South Harrison Township Elementary School District

Committed to Excellence

Course Name: Science	**Grade Level(s): 6**
BOE Adoption Date: October 2016	**Revision Date(s): October 2017**

ABSTRACT

Students will explore 6th grade science through a collaborative and lab/inquiry based environment, developing critical thinking and problems solving skills as well as developing their math skills when applied to life, physical and earth sciences. These life skills are essential to make them informed, productive contributors to society in the 21st century. Students who have mastered 5th grade science will engage in engineering practices and apply crosscutting concepts to deepen their understanding of *Space Systems, History of Earth, Earth's Interior Systems, Earth's Surface Systems, Water and Climate and Human Impacts*. Units which will be explored are: forces and motions, types of interactions, matter and energy in organisms, interdependent relationships in an ecosystem, astronomy, and weather and climate.

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Mission Statement

The primary goal of the South Harrison Township Elementary School District is to prepare each student with the real life skills needed to compete in a highly competitive global economy. This will be achieved by providing a comprehensive curriculum, the integration of technology, and the professional services of a competent and dedicated faculty, administration, and support staff.

Guiding this mission will be Federal mandates, including the Every Student Succeeds Act (ESSA), the New Jersey Student Learning Standards, and local initiatives addressing the individual needs of our students as determined by the Board of Education. The diverse resources of the school district, which includes a caring Home and School Association (HSA) and active adult community, contribute to a quality school system. They serve an integral role in supporting positive learning experiences that motivate, challenge and inspire children to learn.

Curriculum and Instruction Goals

Goal(s):

1. To ensure students are college and career ready upon graduation
2. To vertically and horizontally align curriculum K-12 to ensure successful transition of students at each grade level
3. To identify individual student strengths and weaknesses utilizing various assessment measures (formative, summative, alternative, etc.) so as to differentiate instruction while meeting the rigor of the applicable content standards
4. To improve student achievement as assessed through multiple measures including, but not limited to, state testing, local assessments, and intermediate benchmarking

Philosophy of the Shared Curriculum Service with Kingsway Regional School District

Together in its partnership with the South Harrison Township Elementary School District, the Kingsway Curriculum & Instruction Department is committed to providing all students grades K-12 with an engaging and quality curricular experience that aligns with the New Jersey Student Learning Standards (NJ SLS) for mathematics and English-Language Arts as well as the New Jersey Student Learning Standards (NJ SLS) for all other core disciplines. It is the goal of this shared service to provide students with curricular and educational experiences that allows them to succeed as they move on to the middle and high school level. Through this shared service, both horizontal and vertical alignment is stressed at and within each grade level with the aim of developing life-long learners who are college and career ready upon graduation from high school. Additionally, classroom instruction will be designed to meet the unique learning desires of all children and will be differentiated according to the needs of each learner. Whether through added support or enrichment activities, it is the role of the educator in the classroom to ensure students are reaching their highest level of social, emotional, and academic growth each school year. A combination of summative, formative, and performance-based

assessments will be used to assess students' understanding and acquisition of necessary concepts and skills. Group work, projects, and a variety of co-curricular activities will make mathematics more meaningful and aid in the understanding of its application across all disciplines as well as in life.

How to Read this Document

This document contains a pacing guide and curriculum units. The pacing guides serve to deliver an estimated timeframe as to when noted skills and topics will be taught. The pacing of each course, however, will differ slightly depending upon the unique needs of each class. The curriculum units contain more detailed information as to the specific skills and concepts that are introduced as well as how students will be assessed. The terms and definitions below will assist the reader in better understanding the sections and components of this curriculum document.

Terms to Know

1. **Accommodation(s):** The term "accommodation" may be used to describe an *alteration* of environment, curriculum format, or equipment that allows an individual with a disability to gain access to content and/or complete assigned tasks. They allow students with disabilities to pursue a regular course of study. The term accommodation is often used interchangeable with the term modification. However, it is important to remember that modifications change or modify the intended learning goal while accommodations result in the same learning goal being expected but with added assistance in that achievement. Since accommodations do not alter what is being taught, instructors should be able to implement the same grading scale for students with disabilities as they do for students without disabilities.

2. **Differentiated Instruction:** Differentiation of instruction relies on the idea that instructional approaches should be tailored to each individual student's learning needs. It provides students an array of options during the learning process that allows them make sense of ideas as it relates to them. The integration of differentiated instructional techniques is a curriculum design approach to increase flexibility in teaching and decrease the barriers that frequently limit student access to materials and learning in classrooms. http://www.udlcenter.org/aboutudl

3. **Enduring Understanding:** Enduring understandings (aka big ideas) are statements of understanding that articulate deep conceptual understandings at the heart of each content area. Enduring understandings are noted in the alongside essential questions within each unit in this document. http://www.ascd.org

4. **Essential Question:** These are questions whose purpose is to stimulate thought, to provoke inquiry, and to spark more questions. They extend beyond a single lesson or unit. Essential questions are noted in the beginning of each unit in this document. http://www.ascd.org

5. **Formative Assessment(s):** Formative assessments monitor student learning to provide ongoing feedback that can be used by (1) instructors to improve teaching and (2) by students to improve their learning. Formative assessments help identify students' strengths and weaknesses and address problems immediately.

6. **Learning Activity(s):** Learning activities are those activities that take place in the classroom for which the teacher facilitates and the students participate in to ensure active engagement in the learning process. (Robert J. Marzano, *The Art and Science of Teaching*)

7. **Learning Assignment(s):** Learning assignments are those activities that take place independently by the student inside the classroom or outside the classroom (i.e. homework) to extend concepts and skills within a lesson. http://www.marzanocenter.com

8. **Learning Goal(s):** Learning goals are broad statements that note what students "should know" and/or "be able to do" as they progress through a unit. Learning goals correlate specifically to the NJSLS (New Jersey Student Learning Standards) are noted within each unit.

9. **Learning Objective(s):** Learning objectives are more specific skills and concepts that students must achieve as they progress towards the broader learning goal. These are included within each unit and are assessed frequently by the teacher to ensure students are progressing appropriately. http://www.marzanoresearch.com

10. **Model Assessment:** Within the model curriculum, model assessments are provided that included assessments that allow for measuring student proficiency of those target skills as the year of instruction progresses. http://www.state.nj.us/education/modelcurriculum/

11. **Model Curriculum:** The model curriculum has been provided by the state of New Jersey to provide a "model" for which districts can properly implement the NJSLS (New Jersey Student Learning Standards) by providing an example from which to work and/or a product for implementation.

12. **Modification(s):** The term "modification" may be used to describe a *change* in the curriculum. Modifications are typically made for students with disabilities who are unable to comprehend all of the content an instructor is teaching. The term modification is often used interchangeable with the term accommodations. However, it is important to remember that modifications change or modify the intended learning goal while accommodations result in the same learning goal being expected but with assistance in that achievement.

13. **Performance Assessment(s):** (aka alternative or authentic assessments) Performance assessments are a form of assessment that requires students to perform tasks that generate a more authentic evaluation of a student's knowledge, skills, and abilities. Performance assessments stress the application of knowledge and extend beyond traditional assessments (i.e. multiple-choice question, matching, true & false, etc.).

14. **Standard(s):** Academic standards, from which the curriculum is built, are statements that of what students "should know" or "be able to do" upon completion of a grade-level or course of study. Educational standards help teachers ensure their students have the skills and knowledge they need to be successful by providing clear goals for student learning. http://www.state.nj.us/njded/cccs/

    - **State:** The New Jersey Student Learning Standards (NJSLS) include Preschool Teaching and Learning Standards as well as K-12 standards for: *Visual and Performing Arts; Comprehensive Health and Physical Education; Science; Social Studies; World Languages; Technology; and 21st-Century Life and Careers.*

15. **Summative Assessment(s):** Summative assessments evaluate student learning at the end of an instructional time period by comparing it against some standard or benchmark. Information from summative assessments can be used formatively when students or faculty use it to guide their efforts and activities in subsequent courses.

16. **21st Century Skill(s):** These skills emphasis the growing need to focus on those skills that prepare students successfully by focusing on core subjects and 21st century themes; learning and innovation skills; information, media and technology skills; and life and career skills. These concepts are embedded in each unit of the curriculum. http://www.p21.org/our-work/p21-framework

Proficiencies and Pacing:
Course Name: Science 6

Unit Title:	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
Unit 1: Weather and Climate	**September – October** **(4 Weeks)**	**Subject Area:** NJ Student Learning Standards: *Science-* NJSLS-MS-ESS2-4 NJSLS-MS-ESS2-5 NJSLS-MS-ESS2-6 **Interdisciplinary:** *NJSLS:* *Literacy-* NJSLS-RST.6-8.1 NJSLS-RST.6-8.9 NJSLS-WHST.6-8.8 NJSLS-SL.8.5 *Mathematics-* NJSLS-MP.2 NJSLS-6.NS.C.5 NJSLS-6.EE.B.6	NJ SLS MS-ESS2-4**:** Students will understand that water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (1 week) NJ SLS MS-ESS2-5: Students will understand the complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (1 week) NJ SLS MS-ESS2-6: Students will understand weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (2 weeks)	Topics: Water cycle and phase changes, energy transfer from the sun, air masses, ocean/wind currents, specific heat of land/sea Skills: Developing and using models, Collecting data, planning and carrying out investigations, demonstrate understanding

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
Unit 2: Matter and Energy in	**October – November**	**Subject Area:** NJ Student Learning Standards:	NJ SLS MS-LS2-1:	Topics: Cycling of matter, flow of energy, competition of limited resources, food webs,

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
Organisms and Ecosystems	**(6 Weeks)**	*Science-* NJSLS-MS-LS2-1 NJSLS-MS-LS2-2 NJSLS-MS-LS2-3 NJSLS-MS-LS1-4 NJSLS-MS-LS1-5 **Interdisciplinary:** *NJSLS:* *Literacy-* NJSLS-RST.6-8.1 NJSLS-RST.6-8.7 NJSLS-WHST.6-8.2 NJSLS-WHST.6-8.9 NJSLS-SL.8.1 NJSLS-SL.8.4 NJSLS-SL.8.5 *Mathematics-* NJSLS-6.EE.C.9 NJSLS-6.SP.B.5 NJSLS-MS-LS1-4 NJSLS-MS-LS1-5 NJSLS-6.SP.A.2 NJSLS-6.SP.B.4	Students will understand organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (1 week) NJ SLS MS-LS2-1: Students will understand that growth of organisms and population increases are limited by access to resources (1 week) NJ SLS MS-LS2-2: Students will understand predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared (2 weeks) NJ SLS MS-LS2-3: Students will understand food webs are models that demonstrate how matter and energy is transferred between 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	producers, consumers, decomposers, environmental and genetic factors that influence the growth of organisms Skills: Analyze and interpret data, construct arguments and explanations, study and predict patterns, developing models, constructing arguments

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
			environments or 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. (1 week) NJ SLS MS-LS1-5: Students will understand that genetic factors as well as local conditions affect the growth of the adult plant. (1 week)	

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
Unit 3: Interdependent Relationships in Ecosystems	**November – January** **(5 Weeks)**	**Subject Area:** NJ Student Learning Standards: *Science-* NJSLS-MS-LS2-4 NJSLS-MS-LS2-5 NJSLS-MS-ETS1-1 NJSLS-MS-ETS1-3 **Interdisciplinary:** *NJSLS:* *Literacy-* NJSLS-RST.6-8.1 NJSLS-RST.6-8.8 NJSLS-RI.8.8	NJ SLS MS-LS2-4, NJSLS-MS-ETS1-1: Students will understand ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations (3 weeks) NJ SLS MS-LS2-5: Students will understand 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. (1 week) NJ SLS MS-LS2-5, NJSLS-MS-ETS1-3: Students will be able to understand that biodiversity	Topics: Transfer of matter and energy, biotic and abiotic factors, biodiversity in ecosystems Skills: Study patterns, construct explanations, engineering design, design solutions, engaging in arguments from evidence, developing and using models,

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
		NJSLS-WHST.6-8.1 NJSLS-WHST.6-8.2 NJSLS-RST.6-8.7 NJSLS-WHST.6-8.8 NJSLS-WHST.6-8.9 NJSLS-SL.8.5 *Mathematics-* NJSLS-MP.4 NJSLS-7.EE.3 NJSLS-6.RP.A.3	and Humans Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (1 week)	

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
Unit 4: **Force and Motion**	**February – April** **(5 Weeks)**	**Subject Area:** <u>NJ Student Learning Standards:</u> *Science-* NJSLS-MS-PS2-1 NJSLS-MS-PS2-2 NJSLS-MS-ETS1-1 NJSLS-MS-ETS1-2 NJSLS-MS-ETS1-3 NJSLS-MS-ETS1-4 **Interdisciplinary:** <u>*NJSLS:*</u> *Literacy-*	NJ SLS MS-PS2-1, NJSLS-MS-ETS1-1, NJSLS-MS-ETS1-2, NJSLS-MS-ETS1-3, NJSLS-MS-ETS1-4: Students will understand 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). (3 weeks) NJ SLS MS-PS2-2, NJSLS-MS-ETS1-1, NJSLS-MS-ETS1-2, NJSLS-MS-ETS1-3, NJSLS-MS-ETS1-4: Students will understand 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	<u>Topics:</u> Newton's laws of motion, Collisions, <u>Skills:</u> Analyzing data, Investigating, Applying Newton's Laws

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
		NJSLS-RST.6-8.1 NJSLS-RST.6-8.3 NJSLS-WHST.6-8.8 NJSLS-WHST.6-8.9 NJSLS-RST.6-8.9 NJSLS-WHST.6-8.7 *Mathematics-* NJSLS-MP.2 NJSLS-6.NS.C.5 NJSLS-6.EE.A.2 NJSLS-7.EE.B.3 NJSLS-7.EE.B.4 NJSLS-7.EE.3	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. (1 week) NJ SLS MS-PS2-2: Students will understand all positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (1 week)	

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
Unit 5: Types of Interactions	**May** **(5 Weeks)**	**Subject Area:** NJ Student Learning Standards: *Science-* NJSLS-MS-PS2-3 NJSLS-MS-PS2-4 NJSLS-MS-PS2-5 **Interdisciplinary:** *NJSLS:* *Literacy-* NJSLS-WHST.11-12.7	NJ SLS MS-PS2-3: Students will understand 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. (1 week) NJ SLS MS-PS2-4: Students will understand gravitational forces are	Topics: Gravitational, electrical, and magnetic forces Skills: Conduct investigations, asking questions, planning and carrying out investigations, designing solutions, engaging in argument, evaluate experimental designs

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
		NJSLS-WHST.11-12.8 NJSLS-WHST.11-12.9 *Mathematics-* NJSLS-HSN.Q.A.1 NJSLS-HSN.Q.A.2 NJSLS-HSN.Q.A.3 NJSLS-MP.2 NJSLS-MP.4 NJSLS-HSA.SSE.A.1 NJSLS-HSA.SSE.B.3	always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (1 week) NJ SLS MS-PS2-5: Students will understand 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). (3 weeks)	

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
Unit 6: Astronomy	**June** **(4 Weeks)**	**Subject Area:** NJ Student Learning Standards: *Science-* NJSLS-MS-ESS1-1 NJSLS-MS-ESS1-2 NJSLS-MS-ESS1-3 **Interdisciplinary:** *NJSLS:* *Literacy-* NJSLS-RST.6-8.1 NJSLS-RST.6-8.7 NJSLS-SL.8.5	NJ SLS MS-ESS1-1: Students will understand patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (2 weeks) NJ SLS MS-ESS1-2, NJ SLS MS-ESS1-3 Students will understand 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. (1 week) NJ SLS MS-ESS1-1:	Topics: The Earth's place in relation to the solar system, the Milky Way galaxy, the universe, eclipses, tides, seasons Skills: Developing and using models and analyzing and interpreting data

Unit Title	Duration/ Month(s)	Related Standards	Learning Goals	Topics and Skills
		Mathematics- NJSLS-MP.2 NJSLS-MP.4 NJSLS-6.RP.A.1 NJSLS-7.RP.A.2 NJSLS-6.EE.B.6 NJSLS-7.EE.B.6	Students will understand this 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. (1 week)	

Unit 1: Weather and Climate	Recommended Duration: (4 weeks)

Unit Description:
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 feedbacks between systems as energy from the Sun is transferred between systems and circulates though 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.

Description of abstract from: http://www.nj.gov/education/modelcurriculum/sci/6u7.pdf

Essential Questions	Enduring Understandings
• How does the water cycle influence life on Earth? • What factors influence weather and climate? • How does unequal heating affect wind patterns? • How does the interaction of air masses cause a change in the weather? • What are greenhouse gasses and how do they cause the greenhouse effect?	• Could life exist without the water cycle? • Would uneven heating cause weather and determine climate? • Does human activity contribute to global warming? • How does the water cycle take part in

Relevant Standards	Learning Goals	Learning Objectives
Content Standards: Primary or Power **MS-ESS2-4:** Students will be able to develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	NJ SLS MS-ESS2-4**:** Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (1 week)	NJ SLS MS-ESS2-4**:** • Students will be able to model the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle.

Relevant Standards	Learning Goals	Learning Objectives
MS-ESS2-5: Students will be able to collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. **MS-ESS2-6:** Students will be able to 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.	NJ SLS MS-ESS2-5: Students will understand the complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (1 week) NJ SLS MS-ESS2-6: Students will understand weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (2 weeks)	NJ SLS MS-ESS2-5: • Students will be able to illustrate how the unequal heating of the Earth will cause global winds. • Students will be able to explain why winds curve on Earth (the Coriolis Effect). • Students will be able to identify the global wind belts and oceanic currents on Earth. • Students will be able to use their knowledge of global winds and ocean currents to determine how climate will be affected. • Students will be able to execute an experiment that shows that temperature and salinity drive a global pattern of interconnected ocean currents. NJ SLS MS-ESS2-6: • Students will be able to describe how the Earth is unequally heated. • Students will be able to understand how closeness of large bodies of water will result in climate differences. • Students will be able to define the term climate. • Students will be able to differentiate the difference between climate and weather. • Students will be able to identify the five causes of climate (latitude, elevation, ocean/wind currents, closeness to large bodies of water, and terrain). • Students will be able to observe and collect data from weather instruments. • Students will be able to identify the different

Relevant Standards	Learning Goals	Learning Objectives
		types of air masses that affect our weather in the United States. • Students will be able to predict weather on a weather map. • Students will be able to define global warming. • Students will be able to identify the four main greenhouse gasses. • Students will be able to explain the greenhouse effect. • Students will be able to construct a hypothesis on what would happen to our Earth if the number of greenhouse gasses increase. • Students will be able to explain how the use of fossil fuels cause the surface temperature of Earth to increase. • Students will be able to explain how humans are a major cause of the increasing temperatures of global warming.

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments (required)
• Daily Warm up • Exit Slips • Teacher observation • Self-reflection writing • White board review • Scoot • Task cards • Educational games • Frayer Model Vocabulary Squares • Plickers	• Climate jigsaw project • Global warming argumentative/explanatory essay • Global warming debate • Science Menu	• Laboratory activities: ○ Earth's Hydraulic Cycle (http://www.earthsciweek.org/classroom-activities/earths-hydrologic-cycle) ○ Dangerous Atmosphere (http://www.earthsciweek.org/classroom-activities/dangerous-atmosphere) • Oral Presentations	• Uneven heating activity • Water cycle comic strip • Climate causes research • Global warming close reading • Greenhouse gasses diagram • Global warming debate • Raz Kids Guided Reading Titles • Air Masses, • Ocean Currents and Sea Surface Temperature,

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments (required)
			• Adopt a Drifter: Do Ocean Surface Currents Influence Climate?

Possible Assessment Modifications /Accommodations/Differentiation:			
Special Education Accommodations • Additional time • Vary test formats Modifications • Oral testing • Shortened assessments • Simplify task directions Differentiation • Multiple texts (leveled reading) • Small group administration of classroom tests/quizzes as needed and/or available	English Language Learners Accommodations • Oral responses • Give students extra time to complete tests Modifications • Oral testing • Simplify instructions Differentiation • Multiple texts (leveled reading)	At Risk Students Accommodations • Allow re-ro/retakes • Opportunities for review of assessments Modifications • Make all or part of the exam oral Differentiation • Multiple texts (leveled reading)	Gifted Students Modifications • Have students answer open ended questions Differentiation • Multiple texts (leveled reading) • Individualized assessment/Independent study • Additional research into topics

Instructional Strategies
• Structured Overview • Reading • Brainstorming • Think, Pair, Share • Cooperative Learning Groups • Structured Controversy • Writing to Inform • Essays • Research Projects

Instructional Strategies
• Assigned Questions • Simulations • Explaining • Levels of Questions

Possible Instructional Modifications /Accommodations/Differentiation			
Special Education	English Language Learners	At Risk Students	Gifted Students
<u>Accommodations</u> • Modify pace of instruction to allow additional processing time • Completed copy of notes • Use of checklists • Study guide prior to assessments <u>Modifications</u> • Change level of difficulty using choice boards <u>Differentiation</u> • Small group instruction	<u>Accommodations</u> • Graphic organizers • Extra visual cues • Study guide prior to assessments <u>Modifications</u> • Reword problems in simplified language <u>Differentiation</u> • 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). • Provide ELL students with multiple literacy strategies. • Cooperative learning	<u>Accommodations</u> • Graphic organizers • Study guide prior to assessments <u>Differentiation</u> • One on one conferences • Flexible grouping	<u>Differentiation</u> • Assign alternate assignments for in class work • Encourage students to explore concepts in depth and encourage independent studies or investigations.

Unit Vocabulary
Essential: Climate, weather, global warming, greenhouse effect, greenhouse gasses, atmosphere, fossil fuels

Unit Vocabulary
Non-Essential: Latitude, elevation, ocean currents, wind currents, terrain, salinity, doldrums, trade winds, horse latitudes, equator

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
Literacy- **NJSLS-RST.6-8.1:** Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-5), (MS-ESS3-5) **NJSLS-RST.6-8.9:** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ESS2-5) **NJSLS-WHST.6-8.8:** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-ESS2-5) **NJSLS-SL.8.5:** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS2-6)	**NJ SLS 8.1.8.A.4:** Graph and calculate data within a spreadsheet and present a summary of the results **NJ SLS 8.1.8.D.2:** Demonstrate the application of appropriate citations to digital content. **NJ SLS 8.1.8.D.4:** Assess the credibility and accuracy of digital content. **NJ SLS** 8.2.8.A.2: Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system. **NJ SLS 8.2.8.A.4:** Redesign an existing product that impacts the environment to lessen its impact(s) on the environment. **NJ SLS: 8.2.8.C.8:** Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to	_X_ Health Literacy	Creative Thinking and Problem Solving • Students plan and conduct scientific investigations and write detailed explanations based on their evidence. Students compare their explanations to those made by scientists and relate them to their own understandings of the natural and designed worlds. Communication • Students can identify conventions for writing and speaking scientifically that distinguish scientific communication from other types of expression, and describe reasons behind those differences such as the need in science for precision, detail, and evidence over opinion. Collaboration (Civic Literacy) • Students work collaboratively with others, either virtually or face-to-face, while participating in scientific discussions and appropriately using claims, evidence, and reasoning.

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
Mathematics- **NJSLS-MP.2:** Reason abstractly and quantitatively. (MS-ESS2-5), (MS-ESS3-5) **NJSLS-6.NS.C.5:** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-ESS2-5) **NJSLS-6.EE.B.6:** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS3-5)	peers. **NJ SLS 8.2.8.D.3:** Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.		Information Literacy (Health Literacy) • Students are able to locate reliable scientific information in reputable reference books, back issues of journals and magazines, on websites, and in computer databases. Media Literacy (Financial Literacy) • Students are able to identify and critique arguments in which the claims are not consistent with the evidence given. Leadership and Responsibility • Students understand the importance of proper citations and respect for intellectual property rights.

Resources
Text: • Science (2005). Orlando, FL: Harcourt **Materials:**

Resources
• Chromebooks, coloring supplies, black construction paper, candle wax, heat lamp, globe **Major Assignments (required):** • Greenhouse gasses diagram • Greenhouse effect close reading **Major Activities (required):** • Uneven heating activity • Global warming debate • Climate causes research • Water cycle comic strip

Unit 2: Matter and Energy in Organisms and Ecosystems	Recommended Duration: (6 Weeks)

Unit Description:
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 interpret data, developing models, and constructing arguments. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Description abstract from: http://www.nj.gov/education/modelcurriculum/sci/6u2.pdf

Essential Questions	Enduring Understandings
• How would you describe a biotic factor in an ecosystem? • How are biotic factors and abiotic factors alike/different? • What would happen if an ecosystem did not have abiotic factors? • How do changes in the availability of matter and energy effect 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?	• Do we need to have both biotic and abiotic factors in an ecosystem? • What could happen to a food chain if all of the producers became diseased?

Relevant Standards	Learning Goals	Learning Objectives
Content Standards: Primary or Power **MS-LS2-1:** Students will be able to analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem	**NJ SLS MS-LS2-1:** Students will understand organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (1 week)	**NJ SLS MS-LS2-1:** • Students will be able to identify biotic and abiotic factors in an ecosystem. • Students will be able to explain why an ecosystem relies on both biotic and abiotic factors to exist.

Relevant Standards	Learning Goals	Learning Objectives
MS-LS2-2: Students will be able to construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. **MS-LS2-3:** Students will be able to develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. **MS-LS1-4:** Students will be able to 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:** Students will be able to construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms	**NJ SLS MS-LS2-1:** Students will understand that growth of organisms and population increases are limited by access to resources (1 week) **NJ SLS MS-LS2-2:** Students will understand predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared (2 weeks) **NJ SLS MS-LS2-3:** Students will understand food webs are models that demonstrate how matter and energy is transferred between 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 or 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. (1 week)	• Students will be able to explain what will happen to a population in an ecosystem if there is a limited access to resources. • Students will be able to explain how invasive species can impact entire ecosystems. **NJ SLS MS-LS2-2:** • Students will be able to explain a predator/prey relationship in an ecosystem. • Students will be able to investigate a food chain and predict what would happen if entire populations were diseased/died off. • Students will be able to describe an interdependent relationship and how each organism requires the other for survival. • Students will be able to hypothesize what would happen to one organism in an interdependent relationship if the other did not exist. **NJ SLS MS-LS2-3:** • Students will be able to develop a food web including producers, consumers, and decomposers. • Students will be able to develop a food web of intertwining food chains. • Students will be able to explain the transfer of energy within a food chain/web. **NJ SLS MS-LS1-4, NJ SLS MS-LS1-5:** • Students will be able to explain how local conditions can affect the growth of an adult plant.

Relevant Standards	Learning Goals	Learning Objectives
	NJ SLS MS-LS1-4, NJ SLS MS-LS1-5: Students will understand that genetic factors as well as local conditions affect the growth of the adult plant. (1 week)	

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments (required)
• Daily Warm up • Exit Slips • Teacher observation • Self-Reflection writing • White board review • Scoot • Task Cards • Educational games	• Create a Food Web Project • Food chain gizmo • Endangered species project • Think-tac-toe board	Laboratory activities: • Owl Pellet • Exploring the "Systems" in Ecosystems, Flow of Matter and Energy in Ecosystems SciPack • National Invasive Species Information Center (NISIC) provides data and information regarding invasive species, including covering Federal, State, local, and international sources. This site supports the performance assessment associated with the CPI. http://www.invasivespeciesinfo.gov/ • Annenberg Media's Teachers' Resources offer short video courses covering essential science content for teachers. http://www.learner.org/resources/series179.html	• Exploring the "Systems" in Ecosystems • Flow of Matter and Energy in Ecosystems SciPack • Mosa Mack ecosystems unit • Identify abiotic and biotic factors at South Harrison Elementary

Possible Assessment Modifications /Accommodations/Differentiation			
Special Education Accommodations • Additional time	English Language Learners Accommodations • Oral responses	At Risk Students Accommodations • Allow re-ro/retakes	Gifted Students Modifications • Have students answer open

Possible Assessment Modifications /Accommodations/Differentiation			
• Vary test formats <u>Modifications</u> • Oral testing • Shortened assessments • Simplify task directions <u>Differentiation</u> • Multiple texts (leveled reading) • Small group administration of classroom tests/quizzes as needed and/or available	• Give students extra time to complete tests <u>Modifications</u> • Oral testing • Simplify instructions <u>Differentiation</u> • Multiple texts (leveled reading)	• Opportunities for review of assessments <u>Modifications</u> • Make all or part of the exam oral <u>Differentiation</u> • Multiple texts (leveled reading)	ended questions <u>Differentiation</u> • Multiple texts (leveled reading) • Individualized assessment/Independent study • Additional research into topics

Instructional Strategies
• Structured Overview • Reading • Brainstorming • Think, Pair, Share • Cooperative Learning Groups • Structured Controversy • Writing to Inform • Essays • Research Projects • Assigned Questions • Simulations • Explaining • Levels of Questions

Possible Instructional Modifications /Accommodations/Differentiation			
Special Education	English Language Learners	At Risk Students	Gifted Students
<u>Accommodations</u> • Modify pace of instruction to allow additional processing time <u>Modifications</u> • Change level of difficulty using choice boards <u>Differentiation</u> • Small group instruction	<u>Accommodations</u> • Graphic organizers <u>Modifications</u> • Reword problems in simplified language <u>Differentiation</u> • 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). • Provide ELL students with multiple literacy strategies. • Cooperative learning	<u>Accommodations</u> • Graphic organizers <u>Differentiation</u> • One on one conferences • Flexible grouping	<u>Differentiation</u> • Assign alternate assignments for in class work • Encourage students to explore concepts in depth and encourage independent studies or investigations.

Unit Vocabulary
Essential: Ecosystem, abiotic factors, biotic factors, producer, primary consumer, secondary consumer, decomposer, food chain, food web **Non-Essential:** Predator, prey, tertiary consumer, herbivore, carnivore, omnivore

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
Literacy- **NJSLS-RST.6-8.1:** Cite specific textual	**NJ SLS 8.1.8.A.4:** Graph and calculate data within a	_X_ Health Literacy	<u>Creative Thinking and Problem Solving</u> • Students plan and conduct

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
evidence to support analysis of science and technical texts. (MS-LS2-1), (MS-LS2-2) **NJSLS-RST.6-8.7:** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS2-1) **NJSLS-WHST.6-8.2:** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS2-2) **NJSLS-WHST.6-8.9**: Draw evidence from literary or informational texts to support analysis, reflection, and research. (MS-LS2-2) **NJSLS-SL.8.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. (MS-LS2-2) **NJSLS-SL.8.4:** Present claims and findings, emphasizing salient points in a focused, coherent manner with	spreadsheet and present a summary of the results **NJ SLS 8.1.8.D.2:** Demonstrate the application of appropriate citations to digital content. **NJ SLS 8.1.8.D.4:** Assess the credibility and accuracy of digital content. **NJ SLS** 8.2.8.A.2: Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system. **NJ SLS 8.2.8.A.4:** Redesign an existing product that impacts the environment to lessen its impact(s) on the environment. **NJ SLS: 8.2.8.C.8:** Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers. **NJ SLS 8.2.8.D.3:** Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.		scientific investigations and write detailed explanations based on their evidence. Students compare their explanations to those made by scientists and relate them to their own understandings of the natural and designed worlds. <u>Communication</u> • Students can identify conventions for writing and speaking scientifically that distinguish scientific communication from other types of expression, and describe reasons behind those differences such as the need in science for precision, detail, and evidence over opinion. <u>Collaboration (Civic Literacy)</u> • Students work collaboratively with others, either virtually or face-to-face, while participating in scientific discussions and appropriately using claims, evidence, and reasoning. <u>Information Literacy (Health Literacy)</u> • Students are able to locate reliable scientific information in reputable reference books, back issues of journals and magazines, on websites, and in computer databases.

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (MS-LS2-2) **NJSLS-SL.8.5:** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS2-3) *Mathematics-* **NJSLS-6.EE.C.9:** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS2-3) **NJSLS-6.SP.B.5:** Summarize numerical data sets in relation to their context. (MS-LS2-2)			Media Literacy (Financial Literacy) • Students are able to identify and critique arguments in which the claims are not consistent with the evidence given. Leadership and Responsibility • Students understand the importance of proper citations and respect for intellectual property rights.

Resources
Text: • Science (2005). Orlando, FL: Harcourt **Materials:** • Chomebooks, coloring materials, lined and unlined paper **Major Assignments (required):** • Mosa Mack ecosystems unit **Major Activities (required):** • Identify abiotic and biotic factors at South Harrison Elementary • Exploring the "Systems" in Ecosystems • Flow of Matter and Energy in Ecosystems SciPack

Unit 3: Interdependent Relationships in Ecosystems	Recommended Duration: (5 Weeks)

Unit Description:
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.

Description of abstract from: http://www.nj.gov/education/modelcurriculum/sci/6u3.pdf

Essential Questions	Enduring Understandings
• How can a single change to an ecosystem disrupt the whole system? • What limits the number and variety of living things in an ecosystem?	• Is it possible for interdependent relationships to exist with only one contributor?

Relevant Standards	Learning Goals	Learning Objectives
Content Standards: Primary or Power **MS-LS2-4:** Students will be able to construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. **MS-LS2-5:** Students will be able to evaluate competing design solutions for maintaining biodiversity and ecosystem services **MS-ETS1-1:** Students will be able to 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:** Students will be able to analyze data from tests to determine similarities and differences among several design solutions to	**NJ SLS MS-LS2-4:** Students will understand ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations (3 weeks) **NJ SLS MS-LS2-5:** Students will understand 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. (1 week) **NJ SLS MS-LS2-5:** Students will be able to understand that biodiversity and Humans Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (1 week)	**NJ SLS MS-LS2-4:** • Students will be able to explain how a single change in an ecosystem can disrupt an entire population. **NJ SLS MS-LS2-5:** • Students will be able to define biodiversity and how it affects an ecosystem. **NJ SLS MS-ETS1-1:** • Students will be able to 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. **NJ SLS MS-ETS1-3:** • Students will be able to analyze data from tests to determine similarities and differences among several design solutions to identify the best

Relevant Standards	Learning Goals	Learning Objectives
identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.		characteristics of each that can be combined into a new solution to better meet the criteria for success.

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments (required)
• Daily Warm up • Exit Slips • Teacher observation • Self-Reflection writing • White board review • Scoot • Task Cards • Educational games	• Interdependence jigsaw research project	Laboratory Activities: • Exploring the "System" in Ecosystem • Interactive independence • http://www.environment.nsw.gov.au/resources/education/BiodiversityTeachersGuide.pdf	• Interdependence research • Food chain gizmo

Possible Assessment Modifications /Accommodations/Differentiation			
Special Education <u>Accommodations</u> • Additional time • Vary test formats • Graphic organizers for written tasks <u>Modifications</u> • Oral testing • Shortened assessments • Simplify task directions <u>Differentiation</u> • Multiple texts (leveled reading) • Small group administration of classroom tests/quizzes as needed and/or available	English Language Learners <u>Accommodations</u> • Allow for oral follow up to written responses <u>Modifications</u> • Oral testing • Simplify instructions <u>Differentiation</u> • Multiple texts (leveled reading)	At Risk Students <u>Accommodations</u> • Allow re-ro/retakes • Use of a checklist as a timeline tool <u>Modifications</u> • Make all or part of the exam oral <u>Differentiation</u> • Multiple texts (leveled reading)	Gifted Students <u>Differentiation</u> • Multiple texts (leveled reading) • Individualized assessment/Independent study additional research into topics

Instructional Strategies
• Structured Overview • Reading • Brainstorming • Think, Pair, Share • Cooperative Learning Groups • Structured Controversy • Writing to Inform • Essays • Research Projects • Assigned Questions • Simulations • Explaining • Levels of Questions

Possible Instructional Modifications /Accommodations/Differentiation			
Special Education	English Language Learners	At Risk Students	Gifted Students
<u>Accommodations</u> • Directions repeated/clarified • Graphic organizers <u>Modifications</u> • Change level of difficulty using choice boards <u>Differentiation</u> • Small group instruction	<u>Accommodations</u> • Graphic organizers <u>Modifications</u> • Reword problems in simplified language <u>Differentiation</u> • Preteach vocabulary • Cooperative learning	<u>Accommodations</u> • Graphic organizers • Review directions individually <u>Differentiation</u> • One on one conferences • Flexible grouping	<u>Differentiation</u> • Provide learning centers where students are in charge of their learning • Brainstorm with gifted children on what types of projects they would like to explore to extend what they're learning in the classroom.

Unit Vocabulary
Essential: Biodiversity, interdependent relationships, mutualism, mutual reliance, symbiosis, equilibrium **Non-Essential:** Food web, food chain, population

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
Literacy- **NJSLS-RST.6-8.1:** Cite specific textual evidence to support analysis of science and technical texts. (MS-LS2-4) **NJSLS-RST.6-8.8:** Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. (MS-LS2-5) **NJSLS-RI.8.8:** Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. (MS-LS2-5) **NJSLS-WHST.6-8.1:** Write arguments to support claims with clear reasons and relevant evidence. (MS-LS2-4),(MS-ETS1-1),(MS-ETS1-3) **NJSLS-WHST.6-8.2:** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS2-2) **NJSLS-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	**NJ SLS 8.1.8.A.4:** Graph and calculate data within a spreadsheet and present a summary of the results **NJ SLS 8.1.8.D.2:** Demonstrate the application of appropriate citations to digital content. **NJ SLS 8.1.8.D.4:** Assess the credibility and accuracy of digital content. **NJ SLS** 8.2.8.A.2: Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system. **NJ SLS 8.2.8.A.4:** Redesign an existing product that impacts the environment to lessen its impact(s) on the environment. **NJ SLS: 8.2.8.C.8:** Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers. **NJ SLS 8.2.8.D.3:** Build a prototype that meets a STEM-based design	_X_ Health Literacy	<u>Creative Thinking and Problem Solving</u> • Students plan and conduct scientific investigations and write detailed explanations based on their evidence. Students compare their explanations to those made by scientists and relate them to their own understandings of the natural and designed worlds. <u>Communication</u> • Students can identify conventions for writing and speaking scientifically that distinguish scientific communication from other types of expression, and describe reasons behind those differences such as the need in science for precision, detail, and evidence over opinion. <u>Collaboration (Civic Literacy)</u> • Students work collaboratively with others, either virtually or face-to-face, while participating in scientific discussions and appropriately using claims, evidence, and reasoning. <u>Information Literacy (Health Literacy)</u> • Students are able to locate reliable scientific information in

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
a flowchart, diagram, model, graph, or table). (MS-ETS1-3) **NJSLS-WHST.6-8.8:** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-ETS1-1) **NJSLS-WHST.6-8.9:** Draw evidence from literary or informational texts to support analysis, reflection, and research. (MS-LS2-2),(MS-LS2-4),(MS-ETS1-3), (MS-ETS1-2) **NJSLS-SL.8.5:** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ETS1-4) *Mathematics*- **NJSLS-MP.4:** Reason abstractly and quantitatively. (MS-ETS1-1),(MS-ETS1-3) **NJSLS-MP.2:** Model with mathematics. (MS-LS2-5) **NJSLS-7.EE.3:** Solve multi-step real-life and mathematical problems posed with	challenge using science, engineering, and math principles that validate a solution.		reputable reference books, back issues of journals and magazines, on websites, and in computer databases. <u>Media Literacy (Financial Literacy)</u> • Students are able to identify and critique arguments in which the claims are not consistent with the evidence given. <u>Leadership and Responsibility</u> • Students understand the importance of proper citations and respect for intellectual property rights.

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-ETS1-1),(MS-ETS1-3) **NJSLS-6.RP.A.3:** Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-LS2-5)			

Resources

Text:

- Science (2005). Orlando, FL: Harcourt

Materials:

- **Chomebooks, science articles, Google slides, worksheets**

Major Assignments (required):

- Interdependence research
- Identifying relationships

Major Activities (required):

- Food chain gizmo

Unit 4: Force and Motion	Recommended Duration: (5 Weeks)
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. Description of abstract from: http://www.nj.gov/education/modelcurriculum/sci/6u4.pdf	

Essential Questions	Enduring Understandings
• How can we predict the motion of an object? • How does mass of an object affect the motion of an object? • How do we experience the force of friction in everyday life?	• How would we be able to describe a real-life event for each of Newton's Laws of motion? • What would happen if we did not have the force of friction? • Why do we have rubber tires instead of tires made out of metal or plastic?

Relevant Standards	Learning Goals	Learning Objectives
Content Standards: Primary or Power **MS-PS2-1:** Students will be able to apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. **MS-PS2-2:** Students will be able to plan an investigation to provide evidence that the	NJ SLS MS-PS2-1: Students will understand 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). (3 weeks) NJ SLS MS-PS2-2:	NJ SLS MS-PS2-1: • Students will be able to Apply Newton's third law to design a solution to a problem involving the motion of two colliding objects NJ SLS MS-PS2-1, NJ SLS MS-ETS1-1, NJ SLS MS-ETS1-2, NJ SLS MS-ETS1-3: • Students will be able to design and build an example showing Newton's Third Law of

Relevant Standards	Learning Goals	Learning Objectives
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:** Students will be able to 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:** Students will be able to evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **MS-ETS1-3:** Students will be able to 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:** Students will be able to 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.	Students will understand 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. (1 week) NJ SLS MS-PS2-2: Students will understand all positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (1 week)	Motion. NJ SLS MS-PS2-2: • Students will be able to explain how Newton's Second Law of Motion tells us to wear a seat belt in a car. NJ SLS MS-PS2-2, NJ SLS MS-ETS1-1, NJ SLS MS-ETS1-2, NJ SLS MS-ETS1-3: • Students will be able to design and build an example showing Newton's Second Law of Motion.

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments (required)
• Daily Warm up • Exit Slips • Teacher observation • Self-Reflection writing • White board review • Scoot • Task Cards • Educational games	• Science Menu • Build a racecar	• Laboratory activities: ○ Balloon Zip line ○ Car Design ○ Speed ○ Varying Mass ○ Varying Force ○ Downhill ○ Uphill Climb ○ Car Collisions ○ Car Course (http://www.t4t.org/wp-content/uploads/2013/08/8th_Grade_Forces-Motion_Overview.pdf) ○ Newton's Cradle ○ 3 Puck Chuck ○ Science of NHL Hockey ○ Acceleration Simulator ○ Collisions and Momentum: Bouncing Balls	• Science Menu • Explore Learning Gizmos • Labs • Connecting Newton's Laws to real life

Possible Assessment Modifications /Accommodations/Differentiation			
Special Education <u>Accommodations</u> • Additional time • Vary test formats • Graphic organizers for written tasks <u>Modifications</u> • Oral testing • Shortened assessments • Simplify task directions	English Language Learners <u>Accommodations</u> • Allow for oral follow up to written responses <u>Modifications</u> • Oral testing • Simplify instructions <u>Differentiation</u> • Multiple texts (leveled reading)	At Risk Students <u>Accommodations</u> • Allow re-ro/retakes • Use of a checklist as a timeline tool <u>Modifications</u> • Make all or part of the exam oral <u>Differentiation</u> • Multiple texts (leveled reading)	Gifted Students <u>Differentiation</u> • Multiple texts (leveled reading) • Individualized assessment/Independent study additional research into topics

Possible Assessment Modifications /Accommodations/Differentiation			
<u>Differentiation</u> • Multiple texts (leveled reading) • Small group administration of classroom tests/quizzes as needed and/or available			

Instructional Strategies
• Structured Overview • Reading • Brainstorming • Think, Pair, Share • Cooperative Learning Groups • Structured Controversy • Writing to Inform • Essays • Research Projects • Assigned Questions • Simulations • Explaining • Levels of Questions

Possible Instructional Modifications /Accommodations/Differentiation			
Special Education	English Language Learners	At Risk Students	Gifted Students
<u>Accommodations</u> • Directions repeated/clarified • Graphic organizers <u>Modifications</u> • Change level of difficulty using choice boards <u>Differentiation</u> • Small group instruction	<u>Accommodations</u> • Graphic organizers <u>Modifications</u> • Reword problems in simplified language <u>Differentiation</u> • Preteach vocabulary • Cooperative learning	<u>Accommodations</u> • Graphic organizers • Review directions individually <u>Differentiation</u> • One on one conferences • Flexible grouping	<u>Differentiation</u> • Provide learning centers where students are in charge of their learning Brainstorm with gifted children on what types of projects they would like to explore to extend what they're learning in the classroom.

Unit Vocabulary
Essential: Force, speed, velocity, acceleration, friction, Newton's First Law of Motion, Newton's Second Law of Motion, Newton's Third Law of Motion **Non-Essential:** Sir Isaac Newton, relativity, mass, weight, reference point, reaction, gravity

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
Literacy- **NJSLS-RST.6-8.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. (MS-PS2-1), (MS-ETS1-1), (MS-ETS1-2) **NJSLS-RST.6-8.3:** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS2-1), (MS-PS2-	**NJ SLS 8.1.8.A.4:** Graph and calculate data within a spreadsheet and present a summary of the results **NJ SLS 8.1.8.D.2:** Demonstrate the application of appropriate citations to digital content. **NJ SLS 8.1.8.D.4:** Assess the credibility and accuracy of digital content.	_X_ Health Literacy	<u>Creative Thinking and Problem Solving</u> • Students plan and conduct scientific investigations and write detailed explanations based on their evidence. Students compare their explanations to those made by scientists and relate them to their own understandings of the natural and designed worlds. <u>Communication</u> • Students can identify conventions for writing and speaking

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
2) **NJSLS-WHST.6-8.8:** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-ETS1-1) **NJSLS-WHST.6-8.9:** Draw evidence from informational texts to support analysis, reflection, and research. (MS-ETS1-2) **NJSLS-RST.6-8.9:** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ETS1-2),(MS-ETS1-3) **NJSLS-WHST.6-8.7:** Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ETS1-2) *Mathematics-*	**NJ SLS** 8.2.8.A.2: Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system. **NJ SLS 8.2.8.A.4:** Redesign an existing product that impacts the environment to lessen its impact(s) on the environment. **NJ SLS: 8.2.8.C.8:** Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers. **NJ SLS 8.2.8.D.3:** Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.		scientifically that distinguish scientific communication from other types of expression, and describe reasons behind those differences such as the need in science for precision, detail, and evidence over opinion. Collaboration (Civic Literacy) • Students work collaboratively with others, either virtually or face-to-face, while participating in scientific discussions and appropriately using claims, evidence, and reasoning. Information Literacy (Health Literacy) • Students are able to locate reliable scientific information in reputable reference books, back issues of journals and magazines, on websites, and in computer databases. Media Literacy (Financial Literacy) • Students are able to identify and critique arguments in which the claims are not consistent with the evidence given. Leadership and Responsibility • Students understand the importance of proper citations

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
NJSLS-MP.2: Reason abstractly and quantitatively. (MS-PS2-1), (MS-PS2-2), (MS-PS2-3), (MS-ETS1-1), (MS-ETS1-2) **NJSLS-6.NS.C.5:** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-PS2-1) **NJSLS-6.EE.A.2:** Write, read, and evaluate expressions in which letters stand for numbers. (MS-PS2-1), (MS-PS2-2) **NJSLS-7.EE.B.3:** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-PS2-1), (MS-PS2-2) **NJSLS-7.EE.B.4:** Use variables to represent quantities in a real-world or mathematical problem, and construct			and respect for intellectual property rights.

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
simple equations and inequalities to solve problems by reasoning about the quantities. (MS-PS2-1), (MS-PS2-2) **NJSLS-7.EE.3:** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-ETS1-1), (MS-ETS1-2)			

Resources
Text: • Science (2005). Orlando, FL: Harcourt **Materials:** • Chomebooks, science articles, Google slides, worksheets **Major Assignments (required):** • Connecting Newton's Laws to real life • Science Menu • Build a racecar **Major Activities (required):** • Explore Learning Gizmos • Labs

Unit 5: Types of Interactions	Recommended Duration: (5 Weeks)
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. Description of abstract from: http://www.nj.gov/education/modelcurriculum/sci/6u5.pdf	

Essential Questions	Enduring Understandings
• Can you apply a force on something without touching it? • How can we tell if an object is repulsive? Attractive? • What happens when we combine electrical and magnetic forces? • How could you increase the strength of an electromagnetic force?	• Is it possible to exert on an object without touching it? • Would it affect the electromagnet if we were to spin a wire around the metal more times? • What would happen if the force of gravity did not exist on Earth and in the solar system?

Relevant Standards	Learning Goals	Learning Objectives
Content Standards: Primary or Power **MS-PS2-3:** Students will be able to ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	NJ SLS MS-PS2-3: Students will understand 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. (1 week)	NJ SLS MS-PS2-3: • Students will be able to explain how to change the strength of an electromagnetic force • Students will be able to conduct an experiment in order to determine how the force of electromagnets change

Relevant Standards	Learning Goals	Learning Objectives
MS-PS2-4: Students will be able to 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:** Students will be able to 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.	NJ SLS MS-PS2-4: Students will understand gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (1 week) NJ SLS MS-PS2-5: Students will understand 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). (3 weeks)	NJ SLS MS-PS2-4: • Students will be able to explain how the mass of two objects will affect the gravitational force • Students will be able to explain how two gravitational forces are always attractive

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments (required)
• Daily Warm up • Exit Slips • Teacher observation • Self-Reflection writing • White board review • Scoot • Task Cards • Educational games	• Unit assessment	• Building a Better Electromagnet • Gravitational interactions (http://bit.ly/1LfQU7u) • Solar System Long Jump • Sun's Gravity (https://betterlesson.com/lesson/636941/why-doesn-t-the-earth-fly-off-into-space)	• Explore Learning Gizmos • Unit vocab word work • Building a Better Electromagnet • Gravitational interactions (http://bit.ly/1LfQU7u)

Possible Assessment Modifications /Accommodations/Differentiation			
Special Education Accommodations • Additional time on assessments • Vary test formats • Graphic organizers for written tasks • Follow up questions to expand on responses Modifications • Oral testing • Shortened assessments • Simplify task directions Differentiation • Multiple texts (leveled reading) • Small group administration of classroom tests/quizzes as needed and/or available	English Language Learners Accommodations • Allow for oral follow up to written responses Modifications • Oral testing • Simplify instructions • Scaffold test questions Differentiation • Multiple texts (leveled reading)	At Risk Students Accommodations • Have students verbally summarize questions or tasks before completing Differentiation • Multiple texts (leveled reading)	Gifted Students Differentiation • Allow students to complete extension activity that goes beyond the assessment

Instructional Strategies
• Structured Overview • Reading • Brainstorming • Think, Pair, Share • Cooperative Learning Groups • Structured Controversy • Writing to Inform • Essays • Research Projects • Assigned Questions

Instructional Strategies
• Simulations • Explaining • Levels of Questions

Possible Instructional Modifications /Accommodations/Differentiation			
Special Education	English Language Learners	At Risk Students	Gifted Students
<u>Accommodations</u> • Model expectations for notes/activity • Graphic organizers <u>Modifications</u> • Change level of difficulty using choice boards <u>Differentiation</u> • Small group instruction	<u>Accommodations</u> • Graphic organizers • Have students clarify/summarize directions <u>Modifications</u> • Reword problems in simplified language <u>Differentiation</u> • Preteach vocabulary • Cooperative learning	<u>Accommodations</u> • Graphic organizers • Review directions individually <u>Differentiation</u> • Flexible grouping	<u>Differentiation</u> • Encourage creative expression and thinking by allowing students to choose how to approach a problem or assignment.

Unit Vocabulary
Essential: Electromagnetic forces, gravitational forces, electrical forces, magnetic forces, attract, repel, exert, magnetic field **Non-Essential:** Force, gravity

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
Literacy- **NJSLS-WHST.11-12.7:** Conduct short as well as more sustained research projects to answer a question	**NJ SLS 8.1.8.A.4:** Graph and calculate data within a spreadsheet and present a summary of the results	_X_ Health Literacy	<u>Creative Thinking and Problem Solving</u> • Students plan and conduct scientific investigations and write detailed explanations based on

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
(including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.(HS-PS2-5), (HS-PS2-3) **NJSLS-WHST.11-12.8:** Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS2-5) **NJSLS-WHST.11-12.9:** Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS2-5) *Mathematics-* **NJSLS-HSN.Q.A.1:** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in	**NJ SLS 8.1.8.D.2:** Demonstrate the application of appropriate citations to digital content. **NJ SLS 8.1.8.D.4:** Assess the credibility and accuracy of digital content. **NJ SLS** 8.2.8.A.2: Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system. **NJ SLS 8.2.8.A.4:** Redesign an existing product that impacts the environment to lessen its impact(s) on the environment. **NJ SLS: 8.2.8.C.8:** Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers. **NJ SLS 8.2.8.D.3:** Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.		their evidence. Students compare their explanations to those made by scientists and relate them to their own understandings of the natural and designed worlds. <u>Communication</u> • Students can identify conventions for writing and speaking scientifically that distinguish scientific communication from other types of expression, and describe reasons behind those differences such as the need in science for precision, detail, and evidence over opinion. <u>Collaboration (Civic Literacy)</u> • Students work collaboratively with others, either virtually or face-to-face, while participating in scientific discussions and appropriately using claims, evidence, and reasoning. <u>Information Literacy (Health Literacy)</u> • Students are able to locate reliable scientific information in reputable reference books, back issues of journals and magazines, on websites, and in computer databases. <u>Media Literacy (Financial Literacy)</u>

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
graphs and data displays. (HS-PS2-5), (HS-PS2-4) **NJSLS-HSN.Q.A.2:**Define appropriate quantities for the purpose of descriptive modeling. (HS-PS2-5), (HS-PS2-4) **NJSLS-HSN.Q.A.3:** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS2-5), (HS-PS2-4) **NJSLS-MP.2:** Reason abstractly and quantitatively. (HS-PS2-4) **NJSLS-MP.4:** Model with mathematics. (HS-PS2-4) **NJSLS-HSA.SSE.A.1:** Interpret expressions that represent a quantity in terms of its context. (HS-PS2-4) **NJSLS-HSA.SSE.B.3:** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (HS-PS2-4)			• Students are able to identify and critique arguments in which the claims are not consistent with the evidence given. <u>Leadership and Responsibility</u> • Students understand the importance of proper citations and respect for intellectual property rights.

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills

Resources

Text:

- Science (2005). Orlando, FL: Harcourt

Materials:

- Chromebooks, calculators, 4 to 5 nails or bolts made of different materials, D batteries, Battery Holders/Clips, 1 piece of #22 coated wire about 80cm long, 3 -4 pieces of hookup wire #22 about 20cm long

Major Assignments (required):

- Explore Learning Gizmos
- Unit vocabulary word work

Major Activities (required):

- Building a better Electromagnet
- Gravitational Interactions (http://bit.ly/1LfQU7u)

Unit 6: Astronomy	Recommended Duration: (4 Weeks)
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. Description of abstract from: http://www.nj.gov/education/modelcurriculum/sci/6u6.pdf	

Essential Questions	Enduring Understandings
• 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?	• What would happen if the moon did not exist in the earth-sun-moon system? • Are moon phases visible the same way around the globe at the same exact time? • What would happen to the seasons on Earth if it did not have a tilted axis? • Do we see eclipses every time there is a full or new moon?

Relevant Standards	Learning Goals	Learning Objectives
Content Standards: Primary or Power **MS-ESS1-1:** Students will be able to 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:** Students will be able to develop	NJ SLS MS-ESS1-1: Students will understand patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (2 weeks) NJ SLS MS-ESS1-2, NJ SLS MS-ESS1-3: Students will understand the solar system consists	NJ SLS MS-ESS1-1: • Students will be able to develop a model of the Earth-sun-moon system • Students will be able to describe the cyclic patterns of lunar phases

Relevant Standards	Learning Goals	Learning Objectives
and use a model to describe the role of gravity in the motions within galaxies and the solar system. **MS-ESS1-3:** Students will be able to analyze and interpret data to determine scale properties of objects in the solar system.	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. (1 week) NJ SLS MS-ESS1-1: Students will understand this 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. (1 week)	• Students will be able to explain the positions of the Earth-sun-moon system in order to see solar and lunar eclipses • Students will be able to describe what would happen to the seasons on Earth if there was no axis tilt NJ SLS MS-ESS1-2: • Students will be able to describe the role of gravity in the solar system NJ SLS MS-ESS1-3: • Students will be able to graph data to show the scale properties of objects in the solar system

Formative Assessments	Summative Assessments	Performance Assessments	Major Activities/ Assignments (required)
• Daily Warm up • Exit Slips • Teacher observation • Self-Reflection writing • White board review • Scoot • Task Cards • Educational games	• Unit Assessments • Myths of the eclipse research project	• Lunar Lollipops (https://betterlesson.com/lesson/639051/lunar-lollipops) • Seasons gizmo	• Solar System Sentence Strip (https://betterlesson.com/lesson/638954/solar-system-sentence-strip) • Seasons gizmo • Mosa Mack comic book

Possible Assessment Modifications /Accommodations/Differentiation			
Special Education Accommodations • Additional time on assessments • Vary test formats	English Language Learners Accommodations • Allow for oral follow up to written responses	At Risk Students Accommodations • Have students verbally summarize questions or tasks	Gifted Students Differentiation • Allow students to complete extension activity that goes

Possible Assessment Modifications /Accommodations/Differentiation			
• Graphic organizers for written tasks • Follow up questions to expand on responses <u>Modifications</u> • Oral testing • Shortened assessments • Simplify task directions <u>Differentiation</u> • Multiple texts (leveled reading) • Small group administration of classroom tests/quizzes as needed and/or available	<u>Modifications</u> • Oral testing • Simplify instructions • Scaffold test questions <u>Differentiation</u> • Multiple texts (leveled reading)	before completing <u>Differentiation</u> • Multiple texts (leveled reading)	beyond the assessment

Instructional Strategies
• Structured Overview • Reading • Brainstorming • Think, Pair, Share • Cooperative Learning Groups • Structured Controversy • Writing to Inform • Essays • Research Projects • Assigned Questions • Simulations • Explaining • Levels of Questions

Possible Instructional Modifications /Accommodations/Differentiation			
Special Education	English Language Learners	At Risk Students	Gifted Students
<u>Accommodations</u> • Model expectations for notes/activity • Graphic organizers <u>Modifications</u> • Change level of difficulty using choice boards <u>Differentiation</u> • Small group instruction	<u>Accommodations</u> • Graphic organizers • Have students clarify/summarize directions <u>Modifications</u> • Reword problems in simplified language <u>Differentiation</u> • Preteach vocabulary • Cooperative learning	<u>Accommodations</u> • Graphic organizers • Review directions individually <u>Differentiation</u> • Flexible grouping	<u>Differentiation</u> Encourage creative expression and thinking by allowing students to choose how to approach a problem or assignment.

Unit Vocabulary
Essential: Lunar phases, eclipses of the sun and moon, seasons, gravitational pull, rotation, revolution, orbit, axis, umbra, penumbra, winter solstice, summer solstice, vernal equinox, autumnal equinox, **Non-Essential:** Sun, moon, Earth, asteroids, Tropic of Cancer, Tropic of Capricorn, Equator

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
<u>Literacy-</u> **NJSLS-RST.6-8.1:** Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3) **NJSLS-RST.6-8.7:** Integrate quantitative or technical information expressed in words in a text with a	**NJ SLS 8.1.8.A.4:** Graph and calculate data within a spreadsheet and present a summary of the results **NJ SLS 8.1.8.D.2:** Demonstrate the application of appropriate citations to digital content.	_X_ Health Literacy	<u>Creative Thinking and Problem Solving</u> • Students plan and conduct scientific investigations and write detailed explanations based on their evidence. Students compare their explanations to those made by scientists and relate them to their own understandings of the natural and designed worlds.

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS1-3) **NJSLS-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) *Mathematics-* **NJSLS-6.RP.A.1:** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3) **NJSLS-7.RP.A.2:** Recognize and represent proportional relationships between quantities. (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3) **NJSLS-6.EE.B.6:** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS1-2) **NJSLS-7.EE.B.6:** Use variables to represent quantities in a real-world or	**NJ SLS 8.1.8.D.4:** Assess the credibility and accuracy of digital content. **NJ SLS** 8.2.8.A.2: Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system. **NJ SLS 8.2.8.A.4:** Redesign an existing product that impacts the environment to lessen its impact(s) on the environment. **NJ SLS: 8.2.8.C.8:** Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers. **NJ SLS 8.2.8.D.3:** Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.		Communication • Students can identify conventions for writing and speaking scientifically that distinguish scientific communication from other types of expression, and describe reasons behind those differences such as the need in science for precision, detail, and evidence over opinion. Collaboration (Civic Literacy) • Students work collaboratively with others, either virtually or face-to-face, while participating in scientific discussions and appropriately using claims, evidence, and reasoning. Information Literacy (Health Literacy) • Students are able to locate reliable scientific information in reputable reference books, back issues of journals and magazines, on websites, and in computer databases. Media Literacy (Financial Literacy) • Students are able to identify and critique arguments in which the claims are not consistent with the evidence given.

Interdisciplinary Connections (Applicable Standards)	Integration of Technology	21st Century Themes	21st Century Skills
mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS-ESS1-2)*			<u>Leadership and Responsibility</u> • Students understand the importance of proper citations and respect for intellectual property rights.

Resources
Text: • Science (2005). Orlando, FL: Harcourt **Materials:** • Styrofoam balls, tacky glue, craft sticks, lamp, construction paper, whiffle ball, string, construction paper, coloring supplies, sharpies **Major Assignments (required):** • Lunar Lollipops (https://betterlesson.com/lesson/639051/lunar-lollipops) • Sun's Gravity (https://betterlesson.com/lesson/636941/why-doesn-t-the-earth-fly-off-into-space) **Major Activities (required):** • Solar System Sentence Strip (https://betterlesson.com/lesson/638954/solar-system-sentence-strip)