Created on:	July 14 , 2015
Created by:	
Revised on:	
Revised by:	
Board Approved on:	9/14/15

2015 6th Grade Timeline Ocean County Curriculum

Unit	Weeks
Introduction to Engineering and Design	2
Waves and Electromagnetic Radiation	3
Structure, Function, and Information Processing	9
Matter and Energy in Organisms and Ecosystems	10
Space Systems	8
Weather and Climate	8

The sequence of units is recommended based on the 2013 Next Generation Science Standards.

See the Engineering Design standards or the attached hard copy.

2015 Ocean County Science Curriculum

Grade 6

Unit: Waves and the Electromagnetic Radiation

What are the characteristic properties of waves and how can they be used?

Students are able to describe and predict characteristic properties and behaviors of waves when the waves interact with matter. Students can apply an understanding of waves as a means to send digital information. The crosscutting concepts of patterns and structure and function are used as organizing concepts for these disciplinary core ideas. These performance expectations focus on students demonstrating proficiency in developing and using models, using mathematical thinking, and obtaining, evaluating and communicating information; and to use these practices to demonstrate understanding of the core ideas.

The Grades 3-5 Storyline provides a summary of the understandings that students developed by the end of 5th grade.

#	STUDENT LEARNING OBJECTIVES (SLO)	Corresponding DCIs and PEs
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.]	**MS-PS4-1**
2	Explain why we can see the color of an object in space but cannot hear sound.	PS4.B
3	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.B
4	Create a simple model that explains the mechanism for how wave pulses are used to save, transmit, and receive information.	PS4.C
5	**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-PS4-2**
6	**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.]	**MS-PS4-3**

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models	**PS4.A: Wave Properties**	**Patterns**

Modeling in 6–8 builds on K–5 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-PS4-2)

Using Mathematics and Computational Thinking

Mathematical and computational thinking at the 6–8 level builds on K–5 and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.

- Use mathematical representations to describe and/or support scientific conclusions and design solutions. (MS-PS4-1)

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 6-8 builds on K-5 and progresses to evaluating the merit and validity of ideas and methods.

- Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3)

- -

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS4-1)

- A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1)
- A sound wave needs a medium through which it is transmitted. (MS-PS4-2)

PS4.B: Electromagnetic Radiation

- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2)
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2)
- A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2)
- However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2)

PS4.C: Information Technologies and Instrumentation

- Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)

- Graphs and charts can be used to identify patterns in data. (MS-PS4-1)

Structure and Function

- Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS4-2)
- Structures can be designed to serve particular functions. (MS-PS4-3)

- -

Connections to Engineering, Technology, and Applications of Science

Influence of Science, Engineering, and Technology on Society and the Natural World

- Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations. (MS-PS4-3)

- -

Connections to Nature of Science

Science is a Human Endeavor

- Advances in technology influence the progress of science and science has influenced advances in technology. (MS-PS4-3)

21st Century themes and skills ***(This link is taken from the Partnership for 21st Century Skills)*** ● creativity and innovation ● critical thinking and problem solving ● communication ● collaboration ● information literacy ● media literacy ● information and communications technology (ICT) ● literacy ● flexibility and adaptability ● initiative and self direction ● social and cross cultural skills ● productivity and accountability ● leadership and responsibility		
Connections to other DCIs in this grade-band: **MS.LS1.D** (MS-PS4-2)		
Articulation of DCIs across grade-bands: **4.PS3.A** (MS-PS4-1); **4.PS3.B** (MS-PS4-1); **4.PS4.A** (MS-PS4-1); **4.PS4.B** (MS-PS4-2); **4.PS4.C** (MS-PS4-3); **HS.PS4.A** (MS-PS4-1),(MS-PS4-2),(MS-PS4-3); **HS.PS4.B** (MS-PS4-1),(MS-PS4-2); **HS.PS4.C** (MS-PS4-3); **HS.ESS1.A** (MS-PS4-2); **HS.ESS2.A** (MS-PS4-2); **HS.ESS2.C** (MS-PS4-2); **HS.ESS2.D** (MS-PS4-2)		

Interdisciplinary Connections:

ELA/Literacy -

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-PS4-3)
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. *(MS-PS4-3)*
RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-PS4-3)
WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research. (MS-PS4-3)
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-PS4-1),(MS-PS4-2)*

Mathematics -

MP.2	Reason abstractly and quantitatively. (MS-PS4-1)
MP.4	Model with mathematics. (MS-PS4-1)
6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-PS4-1)
6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS4-1)
7.RP.A.2	Recognize and represent proportional relationships between quantities. (MS-PS4-1)
8.F.A.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *(MS-PS4-1)*

Grade Level: 6	**Title of Unit: Waves and The Electromagnetic Radiation**
Stage 1 - Desired Results	
Understandings: *Students will understand that…* ● Mechanical waves transfer energy from particle to particle in matter. ● Electromagnetic waves transfer energy through either matter or empty space.	**Essential Questions:** ● 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?
Knowledge: *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)	**Skills:** *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
Stage 2- Assessment Evidence	
Performance Tasks and other evidence: ● Summative Assessments o RST- Research Simulation Task o Unit tests and quizzes o Labs and engineering based projects ● Formative Assessments o Graphic Organizers & Guided Note Taking o Directed Reading o Cooperative Group Learning o Homework o Journal Entries	
Stage 3 – Learning Plan	

Digital information and technology integration: Indicate any special considerations as well as materials, resources (online, print, video, audio) or equipment.

- http://cullerscience.weebly.com/electromagnetic-waves.html (Enrichment)
- http://www.ducksters.com/science/light_spectrum.php
- http://missionscience.nasa.gov/ems/01_intro.html
- http://www.pbslearningmedia.org/resource/phy03.sci.phys.energy.lp_emspect/making-waves-with-the-electromagnetic-spectrum/
- http://sciencenetlinks.com/lessons/light-1-making-light-of-science/
- http://www.scienceinschool.org/2009/issue12/microwaves
- http://www.discoveryeducation.com/teachers/free-lesson-plans/the-electromagnetic-spectrum-waves-of-energy.cfm
- https://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_soundandlight/cub_soundandlight_lesson7.xml
- http://www2.parkland.edu/planetarium/_documents/CosmicColorsTeachersGuide.pdf ~ multiple activities geared for 5th-8th grade students; many found on NASA.gov

Modifications: (ELLs, Special Education, Gifted and Talented)

* Follow all IEP modifications/504 plan
* Teacher tutoring
* Peer tutoring
* Cooperative learning groups
* Modified assignments
* Differentiated instruction

Presentation accommodations allow a student to:

* Listen to audio recordings instead of reading text
* Learn content from audiobooks, 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

Response accommodations allow a student to:

* Give responses in a form (oral or written) that's easier for him
* 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"

Setting accommodations allow a student to:

* 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)

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

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

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

Assignment modifications allow a student to:
* Complete fewer or different homework problems than peers
* Write shorter papers
* Answer fewer or different test questions
* Create alternate projects or assignments

Curriculum modifications allow a student to:
* Learn different material (such as continuing to work on multiplication while classmates move on to fractions)
* Get graded or assessed using a different standard than the one for classmates

2015 Ocean County Science Curriculum

Grade 6

Unit: Structure, Function, and Information Processing (Cells)

How do the structures of organisms contribute to life's functions?

Students plan and carry out investigations to develop evidence that living organisms are made of cells and to determine the relationship of organisms to the environment. Students use their understanding of cell theory to develop physical and conceptual models of cells. They construct explanations for the interactions of systems in cells and organisms and how organisms gather and use information from the environment. Students understand that all organisms are made of cells, that special structures are responsible for particular functions in organisms, and that for many organisms the body is a system of multiple interacting subsystems that form a hierarchy from cells to the body. Crosscutting concepts of cause and effect, structure and function, and matter and energy are called out as organizing concepts for these core ideas.

The Grades 3-5 Storyline provides a summary of the understandings that students developed by the end of 5th grade.

#	STUDENT LEARNING OBJECTIVES (SLO)	Corresponding DCIs and PEs
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 non-living things, and understanding that living things may be made of one cell or many and varied cells.]	**MS-LS1-1**
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-LS1-2**
3	**Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.** [Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.] [*Assessment Boundary: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.*]	**MS-LS1-3**
4	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.*]	LS1.D

5	**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.*]	**MS-LS1-8**

The SLOs were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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-LS1-2)
- Develop a model to describe unobservable mechanisms. (MS-LS1-7)

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 meet the goals of an investigation. (MS-LS1-1)

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)

Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas

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)
- 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)
- 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-LS1-3)

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) (SLO 4)

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8)

Scale, Proportion, and Quantity

- Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

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)

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-LS1-2)

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

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 supported or not supported by evidence. (MS-LS1-8) ***21st Century themes and skills*** ***(This link is taken from the Partnership for 21st Century Skills)*** ● creativity and innovation ● critical thinking and problem solving ● communication ● collaboration ● information literacy ● media literacy ● information and communications technology (ICT) ● literacy ● flexibility and adaptability ● initiative and self direction ● social and cross cultural skills ● productivity and accountability ● leadership and responsibility		industries and engineered systems. (MS-LS1-1) ***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-LS1-3)

Connections to other DCIs in this grade-band: **MS.LS3.A** (MS-LS1-2)
Articulation of DCIs across grade-bands: **4.LS1.A** (MS-LS1-2); **4.LS1.D** (MS-LS1-8); **HS.LS1.A** (MS-LS1-1),(MS-LS1-2),(MS-LS1-3),(MS-LS1-8)

Interdisciplinary Connections:

ELA/Literacy -

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3)
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. *(MS-LS1-5),(MS-LS1-6)*
RI.6.8	Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MS-LS1-3)
WHST.6-8.1	Write arguments focused on discipline content. (MS-LS1-3)
WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1)
WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-LS1-8)
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-LS1-2)*

Mathematics -

6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *(MS-LS1-1),(MS-LS1-2),(MS-LS1-3)*

Grade Level: 6	**Title of Unit: Structure, Function, and Information Processing (Cells)**
Stage 1 - Desired Results	
Understandings: *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.	**Essential Questions:** ● How do the structures of organisms contribute to life's functions? ● What do all living things have in common?
Knowledge: *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	**Skills:** *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.
Stage 2- Assessment Evidence	

Performance Tasks and other evidence:

- Summative Assessments
  - RST- Research Simulation Task
  - Unit tests and quizzes
  - Labs and engineering based projects
- Formative Assessments
  - Graphic Organizers & Guided Note Taking
  - Directed Reading
  - Cooperative Group Learning
  - Homework
  - Journal Entries

Stage 3 – Learning Plan

Digital information and technology integration: Indicate any special considerations as well as materials, resources (online, print, video, audio) or equipment.

- http://tinyurl.com/k2zuqxe (Enrichment Interactive: Animal System Interactions)
- http://ed.ted.com/lessons/the-wacky-history-of-cell-theory (High quality cartoon about Cell Theory-TED)
- http://www.projectsharetexas.org/resource/animal-system-interactions-ontrack-biology-module-4-lesson-3-0?field_resource_keywords_tid=&sort_by=title&sort_order=ASC&items_per_page=50 (animal systems)
- https://www.udel.edu/biology/ketcham/microscope/scope.html (Interactive microscope)
- http://www.nclark.net/Biology (lab activities for cells)
- http://science-class.net/archive/science-class/Biology/Cell_Division.htm (cell division)
- http://sciencespot.net/Pages/classbiolsn.html (cell activitiy resources)

Modifications: **(ELLs, Special Education, Gifted and Talented)**

* Follow all IEP modifications/504 plan
* Teacher tutoring
* Peer tutoring
* Cooperative learning groups
* Modified assignments
* Differentiated instruction

Presentation accommodations allow a student to:

* Listen to audio recordings instead of reading text
* Learn content from audiobooks, 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

Response accommodations allow a student to:
* Give responses in a form (oral or written) that's easier for him
* 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"

Setting accommodations allow a student to:
* 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)

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

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

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

Assignment modifications allow a student to:
* Complete fewer or different homework problems than peers
* Write shorter papers
* Answer fewer or different test questions
* Create alternate projects or assignments

Curriculum modifications allow a student to:
* Learn different material (such as continuing to work on multiplication while classmates move on to fractions)
* Get graded or assessed using a different standard than the one for classmates

2015 Ocean County Science Curriculum

Grade 6

Unit: Matter and Energy, Organisms and Ecosystems

How do organisms obtain and use matter and energy?

How do matter and energy move through an ecosystem?

Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct explanations for the cycling of matter in organisms and the interactions of organisms to obtain the matter and energy from the ecosystem to survive and grow. Students have a grade-appropriate understanding and use of the practices of investigations, constructing arguments based on evidence, and oral and written communication. They understand that sustaining life requires substantial energy and matter inputs and the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. Adding to these crosscutting concepts is a deeper understanding of systems and system models that ties the performances expectations in this topic together.

The Grades 3-5 Storyline provides a summary of the understandings that students developed by the end of 5th grade.

#	STUDENT LEARNING OBJECTIVES (SLO)	Corresponding DCIs and PEs
1	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.	LS1.C
2	**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-LS1-6**
3	**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-LS1-7**
4	**Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.** [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]	**MS-LS2-1**
5	**Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.** [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]	**MS-LS2-3**
6	**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	**MS-LS2-4**

	warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]	

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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 a model to describe phenomena. (MS-LS2-3)
- Develop a model to describe unobservable mechanisms. (MS-LS1-7)

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 provide evidence for phenomena. (MS-LS2-1)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.

- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-6)

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).

Disciplinary Core Ideas

LS1.C: Organization for Matter and Energy Flow in Organisms

- Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)
- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)

LS2.A: Interdependent Relationships in Ecosystems

- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)
- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers,

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)

Energy and Matter

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)
- Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6)
- The transfer of energy can be tracked as energy flows through a natural system. (MS-LS2-3)

Stability and Change

- Small changes in one part of a system might cause large changes in another part. (MS-LS2-4)

- -

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS2-3)

● Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4) - ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** ● Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6) ● Science disciplines share common rules of obtaining and evaluating empirical evidence. (MS-LS2-4) ***21st Century themes and skills*** ***(This link is taken from the Partnership for 21st Century Skills)*** ● creativity and innovation ● critical thinking and problem solving ● communication ● collaboration ● information literacy ● media literacy ● information and communications technology (ICT) ● literacy ● flexibility and adaptability ● initiative and self direction ● social and cross cultural skills ● productivity and accountability ● leadership and responsibility	and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) **PS3.D: Energy in Chemical Processes and Everyday Life** ● The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. *(secondary to MS-LS1-6)* ● Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. *(secondary to MS-LS1-7)*	

Connections to other DCIs in this grade-band: **MS.PS1.B** (MS-LS1-6),(MS-LS1-7),(MS-LS2-3); **MS.LS4.C** (MS-LS2-4); **MS.LS4.D** (MS-LS2-4); **MS.ESS2.A** (MS-LS1-6),(MS-LS2-3),(MS-LS2-4); **MS.ESS3.A** (MS-LS2-1),(MS-LS2-4); **MS.ESS3.C** (MS-LS2-1),(MS-LS2-4)
Articulation of DCIs across grade-bands: **3.LS2.C** (MS-LS2-1),(MS-LS2-4); **3.LS4.D** (MS-LS2-1),(MS-LS2-4); **5.PS3.D** (MS-LS1-6),(MS-LS1-7); **5.LS1.C** (MS-LS1-6),(MS-LS1-7); **5.LS2.A** (MS-LS1-6),(MS-LS2-1),(MS-LS2-3); **5.LS2.B** (MS-LS1-6),(MS-LS1-7);(MS-LS2-3); **HS.PS1.B** (MS-LS1-6),(MS-LS1-7); **HS.PS3.B** (MS-LS2-3); **HS.LS1.C** (MS-LS1-6),(HS-LS1-7),(MS-LS2-3); **HS.LS2.A** (MS-LS2-1);

HS.LS2.B (MS-LS1-6),(MS-LS1-7),(MS-LS2-3); **HS.LS2.C** (MS-LS2-4),**HS.LS4.C** (MS-LS2-1),(MS-LS2-4); **HS.LS4.D** (MS-LS2-1),(MS-LS2-4); **HS.ESS2.A** (MS-LS2-3); **HS.ESS2.D** (MS-LS1-6); **HS.ESS2.E** (MS-LS2-4); **HS.ESS3.A** (MS-LS2-1); **HS.ESS3.B** (MS-LS2-4); **HS.ESS3.C** (MS-LS2-4)

Interdisciplinary Connections:

ELA/Literacy -

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. ,(MS-LS1-6),(MS-LS2-1),(MS-LS2-4)
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. *(MS-LS1-6)*
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS2-1)
RI.8.8	Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. (MS-LS2-4)
WHST.6-8.1	Write arguments focused on discipline content. (MS-LS2-4)
WHST.6-8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS1-6)
WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-6)
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-LS1-7),(MS-LS2-3)*

Mathematics -

6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *(MS-LS1-6),(MS-LS2-3)*

Grade Level: 6	**Title of Unit: - Matter and Energy Organisms and Ecosystems**
Stage 1 - Desired Results	
Understandings: *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.	**Essential Questions:** ● 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?
Knowledge: *Students will know…* ● the possible ecological relationships between species that coexist in an ecosystem ● 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	**Skills:** *Students will be able to…* ● Illustrate and/or model the processes of photosynthesis, cellular respiration and protein synthesis to obtain and use energy. ● analyze the flow of energy through an ecosystem beginning with photosynthesis.
Stage 2- Assessment Evidence	
Performance Tasks and other evidence: ● Summative Assessments o RST- Research Simulation Task o Unit tests and quizzes o Labs and engineering based projects ● Formative Assessments o Graphic Organizers & Guided Note Taking	

- Directed Reading
- Cooperative Group Learning
- Homework
- Journal Entries

Stage 3 – Learning Plan

Digital information and technology integration: Indicate any special considerations as well as materials, resources (online, print, video, audio) or equipment.

- http://www2.sd35.bc.ca/uconnect/salmon/DissectionGame.html (Virtual Salmon Dissection)
- http://www.nsta.org/publications/news/story.aspx?id=49206 (idea for teacher created simulation of fish stomach dissection)
- https://www.learner.org/courses/envsci/unit/pdfs/unit4.pdf (info on ecosystems and links)
- https://www.learner.org/courses/envsci/interactives/ecology/producers_1.php (simulation of environment and interaction of living things)
- http://coolclassroom.org/cool_windows/home.html (Virtual Food Web Game)

Modifications: (ELLs, Special Education, Gifted and Talented)

* Follow all IEP modifications/504 plan
* Teacher tutoring
* Peer tutoring
* Cooperative learning groups
* Modified assignments
* Differentiated instruction

Presentation accommodations allow a student to:

* Listen to audio recordings instead of reading text
* Learn content from audiobooks, 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

Response accommodations allow a student to:

* Give responses in a form (oral or written) that's easier for him

* 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”

Setting accommodations allow a student to:

* 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)

Timing accommodations allow a student to:

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

Scheduling accommodations allow a student to:

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

Organization skills accommodations allow a student to:

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

Assignment modifications allow a student to:

* Complete fewer or different homework problems than peers
* Write shorter papers
* Answer fewer or different test questions
* Create alternate projects or assignments

Curriculum modifications allow a student to:

* Learn different material (such as continuing to work on multiplication while classmates move on to fractions)
* Get graded or assessed using a different standard than the one for classmates

2015 Ocean County Science Curriculum

Grade 6

Unit: Space Systems

What is Earth's place in the Universe?

What makes up our solar system and how can the motion of Earth explain seasons and eclipses?

Students examine the Earth's place in relation to the solar system, Milky Way galaxy, and universe. There is a strong emphasis on a systems approach, using models of the solar system to explain astronomical and other observations of the cyclic patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain the data that support the theories that explain the formation and evolution of the universe. The crosscutting concepts of patterns; scale, proportion, and quantity; systems and system models; and interdependence of science, engineering, and technology are called out as organizing concepts for these disciplinary core ideas.

The Grades 3-5 Storyline provides a summary of the understandings that students developed by the end of 5th grade.

#	STUDENT LEARNING OBJECTIVES (SLOs)	Corresponding PEs and DCIs
1	Generate and analyze evidence (through simulations or long term investigations) to explain why the Sun's apparent motion across the sky changes over the course of a year.	ESS1.B
3	**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.]	**MS-ESS1-1**
4	Develop and use a model that shows how gravity causes smaller objects to orbit around larger objects at increasing scales, including the gravitational force of the sun causes the planets and other bodies to orbit around it holding together the solar system.	ESS1.A; ESS1.B
5	**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-ESS1-3**
6	**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.*]	**MS-ESS1-2**

The SLOs were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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-ESS1-1),(MS-ESS1-2)

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-ESS1-3)

21st Century themes and skills ***(This link is taken from the Partnership for 21st Century Skills)***

- creativity and innovation
- critical thinking and problem solving
- communication
- collaboration
- information literacy
- media literacy
- information and communications technology (ICT)
- literacy
- flexibility and adaptability
- initiative and self direction
- social and cross cultural skills
- productivity and accountability
- leadership and responsibility

Disciplinary Core Ideas

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 explained with models. (MS-ESS1-1)
- 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-ESS1-2),(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)
- The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)

Crosscutting Concepts

Patterns

- Patterns can be used to identify cause-and-effect relationships. (MS-ESS1-1)

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-ESS1-3)

Systems and System Models

- Models can be used to represent systems and their interactions. (MS-ESS1-2)

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-ESS1-3)

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

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

Connections to other DCIs in this grade-band:

MS.PS2.A (MS-ESS1-1),(MS-ESS1-2); **MS.PS2.B** (MS-ESS1-1),(MS-ESS1-2); **MS.ESS2.A** (MS-ESS1-3)

Articulation of DCIs across grade-bands:

3.PS2.A (MS-ESS1-1),(MS-ESS1-2); **5.PS2.B** (MS-ESS1-1),(MS-ESS1-2); **5.ESS1.A** (MS-ESS1-2); **5.ESS1.B** (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3); **HS.PS2.A** (MS-ESS1-1),(MS-ESS1-2); **HS.PS2.B** (MS-ESS1-1),(MS-ESS1-2); **HS.LS4.C** (MS-ESS1-4); **HS.ESS1.A** (MS-ESS1-2); **HS.ESS1.B** (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3); **HS.ESS2.A** (MS-ESS1-3)

Interdisciplinary Connections:

ELA/Literacy -

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS1-3)

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-ESS1-1),(MS-ESS1-2)*

Mathematics -

MP.2 Reason abstractly and quantitatively. (MS-ESS1-3)

MP.4 Model with mathematics. *(MS-ESS1-1),(MS-ESS1-2)*

6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *(MS-ESS1-1),(MS-ESS1-2)*,(MS-ESS1-3)

7.RP.A.2 Recognize and represent proportional relationships between quantities. *(MS-ESS1-1),(MS-ESS1-2)*,(MS-ESS1-3)

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. *(MS-ESS1-2),(MS-ESS1-4)*

7.EE.B.6 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS-ESS1-2)*

Grade Level: 6	**Title of Unit: Space Systems**
Stage 1 - Desired Results	
Understandings: *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.	**Essential Questions:** ● 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?
Knowledge: *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	**Skills:** *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.
Stage 2- Assessment Evidence	

Performance Tasks and other evidence:

- Summative Assessments
  - RST- Research Simulation Task
  - Unit tests and quizzes
  - Labs and engineering based projects
- Formative Assessments
  - Graphic Organizers & Guided Note Taking
  - Directed Reading
  - Cooperative Group Learning
  - Homework
  - Journal Entries

Stage 3 – Learning Plan

Digital information and technology integration: Indicate any special considerations as well as materials, resources (online, print, video, audio) or equipment.

- http://astro.unl.edu/ (simulation)
- http://astro.unl.edu/naap/lps/animations/lps.html (moon phase simulation)
- https://docs.google.com/a/trschools.com/file/d/0BwGPbgTNlAinVUl4c1FFMTh1cGs/edit (Toilet Paper Solar System)
- http://www.bbc.co.uk/bitesize/ks3/science/energy_electricity_forces/forces/activity/ (forces)
- http://pbs.panda-prod.cdn.s3.amazonaws.com/media/assets/wgbh/ess05/ess05_int_seasonsgame/index.html (seasons)
- http://www.sciencecourseware.org/eec/GlobalWarming/Tutorials/Seasons/ (seasons)
- http://astro.unl.edu/interactives/
- http://spaceplace.nasa.gov/science-fair/en/ (science method fair ideas)
- https://phet.colorado.edu/sims/lunar-lander/lunar-lander_en.html (lunar landing interactive activity)
- http://www-tc.pbskids.org/designsquad/pdf/parentseducators/DSN_NASA_MissionSolarSystem_SoftLanding.pdf (Lunar landing stem activity)
- http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/78778/Eclipses_Nav.swf::Eclipse%20Interactive (Eclipse Interactive)
- https://www.brainpop.com/games/flytomars/
- *http://www.nasa.gov/pdf/630754main_NASAsBESTActivityGuide6-8.pdf* NASA's BEST activities focus on teaching the engineering design process. Each activity features objectives, a list of materials, educator information, procedures and student worksheets.

Modifications: (ELLs, Special Education, Gifted and Talented)

* Follow all IEP modifications/504 plan
* Teacher tutoring
* Peer tutoring
* Cooperative learning groups
* Modified assignments
* Differentiated instruction

Presentation accommodations allow a student to:

* Listen to audio recordings instead of reading text
* Learn content from audiobooks, 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

Response accommodations allow a student to:
* Give responses in a form (oral or written) that's easier for him
* 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"

Setting accommodations allow a student to:
* 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)

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

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

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

Assignment modifications allow a student to:
* Complete fewer or different homework problems than peers
* Write shorter papers
* Answer fewer or different test questions
* Create alternate projects or assignments

Curriculum modifications allow a student to:
* Learn different material (such as continuing to work on multiplication while classmates move on to fractions)
* Get graded or assessed using a different standard than the one for classmates

2015 Ocean County Science Curriculum

Grade 6

Unit: Weather and Climate

What factors interact and influence weather and climate?

Students construct and use models to develop understanding of the factors that control weather and climate. They take a systems approach to examining the feedbacks between systems as energy from the sun is transferred between systems and circulates though the ocean and atmosphere. The crosscutting concepts of cause and effect, systems and system models, and stability and change are called out as organizing concepts for these disciplinary core ideas.

The Grades 3-5 Storyline provides a summary of the understandings that students developed by the end of 5th grade.

#	STUDENT LEARNING OBJECTIVES (SLO)	Corresponding PEs and DCIs
1	Develop a conceptual model to explain the mechanisms for the Sun's energy to drive wind and the hydrologic cycle.	ESS2.C
2	**Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.** [Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] [*Assessment Boundary: Assessment does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations.*]	**MS-ESS2-5**
3	Explain how variations in density result from variations in temperature and salinity drive a global pattern of interconnected ocean currents.	ESS2.C
4	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.	ESS2.C; ESS2.D
5	**Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.** [Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.] [*Assessment Boundary: Assessment does not include the dynamics of the Coriolis effect.*]	**MS-ESS2-6**
6	**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.]	**MS-ESS3-5**

The SLOs above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.

- Ask questions to identify and clarify evidence of an argument. (MS-ESS3-5)

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-ESS2-6)

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.

- 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. (MS-ESS2-5)

21st Century themes and skills ***(This link is taken from the Partnership for 21st Century Skills)***

- creativity and innovation
- critical thinking and problem solving
- communication
- collaboration
- information literacy
- media literacy
- information and communications technology (ICT)
- literacy
- flexibility and adaptability

Disciplinary Core Ideas

ESS2.C: The Roles of Water in Earth's Surface Processes

- The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)
- Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6)

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 weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)

ESS3.D: Global Climate Change

- Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5)

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. (MS-ESS2-6)

Stability and Change

- Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5)

• initiative and self direction • social and cross cultural skills • productivity and accountability • leadership and responsibility	science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)	

Connections to other DCIs in this grade-band:

MS.PS1.A (MS-ESS2-5); **MS.PS2.A** (MS-ESS2-5),(MS-ESS2-6); **MS.PS3.A** (MS-ESS2-5); **MS.PS3.B** (MS-ESS2-5),(MS-ESS2-6); **MS.PS4.B** (MS-ESS2-6)

Articulation of DCIs across grade-bands:

3.PS2.A (MS-ESS2-6); **3.ESS2.D** (MS-ESS2-5),(MS-ESS2-6); **5.ESS2.A** (MS-ESS2-5),(MS-ESS2-6); **HS.PS2.B** (MS-ESS2-6); **HS.PS3.B** (MS-ESS2-6),(MS-ESS3-5); **HS.PS3.D** (MS-ESS2-6); **HS.PS4.B** (MS-ESS3-5); **HS.ESS1.B** (MS-ESS2-6); **HS.ESS2.A** (MS-ESS2-6),(MS-ESS3-5); **HS.ESS2.C** (MS-ESS2-5); **HS.ESS2.D** (MS-ESS2-5),(MS-ESS2-6);(MS-ESS3-5); **HS.ESS3.C** (MS-ESS3-5); **HS.ESS3.D** (MS-ESS3-5);

Interdisciplinary Connections:

ELA/Literacy -

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-5),(MS-ESS3-5)
RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ESS2-5)
WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. *(MS-ESS2-5)*
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-ESS2-6)*

Mathematics -

MP.2	Reason abstractly and quantitatively. (MS-ESS2-5),*(MS-ESS3-5)*
6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-ESS2-5)
6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. *(MS-ESS3-5)*
7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS-ESS3-5)*

Grade Level: 6	**Title of Unit: Weather and Climate**

Stage 1 - Desired Results

Understandings:

Students will understand that…

- Earth's components form systems. These systems continually interact at different rates of time, affecting the Earth regionally and globally.
- 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.

Essential Questions:

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

Knowledge:

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

Skills:

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.

Stage 2- Assessment Evidence

Performance Tasks and other evidence:

- Summative Assessments
  - RST- Research Simulation Task
  - Unit tests and quizzes
  - Labs and engineering based projects
- Formative Assessments
  - Graphic Organizers & Guided Note Taking
  - Directed Reading
  - Cooperative Group Learning
  - Homework
  - Journal Entries

Stage 3 – Learning Plan

Digital information and technology integration: Indicate any special considerations as well as materials, resources (online, print, video, audio) or equipment.

Weather

- http://www.ciese.org/curriculum/weatherproj2/en/lesson1.shtml
- http://www.projectsharetexas.org/resource-index?field_resource_keywords_tid=&sort_by=title&sort_order=ASC&items_per_page=50&page=1 (everything and anything to sort through)
- http://teachers.egfi-k12.org/lesson-tornado-proof-design/
- http://www.education.noaa.gov/tweather.html#General
- http://climatekids.nasa.gov/science-standards/
- https://www.teachengineering.org/view_curriculararunit.php?url=collection/cub_/curricular_units/cub_weather/cub_weather_curricularunit.xml
- http://www.earthsciweek.org/classroom-activities/ngss

Modifications: (ELLs, Special Education, Gifted and Talented)

* Follow all IEP modifications/504 plan
* Teacher tutoring
* Peer tutoring
* Cooperative learning groups
* Modified assignments
* Differentiated instruction

Presentation accommodations allow a student to:

* Listen to audio recordings instead of reading text
* Learn content from audiobooks, 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

Response accommodations allow a student to:
* Give responses in a form (oral or written) that's easier for him
* 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"

Setting accommodations allow a student to:
* 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)

Timing accommodations allow a student to:
* Take more time to complete a task or a test
* Have extra time to process oral information and directions
* Take frequent breaks, such as afte**r completing a task**

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

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

Assignment modifications allow a student to:
* Complete fewer or different homework problems than peers
* Write shorter papers
* Answer fewer or different test questions
* Create alternate projects or assignments

Curriculum modifications allow a student to:
* Learn different material (such as continuing to work on multiplication while classmates move on to fractions)
* Get graded or assessed using a different standard than the one for classmates

MS-ETS1 Engineering Design

Students who demonstrate understanding can:

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.**

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.

- 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. (MS-ETS1-1)

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 a model to generate data to test ideas about designed systems, including those representing inputs and outputs. (MS-ETS1-4)

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

Disciplinary Core Ideas

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. (MS-ETS1-1)

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. (MS-ETS1-4)
- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3)
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3)
- Models of all kinds are important for testing solutions. (MS-ETS1-4)

Crosscutting Concepts

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. (MS-ETS1-1)
- 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. (MS-ETS1-1)

causation, and basic statistical techniques of data and error analysis. ● Analyze and interpret data to determine similarities and differences in findings. (MS-ETS1-3) **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. ● Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-ETS1-2)	**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. (MS-ETS1-3) ● 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. (MS-ETS1-4)	

Connections to MS-ETS1.A: Defining and Delimiting Engineering Problems include:
Physical Science: MS-PS3-3
Connections to MS-ETS1.B: Developing Possible Solutions Problems include:
Physical Science: MS-PS1-6, MS-PS3-3, **Life Science:** MS-LS2-5
Connections to MS-ETS1.C: Optimizing the Design Solution include:
Physical Science: MS-PS1-6

Articulation of DCIs across grade-bands:
3-5.ETS1.A (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3); **3-5.ETS1.B** (MS-ETS1-2),(MS-ETS1-3),(MS-ETS1-4); **3-5.ETS1.C** (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3),(MS-ETS1-4);**HS.ETS1.A** (MS-ETS1-1),(MS-ETS1-2); **HS.ETS1.B** (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3),(MS-ETS1-4); **HS.ETS1.C** (MS-ETS1-3),(MS-ETS1-4)

Interdisciplinary Connections:
ELA/Literacy -

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-ETS1-1),*(MS-ETS1-2),(MS-ETS1-3)*
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). *(MS-ETS1-3)*
RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.(MS-ETS1-2),(MS-ETS1-3)
WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ETS1-2)
WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-ETS1-1)
WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research. *(MS-ETS1-2)*
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-ETS1-4)*

Mathematics -

MP.2	Reason abstractly and quantitatively. *(MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3),(MS-ETS1-4)*
7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *(MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3)*
7.SP	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. *(MS-ETS1-4)*

Digital information and technology integration: Indicate any special considerations as well as materials, resources (online, print, video, audio) or equipment.

- *http://www.ciese.org/materials/k12/ These compelling lessons and projects promote problem-based learning, collaboration, higher order thinking skills, and critical analysis through the integration of science, technology, engineering, mathematics and other core subjects.*
- *https://www.teachengineering.org/ TeachEngineering curriculum provides innovative resources and ideas for teachers using NGSS.*
- *http://tryengineering.org/lesson-plans TryEngineering offers a variety of lesson plans that align with education standards to allow teachers and students to apply engineering principles in the classroom.*
- *https://www.nsf.gov/news/classroom/engineering.jsp NSDL is the National Science Foundation's online library of resources for science, technology, engineering, and mathematics education.*
- *http://pbskids.org/designsquad/parentseducators/index.html The goal of Design Squad is to give kids a stronger understanding of the design process, and the connection between engineering and the things we all use in everyday life. The DESIGN SQUAD NATION website equips kids with science and math skills, inspires them, and lays the foundation they need to participate in engineering activities later in life.*
- *http://teachers.egfi-k12.org/category/lessons/grades-6-8-lessons/ eGFI is proudly brought to you by the American Society for Engineering Education (ASEE). We are committed to promoting and enhancing efforts to improve K-12 STEM and engineering education.*
- *http://stem-works.com/ a resource for teachers, mentors, parents, STEM professionals, volunteers, and everyone passionate about getting children eager to learn about science, technology, engineering, and math.*
- *http://www.sciencebuddies.org/science-fair-projects/teacher_resources.shtml#scienceactivities Each activity comes with student instructions, and a facilitator guide with just enough information to help anyone lead a good discussion on the science behind the activity.*
- *https://vimeo.com/43038579 The invisible bicycle helmet video clip (Girls in Engineering)*
- *http://stemcollaborative.org/additionalResources.html a wealth of worthy STEM resources readily available on the web*

* The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

The section entitled “Disciplinary Core Ideas” is reproduced verbatim from *A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas*. Integrated and reprinted with permission from the National Academy of Sciences.

*Taken directly from: http://www.nextgenscience.org/msets1-engineering-design.