science, life science, earth and space science, and engineering, technology and applications of science are taught throughout the year. A guided inquiry programs gives students the opportunity to explore topics and concepts through investigations.

Course Sequence:

Unit Title	**Pacing**
Unit 1: Weather and Climate	20 days
Unit 2: Growth, Development, and Reproduction of Organisms	15 days
Unit 3: Matter and Energy in Organisms and Ecosystems	25 days
Unit 4: Interdependent Relationships in Ecosystems	25 days
Unit 5: Forces and Motion	30 days
Unit 6: Types of Interactions	30 days
Unit 7: Astronomy	25 days

Pre-requisite:

Grade 5 Science domains:
5-PS1-3 and 5-PS1-1 Property of Matter
5-PS1-4 and 5-PS1-2 Changes of Matter
5-LS1-1, 5-LS2-1, and 5-PS3-1 Energy and Matter in Ecosystems
5-ESS2-2 and 5-ESS3-1 Water on the Earth
5-ESS2-1 and 5-ESS3-1 Earth Systems
5-PS2-1, 5-ESS1-1, and5-ESS1-2 Interactions within the Earth, Sun, and Moon System

UNIT #1

Overview

Content Area: Science

Unit Title: Weather and Climate

Grade Level(s): 6

Core Ideas: This unit is broken down into three sub-ideas: Earth's large-scale systems interactions, the roles of water in Earth's surface processes, and weather and climate. Students make sense of how Earth's geosystems operate by modeling the flow of energy and the cycling of matter within and among different systems. A systems approach is also important here, examining the feedbacks between systems as energy from the Sun is transferred between systems and circulates through the ocean and atmosphere. The crosscutting concepts of cause and effect, systems and system models, and energy and matter are called out as frameworks for understanding the disciplinary core ideas. In this unit, students are expected to demonstrate proficiency in developing and using models and planning and carrying out investigations as they make sense of the disciplinary core ideas. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Standards (Content and Technology)

CPI#:	Statement:
Performance Expectations (NJSLS)	
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.
MS-ESS2-5	Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
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.
Career Readiness (9.2) Life Literacies, and Key Skills (standard 9.1, 9.4)	
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
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.8	Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities).
Technology Literacy (9.4)/ Computer Science and Design Thinking (standard 8)	
8.1.8.DA.6	Analyze climate change computational models and propose refinements.
8.1.8.IC.1	Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options.
Interdisciplinary Connection	
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
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).
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
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.
WHST.6-8.1	Write arguments focused on discipline-specific content.
WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
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.

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.
WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
Companion Standards ELA/L	
NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
NJSLSA.W8	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

Cross-cultural Statements/Mandates (*Amistad, Holocaust, LGBT/Disabilities, SEL, etc...)*

Amistad Mandate: References to this mandate are made by studying Dr. Warren Washington, who helped develop the first atmospheric computer models that used physics to predict future states of the atmosphere, which helped humans understand the climate crisis.

SEL Mandate: Using the CASEL's Framework, students will discuss responsible decision making, including the capacities to consider ethical standards and safety concerns and to evaluate the benefits and consequences of various actions related to climate change.

Unit Essential Question(s):

- What are the processes involved in the cycling of water through Earth's systems?
- What is the relationship between the complex interactions of air masses and changes in weather conditions?
- What are the major factors that determine regional climates?

Science and Engineering Practices:

- Analyze and interpret data to determine similarities and differences in findings. (MS-ESS1-3)
- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS1-4)

Crosscutting Concepts:

- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-ESS1-1), (MS-ESS1-2)

Enduring Understandings/ Disciplinary Core Ideas:

- Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.
- Global movements of water and its changes in form are propelled by sunlight and gravity.
- The cycling of water through Earth's systems is driven by energy from the sun and the force of gravity.
- Within Earth's systems, the transfer of energy drives the motion and/or cycling of water.
- The motions and complex interactions of air masses result in changes in weather conditions.
- The complex patterns of the changes in and movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns.
- Examples of data that can be used to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions include weather maps, diagrams, and visualizations; other examples can be obtained through laboratory experiments.
- Air masses flow from regions of high pressure to regions of low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time.
- Because patterns of the changes and the movement of water in the atmosphere are so complex, weather can only be predicted probabilistically.

	● Sudden changes in weather can result when different air masses collide. ● Weather can be predicted within probabilistic ranges. Cause-and effect-relationships may be used to predict changes in weather. ● Unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. ● Patterns of atmospheric and oceanic circulation that determine regional climates vary by latitude, altitude, and geographic land distribution. ● Atmospheric circulation that, in part, determine regional climates is the result of sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds. ● Ocean circulation that, in part, determine regional climates is the result of the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. ● Models that can be used to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates can be diagrams, maps and globes, or digital representations.

Evidence of Learning

Formative Assessments: Exit tickets, entrance tickets, teacher observations

Summative/Benchmark Assessment(s): Water Cycle assessment, Air Masses and Pressure Systems assessment

- Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
- Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
- Use a model to explain the mechanisms that cause varying daily temperature ranges in a coastal community and in a community located in the interior of the country.
- 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.

Alternative Assessments:

- Modified versions of formative and summative assessments, project-based assessments, and oral assessments.

Resources/Materials:	**Key Vocabulary:**
Interactive websites, Smart Board, Google Classroom (Slides, Forms)	condensation, precipitation, collection, evaporation, groundwater, water vapor, crystallization, air mass, cold front, warm front, stationary front, occluded front, barometer, anemometer, air pressure, gravity, atmospheric circulation, thermal energy, climate zones, latitude, ocean current, convection cell, density, coriolis effect

Suggested Pacing Guide

Lesson Name/Topic	**Student Learning Objective(s)**	**Suggested Tasks/Activities:**	**Day(s) to Complete**

Water Cycle	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	Students will take notes on the various parts of the water cycle, including the creation of a visual model. Students develop and use a model of the water cycle to describe the processes and forces driving the cycling of water on Earth, including how the process of condensation forms clouds. Rain in a Bottle Lab: Students will model how clouds and rain form as part of the water cycle.	4 days
Weather Conditions	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.	Students will learn and take notes on the formation of air masses and how boundaries of air masses cause weather fronts. Students will watch a simulation to see the difference in molecule movement in different temperatures. Mini Lab: Students investigate what happens when different temperatures of water are added to room temperature water. Students create a model of convection using different temperatures of water.	4 days
Ocean Currents	Explain how variations in density result from variations in temperature and salinity drive a global pattern of interconnected ocean currents.	Students read about climate zones, ocean currents, and the coriolis effect. Students watch Generation Genius video to support the development of models to explain how variations in temperature and salinity form ocean currents which impact the weather and climate of particular regions.	4 days
Temperature Ranges	Use a model to explain the mechanisms that cause varying daily temperature ranges in a coastal community and in a community located in the interior of the country.	Adopt a Drifter: Do Ocean Surface Currents Influence Climate? Students construct climographs showing both precipitation and temperature for 3 coastal cities and describe how ocean surface currents affect climate on nearby land.	4 days
Regional Climates	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.	Students will take notes on two models: Wind Driven Currents and Sea Surface Temperatures. They will create a chart and record observations. Students will record data on uneven air and water temperatures across the globe. Students use ideas from the Generation Genius video to support	4 days

		the development of models to explain how variations in temperature and salinity form ocean currents which impact the weather and climate of particular regions.	

Teacher Notes:

Additional Resources: Generation Genius, Flocabulary, Mystery Science, IXL Science, Teachers Pay Teachers

Differentiation/Modification Strategies

Students with Disabilities	**English Language Learners**
● Consult student IEP ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions, and permit drawing, as an explanation ● Accept participation at any level ● Consult with Case Managers and follow IEP accommodations/modifications	● Consult student ELL Plan ● Assign a buddy, same language or English speaking ● Allow errors in speaking ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level, even one word
Gifted & Talented Students	**Students at Risk**
● Consult with G and T teacher ● Provide extension activities ● Build on students' intrinsic motivations ● Consult with parents to accommodate students' interests in completing tasks at their level of engagement	● Consult with I &RS as needed ● Provide extended time to complete tasks ● Consult with Guidance Counselors and follow I&RS procedures/action plan ● Consult with classroom teacher(s) for specific behavior interventions ● Provide rewards as necessary
504 Students	**Other:**
● Consult 504 Plan and follow accommodations/modifications ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level	

UNIT #2

Overview

Content Area: Science

Unit Title: Growth, Development, and Reproduction of Organisms

Grade Level(s): 6

Core Ideas: Students use data and conceptual models to understand how the environment and genetic factors determine the growth of an individual organism. They connect this idea to the role of animal behaviors in animal reproduction and to the dependence of some plants on animal behaviors for their reproduction. Students provide evidence to support their understanding of the structures and behaviors that increase the likelihood of successful reproduction by organisms. The crosscutting concepts of cause and effect and structure and function provide a framework for understanding the disciplinary core ideas. Students demonstrate grade-appropriate proficiency in analyzing and interpreting data, using models, conducting investigations, and communicating information. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Standards (Content and Technology)

CPI#:	Statement:
Performance Expectations (NJSLS)	
MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
Career Readiness (9.2) Life Literacies, and Key Skills (standard 9.1, 9.4)	
9.2.8.CAP.16	Research different ways workers/ employees improve their earning power through education and the acquisition of new knowledge and skills.
9.4.8.CI.2	Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).
Technology Literacy (9.4)/ Computer Science and Design Thinking (standard 8)	
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.3	Select appropriate tools to organize and present information digitally.
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
Interdisciplinary Connection	
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
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).
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
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.
Companion Standards ELA/L (S.S and Science grades 6-12 only, all other subjects delete rows)	
NJSLSA.W6	Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
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.

Cross-cultural Statements/Mandates (*Amistad, Holocaust, LGBT/Disabilities, SEL, etc...)*

Amistad Mandate: References to this mandate are made by studying Herman Branson. He was an African American geneticist. His research was pivotal for understanding the biochemical roles of proteins and deciphering the structure of DNA.

Unit Essential Question(s):	Enduring Understandings/Disciplinary Core Ideas:

• How do characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively? • How do environmental and genetic factors influence the growth of organisms? **Science and Engineering Practices:** • Develop and use a model to describe phenomena. (MS-LS3-1), (MS-LS3-2) **Crosscutting Concepts:** • Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1)	• Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. • There are a variety of ways that plants reproduce. • Specialized structures for plants affect their probability of successful reproduction. • Some characteristic animal behaviors affect the probability of successful reproduction in plants. • Animals engage in characteristic behaviors that affect the probability of successful reproduction. • There are a variety of characteristic animal behaviors that affect their probability of successful reproduction. • There are a variety of animal behaviors that attract a mate. • Successful reproduction of animals and plants may have more than one cause, and some cause-and-effect relationships in systems can only be described using probability. • Genetic factors as well as local conditions affect the growth of organisms. • A variety of local environmental conditions affect the growth of organisms. • Genetic factors affect the growth of organisms (plant and animal). • The factors that influence the growth of organisms may have more than one cause. • Some cause-and-effect relationships in plant and animal systems can only be described using probability.

Evidence of Learning

Formative Assessments: Exit tickets, entrance tickets, teacher observations

Summative/Benchmark Assessment(s): tests, labs

- Use empirical evidence from experiments and other scientific reasoning to support oral and written arguments that explain the relationship among plant structure, animal behavior, and the reproductive success of plants.
- Use evidence from experiments and other scientific reasoning to support oral and written explanations of how environmental and genetic factors influence the growth of organisms.

Alternative Assessments:

- Modified versions of formative and summative assessments, project-based assessments, and oral assessments

Resources/Materials:	**Key Vocabulary:**
Interactive websites, Smart Board, Google Classroom (Slides, Forms)	Asexual reproduction, sexual reproduction, chromosone, fertalization, gene, allele, dominant allele, recessive allele, punnett square, geneticist, organism, ecosystem, environmental factors, genetic factors, invasive species

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Animal and Plant Reproduction	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	Discuss two types of reproduction: asexual and sexual. Students take note on genes, including punnett square example. Read about probability of traits and	10 days

		DNA and complete genetics worksheet. Reproduction of Living Things Activity: students analyze and interpret data to present an argument that explains why there is such dramatic color variation among male guppies in the same stream. Reproduction of Living Things Activity: clone a vegetable (i.e. lettuce) from the stem.	
Growth of Organisms	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	Read and take notes on environmental factors, genetic factors, food webs, and invasive species that affect competition for resources. Discuss the many careers that study populations of living things. Students will engage in an investigation to figure out and explain ecosystem interactions. Watch Ducks, Seagulls, and Fish Fighting Over Food video and discuss. Students will then work in small groups to make a food web using as many organisms as they can. Complete a gallery walk among groups.	5 days

Teacher Notes:

Additional Resources: Generation Genius, Flocabulary, Mystery Science, IXL Science, Teachers Pay Teachers
Concord Consortium: Virtual Simulations http://concord.org/

Differentiation/Modification Strategies

Students with Disabilities	**English Language Learners**
● Consult student IEP ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions, and permit drawing, as an explanation ● Accept participation at any level ● Consult with Case Managers and follow IEP accommodations/modifications	● Consult student ELL Plan ● Assign a buddy, same language or English speaking ● Allow errors in speaking ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level, even one word
Gifted & Talented Students	**Students at Risk**
● Consult with G and T teacher ● Provide extension activities ● Build on students' intrinsic motivations ● Consult with parents to accommodate students' interests in completing tasks at their level of engagement	● Consult with I &RS as needed ● Provide extended time to complete tasks ● Consult with Guidance Counselors and follow I&RS procedures/action plan ● Consult with classroom teacher(s) for specific behavior interventions ● Provide rewards as necessary
504 Students	**Other:**

● Consult 504 Plan and follow accommodations/modifications ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level	

UNIT #3

Overview

Content Area: Science

Unit Title: Matter and Energy in Organisms and Ecosystems

Grade Level(s): 6

Core Ideas: Students analyze and interpret data, develop models, construct arguments, and demonstrate a deeper understanding of the cycling of matter, the flow of energy, and resources in ecosystems. They are able to study patterns of interactions among organisms within an ecosystem. They consider biotic and abiotic factors in an ecosystem and the effects these factors have on populations. They also understand that the limits of resources influence the growth of organisms and populations, which may result in competition for those limited resources. The crosscutting concepts of matter and energy, systems and system models, patterns, and cause and effect provide a framework for understanding the disciplinary core ideas. Students demonstrate grade-appropriate proficiency in analyzing and interpreting data, developing models, and constructing arguments. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Standards (Content and Technology)

CPI#:	Statement:
Performance Expectations (NJSLS)	
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.
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
Career Readiness (9.2) Life Literacies, and Key Skills (standard 9.1, 9.4)	
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.
Technology Literacy (9.4)/ Computer Science and Design Thinking (standard 8)	
9.4.8.TL.6	Collaborate to develop and publish work that provides perspectives on a real-world problem.
9.4.8.TL.3	Select appropriate tools to organize and present information digitally.
Interdisciplinary Connection	
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
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).
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
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.
Companion Standards ELA/L	
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.

Cross-cultural Statements/Mandates (*Amistad, Holocaust, LGBT/Disabilities, SEL, etc...)*

Amistad Mandate: References to this mandate are made by studying George Washington Carver. He made contributions to the field of agriculture and is best known forcoming up with over 100 uses for the peanut, showing the effects of resource availability for populations in the south.

Unit Essential Question(s):	Enduring Understandings/ Disciplinary Core Ideas:
● How do changes in the availability of matter and energy affect populations in an ecosystem?	

- How do relationships among organisms in an ecosystem, effect populations?
- How can you explain the stability of an ecosystem by tracing the flow of matter and energy?

Science and Engineering Practices:

- Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4)
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5)

Crosscutting Concepts:

- Small changes in one part of a system might cause large changes in another part. (MS-LS2-4), (MS-LS2-5)
- The use 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-LS2-5)
- Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS2-5)

- Organisms and populations of organisms are dependent on their environmental interactions with other living things.
- Organisms and populations of organisms are dependent on their environmental interactions with nonliving factors
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with others for limited resources.
- Access to food, water, oxygen, or other resources constrain organisms' growth and reproduction.
- Predatory interactions may reduce the number of organisms or eliminate whole populations of organisms.
- Mutually beneficial interactions may become so interdependent that each organism requires the other for survival.
- The patterns of interactions of organisms with their environment, both its living and nonliving components, are shared.
- Interactions within ecosystems have patterns that can be used to identify cause-and-effect relationships.
- Patterns of interactions among organisms across multiple ecosystems can be predicted.
- Patterns of interactions can be used to make predictions about the relationships among and between organisms and abiotic components of Ecosystems.
- Food webs are models that demonstrate how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.
- Transfers of matter into and out of the physical environment occur at every level.
- Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments.
- Decomposers recycle nutrients from dead plant or animal matter back to the water in aquatic environments
- The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.
- The transfer of energy can be tracked as energy flows through an ecosystem.
- Science assumes that objects and events in ecosystems occur in consistent patterns that are understandable through measurement and observation.

Evidence of Learning

Formative Assessments: Exit tickets, entrance tickets, teacher observations

Summative/Benchmark Assessment(s): tests, labs

- Construct an explanation about interactions within ecosystems.

- Develop a model to describe the cycling of matter among living and nonliving parts of an ecosystem.
- Develop a model to describe the flow of energy among living and nonliving parts of the ecosystem. Track the transfer of energy as energy flows through an ecosystem.

Alternative Assessments: Modified versions of formative and summative assessments, project-based assessments, and oral assessments

Resources/Materials:	**Key Vocabulary:**
Interactive websites, Smart Board, Google Classroom (Slides, Forms)	resources, organism, environment, environmental factors, symbiosis, predation, competition, food web, predatory, mutualistic, parasitic, commensalistic, producer, consumer, decomposer, food chain, food web, photosynthesis

Suggested Pacing Guide

Lesson Name/Topic	**Student Learning Objective(s)**	**Suggested Tasks/Activities:**	**Day(s) to Complete**
Resource Availability	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	Competition in Eosystems - Students participate in class discussion and an investigation about the interactions of an ecosystem, including competition for the same resources. Students watch a video to gather more information on ecosystem interactions. After the video, have students create a poster explaining some of the interactions they figured out during the discussion, the investigation, and the video. Some explanations that could be included are the following: • Food web interactions • Competition interactions (from the investigation) • Changes in interactions because of environmental factors (e.g., drought, fire, invasive species) *Include qualitative or quantitative relationships between variables as part of explanations about interactions within ecosystems.	8 days
Organism Interactions	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	Symbiosis Lesson: In groups, students are provided a food web and short reading with information about interactions within a particular ecosystem. Students record relationship interactions on an organizer to describe patterns within that ecosystem. Student groups share their findings about patterns of interactions in six different ecosystems and conclude that although the species varied, the same patterns of interactions can be found in each ecosystem. Students identify these interactions as	9 days

		predatory, mutualistic, parasitic, commensalistic, and/or competitive. *Make predictions about the impact within and across ecosystems of competitive, predatory, or mutually beneficial relationships as abiotic (e.g., floods, habitat loss) or biotic (e.g., predation) components change.	
Flow of Energy	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	Read About Food Webs: Cycling of Matter and Flow of Energy. Complete read aloud as a whole group and have studnets take notes. Food Webs Lesson: Students will develop a visual model that illustrates the energy flow through an ecosystem. As students create their models of food chains, they will draw arrows to indicate the flow of energy and cycling of matter.	8 days

Teacher Notes:

Additional Resources: Generation Genius, Flocabulary, Mystery Science, IXL Science, Teachers Pay Teachers
Modeling Marine Food Webs and Human Impact

Differentiation/Modification Strategies

Students with Disabilities	**English Language Learners**
● Consult student IEP ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions, and permit drawing, as an explanation ● Accept participation at any level ● Consult with Case Managers and follow IEP accommodations/modifications	● Consult student ELL Plan ● Assign a buddy, same language or English speaking ● Allow errors in speaking ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level, even one word
Gifted & Talented Students	**Students at Risk**
● Consult with G and T teacher ● Provide extension activities ● Build on students' intrinsic motivations ● Consult with parents to accommodate students' interests in completing tasks at their level of engagement	● Consult with I &RS as needed ● Provide extended time to complete tasks ● Consult with Guidance Counselors and follow I&RS procedures/action plan ● Consult with classroom teacher(s) for specific behavior interventions ● Provide rewards as necessary
504 Students	**Other:**
● Consult 504 Plan and follow accommodations/modifications ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level	

UNIT #4

Overview

Content Area: Science

Unit Title: Interdependent Relationships in Ecosystems

Grade Level(s): 6

Core Ideas: Students build on their understandings of the transfer of matter and energy as they study patterns of interactions among organisms within an ecosystem. They consider biotic and abiotic factors in an ecosystem and the effects these factors have on a population. They construct explanations for the interactions in ecosystems and the scientific, economic, political, and social justifications used in making decisions about maintaining biodiversity in ecosystems. The crosscutting concept of stability and change provide a framework for understanding the disciplinary core ideas. This unit includes a two-stage engineering design process. Students first evaluate different engineering ideas that have been proposed using a systematic method, such as a tradeoff matrix, to determine which solutions are most promising. They then test different solutions, and combine the best ideas into a new solution that may be better than any of the preliminary ideas. Students demonstrate grade appropriate proficiency in asking questions, designing solutions, engaging in argument from evidence, developing and using models, and designing solutions. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Standards (Content and Technology)

CPI#:	Statement:
Performance Expectations (NJSLS)	
MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
MS-LS2-5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
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-ETS1-3	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.
Career Readiness (9.2) Life Literacies, and Key Skills (standard 9.1, 9.4)	
9.2.8.CAP.3	Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
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.
Technology Literacy (9.4)/ Computer Science and Design Thinking (standard 8)	
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
Interdisciplinary Connection	
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
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).
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
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.
Companion Standards ELA/L (S.S and Science grades 6-12 only, all other subjects delete rows)	
WHST.6-8.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

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.

Cross-cultural Statements/Mandates (*Amistad, Holocaust, LGBT/Disabilities, SEL, etc...)*

LGBT Mandate: References to this mandate are made by studying Walter Westman, who made an impact on ecology and public policy. His work includes the effects of fire and air pollution on vegetation, which is connected to the changes in an ecosystem and the effects on survival of organisms.

Unit Essential Question(s):

- How can a single change to an ecosystem disrupt the whole system?
- What limits the number and variety of living things in an ecosystem?

Science and Engineering Practices:

- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5)

Crosscutting Concepts:

- Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS2-5)

Enduring Understandings/ Disciplinary Core Ideas:

- Ecosystems are dynamic in nature.
- The characteristics of ecosystems can vary over time.
- Disruptions to any physical or biological components of an ecosystem can lead to shifts in all the ecosystem's populations.
- Small changes in one part of an ecosystem might cause large changes in another part.
- Patterns in data about ecosystems can be recognized and used to make warranted inferences about changes in populations.
- Evaluating empirical evidence can be used to support arguments about changes to ecosystems.
- Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems.
- The completeness, or integrity, of an ecosystem's biodiversity is often used as a measure of its health.
- Changes in biodiversity can influence humans' resources, such as food, energy, and medicines.
- Changes in biodiversity can influence ecosystem services that humans rely on.
- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.
- A solution needs to be tested and then modified on the basis of the test results, in order to improve it.
- Models of all kinds are important for testing solutions.

Evidence of Learning

Formative Assessments: Exit tickets, entrance tickets, teacher observations

Summative/Benchmark Assessment(s): tests, labs

- Construct a convincing argument that supports or refutes claims for solutions about the natural and designed world(s).
- Create design criteria for design solutions for maintaining biodiversity and ecosystem services.

Alternative Assessments: Modified versions of formative and summative assessments, project-based assessments, and oral assessments

Resources/Materials:
Interactive websites, Smart Board, Google Classroom (Slides, Forms)

Key Vocabulary:
competition, resources, organism, environment, environmental factors, genetic factors, camouflage, ecosystem, invasive species, biodiversity, tide pools, pollutant, extinct

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Changes in Ecosystems	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. 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.	Watch Competition in Ecosystems video (Generation Genius) Construct an argument to support or refute an explanation for the changes to populations in an ecosystem caused by disruptions to a physical or biological component of that ecosystem. Empirical evidence and scientific reasoning must support the argument. Use scientific rules for obtaining and evaluating empirical evidence. Recognize patterns in data and make warranted inferences about changes in populations.	13 days
Maintaining Biodiversity	Evaluate competing design solutions for maintaining biodiversity and ecosystem services. 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.	Read about Maintaining Biodiversity, ecosystems, and how national parks help protect biodiversity. Mini Lab: Food Web Model - make a food web out of labeled cups and see what happens when one living thing is removed. Watch video on ecosystems and biodiversity. Students design a pollinator garden to attract more pollinators to the area, help reduce pollinator population decline, and increase biodiversity. Students will engage in an activity during which they research data to create a solution to a problem concerning biodiversity and ecosystem health. -Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. -Create design criteria for design solutions for maintaining biodiversity and ecosystem services.	12 days

Teacher Notes:

Additional Resources: Generation Genius, Flocabulary, Mystery Science, IXL Science, Teachers Pay Teachers
Exploring the "Systems" in Ecosystems
Flow of Matter and Energy in Ecosystems SciPack

Differentiation/Modification Strategies	
Students with Disabilities	**English Language Learners**

• Consult student IEP • Allow errors • Rephrase questions, directions, and explanations • Allow extended time to answer questions, and permit drawing, as an explanation • Accept participation at any level • Consult with Case Managers and follow IEP accommodations/modifications	• Consult student ELL Plan • Assign a buddy, same language or English speaking • Allow errors in speaking • Rephrase questions, directions, and explanations • Allow extended time to answer questions • Accept participation at any level, even one word
Gifted & Talented Students	**Students at Risk**
• Consult with G and T teacher • Provide extension activities • Build on students' intrinsic motivations • Consult with parents to accommodate students' interests in completing tasks at their level of engagement	• Consult with I &RS as needed • Provide extended time to complete tasks • Consult with Guidance Counselors and follow I&RS procedures/action plan • Consult with classroom teacher(s) for specific behavior interventions • Provide rewards as necessary
504 Students	**Other:**
• Consult 504 Plan and follow accommodations/modifications • Allow errors • Rephrase questions, directions, and explanations • Allow extended time to answer questions • Accept participation at any level	

UNIT #5

Overview

Content Area: Science

Unit Title: Forces and Motion

Grade Level(s): 6

Core Ideas: Students use system and system models and stability and change to understanding ideas related to why some objects will keep moving and why objects fall to the ground. Students apply Newton's third law of motion to related forces to explain the motion of objects. Students also apply an engineering practice and concept to solve a problem caused when objects collide. The crosscutting concepts of system and system models and stability and change provide a framework for understanding the disciplinary core ideas. Students demonstrate proficiency in asking questions, planning and carrying out investigations, designing solutions, engaging in argument from evidence, developing and using models, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Standards (Content and Technology)

CPI#:	Statement:
Performance Expectations (NJSLS)	
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-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.
Career Readiness (9.2) Life Literacies, and Key Skills (standard 9.1, 9.4)	
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.10	Evaluate how careers have evolved regionally, nationally, and globally.
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).
Technology Literacy (9.4)/ Computer Science and Design Thinking (standard 8)	
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
Interdisciplinary Connection	
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
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).
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.
6.SP.B.5	Summarize numerical data sets in relation to their context.

6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in realworld contexts, explaining the meaning of 0 in each situation. (MS-PS2-1)
Companion Standards ELA/L (S.S and Science grades 6-12 only, all other subjects delete rows)	
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.

Cross-cultural Statements/Mandates (*Amistad, Holocaust, LGBT/Disabilities, SEL, etc...)*

Amistad Mandate: References to this mandate are made by studying Arlie Petters, a founder of mathematical astronomy. His research explores how gravity acts on light.

Unit Essential Question(s):

- How can we predict the motion of an object?

Science and Engineering Practices:

- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. (MS-PS3-4)

Crosscutting Concepts:

- Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. (MS-PS3-1), (MS-PS3-4)

Enduring Understandings/ Disciplinary Core Ideas:

- 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).
- Models can be used to represent the motion of objects in colliding systems and their interactions, such as inputs, processes, and outputs, as well as energy and matter flows within systems.
- 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.
- 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.
- The change in an object's motion depends on balanced (Newton's first law) and unbalanced forces in a system 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 includes qualitative comparisons of forces, mass, and changes in motion (Newton's second law); frame of reference; and specification of units
- 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.

Evidence of Learning

Formative Assessments: Exit tickets, entrance tickets, teacher observations

Summative/Benchmark Assessment(s): Forces and Motion Test, Newton's Laws Lab

- Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
- 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.

Alternative Assessments: Modified versions of formative and summative assessments, project-based assessments, and oral assessments

Resources/Materials:	**Key Vocabulary:**

Interactive websites, Smart Board, Google Classroom (Slides, Forms)	force, Newton, net force, inertia, Newton's First Law of Motion, Newton's Second Law of Motion, Newton's Third Law of Motion

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Nature of Force	Identify how forces are described and explain how forces affect motion.	Read and complete notes on forces Mini lab on unbalanced forces	5 days
Newton's Laws	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	Read about Newton's first, second, and third laws of motion. Complete notes on Newton's Laws. Discuss careers that use Newton's Laws of Motion. Newton's Laws Lab: 6 labs incorporated into one, 2 lab stations for each law (wacky washers, dominos, lego car, ball acceleration, balloon rocket, match rocket)	15 days
Change in an Object's Motion	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 mass of the object.	Film Canister Rocket Launch: students will launch film canister rockets across the floor and collect date on distance traveled. Students will then investigate the impact of the rocket colliding with a cardboard wall. They will add design elements to their rocket to lessen the impact. Students will use the film canister rocket launch to explain all 3 of Newton's Laws of Motion and to compare what happens when two rockets of varying mass.	10 days
Design, Evaluate, and Testing Solutions	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. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem 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.	Newton's Laws Lab: 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.	*incorporated in the days above

Teacher Notes:

Additional Resources: Generation Genius, Flocabulary, Mystery Science, IXL Science, Teachers Pay Teachers

Differentiation/Modification Strategies	
Students with Disabilities	**English Language Learners**
● Consult student IEP ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions, and permit drawing, as an explanation ● Accept participation at any level ● Consult with Case Managers and follow IEP accommodations/modifications	● Consult student ELL Plan ● Assign a buddy, same language or English speaking ● Allow errors in speaking ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level, even one word
Gifted & Talented Students	**Students at Risk**
● Consult with G and T teacher ● Provide extension activities ● Build on students' intrinsic motivations ● Consult with parents to accommodate students' interests in completing tasks at their level of engagement	● Consult with I &RS as needed ● Provide extended time to complete tasks ● Consult with Guidance Counselors and follow I&RS procedures/action plan ● Consult with classroom teacher(s) for specific behavior interventions ● Provide rewards as necessary
504 Students	**Other:**
● Consult 504 Plan and follow accommodations/modifications ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level	

UNIT #6

Overview

Content Area: Science

Unit Title: Types of Interactions

Grade Level(s): 6

Core Ideas: Students use cause and effect; system and system models; and stability and change to understand ideas that explain why some materials are attracted to each other while others are not. Students apply ideas about gravitational, electrical, and magnetic forces to explain a variety of phenomena including beginning ideas about why some materials attract each other while others repel. In particular, students develop understandings that gravitational interactions are always attractive but that electrical and magnetic forces can be both attractive and negative. Students also develop ideas that objects can exert forces on each other even though the objects are not in contact, through fields. Students are expected to consider the influence of science, engineering, and technology on society and the natural world. Students are expected to demonstrate proficiency in asking questions, planning and carrying out investigations, designing solutions, and engaging in argument. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Standards (Content and Technology)

CPI#:	Statement:
Performance Expectations (NJSLS)	
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.
Career Readiness (9.2) Life Literacies, and Key Skills (standard 9.1, 9.4)	
9.2.8.CAP.16	Research different ways workers/ employees improve their earning power through education and the acquisition of new knowledge and skills.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.
Technology Literacy (9.4)/ Computer Science and Design Thinking (standard 8)	
9.4.8.TL.1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
8.1.8.DA.3	Identify the appropriate tool to access data based on its file format.
Interdisciplinary Connection	
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
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).
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
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.
WHST.6-8.1	Write arguments focused on discipline-specific content.
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.
MP.2	Reason abstractly and quantitatively.
Companion Standards ELA/L (S.S and Science grades 6-12 only, all other subjects delete rows)	
WHST.6-8.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
Cross-cultural Statements/Mandates (*Amistad, Holocaust, LGBT/Disabilities, SEL, etc...*)	

Amistad Mandate: References to this mandate are made by studying Warren Henry. Henry made contributions to the field of magnetism and is regnozied as one of the most eminent African American scientists in our nation's history.

Unit Essential Question(s):

- Is it possible to exert on an object without touching it?
- What factors affect the strength of electric and magnetic forces?

Science and Engineering Practices:

- Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. (MS-PS2-3

Crosscutting Concepts:

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS2-3), (MS-PS2-5)

Enduring Understandings/ Disciplinary Core Ideas:

- Fields exist between objects that exert forces on each other even though the objects are not in contact.
- The interactions of magnets, electrically charged strips of tape, and electrically charged pith balls are examples of fields that exist between objects exerting forces on each other, even though the objects are not in contact.
- Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object or a ball, respectively).
- Devices that use electric and magnetic forces could include electromagnets, electric motors, and generators.
- Electric and magnetic (electromagnetic) forces can be attractive or repulsive.
- The size of an electric or magnetic (electromagnetic) force depends on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects.
- Cause-and-effect relationships may be used to predict the factors that affect the strength of electrical and magnetic forces in natural or designed systems
- Gravitational interactions are always attractive and depend on the masses of interacting objects.
- 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.
- Evidence supporting the claim that gravitational interactions are attractive and depend on the masses of interacting objects could include data generated from simulations or digital tools and charts displaying mass, strength of interaction, distance from the sun, and orbital periods of objects within the solar system.
- 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.

Evidence of Learning

Formative Assessments: Exit tickets, entrance tickets, teacher observations

Summative/Benchmark Assessment(s): tests and labs

- 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.
- Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
- Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

Alternative Assessments: Modified versions of formative and summative assessments, project-based assessments, and oral assessments

Resources/Materials:	**Key Vocabulary:**
Interactive websites, Smart Board, Google Classroom (Slides, Forms)	field, force, magnet, magnetic field, magnetic poles, electric field, electric charge, electrons, electromagnet, gravity, mass, resistance, acceleration, Newton's law of universal gravitation, series circuit, parallel circuit

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Electric and Magnetic Forces	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.	Read, take notes, and complete worksheet on lessons 1-3 for this unit: electric charges and electric forces, electric current and electric forces, magnetism. Investigation: students will determine how changing different parts of an electromagnet affects the magnetic strength. Lab: Electric forces and magnetism (6 stations)	16 days
Gravitational Interactions & Noncontact forces	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	Read about and take notes on gravitation force, the relationship between mass and gravity, the relationship between mass and weight. Lab: students design a parachute to land an egg. Students will have to make decisions about the size of the parachute and compare itw ith the size of the object being dropped.	14 days

Teacher Notes:

Additional Resources: Generation Genius, Flocabulary, Mystery Science, IXL Science, Teachers Pay Teachers

Differentiation/Modification Strategies

Students with Disabilities	**English Language Learners**
● Consult student IEP ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions, and permit drawing, as an explanation ● Accept participation at any level ● Consult with Case Managers and follow IEP accommodations/modifications	● Consult student ELL Plan ● Assign a buddy, same language or English speaking ● Allow errors in speaking ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level, even one word
Gifted & Talented Students	**Students at Risk**
● Consult with G and T teacher ● Provide extension activities ● Build on students' intrinsic motivations ● Consult with parents to accommodate students' interests in completing tasks at their level of engagement	● Consult with I &RS as needed ● Provide extended time to complete tasks ● Consult with Guidance Counselors and follow I&RS procedures/action plan ● Consult with classroom teacher(s) for specific behavior interventions

	● Provide rewards as necessary
504 Students	**Other:**
● Consult 504 Plan and follow accommodations/modifications ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level	

UNIT #7

Overview

Content Area: Science

Unit Title: Astronomy

Grade Level(s): 6

Core Ideas: This unit is broken down into three sub-ideas: the universe and its stars, Earth and the solar system, and the history of planet Earth. Students examine the Earth's place in relation to the solar system, the Milky Way galaxy, and the universe. There is a strong emphasis on a systems approach and using models of the solar system to explain the cyclical patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain the data that support the theories explaining the formation and evolution of the universe. Students examine geosciences data in order to understand the processes and events in Earth's history. The crosscutting concepts of patterns, scale, proportion, and quantity and systems and systems models provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models and analyzing and interpreting data. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Standards (Content and Technology)

CPI#:	Statement:
Performance Expectations (NJSLS)	
MS-ESS1-1	Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
MS-ESS1-2	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
Career Readiness (9.2) Life Literacies, and Key Skills (standard 9.1, 9.4)	
9.2.8.CAP.10	Evaluate how careers have evolved regionally, nationally, and globally.
9.4.8.CI.3	Examine challenges that may exist in the adoption of new ideas.
9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.
Technology Literacy (9.4)/ Computer Science and Design Thinking (standard 8)	
8.1.8.CS.1	Recommend improvements to computing devices in order to improve the ways users interact with the devices.
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
Interdisciplinary Connection	
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
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).
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
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.
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS1-1), (MS-ESS1-2)
6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
Companion Standards ELA/L (S.S and Science grades 6-12 only, all other subjects delete rows)	
NJSLSA.W8	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

Cross-cultural Statements/Mandates (*Amistad, Holocaust, LGBT/Disabilities, SEL, etc...)*

Disabilities Mandate: References to this mandate are made by studying Stephen Hawking. Hawking made contributions to the understanding of gravity and black holes.

Amistad Mandate: References to this mandate are made by studying Neil Degrasse Tyson. One of Tyson's major contributions to science includes the demotion of Pluto to a dwarf planet.

Unit Essential Question(s):	Enduring Understandings/ Disciplinary Core Ideas:

• What pattern in the Earth–sun–moon system can be used to explain lunar phases, eclipses of the sun and moon, and seasons? • What is the role of gravity in the motions within galaxies and the solar system? • What are the scale properties of objects in the solar system? **Science and Engineering Practices:** • Develop and use a model to describe phenomena. (MS-ESS1- 1), (MS-ESS1-2) **Crosscutting Concepts:** • Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3), (MSESS1-4)	• Patterns in the apparent motion of the sun, moon, and stars in the sky can be observed, described, predicted, and explained with models. • The Earth and solar system model of the solar system can explain eclipses of the sun and the moon. • Earth's spin axis is fixed in direction over the short term but tilted relative to its orbit around the sun. • The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. • Patterns can be used to identify cause-and-effect relationships that exist in the apparent motion of the sun, moon, and stars in the sky. • Science assumes that objects and events in the solar system systems occur in consistent patterns that are understandable through measurement and observation. • Gravity plays a role in the motions within galaxies and the solar system. • Gravity is the force that holds together the solar system and the Milky Way galaxy and controls orbital motions within them. • Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. • The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids, that are held in orbit around the sun by its gravitational pull on them. • The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. • Models can be used to represent the role of gravity in the motions and interactions within galaxies and the solar system. • Science assumes that objects and events in the solar systems occur in consistent patterns that are understandable through measurement and observation. • Objects in the solar system have scale properties. • Data from Earth-based instruments, space-based telescopes, and spacecraft can be used to determine similarities and differences among solar system objects. • The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. • Time, space, and energy phenomena in the solar system can be observed at various scales, using models to study systems that are too large. • Engineering advances have led to important discoveries in space science, and scientific discoveries have led to the development of entire industries and engineered systems.

Evidence of Learning

Formative Assessments: Exit tickets, entrance tickets, teacher observations

Summative/Benchmark Assessment(s): tests and labs

- Generate and analyze evidence (through simulations or long term investigations) to explain why the Sun's apparent motion across the sky changes over the course of a year.
- Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
- Develop and use a model that shows how gravity causes smaller objects to orbit around larger objects at increasing scales, including the gravitational force of the sun causes the planets and other bodies to orbit around it holding together the solar system.
- Analyze and interpret data to determine scale properties of objects in the solar system.
- Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

Alternative Assessments: Modified versions of formative and summative assessments, project-based assessments, and oral assessments

Resources/Materials:	**Key Vocabulary:**
Interactive websites, Smart Board, Google Classroom (Slides, Forms)	eclipse, solar eclipse, lunar eclipse, total eclipse, partial eclipse, atmosphere, earth's axis, earth's orbit, solar system, planet, orbit, gravity, asteroid belt, galaxy, universe

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Sun Motion	Generate and analyze evidence (through simulations or long term investigations) to explain why the Sun's apparent motion across the sky changes over the course of a year.	Discuss, take notes, and watch simulation videos on the sun's motion.	4 days
Cyclic Patterns	Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.	Watch two video that provide a view of Earth from space during the July 2, 2019 solar eclipse. Students will observe and share observations with class. Students use foam balls to create a model of the Earth-Sun-Moon system and use the model to explain the pattern of shadows observed during the July 2, 2019 solar eclipse. They then represent the model on paper.	6 days
Gravity in the Solar System	Develop and use a model that shows how gravity causes smaller objects to orbit around larger objects at increasing scales, including the gravitational force of the sun causes the planets and other bodies to orbit around it holding together the solar system.	Students will read and take notes on the gravity in our solar system and the size and order of the planets. Gravity in Space mini lab	5 days
Scale in Solar System	Analyze and interpret data to determine scale properties of objects in the solar system.	Mini-lab: convert distance of each planet in our solar system from the sun in inches. Students will then work in groups using popsicle sticks to map out the solar system on the field to the correct scale.	6 days

Motions of Galaxies	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	Read about and take notes on galaxies, both the Milky Way and other galaxies in the entire universe. Investigation: Watch NASA coverage of the Perseverance rover launch on July 30, 2020. The travel time is 203 days. Have students work in groups to figure out how many days it would take to get to othe planets if a similar spacecraft traveling at the same speed launched from Earth.	4 days

Teacher Notes:

Additional Resources: Generation Genius, Flocabulary, Mystery Science, IXL Science, Teachers Pay Teachers

Differentiation/Modification Strategies

Students with Disabilities	**English Language Learners**
● Consult student IEP ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions, and permit drawing, as an explanation ● Accept participation at any level ● Consult with Case Managers and follow IEP accommodations/modifications	● Consult student ELL Plan ● Assign a buddy, same language or English speaking ● Allow errors in speaking ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level, even one word
Gifted & Talented Students	**Students at Risk**
● Consult with G and T teacher ● Provide extension activities ● Build on students' intrinsic motivations ● Consult with parents to accommodate students' interests in completing tasks at their level of engagement	● Consult with I &RS as needed ● Provide extended time to complete tasks ● Consult with Guidance Counselors and follow I&RS procedures/action plan ● Consult with classroom teacher(s) for specific behavior interventions ● Provide rewards as necessary
504 Students	**Other:**
● Consult 504 Plan and follow accommodations/modifications ● Allow errors ● Rephrase questions, directions, and explanations ● Allow extended time to answer questions ● Accept participation at any level	