Stafford Township School District

Science Curriculum
Grade 6

2020 New Jersey Student Learning Standards - Science

https://www.nj.gov/education/standards/science/Docs/NJSLS-Science_K-12.pdf

Original Adoption: September 12, 2022

Mission

Stafford Township School District, together with parents/guardians and community, shall provide a secure, nurturing environment that promotes a positive self-image through solid educational achievements that promote attainment of the core curriculum content standards and promotes behavior enabling our students to become life-long learners in a technological society.

Philosophy

The purpose of the Stafford Township School District Science Curriculum is to develop scientific understanding and civic efficacy (the readiness and willingness to assume citizenship responsibilities and to make informed and reasoned decisions for the public good as citizens). The New Jersey Student Learning Standards for Science reflect the belief that all students can and must learn enough science to assume their role as concerned citizens, equipped with necessary information and decision-making skills.

The need for scientific literacy in today's increasingly technological world, for fundamental reforms in how science is taught, and for established standards in science education are by now well-known and documented. Presidential appeals for excellence, combined with expressions of concern from scientists and educators, have led to national, state, and local initiatives. New Jersey is host to an impressive array of scientific and technological industries, and should play a leadership role in the development and implementation of standards for the teaching and learning of science.

Promoting and respecting individual student growth, the science program recognizes that:

- Students gain an understanding and appreciation of science and its impact on daily life.
- Develop critical thinking skills which enable them to function as lifelong learners and to examine and evaluate issues of importance to all Americans.
- Acquire basic literacy in the core disciplines of science and have the understandings needed to apply this knowledge to their lives as citizens.
- Understand science as the context for future environmental awareness.
- Participate in activities that enhance the common good and increase the general welfare.

As a result, teachers in the Stafford Township School District have clear responsibilities to help all children think, read, write, listen, and speak. Therefore, they will:

- Have high expectations for all students.
- Promote the teaching of critical thinking.
- Value the needs of students as key elements in instructional planning.
- Provide adequate resources for children to explore the content area.
- Relate current events as needed to enhance content area instruction.
- Communicate regularly and clearly with parents/guardians and encourage them to be a part of the learning process.
- Teach the full spectrum of science outlined by the provided strands

Primary Interdisciplinary Connections: Language Arts, Math, Technology

Inclusivity/LGBTQ/Disabilities

New Jersey Legislation C.18A:35-4.35 requires that the history of disabled and LGBT persons be included in middle and high school curriculum. Instruction shall focus on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards. In addition, policies, and procedures pertaining to inclusive instructional materials are outlined in Legislation C.18A:35-4.36. Schools shall adopt inclusive instructional materials that portray the cultural and economic diversity of society including the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, where appropriate. The instruction and materials of the course will be made inclusive and representative of all individuals and various groups of people. This course will address the following:

- Address how students feel about the group(s) they identify with and if they are represented in the texts, visual/media representations and materials used in Science.
- Always address and discuss whose voice is missing from readings and materials used in class
- Choose themes in literature that bring LGBTQ perspectives, issues and ideas to teach tolerance and reflect the diversity of our student population.
- Read novels and use material that represent the LGBTQ community and people with disabilities.
- Encourage student independent reading that incorporates experiences and perspectives that differ from their own identify in order to create a more positive concept of LGBTQ students.
- Read LGBTQ-themed literature to combat stereotypes and prejudices. In addition, address stereotypes and promote inclusive conservations about LGBTQ persons and people with disabilities through reading.

- Introduce multifaceted perspectives and themes that reflect student diversity and enable students to explore this through writing
- Assign activities that involve reading, writing and reflecting on the political, economic, and social contributions of persons with disabilities and members of the LGBTQ community.
- Avoid binary assumptive language and use appropriate gender inclusive language in the classroom. In addition, use appropriate gender terms, preferred names, and inclusive language to ensure all students feel safe and represented in the educational process.
- Allow students to choose a topic that interests them and provide multiple avenues to approach their final project.
- Make modifications to accommodate any students with specific needs, views and experience

Unit 1: Introduction to Engineering and Design	**Duration:** 10 days (September) ongoing

Standards	
MS-ETS1-1.	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2.	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3.	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4.	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Science and Engineering Practices	**Discipline Core Ideas/Unit Enduring Understandings**	**Crosscutting Concepts**
Asking Questions and Defining Problems- • Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions	**ETS1.A: Defining and Delimiting Engineering Problems-** • The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions.	**Influence of Science, Engineering, and Technology on Society and the Natural World-** • All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.
Engaging in Argument from Evidence- • Evaluate competing design solutions based on jointly	**ETS1.B: Developing Possible Solutions-**	**Cause and Effect-** • Cause and effect relationships may be used to predict

developed and agreed-upon design criteria.	• There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.	phenomena in natural or designed systems.
Analyzing and Interpreting Data • Analyze and interpret data to determine similarities and differences in findings.	**ETS1.B: Developing Possible Solutions-** • There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. **ETS1.C: Optimizing the Design Solution-** • Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design.	A system is an organized group of related objects or components: models can be used for understanding and predicting the behavior of systems.
Developing and Using Models- • Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.	**ETS1.B: Developing Possible Solutions-** • A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. Models of all kinds are important for testing solutions. **ETS1.C: Optimizing the Design Solution-**	**Systems & Systems Models-** • A system is an organized group of related objects or components: models can be used for understanding and predicting the behavior of systems.

	• The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.	

	Interdisciplinary Connections
	ELA Standards
RI.6.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
W.6.10	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
SL.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
	Math Standards
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.
	Social Studies Standards
6.2.8EconG.3.a:	Explain how the classical civilizations used technology and innovation to enhance agricultural/manufacturing output and commerce, to expand military capabilities, to improve life in urban areas, and to allow for greater division of labor
	Computer Science and Design Thinking
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
	Career Readiness, Life Literacies and Key Skills This outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K-12 academic and technical content areas, the 2020 New Jersey Student Learning Standards — Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy. https://www.nj.gov/education/standards/clicks/index.shtml **9.1 Personal Financial Literacy**

	This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers. **9.2 Career Awareness, Exploration, and Preparation** This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. **9.3 Career and Technical Education** This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. **9.4 Life Literacies and Key Skills** This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy. **Career Readiness, Life Literacies, and Key Skills** 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a). 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3). 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Essential Understandings	**Essential Questions**
Students will understand that... ● Science helps man to understand the natural world while engineering helps man to manipulate the natural world in order to solve problems. ● Asking questions helps define problems and create solutions. ● Models can help explain natural phenomena and communicate ideas. ● Analyzing data and testing results can lead to improvements in engineering designs.	● What are the steps of the Engineering Design Process? ● How do we apply the Engineering Design Process to create solutions to real-world problems? ● How do we determine when solutions are effective? ● What careers utilize the Engineering Design Process?
Evidence of Student Learning	
Performance Tasks: *Activities to provide evidence for student learning of content and cognitive skills.*	**Other Assessments**

Spaghetti Towers - Students work in teams to apply the Engineering Design Process to build a spaghetti tower strong enough to support a large marshmallow.	**Formative Assessments** ● Teacher Observation ● Question and Answer ● Conferencing **Summative Assessments** ● Engineering-based Projects and Explorations ● Criterion-based Rubrics ● Benchmark **Benchmark Assessment** ● Science A-Z Benchmark Assessment **Alternative Assessments** ● Group Work/Class Discussion Rubric ● Guided Observations ● Questions Starters ● Participation Rubric ● Modified Tests/Quizzes/Classwork ● Science A-Z Activities ● Science Related Reading A-Z Activities ● Science Related Achieve3000 Articles and Activities ● Mystery Science Activities ● Fundamentals Unlimited Books and Assessments
Knowledge and Skills	
Content	**Skills**
Students will know... ● That the Engineering Design Process (EDP) is a series of five steps applied cyclically. ● How to safely utilize all equipment, materials, and furniture in the STEAM Lab. ● The various cooperative learning jobs available in the engineering teams.	*Students will be able to …* ● Work in teams to solve engineering challenges. ● Apply the Engineering Design Process to solve engineering challenges. ● Identify careers that utilize the Engineering Design Process.
Instructional Plan	
Suggested Activities	**Resources**

Toothpick Bridge: familiarize students with the design process. This activity requires students to enlist their innovation and creativity and practice making claims based on evidence.	Resources in the Science closet, in the science binder.
Robotics: Students will choose from multiple different robotic projects to show an understanding of the design process.	http://www.sciencebuddies.org/science-fair-projects/search.shtml?v=ia&ia=Robotics
Ping Pong Catapult: students will find the right setting to reliably launch a ping-pong ball from the catapult into a target from a certain distance away	http://www.sciencebuddies.org/science-fair-projects/project-ideas/ApMech_p008/mechanical-engineering/ping-pong-catapult
Slinking Slinkiest: Students will investigate how the angle of an inclined planes affects how a slinky can walk down an incline plane. Students will investigate different inclines and build one in a team. Each team will test their incline out with a slinky and be rated on effectiveness.	http://www.sciencebuddies.org/science-fair-projects/project_ideas/ApMech_p019.shtml
Literature	
● *Technology: A Byte-Sized World!* by Dan Green ● *Hidden Worlds: Looking Through a Scientist's Microscope* by Stephen Kramer ● *Hit it! History of Tools* by Donna H. Rice ● *Design Thinking* by Kristin Fontichiaro **Inclusivity/LGBTQ and Individuals with Disabilities Resources** BrainPop Inclusivity List NOGLSTP	
Websites	
http://stemcollaborative.org/additionalResources.html (resource of STEM activities) This website provides many activities for the students and teachers to use.	https://www.nsf.gov/news/classroom/engineering.jsp (National Science Foundation engineering classroom resources) This website will provide the students with important information.
https://www.teachengineering.org/ (standards-aligned engineering lessons and hands-on activities for science, engineering, and math)	http://pbskids.org/designsquad/parentseducators/index.html (resource of STEM activities)
http://tryengineering.org/lesson-plans (not-for-profit organization of technology professionals dedicated to advancing technology for the benefit of humanity)	http://teachers.egfi-k12.org/category/lessons/grades-6-8-lessons/ (resource of classroom engineering projects and professional development)

<table>
<tr><td>http://stem-works.com/ (resource of STEM activities)</td><td>http://www.sciencebuddies.org/science-fair-projects/teacher_resources.shtml (resource of classroom science activities and projects)</td></tr>
<tr><td>Individuals with disabilities Resources
https://www.mentalfloss.com/article/87068/12-disabled-scientists-who-made-world-better-place
https://www.sciencenewsforstudents.org/article/disabilities-dont-stop-these-experts-science-and-tech
https://www.sciencehistory.org/science-and-disability
https://whyy.org/articles/new-philly-exhibit-celebrates-lives-contributions-of-scientists-with-disabilities/</td><td>LGBTQ plus Resources
https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World
https://www.osc.org/important-lgbtq-scientists-who-left-a-mark-on-stem-fields/
https://www.ideatovalue.com/insp/nickskillicorn/2019/06/14-lgbtq-innovators-inventors-and-scientists-who-changed-the-world/
https://www.pinknews.co.uk/2018/07/05/queer-scientists-history-first-lgbtstemday/</td></tr>
<tr><td colspan="2">Accommodations & Modifications</td></tr>
<tr><td colspan="2">English Language Learners
Provide an alarm to help with time management.
Pair with a peer tutor.
Give extra time to process oral information and directions.
Provide audio books if available.
Speak slowly, distinctly, and write down key terms
Closed Captioning
Emphasize visual literacy
Graphic Organizers
Use charts, graphs and figures
Group projects & cooperative learning
Partner English learners with strong English speakers
Consistent routines
Outlines
Language-based science games
Picture glossary
Root words</td></tr>
<tr><td colspan="2">Gifted and Talented
Interdisciplinary and problem-based assignments with planned scope and sequence
Advance, accelerated, or compacted content
Abstract and advanced higher-level thinking</td></tr>
</table>

● Allowance for individual student interests ● Assignments geared to development in areas of affect, creativity, cognition, and research skills ● Complex, in-depth assignments ● Diverse enrichment that broadens learning ● Variety in types of resources ● Open-ended questions for higher-level thinking ● Higher-level text
Basic Skills ● Provide extra time ● Pre-teach vocabulary using visuals and gestures ● Chunk texts ● Summarize as you go ● Preview lessons ● Graphic organizers ● Highlight key words ● Sentence starters ● Prompting and cuing ● Activate schema ● Build background knowledge
Economically Disadvantaged ● Provide extra time ● Pre-teach vocabulary using visuals and gestures ● Chunk texts ● Summarize as you go ● Preview lessons ● Graphic organizers ● Highlight key words ● Sentence starters ● Prompting and cuing ● Activate schema ● Build background knowledge
Students with IEPs ● Follow all IEP modifications ● Teacher tutoring ● Peer tutoring ● Cooperative learning groups

- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Have a designated reader
- Hear instructions orally
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of a lesson
- Use visual presentations of verbal material, such as word webs and visual organizers
- Be given a written list of instructions
- Give responses in a form (oral or written) that's easier for student
- Dictate answers to a scribe
- Capture responses on an audio recorder
- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table of "math facts"
- Work or take a test in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher)
- Use special lighting or acoustics
- Take a test in small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task
- Take more time to complete a project

Students with 504 plan

- Follow all 504 plan modifications
- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text

- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of a lesson
- Use visual presentations of verbal material, such as word webs and visual organizers
- Be given a written list of instructions
- Give responses in a form (oral or written) that's easier for student
- Dictate answers to a scribe
- Capture responses on an audio recorder
- Take more time to complete a project, task or test

Students at Risk of Failure:

- Strategic grouping
- Pre-teach concepts
- Small group for assessments
- Check in's during experiments to help refocus
- Incorporate social/emotional discussions
- Encourage and monitor positive peer collaboration
- Provide academic resources for both home and school use
- Provide incentives to increase motivation and collaboration

Unit 2: Waves and Electromagnetic Radiation		**Duration:** 11 days (October)
Standards		
MS-PS4-1	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. [Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.] [Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves.]	
PS4.B	Explain why we can see the color of an object in space but cannot hear sound.	
PS4.B	Use ray diagrams to explain how refracted light and reflected light bring images of distant objects closer and enlarge things that are too small to be observed with an unaided eye.	
PS4.C	Create a simple model that explains the mechanism for how wave pulses are used to save, transmit, and receive information.	
MS-PS4-2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.]	
MS-PS4-3	Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. [Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in WIFI devices, and conversion of stored binary patterns to make sound or text on a computer screen.] [Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.]	
Science and Engineering Practices	**Discipline Core Ideas/Unit Enduring Understandings**	**Crosscutting Concepts**
Planning and Carrying Out Investigations- Conduct an investigation and evaluate the experimental design to produce data to serve as the basis for evidence that can meet the goals of the investigation.	**PS2.B: Types of Interactions-** Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively).	**Cause and Effect-** Cause and effect relationships may be used to predict phenomena in natural or designed systems.
	Interdisciplinary Connections	
	ELA Standards	

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Essential Understandings	**Essential Questions**
Students will understand that... ● *Students will understand that…* ● Mechanical waves transfer energy from particle to particle in matter. ● Electromagnetic waves transfer energy through either matter or empty space.	● What is the difference between electromagnetic waves and mechanical waves as they relate to the transfer of energy? ● Explain how knowledge of waves helps us understand our world better and improve the quality of our lives?

Evidence of Student Learning

Performance Tasks: *Activities to provide evidence for student learning of content and cognitive skills.*	**Other Assessments**
Use what you've learned about transfer of thermal energy to draw a diagram showing convection in a gas or liquid. Use arrows to indicate the movement of warm and cool currents in the gas or liquid. Or Draw a diagram of a circuit that includes a battery and three light bulbs. The circuit should be wired in such a way that if any one of the bulbs is removed, the other two will stay lit.	**Formative Assessments** ● Graphic Organizers & Guided Note Taking ● Directed Reading ● Cooperative Group Learning ● Homework ● Journal Entries **Summative Assessments** ● RST- Research Simulation Task ● Unit tests and quizzes ● Labs and engineering based projects **Benchmark Assessment** • Science A-Z Benchmark Assessment **Alternative Assessments** • Group Work/Class Discussion Rubric

	• Guided Observations • Questions Starters • Participation Rubric • Modified Tests/Quizzes/Classwork • Science A-Z Activities • Science Related Reading A-Z Activities • Science Related Achieve3000 Articles and Activities • Mystery Science Activities • Fundamentals Unlimited Books and Assessments
Knowledge and Skills	
Content	**Skills**
Students will know... ● how light interacts with matter ● the properties of sound waves ● how waves are produced ● the ways in which waves interact with matter ● how light differs from other forms of electromagnetic waves. ● the difference between electromagnetic and mechanical waves ● the factors that affect the strength of electric and magnetic forces (properties of waves)	*Students will be able to …* ● Design an invention or model that uses two or three different kinds of electromagnetic waves. ● Produce sound at different pitches and investigate how changing wavelength and frequency changes pitch. ● Distinguish between mechanical and electromagnetic waves and their role in the transfer of energy though models. ● Conduct an experiment to interpret the interactions between mechanical waves. ● Demonstrate how waves transfer energy
Instructional Plan	
Suggested Activities	**Resources**
Newton Ball Demo - Swing Time -The students will see how energy changes and moves from place to place.	Resources will be in the science closet.
Rubber Band Car or Airplane -The students will see potential and kinetic energy at work by building your own rubber band-powered car!	Skill Sharpeners -Science Evan Moor - binder created - will be housed in science lab
Slinky's Making Waves - students will observe the transfer of energy - energy carried by waves, water, light and sound.	Resources will be in the science closet.

<table>
<tr><td>Purple Swirl - Thermal Energy Activity - The students will see the effects of heat transfer in action - thermal energy does all the work.</td><td>Skill Sharpeners -Science Evan Moor - binder created - will be housed in science lab</td></tr>
<tr><td>Students will construct periscopes to demonstrate refraction and reflection of light.</td><td>http://www.exploratorium.edu/science_explorer/periscope.html</td></tr>
<tr><td colspan="2">Literature</td></tr>
<tr><td colspan="2">● The Attractive Story of Magnetism with Max Axiom, Super Scientist by Andrea Gianopoulos
● Sound Waves by Ian Mahaney
● Energy from Water: Hydroelectric, Tidal, and Wave Power by Nancy Dickmann

<u>Inclusivity/LGBTQ and Individuals with Disabilities Resources</u>
BrainPop Inclusivity List
NOGLSTP</td></tr>
<tr><td colspan="2">Websites</td></tr>
<tr><td>http://sciencenetlinks.com/lessons/light-1-making-light-of-science/ (exploration of visible light)</td><td>http://www.ducksters.com/science/light_spectrum.php (background information on light spectrum)</td></tr>
<tr><td>http://www.discoveryeducation.com/teachers/free-lesson-plans/the-electromagnetic-spectrum-waves-of-energy.cfm (electromagnetic spectrum lesson)</td><td>http://www.scienceinschool.org/2009/issue12/microwaves (microwave experiments)</td></tr>
<tr><td>https://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_soundandlight/cub_soundandlight_lesson7.xml (lesson on visible light and the electromagnetic spectrum)</td><td>http://www2.parkland.edu/planetarium/_documents/CosmicColorsTeachersGuide.pdf (color spectrum lesson)</td></tr>
<tr><td>Individuals with disabilities Resources
○ https://www.mentalfloss.com/article/87068/12-disabled-scientists-who-made-world-better-place
○ https://www.sciencenewsforstudents.org/article/disabilities-dont-stop-these-experts-science-and-tech
○ https://www.sciencehistory.org/science-and-disability
○ https://whyy.org/articles/new-philly-exhibit-celebrates-lives-contributions-of-scientists-with-disabilities/</td><td>LGBTQ plus Resources
○ https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World
○ https://www.osc.org/important-lgbtq-scientists-who-left-a-mark-on-stem-fields/
○ https://www.ideatovalue.com/insp/nickskillicorn/2019/06/14-lgbtq-innovators-inventors-and-scientists-who-changed-the-world/
○ https://www.pinknews.co.uk/2018/07/05/queer-scientists-history-first-lgbtstemday/</td></tr>
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English Language Learners

- Provide an alarm to help with time management.
- Pair with a peer tutor.
- Give extra time to process oral information and directions.
- Provide audio books if available.
- Speak slowly, distinctly, and write down key terms
- Closed Captioning
- Emphasize visual literacy
- Graphic Organizers
- Use charts, graphs and figures
- Group projects & cooperative learning
- Partner English learners with strong English speakers
- Consistent routines
- Outlines
- Language-based science games
- Picture glossary
- Root words

Gifted and Talented

- Interdisciplinary and problem-based assignments with planned scope and sequence
- Advance, accelerated, or compacted content
- Abstract and advanced higher-level thinking
- Allowance for individual student interests
- Assignments geared to development in areas of affect, creativity, cognition, and research skills
- Complex, in-depth assignments
- Diverse enrichment that broadens learning
- Variety in types of resources
- Open-ended questions for higher-level thinking
- Higher-level text

Basic Skills

- Provide extra time
- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words

- Sentence starters
- Prompting and cuing
- Activate schema
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Students with IEPs

- Follow all IEP modifications
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- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Have a designated reader
- Hear instructions orally
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of a lesson
- Use visual presentations of verbal material, such as word webs and visual organizers
- Be given a written list of instructions
- Give responses in a form (oral or written) that's easier for student
- Dictate answers to a scribe
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- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table of “math facts”
- Work or take a test in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher)
- Use special lighting or acoustics
- Take a test in small group setting
- Use sensory tools such as an exercise band that can be looped around a chair’s legs (so fidgety kids can kick it and quietly get their energy out)
- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task
- Take more time to complete a project

Students with 504 plan

- Follow all 504 plan modifications
- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
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Take more time to complete a project, task or test

Students at Risk of Failure:

- Strategic grouping
- Pre-teach concepts
- Small group for assessments

- Check in’s during experiments to help refocus
- Incorporate social/emotional discussions
- Encourage and monitor positive peer collaboration
- Provide academic resources for both home and school use
- Provide incentives to increase motivation and collaboration

Unit 3: Structure, Function, and Information Processing (Cells)	**Duration:** 14 days (November – December)

Standards	
MS-LS1-1	Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. [Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and nonliving things, and understanding that living things may be made of one cell or many and varied cells.]
MS-LS1-2	Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. [Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [*Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.*]
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
LS1.D	Develop a model to explain how senses change energy coming from the environment (light, sound waves, chemicals in gases or food, heat or touch/pressure) into electrical signals in the nerves that go into the brain and spinal cord. [*Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.*]
MS-LS1-8	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. [*Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.*]

Science and Engineering Practices	**Discipline Core Ideas/Unit Enduring Understandings**	**Crosscutting Concepts**
Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. • Develop and use a model to describe phenomena. (MS-LS1-1,2,3) (MS-PS1-2) • Develop a model to describe unobservable mechanisms. (MS-LS1-2,7)	**LS1.A: Structure and Function** • All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1,2,3) • Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2, MS-LS1-6, MS-LS1-7) (MS-PS1-2)	**Cause and Effect** • Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-6,7,8) (MS-PS1-2) **Scale, Proportion, and Quantity** • Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-6,7,8) **Systems and System Models** • Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3,4,6) (MS-PS1-2)

Planning and Carrying Out Investigations Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions. • Conduct an investigation to produce data to serve as the basis for evidence that meets the goals of an investigation. (MS-LS1-3,4,5,6) **Engaging in Argument from Evidence** Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s). • Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon. (MS-LS1-3,4,6) **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in 6-8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods. Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are	• In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-2,3) **LS1.D: Information Processing** Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)	**Structure and Function** • Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-1,2,3) **Energy and Matter** • Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-2,3,6,8) ***Connections to Engineering, Technology and Applications of Science*** **Interdependence of Science, Engineering, and Technology** • Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1-4) ***Connections to Nature of Science*** **Science is a Human Endeavor** Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-4)

supported or not supported by evidence. (MS-LS1-1,2,3,4,5,6,7,8)		

	Interdisciplinary Connections
	ELA Standards
RI.6.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
W.6.10	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
SL.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
	Math Standards
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.
	Social Studies Standards
6.2.8Econ G.3.a:	Explain how the classical civilizations used technology and innovation to enhance agricultural/manufacturing output and commerce, to expand military capabilities, to improve life in urban areas, and to allow for greater division of labor
	Computer Science and Design Thinking
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
	Career Readiness, Life Literacies and Key Skills This outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K-12 academic and technical content areas, the 2020 New Jersey Student Learning Standards — Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy. https://www.nj.gov/education/standards/clicks/index.shtml **9.1 Personal Financial Literacy** This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers. **9.2 Career Awareness, Exploration, and Preparation**

	This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. **9.3 Career and Technical Education** This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. **9.4 Life Literacies and Key Skills** This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy. **Career Readiness, Life Literacies, and Key Skills** 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a). 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3). 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Essential Understandings	**Essential Questions**
Students will understand that... ● Living organisms are composed of cellular units (structures) that carry out functions required for life. ● Cellular units are composed of molecules, which also carry out biological functions. ● In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.	● How do the structures of organisms contribute to life's functions? ● What do all living things have in common?

Evidence of Student Learning

Performance Tasks: *Activities to provide evidence for student learning of content and cognitive skills.*	**Other Assessments**
Edible Cell: Students create an animal or a plant cell using various candies. They must know all of the names of the parts of the cell and describe them once their creation is completed. http://grad.bio.uci.edu/ecoevo/ahebling/Research/GK-12_files/EdibleCell.pdf	**Formative Assessments** ● Graphic Organizers & Guided Note Taking ● Directed Reading ● Cooperative Group Learning ● Homework ● Journal Entries

Additional resources found in the Science Lab Binder	**Summative Assessments** ● RST- Research Simulation Task ● Unit tests and quizzes ● Labs and engineering based projects **Benchmark Assessment** ● Science A-Z Benchmark Assessment **Alternative Assessments** ● Group Work/Class Discussion Rubric ● Guided Observations ● Questions Starters ● Participation Rubric ● Modified Tests/Quizzes/Classwork ● Science A-Z Activities ● Science Related Reading A-Z Activities ● Science Related Achieve3000 Articles and Activities ● Mystery Science Activities ● Fundamentals Unlimited Books and Assessments
Knowledge and Skills	
Content	**Skills**
Students will know... ● the parts and use of a compound microscope ● know the major contributors to cell theory ● cell structure and specialized function of each organelle in a plant and animal cell ● Multicellular organisms begin as a single cell. ● Organisms grow and develop as a result of cell division. ● the levels of organization within an organism ● that each sense receptor responds to different inputs (electromagnetic, mechanical, chemical) transmitting them as signals that travel along the nerve cells to the brain resulting in immediate behaviors and memories	*Students will be able to …* ● Demonstrate how to correctly use the compound microscope. ● Describe the structure and function of each organelle in a plant and animal cell. ● Compare and contrast structures of different types of cells and relate the structures to the functions the different cells perform. ● Understand the different levels of organization within an organism.
Instructional Plan	
Suggested Activities	**Resources**

Animal Cell Activity - The students will understand that all organisms are composed of cells that carry on the many functions needed to sustain life. Students will play a game to understand.	Models are in the science lab and the lesson is in the Science Lab Binder. http://sciencenetlinks.com/student-teacher-sheets/comparing-cell-factory-answer-key
Moving Through - The students will conduct an experiment where substances move in and out of a plastic bag by diffusion	Lab Investigation Sheet in Science Lab Binder - Student Resource A47 from the Houghton Mifflin Science Book.
Cells and Disease: Infectious Disease Activity - Students will simulate the spread of infectious disease. A simulation will show how an infectious disease can spread from one infected person to other people, who in turn infect others.	Materials and written lessons are in the Science Lab Binder. http://www.pbs.org/wgbh/nova/education/activities/3318_02_nsn.html
Literature	
● *Decoding Genes with Max Axiom, Super Scientist* by Amber J. Keyser ● *The World of Genetics* by Lynn Van Gorp ● *Super Cool Science Experiments: Cells* by Matt Mullins **Inclusivity/LGBTQ and Individuals with Disabilities Resources** BrainPop Inclusivity List NOGLSTP	
Websites	
http://sciencespot.net/Pages/classbiolsn.html (electronic bibliography for biology teachers)	http://ed.ted.com/lessons/the-wacky-history-of-cell-theory (history of how cell theory evolved)
http://www.nclark.net/Biology (biology teacher resources)	https://www.udel.edu/biology/ketcham/microscope/scope.html (virtual microscope tour)
http://science-class.net/archive/science-class/Biology/Cell_Division.htm (cell division lesson)	
Individuals with disabilities Resources ○ https://www.mentalfloss.com/article/87068/12-disabled-scientists-who-made-world-better-place ○ https://www.sciencenewsforstudents.org/article/disabilities-dont-stop-these-experts-science-and-tech ○ https://www.sciencehistory.org/science-and-disability	**LGBTQ plus Resources** ○ https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World ○ https://www.osc.org/important-lgbtq-scientists-who-left-a-mark-on-stem-fields/ ○ https://www.ideatovalue.com/insp/nickskillicorn/2019/06/14-lgbtq-innovators-inventors-and-scientists-who-changed-the-world/

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Unit 4: Matter and Energy in Organisms and Ecosystems	**Duration:** 16 days (January – February)

Standards	
LS1.C	Create a representation of the process by which plants, algae and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water.
MS-LS1-6	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] [Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.]
MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. [Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.] [Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.]
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]
MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]
MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

Science and Engineering Practices	**Discipline Core Ideas/Unit Enduring Understandings**	**Crosscutting Concepts**
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). ● Support an argument with	LS1.C: Organization for Matter and Energy Flow in Organisms ● Plants acquire their material for growth chiefly from air and water. (MS-LS1-1) LS2.A: Interdependent Relationships in Ecosystems ● The food of almost any kind of	Energy and Matter ● Matter is transported into, out of, and within systems. (MS-LS1-1) Systems and System Models ● A system can be described in terms of its components and their interactions. (MS-LS2-1) Connections to Nature of

evidence, data, or a model. (MS-LS1- 1) **Developing and Using Models** ● Modeling in 3–5 builds on K–2 models and progresses to building and revising simple models and using models to represent events and design solutions. Develop a model to describe phenomena. (MS-LS2-1)	animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A Energy and Matter ● Matter is transported into, out of, and within systems. (MS-LS1-1) Systems and System Models ● A system can be described in terms of its components and their interactions. (MS-LS2-1) Connections to Nature of Science Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena ● Science explanations describe the mechanisms for natural events. (MS- LS2-1) healthy ecosystem is one in which multiple species of	Science Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena ● Science explanations describe the mechanisms for natural events. (MS- LS2-1)

	different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (MS-LS2- 1) LS2.B: Cycles of Matter and Energy Transfer in Ecosystems ● Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (MS-LS2-1)	

	Interdisciplinary Connections
	ELA Standards
RI.6.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
W.6.10	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
SL.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
	Math Standards
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	Computer Science and Design Thinking
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
	Career Readiness, Life Literacies and Key Skills

	This outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K-12 academic and technical content areas, the 2020 New Jersey Student Learning Standards — Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy. https://www.nj.gov/education/standards/clicks/index.shtml **9.1 Personal Financial Literacy** This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers. **9.2 Career Awareness, Exploration, and Preparation** This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. **9.3 Career and Technical Education** This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. **9.4 Life Literacies and Key Skills** This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy. **Career Readiness, Life Literacies, and Key Skills** 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a). 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3). 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Essential Understandings	**Essential Questions**
Students will understand that... ● Living things have a variety of observable features that enable them to survive and reproduce through the conversion of energy from one form to another. ● Organisms and their environments are interconnected.	● How is matter transformed, and energy transferred/transformed in living systems? (photosynthesis and cellular respiration) ● How can change in one part of the ecosystem affect change in other parts of the ecosystem?

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<tr><th colspan="2">Evidence of Student Learning</th></tr>
<tr><td>Performance Tasks: Activities to provide evidence for student learning of content and cognitive skills.</td><td>Other Assessments</td></tr>
<tr><td>Create an iMovie or a wevideo infomercial on endangered species. Students will first research an endangered species, they will then work in small groups separated by the biome their species lives in. Together they will create an informative short film highlighting the endangered animals of their biome. Students will present their video to the class and grade other students using a rubric.</td><td>Formative Assessments
Graphic Organizers & Guided Note Taking
Directed Reading
Cooperative Group Learning
Homework
Journal Entries
Summative Assessments
RST- Research Simulation Task
Unit tests and quizzes
Labs and engineering based projects
Benchmark Assessment
Science A-Z Benchmark Assessment
Alternative Assessments
Group Work/Class Discussion Rubric
Guided Observations
Questions Starters
Participation Rubric
Modified Tests/Quizzes/Classwork
Science A-Z Activities
Science Related Reading A-Z Activities
Science Related Achieve3000 Articles and Activities
Mystery Science Activities
Fundamentals Unlimited Books and Assessments</td></tr>
<tr><th colspan="2">Knowledge and Skills</th></tr>
<tr><td>Content</td><td>Skills</td></tr>
<tr><td>Students will know...
the possible ecological relationships between species that coexist in an ecosystem</td><td>Students will be able to …
Illustrate and/or model the processes of photosynthesis, cellular respiration and protein synthesis to obtain and use energy.</td></tr>
</table>

• that ecological relationships evolved over time and are integral to maintaining the balance and stability of ecosystems • the living and nonliving factors that can throw ecosystems out of balance • how human actions that have contributed to ecosystem imbalance and species decline • how the cell uses the processes of photosynthesis, cellular respiration and protein synthesis to obtain and use energy as well as maintain and repair itself • how the nutrients needed by an organism change over the organism's life span	• Analyze the flow of energy through an ecosystem beginning with photosynthesis.
Instructional Plan	
Suggested Activities	**Resources**
Students will explore the cause and effect relationship between humans and plants with the Oxygen and Carbon Dioxide Cycle. They will gain an understanding of how they play a role in the two cycles.	http://texasaircomfort.com/the-airs-oxygen-cycle-for-kids
Water Cycle Demo - Students will explore the watershed model. Students will learn the water cycle in a hands-on experience.	Watershed Model is in the science lab. http://enviroscapesinc.com/
Energy Pyramid - Students will model how energy transfers from one trophic level to another in an ecosystem.	https://www.sciencea-z.com/main/UnitResource/unit/26/life-science/grades-5-6/food-chains Into the Forest Game - in Science Lab
Owl Pellets - Students will dissect an owl pellet to see the eating habits of an owl and identify with a tangible food web.	https://www.biologycorner.com/worksheets/owlpellet.html
Population Game: Students will replicate procedures that animals use in competing for food. They will observe that some animals are better adapted and more likely to survive, and predict the carrying capacity of a habitat.	Materials and paperwork is in the Science Lab and the Science Lab Binder.
Literature	

- *Biodiversity* by Carla Mooney
- *Life and Non-Life in an Ecosystem* by William B. Rice
- *The Pier at the End of the World* by Paul Erickson

Inclusivity/LGBTQ and Individuals with Disabilities Resources

BrainPop Inclusivity List

NOGLSTP

Websites

https://www.learner.org/courses/envsci/interactives/ecology/producers_1.php (simulation of a newly forming ecosystem)	https://www.learner.org/courses/envsci/unit/pdfs/unit4.pdf (ecosystems lesson)
http://www.nsta.org/publications/news/story.aspx?id=49206 (directions for preparing simulated fish dissection)	http://coolclassroom.org/cool_windows/home.html (food web game)

Individuals with disabilities Resources
• https://www.mentalfloss.com/article/87068/12-disabled-scientists-who-made-world-better-place
  ○ https://www.sciencenewsforstudents.org/article/disabilities-dont-stop-these-experts-science-and-tech
  ○ https://www.sciencehistory.org/science-and-disability
  ○ https://whyy.org/articles/new-philly-exhibit-celebrates-lives-contributions-of-scientists-with-disabilities/
	LGBTQ plus Resources
	○ https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World
	○ https://www.osc.org/important-lgbtq-scientists-who-left-a-mark-on-stem-fields/
	○ https://www.ideatovalue.com/insp/nickskillicorn/2019/06/14-lgbtq-innovators-inventors-and-scientists-who-changed-the-world/
	○ https://www.pinknews.co.uk/2018/07/05/queer-scientists-history-first-lgbtstemday/

Accommodations & Modifications

English Language Learners

- Provide an alarm to help with time management.
- Pair with a peer tutor.
- Give extra time to process oral information and directions.
- Provide audio books if available.
- Speak slowly, distinctly, and write down key terms
- Closed Captioning
- Emphasize visual literacy
- Graphic Organizers
- Use charts, graphs and figures
- Group projects & cooperative learning

● Partner English learners with strong English speakers ● Consistent routines ● Outlines ● Language-based science games ● Picture glossary ● Root words
Gifted and Talented ● Interdisciplinary and problem-based assignments with planned scope and sequence ● Advance, accelerated, or compacted content ● Abstract and advanced higher-level thinking ● Allowance for individual student interests ● Assignments geared to development in areas of affect, creativity, cognition, and research skills ● Complex, in-depth assignments ● Diverse enrichment that broadens learning ● Variety in types of resources ● Open-ended questions for higher-level thinking ● Higher-level text
Basic Skills ● Provide extra time ● Pre-teach vocabulary using visuals and gestures ● Chunk texts ● Summarize as you go ● Preview lessons ● Graphic organizers ● Highlight key words ● Sentence starters ● Prompting and cuing ● Activate schema ● Build background knowledge
Economically Disadvantaged ● Provide extra time ● Pre-teach vocabulary using visuals and gestures ● Chunk texts ● Summarize as you go ● Preview lessons ● Graphic organizers

- Highlight key words
- Sentence starters
- Prompting and cuing
- Activate schema
- Build background knowledge

Students with IEPs

- Follow all IEP modifications
- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Have a designated reader
- Hear instructions orally
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of a lesson
- Use visual presentations of verbal material, such as word webs and visual organizers
- Be given a written list of instructions
- Give responses in a form (oral or written) that's easier for student
- Dictate answers to a scribe
- Capture responses on an audio recorder
- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table of "math facts"
- Work or take a test in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher)
- Use special lighting or acoustics
- Take a test in small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)
- Take more time to complete a task or a test
- Have extra time to process oral information and directions

- Take frequent breaks, such as after completing a task
- Take more time to complete a project

Students with 504 plan

- Follow all 504 plan modifications
- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of a lesson
- Use visual presentations of verbal material, such as word webs and visual organizers
- Be given a written list of instructions
- Give responses in a form (oral or written) that's easier for student
- Dictate answers to a scribe
- Capture responses on an audio recorder

Take more time to complete a project, task or test

Students at Risk of Failure:

- Strategic grouping
- Pre-teach concepts
- Small group for assessments
- Check in's during experiments to help refocus
- Incorporate social/emotional discussions
- Encourage and monitor positive peer collaboration
- Provide academic resources for both home and school use
- Provide incentives to increase motivation and collaboration

Unit 5: Weather and Climate	**Duration:** 15 days (February - March)

Standards

ESS2.C	**Develop a conceptual model to explain the mechanisms for the Sun's energy to drive wind and the hydrologic cycle.**

MS-ESS2-5	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. [Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] [*Assessment Boundary: Assessment does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations.*]
ESS2.C	Explain how variations in density result from variations in temperature and salinity drive a global pattern of interconnected ocean currents.
ESS2.C; ESS2.D	Use a model to explain the mechanisms that cause varying daily temperature ranges in a coastal community and in a community located in the interior of the country.
MS-ESS2-6	Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]

Science and Engineering Practices	**Discipline Core Ideas/Unit Enduring Understandings**	**Crosscutting Concepts**
Analyzing and Interpreting Data Analyze and interpret data to determine similarities and differences in findings. **Developing and Using Models** Develop and use a model to describe phenomena **Planning and Carrying Out Investigations** Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple	ESS2.D: Weather and Climate ● 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. (MS-ESS2-6) ● Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5) ●The ocean exerts a major influence on	**Cause and Effect** Cause and effect relationships may be used to predict phenomena in natural or designed systems. **Systems and System Models** Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. **Patterns**

variables and provide evidence to support explanations or solutions. Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions.	weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6) ESS3.B: Natural Hazards and Forecasting ● Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)	Graphs, charts, and images can be used to identify patterns in data **Influence of Science, Engineering, and Technology on Society and the Natural World** The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time.

	Interdisciplinary Connections
	ELA Standards
RI.6.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
W.6.10	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
SL.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
	Math Standards
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.
	Social Studies Standards
6.2.8EconG.3.a:	Explain how the classical civilizations used technology and innovation to enhance agricultural/manufacturing output and commerce, to expand military capabilities, to improve life in urban areas, and to allow for greater division of labor
	Computer Science and Design Thinking
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

	Career Readiness, Life Literacies and Key Skills This outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K-12 academic and technical content areas, the 2020 New Jersey Student Learning Standards — Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy. https://www.nj.gov/education/standards/clicks/index.shtml **9.1 Personal Financial Literacy** This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers. **9.2 Career Awareness, Exploration, and Preparation** This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. **9.3 Career and Technical Education** This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. **9.4 Life Literacies and Key Skills** This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy. **Career Readiness, Life Literacies, and Key Skills** 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a). 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3). 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Essential Understandings	**Essential Questions**
Students will understand that... ● Earth's components form systems. These systems continually interact at different rates of time, affecting the Earth regionally and globally.	● How do changes in one part of an Earth system affect other parts of the system? ● How does understanding the properties of Earth materials and the physical laws that govern behavior lead to predictions of Earth?

<table>
<tr><td>

- Earth systems can be broken down into individual components which have observable measurable properties.
- Technology enables us to better understand Earth's system and the impact of Earth's systems on human activity.

</td><td>

- How does technology extend human senses and understanding of Earth?

</td></tr>
<tr><td colspan="2">Evidence of Student Learning</td></tr>
<tr><td>Performance Tasks: Activities to provide evidence for student learning of content and cognitive skills.</td><td>Other Assessments</td></tr>
<tr><td>Students will implement a weather forecast video broadcast. The final production will cover a wide range of real world techniques and examples and will teach the students how to create, manage and produce a professional weather forecast. The students will use their weather knowledge learned throughout the unit and apply it to the forecast. They will work in cooperative groups to complete this task.</td><td>

Formative Assessments
- Graphic Organizers & Guided Note Taking
- Directed Reading
- Cooperative Group Learning
- Homework
- Journal Entries

Summative Assessments
- RST- Research Simulation Task
- Unit tests and quizzes
- Labs and engineering based projects

Benchmark Assessment
- Science A-Z Benchmark Assessment

Alternative Assessments
- Group Work/Class Discussion Rubric
- Guided Observations
- Questions Starters
- Participation Rubric
- Modified Tests/Quizzes/Classwork
- Science A-Z Activities
- Science Related Reading A-Z Activities
- Science Related Achieve3000 Articles and Activities
- Mystery Science Activities
- Fundamentals Unlimited Books and Assessments

</td></tr>
<tr><td colspan="2">Knowledge and Skills</td></tr>
</table>

Content	Skills
Students will know... ● interactions of air masses as they relate to weather ● the impact that air pressure systems have on the weather ● how hurricanes develop ● compare different types of winter storms ● how thunderstorms develop and the effects of thunderstorms on weather ● the effects of tornadoes as well as the mechanisms involved in their formation ● the various instruments used by meteorologist to forecast weather ● isobars, recognize them on a weather map and determine the type of weather each represents and differentiate weather from climate ● the geographic factors that affect climate as well as the six major climate zones ● how oceans affect climate	*Students will be able to …* ● Infer from an experiment how density affects colliding air masses. ● Read a weather map to answer a series of questions. ● Observe through a demonstration two air masses with different densities. ● Create a model of the hydrologic cycle that focuses on the transfer of water in and out of the atmosphere. ● Apply the model to different climates around the world.
Instructional Plan	
Suggested Activities	**Resources**
Egg in a Bottle: Students will see the effects of changing air pressure. The teacher will demonstrate how to use the physics of air pressure.	The materials and supplies will be in the science lab and the lab sheet will be in the Science Binder in the Science Lab. The lab sheet will come from Skill Sharpeners - Science by Evan-Moor Corp
Too Cold to Snow: Students will research the weather conditions and temperatures during a winter month in multiple locations. Students will use the internet to research different areas.	The materials and supplies will be in the science lab and the lab sheet will be in the Science Binder in the Science Lab. The lab sheet will come from Skill Sharpeners - Science by Evan-Moor Corp http://www.noaa.gov/
May the Force Be with You: Students will investigate the Coriolis Force. They will work in partners to perform this activity.	The materials and supplies will be in the science lab and the lab sheet will be in the Science Binder in the Science Lab. The lab sheet will come from Skill Sharpeners - Science by Evan-Moor Corp

<table>
<tr><td colspan="2">Current Events: Students will track warm and cold ocean currents and their overall effect on the climate. The students will use laminated world desktop maps.</td><td>The table maps are located in the science closet.</td></tr>
<tr><td colspan="3">Literature</td></tr>
<tr><td colspan="3">● Natural Disasters: Violent Weather by Steve Parker and David West
● Superstorm Sandy by Lynn Peppas
● Weather by Seymour Simon

<u>Inclusivity/LGBTQ and Individuals with Disabilities Resources</u>
BrainPop Inclusivity List
NOGLSTP</td></tr>
<tr><td colspan="3">Websites</td></tr>
<tr><td>http://www.ciese.org/curriculum/weatherproj2/en/lesson1.shtml (make a weather station lesson)</td><td colspan="2">http://teachers.egfi-k12.org/lesson-tornado-proof-design/ (engineering challenge - designing a tornado-proof house)</td></tr>
<tr><td>http://www.projectsharetexas.org/resource-index?field_resource_keywords_tid=&sort_by=title&sort_order=ASC&items_per_page=50&page=1 (online resources from the Texas Education Agency)</td><td colspan="2">http://www.education.noaa.gov/tweather.html (weather and atmosphere education resources)</td></tr>
<tr><td>http://climatekids.nasa.gov/science-standards/ (climate education resources)</td><td colspan="2">https://www.teachengineering.org/view_curricularunit.php?url=collection/cub_/curricular_units/cub_weather/cub_weather_curricularunit.xml (weather and atmosphere unit)</td></tr>
<tr><td>http://www.earthsciweek.org/classroom-activities/ngss (resource of NGSS classroom activities)</td><td colspan="2"></td></tr>
<tr><td>Individuals with disabilities Resources
○ https://www.mentalfloss.com/article/87068/12-disabled-scientists-who-made-world-better-place
○ https://www.sciencenewsforstudents.org/article/disabilities-dont-stop-these-experts-science-and-tech
○ https://www.sciencehistory.org/science-and-disability
○ https://whyy.org/articles/new-philly-exhibit-celebrates-lives-contributions-of-scientists-with-disabilities/</td><td colspan="2">LGBTQ plus Resources
○ https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World
○ https://www.osc.org/important-lgbtq-scientists-who-left-a-mark-on-stem-fields/
○ https://www.ideatovalue.com/insp/nickskillicorn/2019/06/14-lgbtq-innovators-inventors-and-scientists-who-changed-the-world/
○ https://www.pinknews.co.uk/2018/07/05/queer-scientists-history-first-lgbtstemday/</td></tr>
</table>

Accommodations & Modifications
English Language Learners ● Provide an alarm to help with time management. ● Pair with a peer tutor. ● Give extra time to process oral information and directions. ● Provide audio books if available. ● Speak slowly, distinctly, and write down key terms ● Closed Captioning ● Emphasize visual literacy ● Graphic Organizers ● Use charts, graphs and figures ● Group projects & cooperative learning ● Partner English learners with strong English speakers ● Consistent routines ● Outlines ● Language-based science games ● Picture glossary ● Root words
Gifted and Talented ● Interdisciplinary and problem-based assignments with planned scope and sequence ● Advance, accelerated, or compacted content ● Abstract and advanced higher-level thinking ● Allowance for individual student interests ● Assignments geared to development in areas of affect, creativity, cognition, and research skills ● Complex, in-depth assignments ● Diverse enrichment that broadens learning ● Variety in types of resources ● Open-ended questions for higher-level thinking ● Higher-level text
Basic Skills ● Provide extra time ● Pre-teach vocabulary using visuals and gestures ● Chunk texts ● Summarize as you go ● Preview lessons

- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cuing
- Activate schema
- Build background knowledge

Economically Disadvantaged

- Provide extra time
- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cuing
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- Build background knowledge

Students with IEPs

- Follow all IEP modifications
- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
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- Hear instructions orally
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of a lesson
- Use visual presentations of verbal material, such as word webs and visual organizers
- Be given a written list of instructions
- Give responses in a form (oral or written) that's easier for student

- Dictate answers to a scribe
- Capture responses on an audio recorder
- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table of “math facts”
- Work or take a test in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher)
- Use special lighting or acoustics
- Take a test in small group setting
- Use sensory tools such as an exercise band that can be looped around a chair’s legs (so fidgety kids can kick it and quietly get their energy out)
- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task
- Take more time to complete a project

Students with 504 plan

- Follow all 504 plan modifications
- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
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Take more time to complete a project, task or test

Students at Risk of Failure:

- Strategic grouping

- Pre-teach concepts
- Small group for assessments
- Check in's during experiments to help refocus
- Incorporate social/emotional discussions
- Encourage and monitor positive peer collaboration
- Provide academic resources for both home and school use
- Provide incentives to increase motivation and collaboration

Unit 6: Space Systems	**Duration:** 24 days (April – June)

Standards

ESS1.B	Generate and analyze evidence (through simulations or long-term investigations) to explain why the Sun's apparent motion across the sky changes over the course of a year.
MS-ESS1-1	Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. [Clarification Statement: Examples of models can be physical, graphical, or conceptual.]
ESS1.A; ESS1.B	Develop and use a model that shows how gravity causes smaller objects to orbit around larger objects at increasing scales, including the gravitational force of the sun causes the planets and other bodies to orbit around it holding together the solar system.
MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system. [Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models.] [*Assessment Boundary: Assessment does not include recalling facts about properties of the planets and other solar system bodies.*]
MS-ESS1-2	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. [Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state).] [*Assessment Boundary: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.*]

Science and Engineering Practices	**Discipline Core Ideas/Unit Enduring Understandings**	**Crosscutting Concepts**
Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to	**ESS1.A: The Universe and Its Stars** • Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and	**Cause and Effect** • Cause and effect relationships may be used to predict phenomena in natural

describe, test, and predict more abstract phenomena and design systems. • Develop and use a model to describe phenomena. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. • Analyze and interpret data to determine similarities and differences in findings. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3)	explained with models. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) • Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2) **ESS1.B: Earth and the Solar System** • 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. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) • 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. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)	or designed systems.(MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) **Systems and System Models** • Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) **Structure and Function** • Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) **Patterns** • Patterns in rates of change and other numerical relationships can provide information about natural systems. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) **Scale Proportion and Quantity** • Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) **Energy and Matter** • Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3)

		Stability and Change • Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale.(MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) ***Connections to Engineering, Technology and Applications of Science*** **Interdependence of Science, Engineering, and Technology** • Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3) ***Connections to Nature of Science*** **Science is a Human Endeavor** • Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-ESS1-1),(MS-ESS1-2), (MS-ESS1-3)
	Interdisciplinary Connections	
	ELA Standards	

RI.6.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
W.6.10	Write routinely over extended time frames (time for research, reflection, metacognition/self correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
SL.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
	Math Standards
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.
	Social Studies Standards
6.2.8Econ G.3.a:	Explain how the classical civilizations used technology and innovation to enhance agricultural/manufacturing output and commerce, to expand military capabilities, to improve life in urban areas, and to allow for greater division of labor
	Computer Science and Design Thinking
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
	Career Readiness, Life Literacies and Key Skills This outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K-12 academic and technical content areas, the 2020 New Jersey Student Learning Standards — Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy. https://www.nj.gov/education/standards/clicks/index.shtml **9.1 Personal Financial Literacy** This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers. **9.2 Career Awareness, Exploration, and Preparation** This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements. **9.3 Career and Technical Education** This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. **9.4 Life Literacies and Key Skills** This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy.

	Career Readiness, Life Literacies, and Key Skills 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a). 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3). 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Essential Understandings	**Essential Questions**
Students will understand that... ● Observable, predictable patterns of movement in the Sun, Earth, Moon system occur because of gravitational interaction and energy from the Sun. ● The Universe is made up of galaxies, each of which is composed of solar systems, having the same elements and governed by the same laws.	● What predictable, observable patterns occur as a result of the interaction between the Earth, Moon and Sun? ● What types of celestial bodies encompass our Universe?

Evidence of Student Learning

Performance Tasks: *Activities to provide evidence for student learning of content and cognitive skills.*	**Other Assessments**
Catching Stardust: How do astronomers collect stardust? They design and build satellites that are launched into space to collect particles on specially designed panels. Satellites can be sent to orbit around an object of interest: a planet, moon, or comet. In this experiment, you can build your own mini satellite and use it to collect some pretend stellar debris. If you simulate an asteroid impact, how much stellar dust will your satellite collect? Will placing your satellite at different "orbital" distances from the impact change the amount of debris collected? http://www.sciencebuddies.org/science-fair-projects/project_ideas/Astro_p023.shtml	**Formative Assessments** ● Graphic Organizers & Guided Note Taking ● Directed Reading ● Cooperative Group Learning ● Homework ● Journal Entries **Summative Assessments** ● RST- Research Simulation Task ● Unit tests and quizzes ● Labs and engineering based projects ● Benchmark **Benchmark Assessment** ● Science A-Z Benchmark Assessment

	Alternative Assessments • Group Work/Class Discussion Rubric • Guided Observations • Questions Starters • Participation Rubric • Modified Tests/Quizzes/Classwork • Science A-Z Activities • Science Related Reading A-Z Activities • Science Related Achieve3000 Articles and Activities • Mystery Science Activities • Fundamentals Unlimited Books and Assessments
Knowledge and Skills	
Content	**Skills**
Students will know... ● how distance and mass affect gravitational attraction ● the difference between rotation and revolution ● the 3 laws for planetary motion. ● the current theory of the origin of the Earth's moon ● the causes of the phases of the Earth's moon, eclipses, daily and monthly tides ● the factors that combine to explain the changes in the length of the day and seasons	*Students will be able to …* ● Distinguish between Earth's rotation and Earth's revolution ● Model how the Sun strikes Earth's surface. ● Model how solar energy spreads out over Earth's surface throughout the year. ● Simulate how the Moon moves around the Earth. ● Illustrate and demonstrate a solar eclipse and lunar eclipse. ● Design 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. ● Model the different phases of the moon. ● Demonstrate the gravitational pull between the Sun and a planet. ● Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. ● Construct a scale model of our solar system. ● Analyze and interpret data to determine scale properties of objects in the solar system.

	• Differentiate the sun as it relates to other stars in the universe. • Determine one's own individual responsibility from personal actions and contributions to group activities. • Demonstrate leadership skills, cooperative learning strategies, and community building strategies when participating in classroom laboratory activities. • Demonstrate the ability to understand inferences.
Instructional Plan	
Suggested Activities	**Resources**
Scaling the Solar System: Students will model the solar system to scale using the scale model educational insight.	The materials and supplies will be in the science lab and the lab sheet will be in the Science Binder in the Science Lab.
Inflatable/ Portable Planetarium - Star Lab - Students will observe the constellations of the night sky.	Star Lab will be ordered from Gloria Villabros
Impact Craters: Students will evaluate and interpret the physical characteristics of a crater.	Teacher's guide will be in the Science Closet with the Science Binder.
Star Finder: Students will construct a simple star field to identify the constellations in the night sky for the 12 months in the northern hemisphere.	Teacher's guide and supplies will be in the Science closet with the Science Binder.
Which Stars Can You Use for Navigation in Different Parts of the World? In this experiment, the students will determine which stars to use to navigate in each hemisphere of the globe.	http://www.sciencebuddies.org/science-fair-projects/project_ideas/Astro_p008.shtml
Literature	
• *12 Things to Know about Space Exploration* by Rebecca Felix • *Solar and Lunar Eclipses* by Ruth Owen • *21st Century: Mysteries of Deep Space* by Stephanie Paris **Inclusivity/LGBTQ and Individuals with Disabilities Resources** BrainPop Inclusivity List NOGLSTP	
Websites	

http://astro.unl.edu/ (resources for astronomy education from the University of Nebraska-Lincoln)	http://www.nasa.gov/pdf/630754main_NASAsBESTActivityGuide6-8.pdf (NASA's best beginning engineering challenges)
http://astro.unl.edu/naap/lps/animations/lps.html (lunar phase simulator)	http://www.bbc.co.uk/bitesize/ks3/science/energy_electricity_forces/forces/activity/ (short clips on various subjects)
http://pbs.panda-prod.cdn.s3.amazonaws.com/media/assets/wgbh/ess05/ess05_int_seasonsgame/index.html (Earth movement simulation)	http://www.sciencecourseware.org/eec/GlobalWarming/Tutorials/Seasons/ (seasons tutorial)
http://www-tc.pbskids.org/designsquad/pdf/parentseducators/DSN_NASA_MissionSolarSystem_SoftLanding.pdf (engineering challenge - air bag protection for an egg drop)	https://www.brainpop.com/games/flytomars/ (flight to Mars game)
http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/78778/Eclipses_Nav.swf::Eclipse%20Interactive (solar eclipse simulation)	
Individuals with disabilities Resources ○ https://www.mentalfloss.com/article/87068/12-disabled-scientists-who-made-world-better-place ○ https://www.sciencenewsforstudents.org/article/disabilities-dont-stop-these-experts-science-and-tech ○ https://www.sciencehistory.org/science-and-disability ○ https://whyy.org/articles/new-philly-exhibit-celebrates-lives-contributions-of-scientists-with-disabilities/	**LGBTQ plus Resources** ○ https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World ○ https://www.osc.org/important-lgbtq-scientists-who-left-a-mark-on-stem-fields/ ○ https://www.ideatovalue.com/insp/nickskillicorn/2019/06/14-lgbtq-innovators-inventors-and-scientists-who-changed-the-world/ ○ https://www.pinknews.co.uk/2018/07/05/queer-scientists-history-first-lgbtstemday/
Accommodations & Modifications	
English Language Learners ● Provide an alarm to help with time management. ● Pair with a peer tutor. ● Give extra time to process oral information and directions. ● Provide audio books if available. ● Speak slowly, distinctly, and write down key terms ● Closed Captioning ● Emphasize visual literacy ● Graphic Organizers	

- Use charts, graphs and figures
- Group projects & cooperative learning
- Partner English learners with strong English speakers
- Consistent routines
- Outlines
- Language-based science games
- Picture glossary
- Root words

Gifted and Talented

- Interdisciplinary and problem-based assignments with planned scope and sequence
- Advance, accelerated, or compacted content
- Abstract and advanced higher-level thinking
- Allowance for individual student interests
- Assignments geared to development in areas of affect, creativity, cognition, and research skills
- Complex, in-depth assignments
- Diverse enrichment that broadens learning
- Variety in types of resources
- Open-ended questions for higher-level thinking
- Higher-level text

Basic Skills

- Provide extra time
- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cuing
- Activate schema
- Build background knowledge

Economically Disadvantaged

- Provide extra time
- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go

- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cuing
- Activate schema
- Build background knowledge

Students with IEPs

- Follow all IEP modifications
- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Have a designated reader
- Hear instructions orally
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of a lesson
- Use visual presentations of verbal material, such as word webs and visual organizers
- Be given a written list of instructions
- Give responses in a form (oral or written) that's easier for student
- Dictate answers to a scribe
- Capture responses on an audio recorder
- Use a spelling dictionary or electronic spell-checker
- Use a word processor to type notes or give responses in class
- Use a calculator or table of "math facts"
- Work or take a test in a different setting, such as a quiet room with few distractions
- Sit where he learns best (for example, near the teacher)
- Use special lighting or acoustics
- Take a test in small group setting
- Use sensory tools such as an exercise band that can be looped around a chair's legs (so fidgety kids can kick it and quietly get their energy out)

- Take more time to complete a task or a test
- Have extra time to process oral information and directions
- Take frequent breaks, such as after completing a task
- Take more time to complete a project

Students with 504 plan

- Follow all 504 plan modifications
- Teacher tutoring
- Peer tutoring
- Cooperative learning groups
- Modified assignments
- Differentiated instruction
- Listen to audio recordings instead of reading text
- Learn content from audio books, movies, videos and digital media instead of reading print versions
- Work with fewer items per page or line and/or materials in a larger print size
- Record a lesson, instead of taking notes
- Have another student share class notes with him
- Be given an outline of a lesson
- Use visual presentations of verbal material, such as word webs and visual organizers
- Be given a written list of instructions
- Give responses in a form (oral or written) that's easier for student
- Dictate answers to a scribe
- Capture responses on an audio recorder
- Take more time to complete a project, task or test

Students at Risk of Failure:

- Strategic grouping
- Pre-teach concepts
- Small group for assessments
- Check in's during experiments to help refocus
- Incorporate social/emotional discussions
- Encourage and monitor positive peer collaboration
- Provide academic resources for both home and school use
- Provide incentives to increase motivation and collaboration