Science 6

Unit Title: **Earth in Space**

Stage 1: Desired Results

Standards & Indicators:

NJSLS for Science

MS-ESS1-1.
Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

MS-ESS1-2.
Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

MS-ESS1-3.
Analyze and interpret data to determine scale properties of objects in the solar system.

MS-PS2-4.
Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MS-PS2-5.
Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

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.

Science and Engineering Practices (SEP)

- **Engaging in Argument from Evidence-** Engaging in argument from evidence in 6–8 builds from grades 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. Construct and present oral and written arguments 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-PS2-4)

- **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-LS1-5), (MS-LS1-6) (MS-ESS1-4)
- **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)

Disciplinary Core Ideas (DCI)

- Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (MS-PS2-4)
- 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). (MS-PS2-5)
- 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)
- 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), (MSESS1-3)
- 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)
- The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1-4)

Crosscutting Concepts (CCC)

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

- **Systems and System Models** - Models can be used to represent systems and their interactions— such as inputs, processes and outputs—and energy and matter flows within systems. (MS-PS2-1), (MS-PS2-4), (MS-ESS1-2)

- **Scientific Knowledge is Based on Empirical Evidence** -Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS2-2), (MS-PS2-4)(MS-LS1-6)

- **Energy and Matter -**Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6**)**

- **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), (MSESS1-4)

- **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)

- **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)

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Career Readiness, Life Literacies and Key Skills		
Standard	**Performance Expectations**	**Core Ideas**
9.4.8.CI.1 9.4.8.CI.4	Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4). Explore the role of creativity and innovation in career pathways and industries.	Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).	Multiple solutions often exist to solve a problem.
9.4.8.DC.1 9.4.8.DC.2	Analyze the resource citations in online materials for proper use. Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).	Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.
9.4.8.DC.7	Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.	Digital communities are used by individuals to share information, organize, and engage around issues and topics of interest.
9.4.8.DC.8	Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities).	Digital technology and data can be leveraged by communities to address effects of climate change.
9.4.8.IML.7	Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH. IPRET.8).	Sources of information are evaluated for accuracy and relevance when considering the use of information.
9.4.8.TL.2 9.4.8.TL.3	Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4). Select appropriate tools to organize and present information digitally.	Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.
Central Idea/Enduring Understanding: Where is Earth in the Universe, and how is Earth related to other objects in the universe?	**Essential/Guiding Question:** • How is the universe structured?	

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How do the solar system and its objects affect life on Earth?	• What properties of the solar system and its objects help explain why Earth is habitable for life? • What objects are in the solar system? • How does Earth compare with other objects in the solar system? • What causes the moon to change shape? • What causes seasons on Earth? • What is the role of photosynthesis in the cycling of matter and flow of energy into and out of an organism? • How does the Moon affect Earth? • How do solar and lunar eclipses differ? • Why do the solar system and its objects move like they do? • Can you apply a force on something without touching it? • How does gravity influence the shape and the motion of objects in the solar system? • If I were able to eliminate air resistance and dropped a feather and a hammer at the same time, which would land first?
Content: **OpenSciEd: Earth in Space** Lesson 1: How are we connected to the patterns we see in the sky? Lesson 2: What patterns are happening in the sky that I have experienced and can observe (through models and tools)? Lesson 3: How can we explain the Sun's path change over time? Lesson 4: How do these changes in sunlight impact us here on Earth? Lesson 5: How can we explain phenomena like Manhattanhenge? Lesson 6: Why do we see the shape of the Moon change? Lesson 7: Why do we see eclipses and when do we see them? Lesson 8: What does a lunar eclipse look like and how can we explain it? Lesson 9: Why do the Moon and Sun appear to change color near the horizon? Lesson 10: How does light interact with matter in the atmosphere? Lesson 11: How does the shape of a water droplet or an ice crystal cause sunlight to form into a rainbow? Lesson 12: Why does the Moon always change color during a lunar eclipse? Lesson 13: What new patterns do we see when we look more closely at other objects in the sky?	**Skills(Objectives):** • Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. • Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. • Analyze and interpret data to determine scale properties of objects in the solar system. • Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. • Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. • 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. • Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. • Cite specific textual evidence to support analysis of science and technical texts. • 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).

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Lesson 14: Why do some solar system objects orbit planets and others orbit the Sun? 257 Lesson 15: How did the solar system get to be the way it is today?
Lesson 16: What patterns and phenomena are beyond our solar system that we cannot see with just our eyes?
Lesson 17: How are we connected to all of the systems in space beyond the planet we live on?

Investigation 1: What properties of the solar system and its objects help explain why Earth is habitable for life?

a. Objects that make up our solar system
b. Earth's place / Universe > Galaxy > Solar System > Sun > Planet
c. Scale/size
d. Goldilocks Zone/Kepler Mission

Investigation 2: Does the moon affect life on Earth? (Earth-Moon-Sun System)

a. What causes the moon to change shape?
    i. Moon Phases
b. Do the seasons affect life on Earth?
    i. Tilt/Direct vs indirect sunlight
    ii. Photosynthesis
c. Do eclipses prove the moon changes sizes?
    i. Distance perception/Eclipse models
    ii. Tides

Investigation 3: Why do the solar system and its objects move like they do?

a. Gravity / predictable, consistent, orbital motion
b. Size of objects and distance between objects

- Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- 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.
- Reason abstractly and quantitatively.
- Write arguments focused on discipline-specific content.
- Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- Draw evidence from informational texts to support analysis, reflection, and research.

Interdisciplinary Connections:
ELA/Literacy -NJSLS
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

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SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
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.
WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

Mathematics -NJSLS
MP.4 Model with mathematics. (MS-ESS1-1)
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
7.RP.A.2 Recognize and represent proportional relationships between quantities.
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.
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.

Stage 2: Assessment Evidence

Performance Task(s):

- Sun-Earth-Moon models demonstrating: to scale, moon phases, eclipses, direct/indirect sunlight, seasons, rotation, revolution, tilted axis, orbital path, gravitational pull
- Goldilocks Zone CER
- Moon Phase Cookie CFA
- Edulastic Unit 1 Assessment

Other Evidence:

Do Nows
Classwork
Interactive Notebook
Class discussions
Closure activities (ex. exit tickets, kahoots, KWL charts)
Personal digital responses (Kahoot, Quizizz, Quizlet, etc.)
Homework
Teacher observation
Graphic Organizers
Scientific inquiry analysis
Common Formative Assessments
Summative Unit Assessments

Stage 3: Learning Plan

Learning Opportunities/Strategies:

A. Intro to Models: what they are and how to use them
    a. Pictures, Labels, Arrows
    b. Solar system 2.0 model video
B. Intro to Systems: what they are and how to model them
    a. Components, Boundaries, Flow (input/output, interactions)
C. CER
    a. evidence chart in notebook AT START
    b. Sentence starters: use in response/discussion
    c. Examples
        i. My Dad is an Alien
        ii. Sheryl's She Shed
    d. practice with "one does not belong 4 image search"

Resources:

OpenSciEd: Earth in Space
Lesson 1: How are we connected to the patterns we see in the sky?
Lesson 2: What patterns are happening in the sky that I have experienced and can observe (through models and tools)?
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Lesson 9: Why do the Moon and Sun appear to change color near the horizon?
Lesson 10: How does light interact with matter in the atmosphere?

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e. Review rubric: rate pre written sentences/paragraphs f. Break apart a paragraph and piece it back together g. Observations and Inferences practice i. Perception/optical illusions ii. "What Am I?" Lab with random objects D. To Scale a. three objects to represent sun, earth and moon b. Classify/compare images E. Categorizing objects a. shoes, then random objects b. Solar system objects sort i. "Gallery walk"/students review others work c. which one doesn't belong F. Goldilocks Story "Just right" a. Kepler Mission Article G. Gravity a. swinging bucket of water model b. tug-o-war (more mass, more strength) c. objects suspended in jello H. Elliptical Orbit shape is like the track in PE I. Rotation vs Revolution a. Day & Night: a clock, passing time J. Moon Phases a. different models comparison b. MONTH LONG Moon Observation calendar c. Birthday Moon Phase d. Doodle Notes e. Flashlight model/demo K. Eclipse a. article b. flashlight model/demo L. Seasons a. Direct vs indirect i. basketball: bounce pass vs chest pass (intensity) ii. Barrow, AK two months of no sunrise (TILT) iii. Photosynthesis b. Doodle Notes M. READ a. Hidden Figures Teaching Scientific Practices	Lesson 11: How does the shape of a water droplet or an ice crystal cause sunlight to form into a rainbow? Lesson 12: Why does the Moon always change color during a lunar eclipse? Lesson 13: What new patterns do we see when we look more closely at other objects in the sky? Lesson 14: Why do some solar system objects orbit planets and others orbit the Sun? 257 Lesson 15: How did the solar system get to be the way it is today? Lesson 16: What patterns and phenomena are beyond our solar system that we cannot see with just our eyes? Lesson 17: How are we connected to all of the systems in space beyond the planet we live on? - Get Ready to Read - Launch Labs - Content Vocabulary - MiniLabs - Content Practice worksheets - Math Skills - Enrichment - Challenge - Lesson Quizzes - Labs - Key Concept Builder activities - Chapter Tests - Online quiz - Online Standardized Test Practice YouTube videos BrainPop videos Flocabulary Edpuzzle Newsela Readworks.org Scholastic Science World magazine Kesler Science Resources Edulastic IXL LGBT and Disabilities Resources: • LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth • LGBTQ+ Books DEI Resources: • Learning for Justice • GLSEN Educator Resources • Supporting LGBTQIA Youth Resource List • Respect Ability: Fighting Stigmas, Advancing Opportunities

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- Guide students through appropriate laboratory techniques (safety, accuracy, frequency, data collection, etc.)
- Students will utilize the engineering and design process to ask questions, plan and carry out investigations, refine models, design solutions, construct explanations, and design solutions.

Literacies

- Use reading strategies to read non-fiction text (preview, question, reflect, highlight, recite, review, utilize text structure, etc.)
- Digital tools - utilize features available on ebooks such as highlighting, bookmarking, linking to more information, etc.
- Digital literacy - Find and evaluate digital sources. Communicate clearly using digital platforms

Questioning - Present guiding leveled questions to students. See differentiation section for specific questions.

Formative assessment response modalities

- Teacher/student question discussion
- Thumbs up/thumbs down
- Rate yourself on understanding on a fist to five scale
- Google Forms
- Digital polling devices (Kahoot, Quizizz, etc.)
- Exit tickets/responses
- Whiteboards

Learning Strategies

- Think, Pair, Share
- Direct instruction
- Jigsaw
- Cooperative groups
- Discussion in class and discussion boards
- Socratic Seminar

Learning Management

- Google Classroom - share information with students, post assignments, collect feedback
- Google Docs & Google Slides - creation and presentation tools

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- NJDOE Diversity, Equity & Inclusion Educational Resources
- Diversity Calendar

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Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

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High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Interactive Science notebooks - higher level of Costa's questions created Less structure provided for assignments/assessments Heterogeneous grouping Research independently or collaboratively with minimal teacher guidance Laboratory investigations designed and carried out by students Independent Reading Marking the text on Device Using a graphic organizer for essay, bullet main points and ideas used in essay. Student generates notes on class readings. Project based learning using technology Provide a higher grade level readings based on topic being covered in class Students read their assigned material independently Provide opportunity for students to respond and reflect on day's learning.	Interactive Science notebooks Provide challenging tasks with support to allow students to experience success Moderate amount of scaffold on assignments Heterogeneous grouping Laboratory investigations designed by students with teacher assistance and carried out by students Students work in groups generating notes on a specific reading. Project based learning using technology Provide any readings on grade level based on a topic being covered in class Students meet with those from other groups that read the same material to discuss what was most important and what needs to be taught to their groups. Keep a stack of blank index cards on hand to give to students at the end of class. Have students	Interactive Science notebooks - templates provided by teacher Break down assignments into smaller tasks Structured, predictable classroom Graphic organizers/Study guides provided Copy of class notes/presentation provided to student Utilize student's best personal learning modality (auditory, visual, kinesthetic) Heterogeneous grouping Laboratory investigations provided by teacher for students to carry out Audio of the book/readings read to the whole class Marking the text and teacher guiding the practice Using level 1 and 2 questioning Using a graphic organizer for essay. Organizer must be completely filled out before proceeding with essay.	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries

3-4 week independent study projects intended to provide enrichment	respond on the card to something from the day's lesson.	Students use teacher generated notes while filling in missing information. Project based learning using technology - In groups develop a google slide presentation Project based learning - 2 paragraph writing incorporated with visual aid Provide a book that is a grade or two lower and pair them with a higher functioning student Students meet with their small groups and to share what they've learned with each other. Follow with whole group discussion of the most important points. Complete a "What I Learned" Chart.	

Unit Title: **Plate Tectonics & Rock Cycling**

Stage 1: Desired Results

Standards & Indicators:

NJSLS for Science

MS-ESS1-4.
Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

MS-ESS2-1.
Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

MS-ESS2-2.

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Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MS-ESS2-3.
Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

MS-ESS2-4.
Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

MS-ESS3-1.
Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Science and Engineering Practices (SEP)

- **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-ESS2-2)(MS-ESS3-1)

- **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 describe unobservable mechanisms (MS-ESS2-4). Develop and use a model to describe phenomena. (MS-ESS2-1).

- **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-ESS2-3)

Disciplinary Core Ideas (DCI)

- Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)
- The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1-4)
- All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1)
- The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2)
- Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3)

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- Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4)
- Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)
- Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2)

Crosscutting Concepts (CCC)

- **Cause and Effect** - Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1)
- **Scientific Knowledge is Based on Empirical Evidence** -Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS2-2)
- **Energy and Matter -**Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS 2-4**)**
- **Patterns -** Patterns can be used to identify cause-and-effect relationships. (MS-ESS2-3)
- **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-ESS2-2), (MS-ESS1-4)
- **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-ESS2-1)
- **Scientific Knowledge is Open to Revision in Light of New Evidence-** Science findings are frequently revised and/or reinterpreted based on new evidence. (MS-ESS2-3)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).	Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.	
9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).	Multiple solutions often exist to solve a problem.
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.	Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.
9.4.8.DC.2	Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).	

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9.4.8.DC.7	Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.	Digital communities are used by individuals to share information, organize, and engage around issues and topics of interest.
9.4.8.DC.8	Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities).	Digital technology and data can be leveraged by communities to address effects of climate change.
9.4.8.IML.7	Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH. IPRET.8).	Sources of information are evaluated for accuracy and relevance when considering the use of information.
9.4.8.TL.2 9.4.8.TL.3	Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4). Select appropriate tools to organize and present information digitally.	Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.

Central Idea/Enduring Understanding:

If no one was there, how do we know the Earth's history?

How do people figure out that the Earth and life on Earth have changed over time?

How does the movement of tectonic plates impact the surface of Earth?

What provides the forces that drive Earth's systems?

How do the materials in and on Earth's crust change over time?

Essential/Guiding Question:

- How do we know that the Earth is approximately 4.6-billion-year-old history?
- Do all of the changes to Earth systems occur in similar time scales?
- How is it possible for the same kind of fossils to be found in New Jersey and in Africa?
- What are the composition and structure of the atmosphere?
- What are Earth's Systems?
- What are the composition and structure of the geosphere?
- How does the rock cycle show interactions of Earth Systems?
- What is the theory of plate tectonics?
- What are the differences between divergent, convergent, and transform plate boundaries?
- What causes tectonic plates to move on Earth's surface?
- How are landforms related to plate tectonics?
- How does plate movement form mountains?
- Where do most earthquakes and volcanoes occur?
- What is the difference between physical and chemical weathering?
- How do water ice, and wind change Earth's surface?

Content:

OpenSciEd: Plate Tectonics and Rock Cycling

Lesson 1: What is causing Mt. Everest and other mountains to move, grow, or shrink?

Lesson 2: How are earthquakes related to where mountains are located?

Skills(Objectives):

- Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
- Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

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Lesson 3: How does what we find on and below Earth's surface compare in different places? Lesson 4: What is happening to Earths' surface and the material below it during an earthquake? Lesson 5: How does plate movement affect the land around mountains such as Mt. Everest? Lesson 6: How could plate movement help us explain how Mt. Everest and other locations are changing in elevation? Lesson 7: What happens at mountains where we see volcanic activity? Lesson 8: What is occurring at locations where two plates are moving away from each other? Lesson 9: What causes mountains to change? Lesson 10: Where were Africa and South America in the past? 11: Where were the other plates located in the distant past? Lesson 12: Where did mountains that aren't at plate boundaries today, like the Appalachians and Urals, come from? Lesson 13: What causes mountains to shrink in elevation? Lesson 14: How is there an exposed marine fossil on Mt. Everest? And, what other remaining questions from our Driving Question Board can we now answer? The History of Planet Earth - The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. - Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. Earth Materials and Systems - The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. - All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and	● Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. ● Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. ● Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. ● Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. ● Cite specific textual evidence to support analysis of science and technical texts. ● Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. ● Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. ● 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). ● Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. ● Draw evidence from informational texts to support analysis, reflection, and research.

physical changes in Earth's materials and living organisms.

Plate Tectonics and Large-Scale System Interactions

- Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.

The Roles of Water in Earth's Surface Processes

- Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.
- Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.
- Global movements of water and its changes in form are propelled by sunlight and gravity.

Interdisciplinary Connections:

ELA/Literacy -NJSLS

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
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.
WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

Mathematics -NJSLS

MP.4 Model with mathematics.
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
7.RP.A.2 Recognize and represent proportional relationships between quantities.
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.
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.

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Stage 2: Assessment Evidence

Performance Task(s):

- Model:
- Rock Cycle Project
- Fault movement with clay/cookies CFA
- CER:
- Edulastic Unit 2 Assessment

Other Evidence:

Do Nows
Classwork
Interactive Notebook
Class discussions
Closure activities (ex. exit tickets, kahoots, KWL charts)
Personal digital responses (Kahoot, Quizizz, Quizlet, etc.)
Homework
Teacher observation
Graphic Organizers
Scientific inquiry analysis
Common Formative Assessments
Summative Unit Assessments

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Teaching Scientific Practices

- Guide students through appropriate laboratory techniques (safety, accuracy, frequency, data collection, etc.)
- Students will utilize the engineering and design process to ask questions, plan and carry out investigations, refine models, design solutions, construct explanations, and design solutions.

Literacies

- Use reading strategies to read non-fiction text (preview, question, reflect, highlight, recite, review, utilize text structure, etc.)
- Digital tools - utilize features available on ebooks such as highlighting, bookmarking, linking to more information, etc.
- Digital literacy - Find and evaluate digital sources. Communicate clearly using digital platforms

Questioning - Present guiding leveled questions to students. See differentiation section for specific questions.

Formative assessment response modalities

- Teacher/student question discussion
- Thumbs up/thumbs down

Resources:

OpenSciEd: Plate Tectonics and Rock Cycling

Lesson 1: What is causing Mt. Everest and other mountains to move, grow, or shrink?
Lesson 2: How are earthquakes related to where mountains are located?
Lesson 3: How does what we find on and below Earth's surface compare in different places? Lesson 4: What is happening to Earths' surface and the material below it during an earthquake? Lesson 5: How does plate movement affect the land around mountains such as Mt. Everest? Lesson 6: How could plate movement help us explain how Mt. Everest and other locations are changing in elevation?
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Lesson 12: Where did mountains that aren't at plate boundaries today, like the Appalachians and Urals, come from?
Lesson 13: What causes mountains to shrink in elevation?
Lesson 14: How is there an exposed marine fossil on Mt. Everest? And, what other remaining questions from our Driving Question Board can we now answer?

- Get Ready to Read
- Launch Labs
- Content Vocabulary

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- Rate yourself on understanding on a fist to five scale - Google Forms - Digital polling devices (Kahoot, Quizizz, etc.) - Exit tickets/responses - Whiteboards Learning Strategies - Think, Pair, Share - Direct instruction - Jigsaw - Cooperative groups - Discussion in class and discussion boards - Socratic Seminar Learning Management - Google Classroom - share information with students, post assignments, collect feedback - Google Docs & Google Slides - creation and presentation tools	- MiniLabs - Content Practice worksheets - Math Skills - Enrichment - Challenge - Lesson Quizzes - Labs - Key Concept Builder activities - Chapter Tests - Online quiz - Online Standardized Test Practice YouTube videos BrainPop videos Flocabulary Edpuzzle Newsela Readworks.org Scholastic Science World magazine Kesler Science Resources Edulastic NGSS Phenomena: https://www.ngssphenomena.com IXL LGBT and Disabilities Resources: ● LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth ● LGBTQ+ Books DEI Resources: ● Learning for Justice ● GLSEN Educator Resources ● Supporting LGBTQIA Youth Resource List ● Respect Ability: Fighting Stigmas, Advancing Opportunities ● NJDOE Diversity, Equity & Inclusion Educational Resources ● Diversity Calendar

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Interactive Science notebooks - higher level of Costa's questions created Less structure provided for	Interactive Science notebooks Provide challenging tasks with support to allow students to experience success	Interactive Science notebooks - templates provided by teacher Break down assignments into smaller tasks	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through

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assignments/assessments Heterogeneous grouping Research independently or collaboratively with minimal teacher guidance Laboratory investigations designed and carried out by students Independent Reading Marking the text on Device Using a graphic organizer for essay, bullet main points and ideas used in essay. Student generates notes on class readings. Project based learning using technology Provide a higher grade level readings based on topic being covered in class Students read their assigned material independently Provide opportunity for students to respond and reflect on day's learning. 3-4 week independent study projects intended to provide enrichment	Moderate amount of scaffold on assignments Heterogeneous grouping Laboratory investigations designed by students with teacher assistance and carried out by students Students work in groups generating notes on a specific reading. Project based learning using technology Provide any readings on grade level based on a topic being covered in class Students meet with those from other groups that read the same material to discuss what was most important and what needs to be taught to their groups. Keep a stack of blank index cards on hand to give to students at the end of class. Have students respond on the card to something from the day's lesson.	Structured, predictable classroom Graphic organizers/Study guides provided Copy of class notes/presentation provided to student Utilize student's best personal learning modality (auditory, visual, kinesthetic) Heterogeneous grouping Laboratory investigations provided by teacher for students to carry out Audio of the book/readings read to the whole class Marking the text and teacher guiding the practice Using level 1 and 2 questioning Using a graphic organizer for essay. Organizer must be completely filled out before proceeding with essay. Students use teacher generated notes while filling in missing information. Project based learning using technology - In groups	several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries

		develop a google slide presentation Project based learning - 2 paragraph writing incorporated with visual aid Provide a book that is a grade or two lower and pair them with a higher functioning student Students meet with their small groups and to share what they've learned with each other. Follow with whole group discussion of the most important points. Complete a "What I Learned" Chart.	

Unit Title: Weather, Climate & Water Cycling

Stage 1: Desired Results

Standards & Indicators:

NJSLS for Science

MS-ESS2-5.
Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions

MS-ESS2-6.
Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates

MS-ESS3-2.
Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Science and Engineering Practices (SEP)

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- **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)

- **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-ESS3-2)

Disciplinary Core Ideas (DCI)

- 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).
- 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)

Crosscutting Concepts (CCC)

- **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)

- **Patterns -** Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2)

- **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. (MS-ESS3-2)

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).	Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.	

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9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).	Multiple solutions often exist to solve a problem.
9.4.8.DC.1 9.4.8.DC.2	Analyze the resource citations in online materials for proper use. Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).	Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.
9.4.8.DC.7	Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.	Digital communities are used by individuals to share information, organize, and engage around issues and topics of interest.
9.4.8.DC.8	Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities).	Digital technology and data can be leveraged by communities to address effects of climate change.
9.4.8.IML.7	Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH. IPRET.8).	Sources of information are evaluated for accuracy and relevance when considering the use of information.
9.4.8.TL.2 9.4.8.TL.3	Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4). Select appropriate tools to organize and present information digitally.	Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.

Central Idea/Enduring Understanding: What factors interact and influence weather and climate? How does water influence weather, circulate in the oceans, and shape Earth's surface?	**Essential/Guiding Question:** ● What are the processes involved in the cycling of water through Earth's systems? ● What is the relationship between the complex interactions of air masses and changes in weather conditions? ● What are the major factors that determine regional climates? ● How can we predict and prepare for natural disasters?
Content: **OpenSciEd: Weather, Climate & Water Cycling** Lesson 1: What causes this kind of precipitation event to occur? Lesson 2: What are the conditions like on days when it hails? Lesson 3: How does the air higher up compare to the air near the ground?	**Skills(Objectives):** ● Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions. ● 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.

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Lesson 4: Why is the air near the ground warmer than the air higher up? Lesson 5: What happens to the air near the ground when it is warmed up? Lesson 6: How can we explain the movement of air in a hail cloud? Lesson 7: Where did all that water in the air come from, and how did it get into the air? Lesson 8: What happens to water vapor in the air if we cool the air down, and why? Lesson 9: Why don't we see clouds everywhere in the air, and what is a cloud made of? Lesson 10: Why do clouds or storms form at some times but not others? Lesson 11: Why don't water droplets or ice crystals fall from the clouds all the time? Lesson 12: What causes more lift in one cloud versus another? Lesson 13: Why do some storms produce (really big) hail and others don't? Lesson 14: What causes a large-scale precipitation event like this to occur? Lesson 15: What happens with temperature and humidity of air in large storms? Lesson 16: How do warm air masses and cold air masses interact along the boundaries between them? Lesson 17: Is there a relationship between where the air is rising and where precipitation falls? Lesson 18: How can we explain what is happening across this storm (and other large-scale storms)? Lesson 19: Are there patterns to how air masses move that can help predict where large storms will form? Lesson 20: How do oceans affect whether a place gets a lot or a little precipitation? Lesson 21: Why is there less precipitation further inland in the Pacific Northwest than further inland from the Gulf Coast? Lesson 22: How can we explain differences in climate in different parts of the world? 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.	● Cite specific textual evidence to support analysis of science and technical texts. ● Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. ● 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. ● Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. ● 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).

- Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. Weather and Climate - Because these patterns are so complex, weather can only be predicted probabilistically. - 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. - 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. Natural Hazards - 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.	

Interdisciplinary Connections:

ELA/Literacy -NJSLS
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
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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.

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Stage 2: Assessment Evidence

Performance Task(s):

- Model: air movement in atmosphere (pressure & temperature, convection current)
- My LIfe as a Water Drop Project
- Weather Map Model
- Weather Report Essay & Video
- Emergency Preparedness Project
- CER:
- Edulastic Unit 3 Assessment

Other Evidence:

Do Nows
Classwork
Interactive Notebook
Class discussions
Closure activities (ex. exit tickets, kahoots, KWL charts)
Personal digital responses (Kahoot, Quizizz, Quizlet, etc.)
Homework
Teacher observation
Graphic Organizers
Scientific inquiry analysis
Common Formative Assessments
Summative Unit Assessments

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Teaching Scientific Practices

- Guide students through appropriate laboratory techniques (safety, accuracy, frequency, data collection, etc.)
- Students will utilize the engineering and design process to ask questions, plan and carry out investigations, refine models, design solutions, construct explanations, and design solutions.

Literacies

- Use reading strategies to read non-fiction text (preview, question, reflect, highlight, recite, review, utilize text structure, etc.)
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- Digital literacy - Find and evaluate digital sources. Communicate clearly using digital platforms

Questioning - Present guiding leveled questions to students. See differentiation section for specific questions.

Formative assessment response modalities

- Teacher/student question discussion
- Thumbs up/thumbs down
- Rate yourself on understanding on a fist to five scale
- Google Forms

Resources:

OpenSciEd: Weather, Climate & Water Cycling

Lesson 1: What causes this kind of precipitation event to occur?
Lesson 2: What are the conditions like on days when it hails?
Lesson 3: How does the air higher up compare to the air near the ground?
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- Digital polling devices (Kahoot, Quizizz, etc.)
- Exit tickets/responses
- Whiteboards

Learning Strategies

- Think, Pair, Share
- Direct instruction
- Jigsaw
- Cooperative groups
- Discussion in class and discussion boards
- Socratic Seminar

Learning Management

- Google Classroom - share information with students, post assignments, collect feedback
- Google Docs & Google Slides - creation and presentation tools

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Lesson 17: Is there a relationship between where the air is rising and where precipitation falls? Lesson 18: How can we explain what is happening across this storm (and other large-scale storms)?
Lesson 19: Are there patterns to how air masses move that can help predict where large storms will form?
Lesson 20: How do oceans affect whether a place gets a lot or a little precipitation?
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- Get Ready to Read
- Launch Labs
- Content Vocabulary
- MiniLabs
- Content Practice worksheets
- Math Skills
- Enrichment
- Challenge
- Lesson Quizzes
- Labs
- Key Concept Builder activities
- Chapter Tests
- Online quiz
- Online Standardized Test Practice

YouTube videos
BrainPop videos
Flocabulary
Edpuzzle
Newsela
Readworks.org
Scholastic Science World magazine
Kesler Science Resources
Edulastic
NGSS Phenomena: https://www.ngssphenomena.com
IXL

LGBT and Disabilities Resources:

- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth
- LGBTQ+ Books

DEI Resources:

- Learning for Justice
- GLSEN Educator Resources
- Supporting LGBTQIA Youth Resource List
- Respect Ability: Fighting Stigmas, Advancing Opportunities
- NJDOE Diversity, Equity & Inclusion Educational Resources

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	• Diversity Calendar

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Interactive Science notebooks - higher level of Costa's questions created Less structure provided for assignments/assessments Heterogeneous grouping Research independently or collaboratively with minimal teacher guidance Laboratory investigations designed and carried out by students Independent Reading Marking the text on Device Using a graphic organizer for essay, bullet main points and ideas used in essay. Student generates notes on class readings. Project based learning using technology Provide a higher grade level readings based on topic being covered in class Students read their assigned material independently	Interactive Science notebooks Provide challenging tasks with support to allow students to experience success Moderate amount of scaffold on assignments Heterogeneous grouping Laboratory investigations designed by students with teacher assistance and carried out by students Students work in groups generating notes on a specific reading. Project based learning using technology Provide any readings on grade level based on a topic being covered in class Students meet with those from other groups that read the same material to discuss what was most important and	Interactive Science notebooks - templates provided by teacher Break down assignments into smaller tasks Structured, predictable classroom Graphic organizers/Study guides provided Copy of class notes/presentation provided to student Utilize student's best personal learning modality (auditory, visual, kinesthetic) Heterogeneous grouping Laboratory investigations provided by teacher for students to carry out Audio of the book/readings read to the whole class Marking the text and teacher guiding the practice Using level 1 and 2 questioning	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries

Provide opportunity for students to respond and reflect on day's learning. 3-4 week independent study projects intended to provide enrichment	what needs to be taught to their groups. Keep a stack of blank index cards on hand to give to students at the end of class. Have students respond on the card to something from the day's lesson.	Using a graphic organizer for essay. Organizer must be completely filled out before proceeding with essay. Students use teacher generated notes while filling in missing information. Project based learning using technology - In groups develop a google slide presentation Project based learning - 2 paragraph writing incorporated with visual aid Provide a book that is a grade or two lower and pair them with a higher functioning student Students meet with their small groups and to share what they've learned with each other. Follow with whole group discussion of the most important points. Complete a "What I Learned" Chart.	

Unit Title: Earth's Resources and Human Impact

Stage 1: Desired Results

Standards & Indicators:

NJSLS for Science

MS-ESS3-3.

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Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4.
Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems

MS-ESS3-5.
Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century

Science and Engineering Practices (SEP)

- **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)

- **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 6–8 builds on grades K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.Apply scientific principles to design an object, tool, process or system. (MS-ESS3-3)

- **Engaging in Argument from Evidence -**Engaging in argument from evidence in 6–8 builds on grades 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). 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-ESS3-4)

Disciplinary Core Ideas (DCI)

- 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 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)
- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3)
- Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3), (MS-ESS3-4)
-

Crosscutting Concepts (CCC)

- **Cause and Effect** - Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3). Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-4)

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

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- **Influence of Science, Engineering, and Technology on Society and the Natural World-**TAll 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-ESS3-4).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. (MS-ESS3-3)

- **Science Addresses Questions About the Natural and Material World** - Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-ESS3-4)

Career Readiness, Life Literacies and Key Skills		
Standard	**Performance Expectations**	**Core Ideas**
9.4.8.CI.1 9.4.8.CI.4	Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4). Explore the role of creativity and innovation in career pathways and industries.	Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).	Multiple solutions often exist to solve a problem.
9.4.8.DC.1 9.4.8.DC.2	Analyze the resource citations in online materials for proper use. Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).	Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.
9.4.8.DC.7	Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.	Digital communities are used by individuals to share information, organize, and engage around issues and topics of interest.
9.4.8.DC.8	Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities).	Digital technology and data can be leveraged by communities to address effects of climate change.
9.4.8.IML.7	Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH. IPRET.8).	Sources of information are evaluated for accuracy and relevance when considering the use of information.

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9.4.8.TL.2 9.4.8.TL.3	Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4). Select appropriate tools to organize and present information digitally.	Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.

Central Idea/Enduring Understanding: Why aren't minerals and groundwater distributed evenly across the world?	**Essential/Guiding Question:** ● How might we treat resources if we thought about the Earth as a spaceship on an extended survey of the solar system? (How would astronauts manage their resources?) ● How do we monitor the health of the environment (our life support system)? ● What information is necessary to ensure that a problem can be solved? ● What are advantages and disadvantages to design solutions? ● What characteristics of a design will yield the best solutions?
Content:OpenSciEd: Earth's Resources & Human Impact Lesson 1: Why are floods and droughts happening more often? Lesson 2: What would we normally expect for these places and how do we know it's really changing? Lesson 3: How would increased temperatures affect evaporation? Lesson 4: Are rising temperatures affecting anything else in Earth's water system? Lesson 5: How are rising temperatures changing water stories in these communities? Lesson 6: How are rising temperatures connected to two seemingly different phenomena? Lesson 7: Are there any changes in the air that could be related to rising temperatures? Lesson 8: Are changes in carbon dioxide and methane related to or causing temperatures to increase? Lesson 9: Are the changes in the amount of CO2 in the atmosphere part of normal cycles that Earth goes through? Lesson 10: What is happening in the world to cause the sharp rise in CO2? Lesson 11: Why could burning fossil fuels create a problem for CO2 in the atmosphere? Lesson 12: How are changes to Earth's carbon system impacting Earth's water system? Lesson 13: Why is solving the climate change problem so challenging?	**Skills(Objectives):** ● Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. ● Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. ● Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. ● Cite specific textual evidence to support analysis of science and technical texts. ● 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. ● 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. ● Write arguments focused on discipline content. ● Draw evidence from informational texts to support analysis, reflection, and research.

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Lesson 14: What things can people do to reduce carbon dioxide going into the atmosphere? Lesson 15: How can large-scale solutions work to reduce carbon in the atmosphere? Lesson 16: How are these solutions working in our communities? Lesson 17: What solutions work best for our school or community? Lesson 18: What can we explain now, and what questions do we still have? Natural Resources - Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. Human Impacts on Earth Systems - Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. - Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. 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 science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on	

applying that knowledge wisely in decisions and activities. 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. 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. 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.	

Interdisciplinary Connections:

ELA/Literacy -NJSLS
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
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.
WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

Mathematics -NJSLS
MP.4 Model with mathematics.
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
7.RP.A.2 Recognize and represent proportional relationships between quantities.

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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.
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.

Stage 2: Assessment Evidence

Performance Task(s):

- Natural Resource CER/"Instagram" Slides Project
- Green City Project
- Edulastic Unit 4 Assessment

Other Evidence:

Do Nows
Classwork
Interactive Notebook
Class discussions
Closure activities (ex. exit tickets, kahoots, KWL charts)
Personal digital responses (Kahoot, Quizizz, Quizlet, etc.)
Homework
Teacher observation
Graphic Organizers
Scientific inquiry analysis
Common Formative Assessments
Summative Unit Assessments

Stage 3: Learning Plan

Learning Opportunities/Strategies:

Teaching Scientific Practices

- Guide students through appropriate laboratory techniques (safety, accuracy, frequency, data collection, etc.)
- Students will utilize the engineering and design process to ask questions, plan and carry out investigations, refine models, design solutions, construct explanations, and design solutions.

Literacies

- Use reading strategies to read non-fiction text (preview, question, reflect, highlight, recite, review, utilize text structure, etc.)
- Digital tools - utilize features available on ebooks such as highlighting, bookmarking, linking to more information, etc.
- Digital literacy - Find and evaluate digital sources. Communicate clearly using digital platforms

Questioning - Present guiding leveled questions to students. See differentiation section for specific questions.

Formative assessment response modalities

- Teacher/student question discussion

Resources:

OpenSciEd: Earth's Resources & Human Impact

Lesson 1: Why are floods and droughts happening more often?
Lesson 2: What would we normally expect for these places and how do we know it's really changing?
Lesson 3: How would increased temperatures affect evaporation?
Lesson 4: Are rising temperatures affecting anything else in Earth's water system?
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Lesson 12: How are changes to Earth's carbon system impacting Earth's water system?
Lesson 13: Why is solving the climate change problem so challenging?

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- Thumbs up/thumbs down
- Rate yourself on understanding on a fist to five scale
- Google Forms
- Digital polling devices (Kahoot, Quizizz, etc.)
- Exit tickets/responses
- Whiteboards

Learning Strategies

- Think, Pair, Share
- Direct instruction
- Jigsaw
- Cooperative groups
- Discussion in class and discussion boards
- Socratic Seminar

Learning Management

- Google Classroom - share information with students, post assignments, collect feedback
- Google Docs & Google Slides - creation and presentation tools

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Lesson 14: What things can people do to reduce carbon dioxide going into the atmosphere?
Lesson 15: How can large-scale solutions work to reduce carbon in the atmosphere?
Lesson 16: How are these solutions working in our communities?
Lesson 17: What solutions work best for our school or community?
Lesson 18: What can we explain now, and what questions do we still have?

- Get Ready to Read
- Launch Labs
- Content Vocabulary
- MiniLabs
- Content Practice worksheets
- Math Skills
- Enrichment
- Challenge
- Lesson Quizzes
- Labs
- Key Concept Builder activities
- Chapter Tests
- Online quiz
- Online Standardized Test Practice

YouTube videos
BrainPop videos
Flocabulary
Edpuzzle
Newsela
Readworks.org
Scholastic Science World magazine
Kesler Science Resources
Edulastic
NGSS Phenomena: https://www.ngssphenomena.com
IXL

LGBT and Disabilities Resources:

- LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth
- LGBTQ+ Books

DEI Resources:

- Learning for Justice
- GLSEN Educator Resources
- Supporting LGBTQIA Youth Resource List
- Respect Ability: Fighting Stigmas, Advancing Opportunities
- NJDOE Diversity, Equity & Inclusion Educational Resources
- Diversity Calendar

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Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
Interactive Science notebooks - higher level of Costa's questions created Less structure provided for assignments/assessments Heterogeneous grouping Research independently or collaboratively with minimal teacher guidance Laboratory investigations designed and carried out by students Independent Reading Marking the text on Device Using a graphic organizer for essay, bullet main points and ideas used in essay. Student generates notes on class readings. Project based learning using technology Provide a higher grade level readings based on topic being covered in class Students read their assigned material independently Provide opportunity for students to respond and reflect on day's learning.	Interactive Science notebooks Provide challenging tasks with support to allow students to experience success Moderate amount of scaffold on assignments Heterogeneous grouping Laboratory investigations designed by students with teacher assistance and carried out by students Students work in groups generating notes on a specific reading. Project based learning using technology Provide any readings on grade level based on a topic being covered in class Students meet with those from other groups that read the same material to discuss what was most important and what needs to be taught to their groups. Keep a stack of blank index cards on hand	Interactive Science notebooks - templates provided by teacher Break down assignments into smaller tasks Structured, predictable classroom Graphic organizers/Study guides provided Copy of class notes/presentation provided to student Utilize student's best personal learning modality (auditory, visual, kinesthetic) Heterogeneous grouping Laboratory investigations provided by teacher for students to carry out Audio of the book/readings read to the whole class Marking the text and teacher guiding the practice Using level 1 and 2 questioning Using a graphic organizer for essay. Organizer must be completely filled out	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries

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3-4 week independent study projects intended to provide enrichment	to give to students at the end of class. Have students respond on the card to something from the day's lesson.	before proceeding with essay. Students use teacher generated notes while filling in missing information. Project based learning using technology - In groups develop a google slide presentation Project based learning - 2 paragraph writing incorporated with visual aid Provide a book that is a grade or two lower and pair them with a higher functioning student Students meet with their small groups and to share what they've learned with each other. Follow with whole group discussion of the most important points. Complete a "What I Learned" Chart.	

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Pacing Guide
(90 days)

Course Name	Content/Resources	Standards
UNIT 1:		
Earth in Space 23 Days	**CHAPTERS:** **2: 28 days** **8: 10 days** Unit Online Assessment: Edulastic-2 days	MS- ESS 1-1 MS- ESS 1-2 MS- ESS 1-3 MS- PS -2-4 MS-PS 2-5 MS- LS 1-6
UNIT 2:		
Earth's Systems 23 Days	**CHAPTERS** **3: 19 days (Part 1)** **4: 19 days (Part 1)** Unit Online Assessment: Edulastic-2 days	MS- ESS 1-4 MS- ESS 2.1 MS- ESS 2.2 MS- ESS 2.3 MS- ESS 2.4 MS- ESS 3-1
UNIT 3:		
Weather & Climate/Stability & Change 22 Days	**CHAPTERS** **3: 19 days (Part 2)** **4: 19 days (Part 2)** Unit Online Assessment: Edulastic -2 days	MS- ESS 2.5 MS- ESS 2.6 MS- ESS 3.2
UNIT 4:		
Earth & Human Activity/Impact 22 Days	**CHAPTERS** 5: 38 days Unit Online Assessment: Edulastic -2 days	MS- ESS 3.3 MS- ESS 3.4 MS- ESS 3.5