Bedminster Township School District
Subject Area: Earth and Environmental Science
Grade Level: MS Grade 6

Unit:
Earth's Water and Atmosphere (Weather & Climate)

PACING: September - end of December

OVERVIEW: After completing this unit, students should be able to understand how the water on Earth is not only essential for life, but that it cycles from the vast oceans to the atmosphere, falls to the surface as fresh water, and eventually returns to the ocean or the atmosphere. The methods and processes in which this occurs are simple; however, the many variables of atmospheric conditions cause different surface conditions (including extreme events). The atmosphere can be calm but can also be volatile or even deadly for both plant and animal life.

BIG IDEAS:
Unit 1: Water moves through Earth's atmosphere, oceans, and land in a cycle and is essential for life on Earth.
Unit 2: The oceans are a connected system of water in motion that transports matter and energy around the Earth's surface.
Unit 3: Earth's atmosphere is a mixture of gases that interact with solar energy.
Unit 4: Air pressure, temperature, air movement, and humidity in the atmosphere affect both weather and climate. (Includes Global Climate Change)

ESSENTIAL QUESTIONS:
Unit 1:

1. *What makes water so important?*
2. *How does water change state and move around Earth?*
3. *How does fresh water flow on Earth?*
4. *How do human activities affect the flow of water and water quality?*
5. *How is the water cycle affected by global temperature increases?*

Unit 2:

1. *What lies beneath an ocean's surface?*
2. *How does an ocean wave form and move?*
3. *How does water move in an ocean?*

Unit 3:

1. *What is the atmosphere?*
2. *How does energy move through the ecosystem?*
3. *What is wind?*

Unit 4:

1. *What is weather and how can we describe different types of weather conditions?*
2. *How do clouds form, and how are clouds classified?*
3. *How do the water cycle and other global patterns affect local weather?*
4. *How can humans protect themselves from hazardous weather?*
5. *What tools do we use to predict the weather?*
6. *How is climate affected by energy from the sun and variations on Earth's surface?*
7. *What are the causes and effects of climate change?*

SEL Goals for this unit:

- Goal 1: Become comfortable and confident with your classmates and teacher
- Goal 2: Feel confident in your abilities to solve problems and collect data in any setting; especially the classroom

LGBTQ Awareness Infusion:

- Discuss scientific research as non-discriminate toward anyone's gender, sexual preference, etc. Let the data tell the story- all viewpoints accepted

TARGET STANDARDS: (NGSS / NJSLS-S)

STANDARD (NJSLS-S)	Description	Student Learning Objectives
MS-ESS2-5.	Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions	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 weather changes 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 does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations. Utilize our in-class aquarium to provide examples of the water cycle and how evaporation occurs from the aquarium which humidifies the air in the classroom.
MS-ESS2-6.	Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of	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

	atmospheric and oceanic circulation that determine regional climates.	diagrams, maps, globes, or digital representations. Assessment does not include the dynamics of the Coriolis effect. Apply the principles of unequal heating and circulation of the ocean to the microcosm that is the in-class aquarium. Without aid of a circulating filter, what would happen to the water temperature? What would happen to the waste and nutrients that are more dense than the water? How does the heated water of the aquarium affect the classroom air near the aquarium in terms of temperature and humidity?
MS-ESS3-5.	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	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. Students will conduct research via sources like the Global Carbon Atlas to determine patterns within data that explain the correlation between increases in certain gases and the changing climate.
Climate Change Extra Updates (MS-ESS3.D) and (MS-ESS3-5)	Evaluate the evidence of climate change-causing pollution (greenhouse gases) and the evidence of climate change itself (rising oceans, global temperature trends, etc.) and extrapolate a correlation between the data and the result. Human activities, such as the release of greenhouse	Utilize evidence of greenhouse gas pollution over time and compare this data with the evidence/result of such phenomena to conclude the relationship between greenhouse gases in the atmosphere and climate change / environmental change. Formulate strategies to lower or eliminate greenhouse gas emissions and create hypotheses regarding how Global Climate Change will respond to such lowering of Greenhouse gases. Conduct a web quest regarding the basics of GCC, compilation of evidence, discussion of these pieces of evidence, determination of solutions for this potential phenomenon, and critical thinking regarding current technologies. Write an essay that highlights your main concerns about GCC and how you could live your life in a way that helps minimize your impact.

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

Unit Name and Resources	***Application of Cross-Curricular, 21st Century Skills, Technology, Financial Literacy, and Career Awareness Standards***	***Outcomes, Assessments, and Modifications***

Earth's Water and Atmosphere **Resources:** 8. Teacher-created ActivInspire presentations (for use with Promethean Activboard/Smartboard/etc.) 9. Google Classroom and Google Docs / Slides as created by teachers and students *10. IXL Science* *11. BrainPOP Science* *12. Various YouTube videos as selected and previewed by the teacher* *13. Newsela* *14.* <u>PhET Interactive Simulations</u>	**NJSLS-CS-8.1.8.3** Students are instructed regarding how to troubleshoot computer issues such as connectivity problems; students are encouraged to solve their problems without requiring assistance **9.1** Examined the cost of researching the Atmosphere and Environment (including creating/launching/maintaining Weather Satellites, detailed airplane Hurricane Hunter investigations, and maintaining land-based weather observation stations and/or weather balloons for observation purposes **NJSLS-CLKS-8.1.5.[illegible]** - Students examined the meaning of a career in Meteorology / Atmospheric Sciences Laptop / Chromebook used daily to organize data and to share information/activity results (as needed) Google Classroom is utilized as well as Google Docs /	***Formative Assessment:*** Paper-based preliminary assessment at the beginning of the school year (prior knowledge check), Google Form-based quiz after 2 weeks of the unit <u>Modifications:</u> • General Education (GenEd) Standard/Full version of test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher order thinking questions • MLL - Translate function available on Chromebook ***Project 1***: Student groups created a stormwater management system that helps filter and control runoff/discharge from heavy precipitation events while also demonstrating an understanding of the Hydrologic (Water) Cycle (Rubric used to grade students) <u>Modifications:</u> • General Education (GenEd) Standard/Full project requirements • IEP / 504 - Simplified project requirements / frequent project check-ins to document progress • G&T - Greater depth / additional components to project • At-Risk - Simplified project requirements / frequent project check-ins to document progress • MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided / project directions

	Sheets / Slides / Forms depending on the task at hand. Research also conducted via Internet resources. - "Hurricane Webquest" information recorded via Google Docs - Google Slides utilized for Hurricane or Tornado Research project - Internet used for "Water Cycle Webquest" Assignment - Internet used for "River Runner / Where does the water go?" Assignment - Internet used for Groundwater and Surface Water Webquest <u>(utilizes USGS Real-Time Water Data for the Nation)</u> - Dam Removal Research project uses the Internet for sources	and requirements provided in native language • ***Project 2:*** Student groups research a particular ocean current to determine its effects on nearby land masses as well as its role in transferring heat around the globe as well as transporting nutrients and migratory animals <u>Modifications:</u> • General Education (GenEd) Standard/Full project requirements • IEP / 504 - Simplified project requirements / frequent project check-ins to document progress • G&T - Greater depth / additional components to project • At-Risk - Simplified project requirements / frequent project check-ins to document progress • MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided / project directions and requirements provided in native language ***Summative Assessment:*** Unit Test Alternative Assessment: Research assignment regarding climate change evidence (greenhouse gas levels) and results of climate change (hurricane frequency or strength, ocean-level rise, ice-cap depletion) <u>Modifications:</u> • General Education (GenEd) Standard/Full version of test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins /

	as well as Google Slides for student-made presentations - Quizlet utilized for studying and reviewing terms - Digital versions of teacher-made presentations are available via Google Classroom - Student-created study guides made digitally via Google Docs - All warm-up assignments compiled on one central Google Doc per student	• G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher-order thinking questions, limit multiple-choice selections, choice of long-response essay, word bank for fill-ins • MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided ***Modifications/Accommodations:*** *(IEP/504/At-Risk/Danger of Failing):* Students may be permitted to verbally respond to open-ended and short answer questions on assessment; multiple choice questions have one less response option (3) than the typical amount (4). Study guide provided for certain students as required in IEP. - Pass/Fail option on some assignments - May waive "enrichment" assignments (5) At-Risk / Danger of Failing - ***ELL / MLL modifications:*** Locate news articles via NewsELA and Noticias Google in one's native language that support or reject climate change OR relate to a current topic (topics vary week-to-week) as being studied in this course. **G + T Students:** In-depth research assignments or extension activities • Tracking weather patterns using our school rooftop weather station / Ambient Weather network stations like that at Mr. Mac's house and from citizens around the Bedminster Area • Climate Change

		argumentative writing • Bonus C-E-R assignment regarding debunking erroneous climate change data ***Visual observation:*** Map reading skills assessment

Standards Addressed

Earth and Space Science (ESS)

1. **MS-ESS2: Earth's Systems**
   - **MS-ESS2-1**: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
   - **MS-ESS2-4**: 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-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.
2. **MS-ESS3: Earth and Human Activity**
   - **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.
   - **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.
   - **MS-ESS3-3**: Apply scientific principles to design a method for monitoring and minimizing 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.

NJSLS for Grades 6-8 (Reading Standards for Science and Technical Subjects - RST)

NJSLS.ELA-Literacy.RST.6-8:

- **RST.6-8.1:** Cite specific textual evidence to support analysis of science and technical texts.
- **RST.6-8.2:** Determine a text's central ideas or conclusions; provide an accurate summary distinct from prior knowledge or opinions.
- **RST.6-8.3:** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- **RST.6-8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases used in a specific scientific or technical context.
- **RST.6-8.7:** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6-8.8: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

Technology: NJSLS Computer Science and Design Thinking

8.1 Computer Science and Design Thinking Standards (Grades 6-8)

1. **8.1.8.A.1**
   Demonstrate knowledge of a real-world problem using digital tools.
2. **8.1.8.A.2**
   Create a document (e.g., newsletter, reports, flyers) that includes text, graphics, and other digital elements using word processing software.
3. **8.1.8.B.1**
   Synthesize and publish information about a local or global issue or event (e.g., using a blog, podcast, or video) with peers and experts, using digital tools.
4. **8.1.8.C.1**
   Collaborate to develop and publish work that provides information or solutions to a problem, using digital tools and resources.
5. **8.1.8.D.1**
   Understand and model appropriate online behaviors related to cyber safety, cyberbullying, cyber security, and cyber ethics including appropriate use of social media.
6. **8.1.8.D.2**
   Demonstrate the application of appropriate citations to digital content.

7. **8.1.8.D.3**
   Demonstrate an understanding of fair use and Creative Commons to intellectual property.
8. **8.1.8.E.1**
   Gather and analyze findings using data collection technology to produce a possible solution for a content-related problem or issue.
9. **8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
10. **8.1.8.IC.1**: Analyze the impact of computing technologies on culture and society.
11. **8.1.8.AP.2**: Create programs that use algorithms to solve a given problem.
12. **8.1.8.DA.1**: Explain the importance of data collection and analysis in the real world.
13. **8.1.8.DA.2**: Organize and present data in a way that can be interpreted by others.
14. **8.1.8.NI.1**: Identify potential cybersecurity threats and ways to protect against them.

8.2 Design Thinking:

- **8.2.8.ED.1**: Define a design problem and identify criteria and constraints.
- **8.2.8.ED.2**: Develop and test a model of a proposed solution.
- **8.2.8.ETW.1**: Compare how different technologies impact the environment.
- **8.2.8.EC.1**: Explain how ethics influence design and engineering decisions.

NJ Student Learning Standards for mathematics:

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. Calculating human population growth rate and graphing population data.

Financial Literacy: NJSLS Career Readiness, Life Literacies, and Key Skills

9.1 Personal Financial Literacy:

- **9.1.8.PB.1**: Relate the concept of financial choices to personal financial well-being.
- **9.1.8.PB.2**: Explain how spending choices and decisions impact future opportunities.
- **9.1.8.PB.3**: Create a personal budget to assess spending and saving plans.
- **9.1.8.PB.4**: Relate consumer decisions to personal financial success.
- **9.1.8.FP.1**: Describe the impact of inflation on purchasing power.
- **9.1.8.FP.2**: Evaluate the benefits of saving versus spending.
- **9.1.8.RM.1**: Analyze the purpose and forms of financial risk management.
- **9.1.8.CP.1**: Compare financial products and services.
- **9.1.8.EG.1**: Explain how earning power and working conditions impact personal financial decisions.

NJSLS - Career Readiness, Life Literacies, and Key Skills

- **9.4.8.CI.3**: Investigate new challenges and opportunities for personal growth, advancement, and transition.
- **9.4.8.CT.2**: Develop multiple solutions to solve a problem and evaluate short- and long-term consequences to determine the most appropriate solution.
- **9.4.8.DC.7**: Assess the impact of using a digital tool on personal and professional ethics.
- **9.4.8.TL.3**: Select appropriate tools to organize and present information digitally for different purposes.
- **9.4.8.IML.7**: Evaluate digital sources to determine the credibility and relevance of information needed for a specific problem or question.
- **9.4.8.GCA.2**: Demonstrate openness to diverse ideas and perspectives through active discussion to achieve a group goal.

Social and Emotional Competencies - activities/topics

1. Self-Awareness

- Recognizing one's emotions and thoughts and their influence on behavior.
- Accurately assessing one's strengths and limitations, with a well-grounded sense of confidence and optimism.
- Identifying and labeling one's emotions.
- Recognizing personal traits, interests, and values.
- A sense of self-efficacy and optimism

2. Self-Management

- Regulating one's emotions, thoughts, and behaviors in different situations.
- Managing stress, controlling impulses, and motivating oneself.
- Setting and working toward personal and academic goals.
- Demonstrating self-discipline and organizational skills.
- Using strategies for managing stress and overcoming challenges.

3. Social Awareness

- Showing understanding and empathy for others.
- Understanding social norms for behavior.
- Recognizing family, school, and community resources and supports.
- Respecting others and appreciating diversity in terms of cultural and social differences.
- Demonstrating consideration for and respecting others' perspectives.

4. Relationship Skills

- Establishing and maintaining healthy and rewarding relationships with diverse individuals and groups.
- Communicating, listening actively, and cooperating with others.
- Resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.
- Developing positive peer relationships and resolving interpersonal conflicts constructively.

5. Responsible Decision-Making

- Making constructive and respectful choices about personal behavior and social interactions based on ethical standards, safety concerns, and social norms.
- Evaluating the consequences of one's actions and considering the well-being of oneself and others.
- Developing problem-solving skills and critical thinking.
- Reflecting on experiences and learning from them.

LGBTQ Awareness Infusion:

Discuss scientific research as non-discriminate toward anyone's gender, sexual preference, etc. Always let the data tell the story- all viewpoints are accepted!

Pacing Breakdown:

Portion of Unit / Timeframe	***Standards Addressed:***	***Notes:***
Part 1: Properties and Behaviors of Water / The Hydrologic Cycle September/October (8 weeks)	MS-ESS2-5. 8.1 9.1	**A pre-test** is given before the start of the unit **Formative Assessment** (Checkpoint Quiz) given after week 1 of instruction
Part 2: The Interactions between the atmosphere, oceans, and land /meteorology / Global Climate Change November-December (8 weeks)	MS-ESS2-6. MS-ESS3-5. 8.1 9.1 9.2	The final **assessment** for this portion of the unit is completed by completing a **Post-Test** as well as a **Performance Assessment** in which students debate about the causes/effects of Global Climate Change. A **comprehensive rubric** is used to assess the students' use of data/facts to support their position in their Global Climate Change debate.

		Student research project used to examine the effects of ocean currents on the land masses of the Earth **Project modifications:** Research guide/checklist/questions available for students

Subject Area: Earth and Environmental Science
Grade Level: MS Grade 6

Unit:
The Dynamic Earth (Inside Earth & Surface of Earth)

PACING: January - Mid-April

OVERVIEW: After completing this unit, students should be able to understand Earth is a massive system that transfers energy in a multitude of ways. From solar energy to seismic energy, energy is present in and around Earth in many forms. The Earth itself is in constant motion, as is the energy in and around it. This unit focuses on energy at the surface of Earth and in its atmosphere, and how these types of energy interact to shape the Earth. The unit then digs deeper and examines energy beneath the surface in the form of convection currents in the mantle, moving tectonic plates, adding and recycling crust, and causing earthquakes and volcanic events.

BIG IDEAS:
Unit 1: Continuous processes on Earth's surface result in the formation and destruction of landforms and the formation of soil.
Unit 2: Rock, fossils, and other types of natural evidence are used to study Earth's history and measure Geologic time.
Unit 3: Minerals and rocks are basic building blocks of Earth and can change over time from one type of mineral to another.
Unit 4: The movement of tectonic plates accounts for important features of Earth's surface and major geologic events.

ESSENTIAL QUESTIONS:
Unit 1:

1. *How do matter and energy move through Earth's spheres?*
2. *How does weathering change Earth's surface?*
3. *How does water change Earth's surface?*

4. *How do wind, ice, and gravity change Earth's surface?*
5. *How does soil form?*

Unit 2:

1. *How do we learn about Earth's history?*
2. *How are the relative ages of rock measured?*
3. *How is the absolute age of rock measured?*
4. *What is the geologic time scale?*

Unit 3:

1. *What are minerals, how do they form, and how can they be identified?*
2. *What is the rock cycle and how does it explain the formation and destruction of rocks?*
3. *How do rocks form?*

Unit 4:

1. *What are Earth's layers?*
2. *What is plate tectonics?*
3. *How do mountains form?*
4. *How do volcanoes change Earth's surface?*
5. *Why do earthquakes happen?*
6. *How are seismic waves used to study earthquakes?*

SEL Goals for this unit:

- **Goal 1 - Collaborate with students to create realistic models of Earth's structures**
- **Goal 2 - Understand your role as a human on Earth as a caretaker of the Earth**
- **Goal 3 - Foster good team-building skills and contribute positively with group members on various projects**

LGBTQ Awareness Infusion:

- **Discuss scientific research as non-discriminate toward anyone's gender, sexual preference, etc. Always let the data tell the story- all viewpoints are accepted!**

TARGET STANDARDS.

STANDARD	NGSS / NJSLS-S	Student Learning Objectives
MS-ESS2-1. .	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials. Assessment does not include the identification and naming of minerals. Utilize the classroom aquarium as a visible vehicle to

		demonstrate the cycling of heat/energy, nutrients, and waste.
MS-ESS2-1.	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	**Clarification Statement:** Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical. A quantitative understanding of the latent heat of vaporization and fusion is not assessed. Utilize the classroom aquarium as a visible vehicle to demonstrate the cycling of heat/energy, nutrients, and waste as well as the effect of a heat source (heat lamp) on the water vs. having an in-water heat source (aquarium water heater).
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.	Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock). Utilize the classroom aquarium as a living demonstration to show the recycling of water and how mineral resources/food waste is trapped by a filter instead of naturally falling to the bottom. Demonstrate this principle by turning the filter off for one entire calendar day and having students observe the accumulation of dirt/debris/waste as well as the stratification of temperature zones.

Unit Name and Resources	***Application of Cross-Curricular, 21st Century Skills, Technology, Financial Literacy, and Career Awareness Standards***	***Outcomes, Assessments, and Modifications***

The Dynamic Earth **Resources:** 1. Science Fusion Textbook: The Dynamic Earth 2. Teacher-created ActivInspire presentations (for use with Promethean Activboard/Smartboard/etc.) 3. Google Classroom and Google Docs / Slides as created by teacher and students 4. *IXL Science* 5. *BrainPOP Science* 6. *Various YouTube videos as selected and previewed by the teacher* 7. *Newsela* 8. PhET Interactive Simulations	**NJSLS-CS-8.1.8.3** Students are instructed regarding how to troubleshoot computer issues such as connectivity problems; students are encouraged to solve their problems without requiring assistance **NJSLS-CLKS-9.1.8.PB.3** There are strategies to decrease and manage expenses: Students can manage the expenses needed for model-making projects by reusing/recycling materials **NJSLS-CLKS-9.1.8.CI.1** Utilize a variety of sources to foster creativity and independent thinking **NJSLS-CLKS-9.2.8.CAP.1**- Students examined the meaning of a career in: Geology, Seismology, Volcanology **NJSLS-CLKS-8.1.5.1** - Students examined the meaning of a career in: Earth / Environmental Sciences / Geology/ Seismology Laptop / Chromebook used daily to organize	***Formative Assessment:*** Google Form-based preliminary assessment at the beginning of the unit (prior knowledge check) Modifications: • General Education (GenEd) Standard/Full version of test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher-order thinking questions • MLL - Translate function available on Chromebook ***Project 1:*** Students utilized real-time seismic data to determine locations and magnitude of Earthquakes in the USA and its territories. Modifications: • General Education (GenEd) Standard/Full project requirements • IEP / 504 - Simplified project requirements / frequent project check-ins to document progress • G&T - Greater depth / additional components to project • At-Risk - Simplified project requirements / frequent project check-ins to document progress • MLL - Translate function available on Chromebook, word bank of cognates /

	data and to share information/activity results (as needed) Google Classroom is utilized as well as Google Docs / Sheets / Slides / Forms depending on the task at hand. Research also conducted via Internet resources. - Google Docs used to record Earthquakes and Plate Tectonics notes - Google Slides utilized for "Historical Earthquake" research project Internet used for "Sea Floor Spreading and Subduction Review" Assignment - Internet used for "Earthquake Protection Structures and Devices" Assignment - Volcano Research project uses the Internet for sources as well as Google Slides for student-made presentations - Quizlet utilized for studying	similar native language words provided / project directions ***Project 2:*** Students created a model Volcano complete with all Volcanic structures both below and above ground level. Volcano was also allowed to "erupt" using a chemical reaction to enhance realism and effect. (Rubric used for assessment) <u>Modifications:</u> • General Education (GenEd) Standard/Full project requirements • IEP / 504 - Simplified project requirements / frequent project check-ins to document progress • G&T - Greater depth / additional components to project • At-Risk - Simplified project requirements / frequent project check-ins to document progress • MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided / project directions ***Summative Assessment:*** Unit Test <u>Modifications:</u> • General Education (GenEd) Standard/Full version of test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins / • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher-order

	and reviewing terms - Digital versions of teacher-made presentations are available via Google Classroom - Student-created study guides made digitally via Google Docs - All warm-up assignments compiled on one central Google Doc per student	thinking questions, limit multiple-choice selections, choice of long-response essay, word bank for fill-ins • MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided ***Modifications/Accommodations:*** *(IEP/504/At-Risk/Danger of Failing):* Students may be permitted to verbally respond to open-ended and short answer questions on assessment; multiple choice questions have one less response option (3) than the typical amount (4). Study guide provided for certain students as required in IEP. - Pass/Fail option on some assignments - May waive "enrichment" assignments ***ELL / MLL modifications:*** Locate news articles via NewsELA and Noticias Google in one's native language that relate to a current topic as being studied in this course (earthquakes or volcanic eruptions). **G + T Students:** In-depth research assignments or extension activities • Tracking seismic activity and/or ground movement near a fault • Monitor Sulfur Dioxide Levels at a volcano of your choice and give the class a weekly update

		Visual Assessment: Reading a Seismograph / Real-Time seismic data (part of Earthquake Project)

Standards Addressed

Cross-cutting concepts and

Earth and Space Science (ESS)

3. **MS-ESS2: Earth's Systems**
   - **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**: 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 past plate motions.
4. **MS-ESS3: Earth and Human Activity**
   - **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.
   - **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.
   - **MS-ESS3-3**: Apply scientific principles to design a method for monitoring and minimizing 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.

NJSLS for Grades 6-8 (Reading Standards for Science and Technical Subjects - RST)

NJSLS.ELA-Literacy.RST.6-8:

- **RST.6-8.1:** Cite specific textual evidence to support analysis of science and technical texts.
- **RST.6-8.2:** Determine a text's central ideas or conclusions; provide an accurate summary distinct from prior knowledge or opinions.
- **RST.6-8.3:** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- **RST.6-8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases used in a specific scientific or technical context.
- **RST.6-8.7:** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6-8.8: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

Technology: NJSLS Computer Science and Design Thinking

8.1 Computer Science and Design Thinking Standards (Grades 6-8)

15. **8.1.8.A.1**
    Demonstrate knowledge of a real-world problem using digital tools.
16. **8.1.8.A.2**
    Create a document (e.g., newsletter, reports, flyers) that includes text, graphics, and other digital elements using word processing software.
17. **8.1.8.B.1**
    Synthesize and publish information about a local or global issue or event (e.g., using a blog, podcast, or video) with peers and experts, using digital tools.
18. **8.1.8.C.1**
    Collaborate to develop and publish work that provides information or solutions to a problem, using digital tools and resources.
19. **8.1.8.D.1**
    Understand and model appropriate online behaviors related to cyber safety, cyberbullying, cyber security, and cyber ethics including appropriate use of social media.
20. **8.1.8.D.2**
    Demonstrate the application of appropriate citations to digital content.
21. **8.1.8.D.3**
    Demonstrate an understanding of fair use and Creative Commons to intellectual property.

22. **8.1.8.E.1**
    Gather and analyze findings using data collection technology to produce a possible solution for a content-related problem or issue.
23. **8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
24. **8.1.8.IC.1**: Analyze the impact of computing technologies on culture and society.
25. **8.1.8.AP.2**: Create programs that use algorithms to solve a given problem.
26. **8.1.8.DA.1**: Explain the importance of data collection and analysis in the real world.
27. **8.1.8.DA.2**: Organize and present data in a way that can be interpreted by others.
28. **8.1.8.NI.1**: Identify potential cybersecurity threats and ways to protect against them.

8.2 Design Thinking:

- **8.2.8.ED.1**: Define a design problem and identify criteria and constraints.
- **8.2.8.ED.2**: Develop and test a model of a proposed solution.
- **8.2.8.ETW.1**: Compare how different technologies impact the environment.
- **8.2.8.EC.1**: Explain how ethics influence design and engineering decisions.

NJ Student Learning Standards for mathematics:

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. Calculating human population growth rate and graphing population data.

Financial Literacy: NJSLS Career Readiness, Life Literacies, and Key Skills

9.1 Personal Financial Literacy:

- **9.1.8.PB.1**: Relate the concept of financial choices to personal financial well-being.
- **9.1.8.PB.2**: Explain how spending choices and decisions impact future opportunities.
- **9.1.8.PB.3**: Create a personal budget to assess spending and saving plans.
- **9.1.8.PB.4**: Relate consumer decisions to personal financial success.
- **9.1.8.FP.1** Describe the impact of inflation on purchasing power.
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- **9.1.8.RM.1**: Analyze the purpose and forms of financial risk management.
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NJSLS - Career Readiness, Life Literacies, and Key Skills

- **9.4.8.CI.3**: Investigate new challenges and opportunities for personal growth, advancement, and transition.

- **9.4.8.CT.2**: Develop multiple solutions to solve a problem and evaluate short- and long-term consequences to determine the most appropriate solution.
- **9.4.8.DC.7**: Assess the impact of using a digital tool on personal and professional ethics.
- **9.4.8.TL.3**: Select appropriate tools to organize and present information digitally for different purposes.
- **9.4.8.IML.7**: Evaluate digital sources to determine the credibility and relevance of information needed for a specific problem or question.
- **9.4.8.GCA.2**: Demonstrate openness to diverse ideas and perspectives through active discussion to achieve a group goal.

Social and Emotional Competencies - activities/topics

1. Self-Awareness

- Recognizing one's emotions and thoughts and their influence on behavior.
- Accurately assessing one's strengths and limitations with a well-grounded sense of confidence and optimism.
- Identifying and labeling one's emotions.
- Recognizing personal traits, interests, and values.
- A sense of self-efficacy and optimism.

2. Self-Management

- Regulating one's emotions, thoughts, and behaviors in different situations.
- Managing stress, controlling impulses, and motivating oneself.
- Setting and working toward personal and academic goals.
- Demonstrating self-discipline and organizational skills.
- Using strategies for managing stress and overcoming challenges.

3. Social Awareness

- Showing understanding and empathy for others.
- Understanding social norms for behavior.
- Recognizing family, school, and community resources and supports.
- Respecting others and appreciating diversity in terms of cultural and social differences.
- Demonstrating consideration for and respecting others' perspectives.

4. Relationship Skills

- Establishing and maintaining healthy and rewarding relationships with diverse individuals and groups.
- Communicating, listening actively, and cooperating with others.

- Resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.
- Developing positive peer relationships and resolving interpersonal conflicts constructively.

5. Responsible Decision-Making

- Making constructive and respectful choices about personal behavior and social interactions based on ethical standards, safety concerns, and social norms.
- Evaluating the consequences of one's actions and considering the well-being of oneself and others.
- Developing problem-solving skills and critical thinking.
- Reflecting on experiences and learning from them.

LGBTQ Awareness Infusion:

Discuss scientific research as non-discriminate toward anyone's gender, sexual preference, etc. Always let the data tell the story- all viewpoints are accepted!

Pacing Breakdown:

Portion of Unit / Timeframe	***Standards Addressed:***	***Notes:***
Part 1: Structure of Earth / Geology / Seismic Activity January-February (7 weeks)	MS-ESS2-1. MS-ESS2-4. MS-ESS3-1. 8.1 9.1	**Pre-test** is given before start of the unit **Formative Assessment** (Checkpoint Quiz) given after week 2 of instruction **Project** utilizes the USGS network of telemetric data and the power of the Internet to garner real-time seismic data.
Part 2: Cycles of Matter / Volcanoes, Minerals February-April (7 weeks)	MS-ESS2-1. MS-ESS2-4. MS-ESS3-1. 8.1 9.1 9.2	Final **assessment** for this portion of the unit is completed by completing a **Post-Test** as well as a **Field Study** on Identifying native/invasive plants and animals. A **comprehensive rubric** is used to assess the student's mastery of the structure of volcanoes and their role in shaping the Earth (for use in

		assessing the research project detailed below) **The student research project** used to create a lifelike and accurate model of a Volcano, both above and below ground (part of the **Summative Assessment**)

Subject Area: Earth and Space Science
Grade Level: MS Grade 6

Unit: Space Science

PACING: Mid-April - June

OVERVIEW: After completing this unit, students should be able to understand where Earth is in relation to the Solar System as well as the context of the cosmos- that we are part of a galaxy of stars (most of which have their own planetary systems) which is only a small part of the universe. Students should also understand how our Earth functions as part of our solar system and is unique in terms of temperature, atmospheric composition, length of year, etc. Students should also understand how our understanding of our place in the cosmos came to be and what empirical data was used to formulate our current theories and overall understandings. A shallow exploration into elements and compounds found in the solar system and in other stars will also occur in this unit.

BIG IDEAS:
Unit 1: The sun is one of the billions of stars in one of the billions of galaxies in the universe.
Unit 2: Planets and a variety of other bodies form a system of objects orbiting the sun.
Unit 3: Earth and the moon move in predictable ways and have predictable effects on each other as they orbit the sun.
Unit 4: People develop and use technology to explore and study space. Space technologies often have residual applications for Earth-based consumers.

ESSENTIAL QUESTIONS:
Unit 1:

1. *What makes up the universe?*
2. *What are some properties of stars?*
3. *How do stars change over time?*

Unit 2:

1. *How have people modeled the solar system?*
2. *Why is gravity important in the solar system?*
3. *What are the properties of the sun?*
4. *What is known about the terrestrial planets?*
5. *What is known about the gas giant planets, like Uranus?*
6. *What is found in the solar system besides the sun, planets, and moons?*

Unit 3:

1. *How are Earth's days, years, and seasons related to the way Earth moves in space?*
2. *How do Earth, the moon, and the sun affect each other?*
3. *What causes tides?*

Unit 4:

1. *What can we learn from space images?*
2. *How do we explore space?*
3. *What are some milestones of space exploration?*

SEL Goals for this unit:

- **Goal 1: Understand the context of the universe and humans' relatively short lifespan; make the most of every day, enjoy life, and cherish the Earth.**
- **Goal 2: Maintain perspective and foster happiness and solitude in your personal space**

LGBTQ Awareness Infusion:

- **Discuss scientific research as non-discriminatory toward anyone's gender, sexual preference, etc. Always let the data tell the story- all viewpoints are accepted!**

TARGET STANDARDS:

STANDARD	NGSS / NJSLS-S	Student Learning Objectives
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.	Examples of models can be physical, graphical, or conceptual. Utilize technological resources to create an accurate representation of Earth-Sun-Moon systems
MS-ESS1-2.	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	The 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 does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.
MS-ESS1-3.	Analyze and interpret data to determine scale properties of objects in the solar system.	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 photographs, and models. Assessment does not include recalling facts about the properties of the planets and other solar system bodies.

Unit Name and Resources	***Application of Cross-Curricular: 21st Century Skills, Technology, Financial Literacy, and Career Awareness Standards***	***Outcomes, Assessments, and Modifications***

Space Science **Resources:** 1. Teacher-created ActivInspire presentations (for use with Promethean Activboard/Smartboard/etc.) 2. Google Classroom and Google Docs / Slides as created by teacher and students 3. *IXL Science* 4. *BrainPOP Science* 5. *Various YouTube videos as selected and previewed by the teacher* 6. *Newsela* 7. PhET Interactive Simulations	**8.1** Laptop used daily to organize data and to share information/activity results (as needed) Google Classroom utilized as well as Google Docs/Sheets/Slides/Forms depending on the task at hand. Research also conducted via Internet resources. **9.1** Examined the cost of studying "outer space" and areas beyond Earth's atmosphere, including those outside of our Solar System. **9.2** - Students examined the meaning of a career in Astronomy, Astrophysics, Quantum Mechanics, Aerospace Engineering **NJSLS-CLKS-8.1.5.1** - Students examined the meaning of a career in: Earth / Environmental Sciences / Geology/ Seismology Laptop / Chromebook used daily to organize data and to share information/activity results (as needed) Google Classroom is utilized as well as Google Docs / Sheets	***Formative Assessment:*** Google Form-based preliminary assessment at the beginning of the unit (prior knowledge check) Modifications: • General Education (GenEd) Standard/Full version of test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher-order thinking questions • MLL - Translate function available on Chromebook ***Project:*** Student groups investigated one particular celestial body or group such as a planet, moon, star, black hole, asteroid belt, etc. Modifications: • General Education (GenEd) Standard/Full project requirements • IEP / 504 - Simplified project requirements / frequent project check-ins to document progress • G&T - Greater depth / additional components to project • At-Risk - Simplified project requirements / frequent project check-ins to document progress • MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided / project directions ***Summative Assessment:*** Unit

	/ Slides / Forms depending on the task at hand. Research also conducted via Internet resources. - Google Docs used to record "Space Science Overview" notes - Google Slides optionally utilized for "Space Entity Research Assignment" - Internet used for "Space Entity Research Assignment" - Quizlet utilized for studying and reviewing terms - Digital versions of teacher-made presentations are available via Google Classroom - Student-created study guides made digitally via Google Docs - All warm-up assignments compiled on one central Google Doc per student	Test <u>Modifications:</u> • General Education (GenEd) Standard/Full version of test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins / • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope of number of higher-order thinking questions, limit multiple-choice selections, choice of long-response essay, word bank for fill-ins • MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided ***Modifications/Accommodations:*** *(IEP/504/At-Risk/Danger of Failing):* Students may be permitted to verbally respond to open-ended and short answer questions on assessment; multiple choice questions have one less response option (3) than the typical amount (4). Study guide provided for certain students as required in IEP. - Pass/Fail option on some assignments - May waive "enrichment" assignments **G + T Students:** In-depth research assignments or extension activities • Tracking asteroid travel

		or Earth's orbit into meteor zones/meteor showers • Monitor StarLink satellite, and NASA satellites (like Webb Telescope) activity and provide a weekly report **ELL / MLL modifications:** use vocabulary based on a similar root language (such as Latin terms to coincide with Spanish or Portuguese speakers). Utilize Google Translate and Merriam-Webster's online Thesaurus to locate such terms. English terminology will be provided to students via Quizlet, hand-outs, digital presentations (posted on Google Classroom), etc.

Standards Addressed

Earth and Space Science (ESS)

1. **MS-ESS1: Earth's Place in the Universe**
   - **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-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.

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Pacing Breakdown:

Portion of Unit / Timeframe	***Standards Addressed:***	***Notes:***
Part 1: Scale of the Universe and Our Solar System April-May (6 weeks)	MS-ESS1-1. MS-ESS1-2. MS-ESS1-3. 8.1 9.1	**Pre-test** is given before start of the unit **Formative Assessment** (Checkpoint Quiz) given after week 2 of instruction
Part 2: Earth's place in the cosmos/revolution around the Sun May-June (4 weeks)	MS-ESS1-1. MS-ESS1-2. MS-ESS1-3. 8.1 9.1 9.2	The final **assessment** for this portion of the unit is completed by completing a **Post-Test.** A **comprehensive rubric** is used to assess the student's mastery of the Space Concept that they have chosen for their research project.

		Student research project used to examine how scientists have discovered Earth's relative place in the cosmos and its movement in our solar system (part of **Summative Assessment**)