Hainesport Township School District
211 Broad Street Hainesport, NJ 08036

Course Title: Science Grade: 6
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Introduction 2020 New Jersey Student Learning Standards

Science Introduction Science Scientific and technological advances have proliferated and now permeate most aspects of life in the 21st century. It is increasingly important that all members of our society develop an understanding of scientific and engineering concepts and processes. Learning how to construct scientific explanations and how to design evidence-based solutions provides students with tools to think critically about personal and societal issues and needs. Students can then contribute meaningfully to decision-making processes, such as discussions about climate change, new approaches to health care, and innovative solutions to local and global problems.

Mission

Mission All students will possess an understanding of scientific concepts and processes required for personal decision making, participation in civic life, and preparation for careers in STEM fields (for those that chose).

Vision

Prepare students to become scientifically literate individuals who can effectively:

- Apply scientific thinking, skills, and understanding to real-world phenomena and problems;
- Engage in systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned;
- Conduct investigations, solve problems, and engage in discussions;
- Discuss open-ended questions that focus on the strength of the evidence used to generate claims;

• Read and evaluate multiple sources, including science-related magazine and journal articles and web-based resources to gain knowledge about current and past science problems and solutions and develop well reasoned claims; and
• Communicate ideas through journal articles, reports, posters, and media presentations that explain and argue.

Spirit and Intent The New Jersey Student Learning Standards for Science (NJSLS-S)

Describe the expectations for what students should know and be able to do as well as promote three-dimensional science instruction across the three science domains (i.e., physical sciences, life science, earth and space sciences). From the earliest grades, the expectation is that students will engage in learning experiences that enable them to investigate phenomena, design solutions to problems, make sense of evidence to construct arguments, and critique and discuss those arguments (in appropriate ways relative to their grade level). The foundation of the NJSLS-S reflects three dimensions — science and engineering practices, disciplinary core ideas, and crosscutting concepts. The performance expectations are derived from the interplay of these three dimensions. It is essential that these three components are integrated into all learning experiences. Within each standard document, the three dimensions are intentionally presented as integrated components to foster sensemaking and designing solutions to problems. Because the NJSLS-S is built on the notions of coherence and contextuality, each of the science and engineering practices and crosscutting concepts appear multiple times across New Jersey Department of Education June 2020 1 topics and at every grade level. Additionally, the three dimensions should be an integral part of every curriculum unit and should not be taught in isolation.

Course Description and Concepts

Grade 6 Science is a hands-on inquiry based course in which students investigate topics related to life science, physics, chemistry and earth/space science. The course will help students to understand some of the basic principles of life science and acquire useful science and laboratory skills helping them to develop and design models to explain phenomenon. A student's ability to understand the discoveries of science rests in their ability to relate those ideas to the real world. Topics of study are to include: forces and motion, biodiversity and humans, chemical reactions and energy, structure and function, information processing, thermal energy, types of interactions and electromagnetic radiation.

New Jersey Student Learning Standards The Next Generation Science Standards

MS-PS1-3 Evidence Statements	MS-LS1-1 Evidence Statements	MS-LS1-2 Evidence Statements	MS-LS1-3 Evidence Statements
MS-LS1-4 Evidence Statements	MS-LS1-5 Evidence Statements	MS-LS1-6 Evidence Statements	MS-LS1-7 Evidence Statements
MS-LS1-8 Evidence Statements	MS-LS3-1 Evidence Statements	MS-LS3-2 Evidence Statements	MS-LS4-3 Evidence Statements
MS-LS4-4 Evidence Statements	MS-LS4-5 Evidence Statements	MS-LS4-6 Evidence Statements	MS-ESS3-3 Evidence Statements
MS-ESS3-4 Evidence Statements	MS-ESS3-5 Evidence Statements	MS-ETS1-1 Evidence Statements	MS-ETS1-2 Evidence Statements
MS-ETS1-3 Evidence Statements	MS-ETS1-4 Evidence Statements	**Next Generation Science Standards For Teachers** https://www.nextgenscience.org/teachers	

New Jersey Student Learning Standards for English Language Arts Companion Standards Grades 6-8 Progress Indicators Reading Science and Technical Subjects

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. Craft and Structure	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.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.	RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. Integration of Knowledge and Ideas

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. Range of Reading and Level of Text Complexity	RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

NJ Technology Standards

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

8.2 Technology Education, Engineering, Design and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.

CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Pacing Guide

Unit Topic	Unit #	APX Unit Length
Growth, Development, and Reproduction of Organisms	I	25 Days
Matter and Energy in Organisms and Ecosystems	II	25 Days
Interdependent Relationships in Ecosystems	III	25 Days
Forces and Motion	IV	25 Days
Types of Interactions	V	25 Days
Astronomy	VI	20 Days
Weather and Climate	VII	20 Days

Unit 1 (Growth, Development, and Reproduction of Organisms)	
Content Area	Science
Unit Title	Growth, Development, and Reproduction of Organisms
Grade Level	Grade 6
Recommended Pacing	APX: 25 Days
Unit Summary	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 understanding of the core ideas.
Interdisciplinary Connections	Primary Interdisciplinary Connections: ELA/Math
Career Readiness, Life Literacies, and Key Skills Addressed	***Creativity & Innovation:*** Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
Computer Science and Design Thinking	***Data & Analysis:*** Computer models can be used to simulate events, examine theories and inferences, or make predictions.
Supplemental Class Resources	GSuite for Education MosaMac Program NEWSELA MS -LS1 From Molecules to Organisms: Structures and Processes

Science Student Learning Objectives Covered in this Unit
● Use arguments 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. *[Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.]* (MS-LS1-4) ● Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. *[Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.] [Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical processes.]* (MS-LS1-5)
ELA Student Learning Objectives Covered in this Unit
● Cite specific, empirical, textual evidence to support analysis of how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively. ● Trace and evaluate the argument and specific claims in a text about how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively. Distinguish claims that are supported by empirical evidence and scientific reasoning from claims that are not. ● Write an argument focused on how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively.
Math Student Learning Objectives Covered in this Unit
● Understand that a set of data collected to answer a statistical question about how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively, has a distribution which can be described by its center (mean), spread (range), and overall shape (shape of the distribution of data).

● Summarize numerical data sets, collected to answer a statistical question about how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively, that have a distribution that can be described by its center (mean), spread (range), and overall shape (shape of the distribution of data) in relation to their context.
Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.) ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). ● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ● Use project-based science learning to connect science with observable phenomena. • Structure the learning around explaining or solving a social or community-based issue. ● Provide ELL students with multiple literacy strategies. ● Collaborate with after-school programs or clubs to extend learning opportunities ● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

Unit Sequence/Essential Question: Part A: : How do characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively?	
Concepts	**Formative Assessments**
● 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	● Students who understand the concepts are able to: ● Collect empirical evidence about animal behaviors that affect the animals' probability of successful reproduction and also affect the probability of plant reproduction.

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.	● Collect empirical evidence about plant structures that are specialized for reproductive success. ● 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. ● Identify and describe possible cause-and effect relationships affecting the reproductive success of plants and animals using probability. ● Support or refute an explanation of how characteristic animal behaviors and specialized plant structures affect the probability of successful plant reproduction using oral and written arguments.
Unit Sequence/Essential Question: Part B: How do environmental and genetic factors influence the growth of organisms?	
Concepts	**Formative Assessments**
● 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.	● Students who understand the concepts are able to: ● Conduct experiments, collect evidence, and analyze empirical data. ● 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. ● Identify and describe possible causes and effects of local environmental conditions on the growth of organisms. ● Identify and describe possible causes and effects of genetic conditions on the growth of organisms.

District/School Summative Assessment Plan
Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.

- Unit Test 1 Assessment (Growth, Development, and Reproduction of Organisms)
- Vocabulary Quiz 1/2/3
- Teacher constructed standards based quiz Part A, Part B, Part C
- Alternative Assessment Teacher Constructed 1

Unit 2 (Matter and Energy in Organisms and Ecosystems)	
Content Area	Science
Unit Title	Matter and Energy in Organisms and Ecosystems
Grade Level	Grade 7
Recommended Pacing	APX: 25 Days
Unit Summary	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 understanding of the core ideas.
Interdisciplinary Connections	Primary Interdisciplinary Connections: ELA/Math
Career Readiness, Life Literacies, and Key Skills Addressed	***Creativity & Innovation:*** Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.

Computer Science and Design Thinking	***Data & Analysis:*** Computer models can be used to simulate events, examine theories and inferences, or make predictions.
Supplemental Class Resources	GSuite for Education MosaMac Program NEWSELA MS -LS2 Ecosystems: Interactions, Energy, and Dynamics

Science Student Learning Objectives Covered in this Unit
• 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-LS2-1) • 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-LS2-2) • 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-LS2-3)
ELA Student Learning Objectives Covered in this Unit
• Cite specific, empirical, textual evidence to support analysis of how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively. • Trace and evaluate the argument and specific claims in a text about how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively. Distinguish claims that are supported by empirical evidence and scientific reasoning from claims that are not. • Write an argument focused on how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively.
Math Student Learning Objectives Covered in this Unit

● Understand that a set of data collected to answer a statistical question about how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively, has a distribution which can be described by its center (mean), spread (range), and overall shape (shape of the distribution of data). ● Summarize numerical data sets, collected to answer a statistical question about how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively, that have a distribution that can be described by its center (mean), spread (range), and overall shape (shape of the distribution of data) in relation to their context.
Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.) ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). ● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue. ● Provide ELL students with multiple literacy strategies. • Collaborate with after-school programs or clubs to extend learning opportunities. ● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

Unit Sequence/Essential Question: Part A: How do changes in the availability of matter and energy affect populations in an ecosystem?	
Concepts	**Formative Assessments**
● Organisms and populations of organisms are dependent on their environmental interactions with other living things. ● Organisms and populations of organisms are dependent on	● Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

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.	● Use cause-and-effect relationships to predict the effect of resource availability on organisms and populations in natural systems.
Unit Sequence/Essential Question: Part B: How do relationships among organisms, in an ecosystem, effect populations?	
Concepts	**Formative Assessments**
● 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.	● Construct an explanation about interactions within ecosystems. • Include qualitative or quantitative relationships between variables as part of explanations about interactions within ecosystems. ● 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.
Unit Sequence/Essential Question: Part C: : How can you explain the stability of an ecosystem by tracing the flow of matter and energy?	
Concepts	**Formative Assessments**
● Food webs are models that demonstrate how matter and energy are transferred among producers, consumers, and	● Develop a model to describe the cycling of matter among living and nonliving parts of an ecosystem.

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.	● 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. ● Observe and measure patterns of objects and events in ecosystems.

District/School Summative Assessment Plan
Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit. ● Unit Test Assessment (Matter and Energy in Organisms and Ecosystems) ● Vocabulary Quiz 1/2/3 ● Teacher constructed standards based quiz Part A, Part B, Part C ● Alternative Assessment Teacher Constructed 1

Unit 3 (Interdependent Relationships in Ecosystems)	
Content Area	Science
Unit Title	Interdependent Relationships in Ecosystems

Grade Level	Grade 7
Recommended Pacing	APX: 25 Days
Unit Summary	Students build on their understanding 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 understanding of the core ideas.
Interdisciplinary Connections	Primary Interdisciplinary Connections: ELA/Math
Career Readiness, Life Literacies, and Key Skills Addressed	***Creativity & Innovation:*** Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking. ***Critical Thinking and Problem-solving:*** Multiple solutions exist to solve a problem. • An essential aspect of problem solving is being able to self reflect on why possible solutions for solving problems were or were not successful.
Computer Science and Design Thinking	***Engineering and Design:*** Engineering design is a systematic, creative and iterative process used to address local and global problems. ***Engineering and Design:*** Engineering design requirements and specifications involve making trade-offs between competing requirements and desired design features.
Supplemental Class Resources	GSuite for Education MosaMac Program

	NEWSELA MS-ETS1 Engineering Design

Science Student Learning Objectives Covered in this Unit
● 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-LS2-4) ● Evaluate competing design solutions for maintaining biodiversity and ecosystem services. * *[Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]* (MS-LS2-5) ● 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-ETS1-1) ● 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-ETS1-3)
ELA Student Learning Objectives Covered in this Unit
● Distinguish among facts, reasoned judgment based on research findings, and speculation when reading text about maintaining biodiversity and ecosystem services. Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. ● Trace and evaluate the argument and specific claims in a text about maintaining biodiversity and ecosystem services, distinguishing claims that are supported by reasons and evidence from claims that are not. Trace and evaluate the arguments about specific claims in a text and assess whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. ● Include multimedia components and visual displays as part of an argument about competing design solutions based on jointly developed and agreed-upon design criteria to clarify information. Include multimedia components and visual displays. The multimedia component and visual displays should clarify claims and findings and emphasize salient points in the presentation.
Math Student Learning Objectives Covered in this Unit
● Model design solutions for maintaining biodiversity and ecosystem services with mathematics. Use ratio and rate reasoning to evaluate competing design solutions for maintaining biodiversity and ecosystem services.

● Develop a model that generates data for the iterative testing of competing design solutions involving a proposed object, tool, or process that maintains biodiversity and ecosystem services, reasoning quantitatively (with amounts, numbers, sizes) and abstractly (with variables). ● Develop a probability and use it to find the probability that designed systems, including those representing inputs and outputs, will maintain biodiversity and ecosystem services. Compare probabilities from the model to observe frequencies. If the agreement is not good, explain possible sources of the discrepancy.
Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.) ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). ● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ● Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue. ● Provide ELL students with multiple literacy strategies. • Collaborate with after-school programs or clubs to extend learning opportunities. ● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

Unit Sequence/Essential Question: Part A: How can a single change to an ecosystem disrupt the whole system?	
Concepts	**Formative Assessments**
● Ecosystems are dynamic in nature. ● The characteristics of ecosystems can vary over time.	● Construct an argument to support or refute an explanation for the changes to populations in an ecosystem caused by

● Disruptions to any physical or biological component 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.	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. ● Evaluate empirical evidence supporting arguments about changes to ecosystems.
Unit Sequence/Essential Question: Part B: What limits the number and variety of living things in an ecosystem?	
Concepts	**Formative Assessments**
● 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. ● The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. ● Small changes in one part of a system might cause large changes in another part.	● Construct a convincing argument that supports or refutes claims for solutions about the natural and designed world(s). ● 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. ● Evaluate competing design solutions based on jointly developed and agreed upon design criteria.

• Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.	

District/School Summative Assessment Plan
Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit. • Unit Test Assessment (Interdependent Relationships in Ecosystems) • Vocabulary Quiz 1/2/3/4 • Teacher constructed standards based quiz Part A, Part B, Part C, Part D • Alternative Assessment Teacher Constructed 1

Unit 4 (Force and Motion)	
Content Area	Science
Unit Title	Force and Motion
Grade Level	Grade 7
Recommended Pacing	APX: 25 Days
Unit Summary	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 understanding of the core ideas.
Interdisciplinary Connections	Primary Interdisciplinary Connections: ELA/Math
Career Readiness, Life Literacies, and Key Skills Addressed	***Creativity & Innovation:*** Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking. ***Critical Thinking and Problem-solving:*** Multiple solutions exist to solve a problem. An essential aspect of problem solving is being able to self reflect on why possible solutions for solving problems were or were not successful.
Computer Science and Design Thinking	***Engineering and Design***: Engineering design is a systematic, creative and iterative process used to address local and global problems. ***Engineering and Design:*** The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes. ***Engineering and Design:*** Engineering design requirements and specifications involve making trade-offs between competing requirements and desired design features.
Supplemental Class Resources	GSuite for Education MosaMac Program NEWSELA MS-PS1 Matter and its Interactions MS-ETS1 Engineering Design

Science Student Learning Objectives Covered in this Unit
● Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. * *[Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.] [Assessment Boundary: Assessment is limited to vertical or horizontal interactions in one dimension.]* ● 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. *[Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.]*

[Assessment Boundary: Assessment is limited to forces and changes in motion in one dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.]

- 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.
- 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.

ELA Student Learning Objectives Covered in this Unit

- Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions of the application of Newton's third law involving the motion of two colliding objects.
- Follow precisely a multistep procedure when carrying out experiments to apply Newton's third law when designing a solution to a problem involving the motion of two colliding objects, taking measurements, or performing technical tasks.
- Follow precisely a multistep procedure when performing an investigation that provides 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, taking measurements or performing technical tasks.
- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading texts about the application of Newton's third law to the motion of two colliding objects Conduct a short research project to answer a question about the application of Newton's third law when designing a solution to a problem involving the motion of two colliding objects, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- Conduct a short research project to answer a question about how the sum of the forces on the object and the mass of the object change an object's motion, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- Gather relevant information from multiple print and digital sources that provide information about the application of Newton's third law when designing a solution to a problem involving the motion of two colliding objects; assess the credibility of each source and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
- Draw evidence from informational texts to support analysis, reflection, and research about the application of Newton's third law when designing a solution to a problem involving the motion of two colliding objects.

Math Student Learning Objectives Covered in this Unit

● Reason abstractly and quantitatively when collecting and analyzing data about the application of Newton's third law in the course of designing a solution to a problem involving the motion of two colliding objects. ● Analyze data in the form of numbers and symbols to draw conclusions about how the sum of the forces on an object and the mass of an object change the object's motion. ● 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 a design that applies Newton's third law to a problem involving the motion of two colliding objects. ● When collecting and analyzing data from investigations about how the sum of the forces on an object and the mass of the object changes the object's motion, write, read, and evaluate expressions in which letters stand for numbers.
Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.) ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). ● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue. ● Provide ELL students with multiple literacy strategies. • Collaborate with after-school programs or clubs to extend learning opportunities. ● Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

Unit Sequence/Essential Question: Part A: How does a sailboat work?	
Concepts	**Formative Assessments**

● 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. ● Specification of constraints includes consideration of scientific principles and other relevant knowledge, which are likely to limit possible solutions.	● Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects. ● Define a design problem involving the motion of two colliding objects that can be solved through the development of an object, tool, process, or system and that includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. ● Evaluate competing design solutions involving the motion of two colliding objects based on jointly developed and agreed-upon design criteria. ● Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. ● Analyze and interpret data to determine similarities and differences in findings
Unit Sequence/Essential Question: Part B: Who can build the fastest sailboat?	
Concepts	**Formative Assessments**
● 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.	● Plan an investigation individually and collaboratively 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. ● Design an investigation and 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. ● Make logical and conceptual connections between evidence and explanations. ● Examine the changes over time and forces at different scales

● For any given object, a larger force causes a larger change in motion. ● Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales.	to explain the stability and change in designed systems.

District/School Summative Assessment Plan
Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit. ● Unit Test Assessment (Force and Motion) ● Vocabulary Quiz 1/2/3 ● Teacher constructed standards based quiz Part A, Part B, Part C ● Alternative Assessment Teacher Constructed 1

Unit 5 (Types of Interactions)	
Content Area	Science
Unit Title	Types of Interactions
Grade Level	Grade 7
Recommended Pacing	APX: 25 Days
Unit Summary	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 understanding of the core ideas.
Interdisciplinary Connections	Primary Interdisciplinary Connections: ELA/Math
Career Readiness, Life Literacies, and Key Skills Addressed	***Creativity & Innovation:*** Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking. ***Critical Thinking and Problem-solving:*** Multiple solutions exist to solve a problem. An essential aspect of problem solving is being able to self reflect on why possible solutions for solving problems were or were not successful.
Computer Science and Design Thinking	***Engineering and Design:*** The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes.
Supplemental Class Resources	GSuite for Education MosaMac Program NEWSELA MS-PS2 Motion and Stability: Forces and Interactions

Science Student Learning Objectives Covered in this Unit
• 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. *[Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls. Examples of investigations could include first-hand experiences or simulations.]* [Assessment Boundary: Assessment is limited to electric and magnetic fields, and is limited to qualitative evidence for the existence of fields.] • Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. *[Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or*

strength of magnets on the speed of an electric motor.] [Assessment Boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.] ● Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. *[Clarification Statement: Examples of evidence for arguments 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.]* [Assessment Boundary: Assessment does not include Newton's Law of Gravitation or Kepler's Laws.]
ELA Student Learning Objectives Covered in this Unit
● Cite specific textual evidence to support analysis of information about science and technical texts regarding the factors that affect the strength of electric and magnetic forces, attending to the precise details of explanations or descriptions. ● Write arguments focused on evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
Math Student Learning Objectives Covered in this Unit
● Reason abstractly and quantitatively while using data to determine the factors that affect the strength of electric and magnetic forces.
Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.) ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). ● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue.

- Provide ELL students with multiple literacy strategies. • Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

Unit Sequence/Essential Question: Part A: Can you apply a force on something without touching it?	
Concepts	**Formative Assessments**
● 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). ● Cause-and-effect relationships may be used to predict phenomena in natural or designed systems.	● Students will conduct an investigation and evaluate an experimental design to produce data that can serve as the basis for evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. ● Students will identify the cause-and-effect relationships between fields that exist between objects and the behavior of the objects.
Unit Sequence/Essential Question: Part B: How does a Maglev train work?	
Concepts	**Formative Assessments**
● Factors affect the strength of electric and magnetic forces. • 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	● Students will ask questions about data to determine the effect of the strength of electric and magnetic forces 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. ● Students will perform investigations using devices that use electromagnetic forces.

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	● Students will collect and analyze data that could include the effect of the number of turns of wire on the strength of an electromagnet or the effect of increasing the number or strength of magnets on the speed of an electric motor.
Unit Sequence/Essential Question: Part C: If I were able to eliminate air resistance and dropped a feather and a hammer at the same time, which would land first?	
Concepts	**Formative Assessments**
● 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.	● Students construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. ● Students use models to represent the gravitational interactions between two masses.

District/School Summative Assessment Plan
Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit. ● Unit Test Assessment (Types of Interactions) ● Vocabulary Quiz 1/2/3 ● Teacher constructed standards based quiz Part A, Part B, Part C ● Alternative Assessment Teacher Constructed 1

Unit 6 (Astronomy)	
Content Area	Science
Unit Title	Astronomy
Grade Level	Grade 7
Recommended Pacing	APX: 20 Days
Unit Summary	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 understanding of the core ideas.
Interdisciplinary Connections	Primary Interdisciplinary Connections: ELA/Math
Career Readiness, Life Literacies, and Key Skills Addressed	***Critical Thinking and Problem-solving:*** Multiple solutions exist to solve a problem. An essential aspect of problem solving is being able to self reflect on why possible solutions for solving problems were or were not successful.
Computer Science and Design Thinking	***Data & Analysis:*** Computer models can be used to simulate events, examine theories and inferences, or make predictions.
Supplemental Class Resources	GSuite for Education MosaMac Program

	NEWSELA MS-ESS1 Earth's Place in the Universe

Science Student Learning Objectives Covered in this Unit
● 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. (ESS1.B) *[Clarification Statement: This SLO is based on a disciplinary core idea found in the Framework. It is included as a scaffold to the following SLO.]* ● 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. *[Clarification Statement: Examples of models can be physical, graphical, or conceptual.]* ● 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. (ESS1.A; ESS1.B) *[Clarification Statement: This SLO is based on disciplinary core ideas found in the Framework. It is included as a scaffold to the following SLO.]* ● Analyze and interpret data to determine scale properties of objects in the solar system. *[Clarification Statement: Emphasis is on the analysis of data from Earth based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models.]* [Assessment Boundary: Assessment does not include recalling facts about properties of the planets and other solar system bodies.] ● Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. *[Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state).]* [Assessment Boundary: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.]
ELA Student Learning Objectives Covered in this Unit
● Include multimedia components and visual displays in presentations to describe the cyclical patterns of lunar phases, eclipses of the sun and moon, seasons, and the role of gravity in the motions within galaxies and the solar system. The presentation needs to clarify claims and findings and emphasize salient points. ● Cite specific textual evidence to support analysis of science and technical text about scale properties of objects in the solar system.

- Integrate quantitative or technical information expressed in words in a text about scale properties of objects in the solar system with a version of that information expressed visually in a flowchart, diagram, model, graph, or table.

Math Student Learning Objectives Covered in this Unit

- Reason quantitatively and abstractly about the sizes of an object's layers, surface features, and orbital radius where appropriate.
- Use mathematics to model the motion of the sun, moon, and stars in the sky and the role of gravity in the motions within galaxies and the solar system.
- Understand the concept of a ratio and use ratio language to describe a ratio relationship between the measurements of the cyclical motion between at least two bodies in the solar system and the relative sizes of objects and/or distances between objects and the impact of gravity on the motion of these objects.
- Recognize and represent proportional relationships between the measurement of patterns in the cyclical motion of the sun, moon, and stars in the sky and mathematical proportions relative to the sizes of objects and the effect of gravity on the motion of these objects.
- Use variables to represent numbers and write expressions when solving a problem involving the role of gravity in the motions within galaxies and within the solar system. Understand that a variable can represent an unknown number, or depending on the problem, any number in a specified set.

Modifications

(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.)

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies. • Collaborate with after-school programs or clubs to extend learning opportunities.

• Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

Unit Sequence/Essential Question: Part A: What pattern in the Earth–sun–moon system can be used to explain lunar phases, eclipses of the sun and moon, and seasons?	
Concepts	**Formative Assessments**
• 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.	• Students will develop and use a physical, graphical, or conceptual model to describe patterns in the apparent motion of the sun, moon, and stars in the sky.
Unit Sequence/Essential Question: Part B: What is the role of gravity in the motions within galaxies and the solar system?	
Concepts	**Formative Assessments**
• Gravity plays a role in the motions within galaxies and the solar system. • Gravity is the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. • Earth and its solar system are part of the Milky Way galaxy,	• Students develop and use models to explain the relationship between the tilt of Earth's axis and seasons.

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.	
Unit Sequence/Essential Question: Part C: What are the scale properties of objects in the solar system?	
Concepts	**Formative Assessments**
● 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.	● Analyze and interpret data to determine similarities and differences among objects in the solar system.

District/School Summative Assessment Plan
Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.

- Unit Test Assessment (Astronomy)
- Vocabulary Quiz 1/2/3
- Teacher constructed standards based quiz Part A, Part B, Part C
- Alternative Assessment Teacher Constructed 1

Unit 7 (Weather and Climate)	
Content Area	Science
Unit Title	Weather and Climate
Grade Level	Grade 7
Recommended Pacing	APX: 20 Days
Unit Summary	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 cycling of matter within and among different systems. A systems approach is also important here, examining the feedback 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 understanding of the core ideas.
Interdisciplinary Connections	Primary Interdisciplinary Connections: ELA/Math
Career Readiness, Life Literacies, and Key Skills Addressed	***Critical Thinking and Problem-solving:*** Multiple solutions exist to solve a problem.

	An essential aspect of problem solving is being able to self reflect on why possible solutions for solving problems were or were not successful.
Computer Science and Design Thinking	***Data & Analysis:*** Computer models can be used to simulate events, examine theories and inferences, or make predictions.
Supplemental Class Resources	GSuite for Education MosaMac Program NEWSELA MS-ESS2 Earth's Systems

Science Student Learning Objectives Covered in this Unit
● 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.]* ● 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.] ● Explain how variations in density result from variations in temperature and salinity drive a global pattern of interconnected ocean currents. *[Note: This SLO is based on a disciplinary core idea found in the Framework. It is included as a scaffold to the following SLO.]* ● 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. [Note: This SLO is based on disciplinary core ideas found in the Framework. It is included as a scaffold to the following SLO.] ● 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.]
ELA Student Learning Objectives Covered in this Unit
● Support the analysis of science and technical texts by citing specific textual evidence for how the motions and complex interactions of air masses result in changes in weather conditions. ● Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with information that is gained from reading text about how the complex patterns of the changes and movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents are major determinants of local weather patterns. ● Gather relevant information from multiple print and digital sources about how the complex patterns of the changes and movement of water in the atmosphere,determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. ● Include multimedia components and visual displays in presentations to clarify information about how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
Math Student Learning Objectives Covered in this Unit
● Reason abstractly and quantitatively by using data such as weather maps, diagrams, and visualizations or obtained through laboratory experiments to predict weather within probabilities ranges. ● Understand that positive and negative numbers are used together to describe quantities having opposite directions or values. Use positive and negative numbers to represent changes in atmospheric and oceanic temperatures, explaining the meaning of 0 in each situation.
Modifications
(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.) ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).

- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies. • Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principles (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

Unit Sequence/Essential Question: Part A: What are the processes involved in the cycling of water through Earth's systems?	
Concepts	**Formative Assessments**
• 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	• Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. • Model the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle.
Unit Sequence/Essential Question: Part B: What is the relationship between the complex interactions of air masses and changes in weather conditions?	
Concepts	**Formative Assessments**
• The motions and complex interactions of air masses result in changes in weather conditions.	• Collect data to serve as the basis for evidence for how the motions and complex interactions of air masses result in

• 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.	changes in weather conditions.
Unit Sequence/Essential Question: Part C: What are the major factors that determine regional climates?	
Concepts	**Formative Assessments**
• 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, determines regional climates is the result of sunlight-driven latitudinal banding, the	• 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.

Coriolis effect, and resulting prevailing winds. ● Ocean circulation that, in part, determines 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.	

District/School Summative Assessment Plan
Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit. ● Unit Test Assessment (Weather and Climate) ● Vocabulary Quiz 1/2/3 ● Teacher constructed standards based quiz Part A, Part B, Part C ● Alternative Assessment Teacher Constructed 1

OpenSciEd:
A multistate effort to develop freely accessible and open science course materials for grades 6-8.

Modifications for SpEd/ESL/Students at Risk/Gifted

● Complete fewer or different homework problems than peers
● Write shorter papers
● Supports, Accommodations, and Modifications must be provided as stated in IEP, 504 Plan, or IR&S Intervention Plan, and may include (but are not limited to) the following:

Presentation accommodations:

● Listen to audio recordings instead of reading text
● Learn content from audio books, movies, videos and digital media instead of reading print versions
● Use alternate texts at lower readability level
● Work with fewer items per page or line and/or materials in a larger print size
● Use magnification device, screen reader, or Braille / Nemeth Code
● Use audio amplification device (e.g., hearing aid(s), auditory trainer, sound-field system (which may require teacher use of microphone)
● Be given a written list of instructions
● Record a lesson, instead of taking notes
● Have another student share class notes with him
● Be given an outline of a lesson
● Be given a copy of teacher's lecture notes
● Be given a study guide to assist in preparing for assessments
● Use visual presentations of verbal material, such as word webs and visual organizers
● Use manipulatives to teach or demonstrate concepts
● Have curriculum materials translated into native language

Response accommodations:

● Use sign language, a communication device, Braille, other technology, or native language other than English
● Dictate answers to a scribe
● Capture responses on an audio recorder
● Use a spelling dictionary or electronic spell-checker
● Use a word processor to type notes or give responses in class
● Use a calculator or table of "math facts"
● Respond directly in the test booklet rather than on an answer sheet. Setting accommodations:
● Work or take a test in a different setting, such as a quiet room with few distractions
● Sit where he learns best (for example, near the teacher, away from distractions)
● Use special lighting or acoustics
● Take a test in small group setting
● Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
● Use noise buffers such as headphones, earphones, or earplugs

Timing accommodations:
● Take more time to complete a task or a test
● Have extra time to process oral information and directions
● Take frequent breaks, such as after completing a task

Scheduling accommodations:
● Take more time to complete a project
● Take a test in several timed sessions or over several days
● Take sections of a test in a different order
● Take a test at a specific time of day

Organization skills accommodations:
● Use an alarm to help with time management
● Mark texts with a highlighter
● Have help coordinating assignments in a book or planner
● Receive study skills instruction

Assignment modifications:
● Answer fewer or different test questions
● Create alternate projects or assignments

Curriculum modifications:
● Learn different material
● Get graded or assessed using a different standard than the one for classmates