Orange Public Schools

Office of Curriculum & Instruction

2019-2020 Science Curriculum Guide

Grade 6

Module 2B: Weather and Climate

January 19, 2020 – February 14, 2020

Board Approved: 1.14.2020

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Table of Contents

I.	Lesson Scope and Sequence with Embedded Assessments	p. 1
II.	Unit Introduction and Overview	p. 2
III.	Essential Questions / Enduring Understanding	p. 3
IV.	Performance Expectations	p. 6
V.	Interdisciplinary Connections	p. 8
VI.	Pacing Guide	p. 10-17
VII.	Modifications	p. 18-21

GRADE 6 Yearlong Scope and Sequence by Instructional Weeks

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12

UNIT 1 – Physical Science (Sept 9th – Nov 27th)

TOPIC 1 FORCE AND MOTION (6 Weeks)
Students use systems, system models, stability, and change to understanding ideas related to why some objects will keep moving and why other objects fall to the ground.

TOPIC 2 TYPES OF INTERACTIONS (6 Weeks)
In this unit, students use the practices of analyzing and interpreting data, developing and using models, and engaging in argument from evidence to make sense of the relationship between energy and forces.

Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24

UNIT 2 – Earth Science (Dec 2nd – Feb 14th)

TOPIC 1 ASTRONOMY (5 Weeks)
This unit is broken down into three sub-ideas: the universe and its stars, Earth and the solar system, and the history of planet Earth. Students examine the Earth's place in relation to the solar system, the Milky Way galaxy, and the universe.

TOPIC 2 WEATHER AND CLIMATE (4 Weeks)
This unit is broken down into three sub-ideas: Earth's large-scale systems interactions, the roles of water in Earth's surface processes, and weather and climate.

Unit 3 – Life Science Feb 24th – Jun 12th

TOPIC 1 Growth Development and Reproduction of Organisms (5 Weeks)
Students use data and conceptual models to understand how the environment and genetic factors

Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31	Week 32	Week 33	Week 34	Week 35	Week 36

Unit 3 – Life Science (Feb 24th – Jun 12th)

TOPIC 1 Growth Dev and Rep of Organisms (5 Weeks)
Students use data and conceptual models to understand how the environment and genetic factors determine the growth of an individual organism

TOPIC 2 Matter and Energy in Organisms and Ecosystems (5 weeks)
Students analyze and interpret data, develop models, construct arguments, and demonstrate a deeper understanding of the cycling of matter, the flow of energy, and resources in ecosystems. They are able to study patterns of interactions among organisms within an ecosystem.

TOPIC 3 Interdependent Relationships in Ecosystems (5 Weeks)
Students build on their understanding of the transfer of matter and energy as they study patterns of interactions among organisms within an ecosystem. They consider biotic and abiotic factors in an ecosystem and the effects these factors have on a population.

Week 37	Week 38	Week 38	Week 40	Week 41	Week 42	Week 43					

UNIT 4 Engineering Design (June 15th – 26th)

TOPIC 1 ENGINEERING DESIGN PROCESS (2 Weeks)

Grade/Course Overview: 6th Grade Unit 2: Weather and Climate - Earth Science Module

This is a hands-on course which teaches 6th grade students the Next Generation Science Standards. We will focus on studying concepts related to earth science, specifically Astronomy and Weather and Climate. The purpose of this course is to have students develop, model, and carry out investigations related to these topics by using strategies aligned with the New Jersey Student Learning Standards and the Next Generation Science Standards (MS-ESS2-4, MS-ESS2-5, and MS-ESS2-6).

Unit 2: Weather and Climate
Unit Summary: This unit is broken down into three sub-ideas: Earth's large-scale systems interactions, the roles of water in Earth's surface processes, and weather and climate. Students make sense of how Earth's geosystems operate by modeling the flow of energy and the cycling of matter within and among different systems. A systems approach is also important here, examining the feedbacks between systems as energy from the Sun is transferred between systems and circulates through the ocean and atmosphere. The crosscutting concepts of cause and effect, systems and system models, and energy and matter are called out as frameworks for understanding the disciplinary core ideas. In this unit, students are expected to demonstrate proficiency in developing and using models and planning and carrying out investigations as they make sense of the disciplinary core ideas. Students are also expected to use these practices to demonstrate an understanding of the core ideas. This unit is based on MS-ESS2-4, MS-ESS2-5, and MS-ESS2-6.
Related Phenomena: The following links can be referenced for Earth Science related phenomena: **NGSS Based Phenomena - https://thewonderofscience.com/phenomenal** **#Project Phenomena - https://sites.google.com/site/sciencephenomena/** **Phenomena for NGSS - https://www.ngssphenomena.com/how-to-use-phenomena** **Sunrise Science (a collection of fee websites) - http://sunrisescience.blog/free-websites-ngss-anchoring-phenomena/** **Teaching Channel – Phenomena - https://www.teachingchannel.org/video/using-phenomena-achieve** **STEM Scopes – Developing Student Inquiry Through Phenomena - https://www.stemscopes.com/phenomena**

Conceptual Flow

Students will focus on the following concepts and ideas:

- Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
- Model the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle.
- Collect data to serve as the basis for 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.
- Model how the unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
- Model the patterns by latitude, altitude, and geographic distribution.
- Compare data collected from sources such as simulations, video, or experiments to identify the patterns of change in the movement of water in the atmosphere that are used to make weather predictions, understanding that any predictions are reported within probability ranges.
- Model the continuous movement of water from land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation.

Essential Questions:	**Enduring Understandings:**
What factors interact and influence weather and climate? 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?	Engineering advances have led to important discoveries in space science, and scientific discoveries have led to the development of entire industries and engineered systems. 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. The cycling of water through Earth's systems is driven by energy from the sun and the force of gravity. Within Earth's systems, the transfer of energy drives the motion and/or cycling of water. The motions and complex interactions of air masses result in changes in weather conditions. The complex patterns of the changes in and movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. Examples of data that can be used to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions include weather maps, diagrams, and visualizations; other examples can be obtained through laboratory experiments. Air masses flow from regions of high pressure to regions of low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time. Because patterns of the changes and the movement of water in the atmosphere are so complex, weather can only be predicted probabilistically. Sudden changes in weather can result when different air masses collide. Weather can be predicted within probabilistic ranges. Cause-and effect-relationships may be used to predict changes in weather.

	Unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. Patterns of atmospheric and oceanic circulation that determine regional climates vary by latitude, altitude, and geographic land distribution. Atmospheric circulation that, in part, determines regional climates is the result of sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds. Ocean circulation that, in part, determines regional climates is the result of the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Models that can be used to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates can be diagrams, maps and globes, or digital representations.

Possible Student Misconceptions:

Students may not be able to understand explanations of the seasons before they reasonably understand the relative size, motion, and distance of the sun and the earth. Many students before and after instruction in earth science think that winter is colder than summer because the earth is further from the sun in winter. This idea is often related to the belief that the earth orbits the sun in an elongated elliptical path. Other students, especially after instruction, think that the distance between the northern hemisphere and the sun changes because the earth leans toward the sun in the summer and away from the sun in winter. Students' ideas about how light travels and about the earth-sun relationship, including the shape of the earth's orbit, the period of the earth's revolution around the sun, and the period of the earth's rotation around its axis, may interfere with students' understanding of the seasons. For example, some students believe that the side of the sun not facing the earth experiences winter, indicating confusion between the daily rotation of the earth and its yearly revolution around the sun. Although upper elementary students may identify air as existing even in static situations and recognize that it takes space, recognizing that air has weight may be challenging even for high-school students. Students of all ages (including college students) may believe that air exerts force or pressure only when it is moving and only downwards. Only a few middle-school students use the idea of pressure differences between regions of the atmosphere to account for wind; instead they may account for winds in terms of visible moving objects or the movement of the earth. Before students understand that water is converted to an invisible form, they may initially believe that when water evaporates it ceases to exist, or that it changes location but remains a liquid, or that it is transformed into some other perceptible form (fog, steam, droplets, etc.). Students must accept air as a permanent substance before they can identify the air as the final location of evaporating water. For many students, difficulty understanding the existence of water vapor in the

atmosphere persists in middle school years. Students can understand rainfall in terms of gravity once they attribute weight to little drops of water (typically in upper elementary grades), but the mechanism through which condensation occurs may not be understood until high school. Students of all ages may confuse the ozone layer with the greenhouse effect, and may have a tendency to imagine that all environmentally friendly actions help to solve all environmental problems (for example, that the use of unleaded petrol reduces the risk of global warming). Students have difficulty linking relevant elements of knowledge when explaining the greenhouse effect and may confuse the natural greenhouse effect with the enhancement of that effect.

NGSS Performance Expectations: ***Students who demonstrate understanding can…***

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-ESS2-4)

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

Explain how variations in density result from variations in temperature and salinity drive a global pattern of interconnected ocean currents. (ESS2.C)

Use a model to explain the mechanisms that cause varying daily temperature ranges in a coastal community and in a community located in the interior of the country. (ESS2.C; ESS2.D)

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-ESS2-6)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

Developing and Using Models Develop a model to describe unobservable mechanisms. (MS-ESS2-4) **Planning and Carrying Out Investigations** 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)	ESS2.C: The Roles of Water in Earth's Surface Processes 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) 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. (MSESS2-5) Global movements of water and its changes in form are propelled by sunlight and gravity. (MSESS2-4) Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6) ESS2.D: Weather and Climate Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5) The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)	**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) **Energy and Matter** • Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)

Primary CCSS ELA/Literacy Connections:	Primary CCSS Mathematics Connections:
● **Support the analysis of science and technical texts by citing specific textual evidence for how the motions and complex interactions of air masses result in changes in weather conditions.** ○ **Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-5),(MS-ESS3-5) RST.6-8.1** ● **Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with information that is gained from reading text about how the complex patterns of the changes and movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents are major determinants of local weather patterns.** ○ **Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.(MS-ESS2-5) RST.6-8.9** ● **Gather relevant information from multiple print and digital sources about how the complex patterns of the changes and movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.** ○ **Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility**	● **Reason abstractly and quantitatively by using data such as weather maps, diagrams, and visualizations or obtained through laboratory experiments to predict weather within probabilities ranges.** ○ **Reason abstractly and quantitatively. (MS-ESS2-5),(MS-ESS3-5) MP.2** ● **Understand that positive and negative numbers are used together to describe quantities having opposite directions or values. Use positive and negative numbers to represent changes in atmospheric and oceanic temperatures, explaining the meaning of 0 in each situation.** ○ **Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-ESS2-5) 6.NS.C.5** ○ **Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS3-5) 6.EE.B.6**

and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-ESS2-5) WHST.6-8.8 ● **Include multimedia components and visual displays in presentations to clarify information about how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.** ○ **Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS2-6) SL.8.5**	

Unit Performance Task:

Students make sense of how Earth's geosystems operate by modeling the flow of energy and the cycling of matter within and among different systems. A systems approach is also important here, examining the feedbacks between systems as energy from the Sun is transferred between systems and circulates through the ocean and atmosphere. The crosscutting concepts of cause and effect, systems and system models, and energy and matter are called out as frameworks for understanding the disciplinary core ideas. In this unit, students are expected to demonstrate proficiency in developing and using models and planning and carrying out investigations as they make sense of the disciplinary core ideas. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Lesson Scope and Sequence			
Unit Pacing and Duration *Each unit contains several components. The duration of each lesson will vary based on block scheduling, ut should not exceed more than 4 class periods.	**Focus Standards with CCSS Connections**	**Primary Resources & Supplements** *Each link requires a teacher login for full access to assessments. All assessments can be found through each homepage by searching the key headings if login links are inaccessible.	**Assessment** *Each link requires a teacher login for full access to assessments. All assessments can be found through each homepage by searching the key headings if login links are inaccessible.

*Depending on ability of students (Could serve as a review lesson/unit)
 	
Between 5 - 8 class periods (45 min blocks)
	NGSS: 3.1 - Energy Transfer and the Water Cycle
	- **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-ESS2-4.2.1** Develop a model to describe unobservable mechanisms.
	- **MS-ESS2-4.5.1** Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter.
	- **MS-ESS2-4.ESS2.C.1** 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.ESS2.C.2** Global movements of water and its changes in form are propelled by sunlight and gravity.
	
	CCSS for ELA:
	- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
	- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information
		Primary Resources:
		- Discovery Education Techbook
		  - Unit 3: Earth's Systems
		  - 3.1 - Energy Transfer and the Water Cycle
		  - 5E Lesson Planner
		
		Supplements:
		- Hands-on Activities: (Discovery Education)
		  - Observing Evaporation and Condensation
		  - A Water Cycle Model
		
		- BrainPOP Modules:
		  - Earth System
		  - Water Cycle
		  - Earth's Atmosphere
		  - Water
		
		- Readorium:
		  - Earth Science Books
		  - Big Delicious Earth
			Discovery Education: (Test/Authentic Assessment)
			- Energy Transfer and the Water Cycle Constructed Response
			- Energy Transfer and the Water Cycle: Summative Assessment - Multiple Choice/Online
			- Hands-on activities
			- Board Builder
			
			BrainPOP: (Formative - Classwork/Quiz Grade)
			- Offers video and lesson quizzes for each lesson/module
			
			Readorium: (Classwork/Quiz Grade, Extension/Lesson Closer, Homework):
			- PDF versions of multiple choice book quizzes

	expressed visually (e.g., in a flowchart, diagram, model, graph, or table). - 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. - .6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. CCSS for Math: *Not Applicable		
TBD Between 5 - 8 class periods (45 min blocks)	NGSS: 3.2 - Meteorology - **MS-ESS2-5** Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. - **MS-ESS2-5.2.1** Cause and effect relationships may be used to predict phenomena in natural or designed systems. - **MS-ESS2-5.3.1** 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.ESS2.C.1** 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.ESS2.D.1** Because these patterns are so complex, weather can only be predicted probabilistically. - **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-ESS2-6.2.1** Develop and use a model to describe phenomena. - **MS-ESS2-6.4.1** Models can be used to represent systems and their	Primary Resources: Discovery Education Techbook - Unit 3: Earth Systems - 3.2 - Meteorology - 5E Lesson Planner Supplements: - Hands-on Activities: (Discovery Education) - Weather Watcher - I'm a Meteorologist - BrainPOP Modules: - Weather - Weather - Wind - Temperature - Humidity - Clouds - Earth's Atmosphere - Our Fragile Environment - Wind Energy - Readorium: - Earth Science Books	Discovery Education: (Test/Authentic Assessment) - Brief Constructed Response - Meteorology - Meteorology: Summative Assessment - Multiple Choice/Online - Hands-on activities - Board Builder BrainPOP: (Formative - Classwork/Quiz Grade) - Offers video and lesson quizzes for each lesson/module

	interactions-such as inputs, processes and outputs-and energy, matter, and information flows within systems. - **MS-ESS2-6.ESS2.C.1** Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. - **MS-ESS2-6.ESS2.D.1** Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. - **MS-ESS2-6.ESS2.D.2** 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. <u>CCSS for ELA:</u> - RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. - RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. - WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. - SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. <u>CCSS for Math:</u>		

	- MP.2 Reason abstractly and quantitatively. - 6.NS.C. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.		

TBD
 	
Between 5 - 8 class periods (45 min blocks)
	NGSS: 3.3 Extreme Weather
	
	- **MS-ESS2-5** Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
	- **MS-ESS2-5.ESS2.C.1** 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-ESS3-4.2.1** Cause and effect relationships may be used to predict phenomena in natural or designed systems.
	
	CCSS for ELA:
	- 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.
	- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
	- RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources
		Primary Resources:
		- Discovery Education Techbook
		  - Unit 3: Earth's Systems
		  - 3.3 - Extreme Weather
		  - 5E Lesson Planner
		
		Supplements:
		- Hands-On Activities:
		  - Model a Tornado (Discovery Education)
		  - Create Your Own Natural Disasters: Science Fair Idea
		
		- BrainPOP Modules:
		  - Forces of Nature
		  - Weather
		  - Natural Disasters
		  - Thunderstorms
		  - Tornados
		  - Hurricanes
		  - Droughts
		  - Floods
		  - Our Fragile Environment
		  - Wildfires
		  - Earth System
		  - Earthquakes
		  - Tsunamis
		- Readorium:
		  - Earth Science Books
			Discovery Education: (Test/Authentic Assessment)
			- Brief Constructed Response - Extreme Weather
			- Extreme Weather: Summative Assessment - Multiple Choice/Online
			- Hands-on activities
			- Board Builder
			
			BrainPOP: (Formative - Classwork/Quiz Grade)
			- Offers video and lesson quizzes for each lesson/module
			
			Readorium: (Classwork/Quiz Grade, Extension/Lesson Closer, Homework):
			- PDF versions of multiple choice book quizzes

	with that gained from reading a text on the same topic. - WHST.6-8.1 Write arguments focused on discipline content. - WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. - WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. - SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. CCSS for Math: - MP.2 Reason abstractly and quantitatively. - 6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.		
TBD Between 5 - 8 class periods (45 min blocks)	NGSS: 3.5 Climate and Factors that Affect it - **MS-ESS3-5** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. - **MS-ESS3-5.1.1** Ask questions to identify and clarify evidence of an argument.	Primary Resources: - Discovery Education Techbook - Unit 3: Earth's Systems - 3.5 - Climate and Factors That Affect it - 5E Lesson Planner Supplements:	Discovery Education: (Test/Authentic Assessment) - Brief Constructed Response - Climate and Factors that Affect it - Climate and Factors that Affect it: Summative Assessment - Multiple Choice/Online - Hands-on activities - Board Builder

	- **MS-ESS3-5.7.1** Stability might be disturbed either by sudden events or gradual changes that accumulate over time.
	- **MS-ESS3-5.ESS3.D.1** 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.
	
	CCSS for ELA:
	- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
	
	CCSS for Math:
	- MP.2 Reason abstractly and quantitatively.
	- 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.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
		- Hands-on Activities: (Discovery Education)
		  - Investigate the Effects of Warm Ocean Currents on Air Temperature
		  - Hot House
		
		- BrainPOP Modules:
		  - Weather Unit
		  - Climate Change
		  - Climate Types
		  - Greenhouse Effect
		  - Our Fragile Environment
		  - Climate Change
		  - Conserving Energy
		  - Energy Sources
		  - Fossil Fuels
		  - Greenhouse Effect
		  - Humans and the Environment
		  - Earth System
		  - Tundra
		  - Deserts
		  - Savanas
		- Readorium:
		  - Earth Science Books
			BrainPOP: (Formative - Classwork/Quiz Grade)
			- Offers video and lesson quizzes for each lesson/module

This lesson/unit can serve as an extension for	NGSS: 3.6 Oceans and Climate
	
	- **MS-ESS2-6** Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric
		Primary Resources:
		- Discovery Education Techbook
		  - Unit 3: Earth's Systems
		  - 3.6 - Oceans and Climate
		  - 5E Lesson Planner
			Discovery Education: (Test/Authentic Assessment)
			- Brief Constructed Response - Oceans and Climate
			- Oceans and Climate: Summative Assessment - Multiple Choice/Online

Climate for higher tiered students	and oceanic circulation that determine regional climates.
	- **MS-ESS2-6.2.1** Develop and use a model to describe phenomena.
	- **MS-ESS2-6.4.1** 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.ESS2.C.1** Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.
	- **MS-ESS2-6.ESS2.D.1** Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.
	- **MS-ESS2-6.ESS2.D.2** 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.
	
	CCSS for ELA:
	- 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
	- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
	- RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources
		Supplements:
		- Hands-on Activities: (Discovery Education):
		  - Density Currents
		  - Temperatures around the World
		
		- BrainPOP Modules:
		  - Weather
		  - Our Fragile Environment
		
		- Readorium:
		  - Earth Science Books
			- Hands-on activities
			- Board Builder
			
			BrainPOP: (Formative - Classwork/Quiz Grade)
			- Offers video and lesson quizzes for each lesson/module

	with that gained from reading a text on the same topic. - WHST.6-8.1 Write arguments focused on discipline content. - WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. - WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. - SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. <u>CCSS for Math:</u> *Not Applicable		

Modifications	
Special Education/ 504:	**English Language Learners:**
• Adhere to all modifications and health concerns stated in each IEP. • Give students a MENU of options, allowing them to choose assignments from different levels based on difficulty. • Accommodate Instructional Strategies: use of post-its, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time • Allow extra time to complete assignments or tests • Allow students to demonstrate understanding of a problem by drawing a functional model of the answer and then explaining the reasoning orally and/or writing. • Provide breaks between tasks, use positive reinforcement, use proximity • Work in a small group • Use large print books, Braille, or digital texts Strategies for students with 504 plans	• Simplify written and verbal instructions • Use manipulatives to promote conceptual understanding and enhance vocabulary usage • Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing • Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words • Provide graphic representations, gestures, drawings, equations, and pictures during all segments of instruction • Utilize program translations tools such as Snap and Read (if available) • Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information • Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve real life problems. • Reword questions in simpler language • Provide class notes ahead of time to allow students to preview material and increase comprehension • Provide extended time

Gifted and Talented:	Students at Risk for Failure:

• Organize and offer flexible small group learning opportunities / activities.
• Utilize elevated contextual complexity
• Inquiry based or open ended assignments, performance tasks and projects
• Allow more time to study concepts with greater depth
• Provide options, alternatives and choices to differentiate and broaden the curriculum.
• Promote the synthesis of concepts and making real world connections
• Provide students with enrichment practice that are imbedded in the curriculum
  ○ allowing students to design problems to be addressed by the class
  ○ allowing students to modify the lesson by introducing a related phenomena
  ○ allow for interest-based extension activities
• Utilize an enhanced set of introductory activities (e.g. phenomena, organizers, concept maps etc)
• Provide whole group enrichment explorations.
• Teach cognitive and methodological skills
• Allow for the use of stations
• Organize integrated problem-solving simulations.
	• Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum
	• Modify Instructional Strategies; extended time, reading aloud text, graphic organizers, flexible grouping, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Utilize Scaffolded Questioning, Field Trips, Google Expeditions, Peer Support, Modified Assignments, Chunking of Information, Peer Buddies
	• Assure constant parental/ guardian contact throughout the year with successes/ challenges
	• Provide academic contracts to students and guardians
	• Create an interactive notebook with samples, key vocabulary words, student goals/ objectives.
	• Always plan to address students at risk in the designing of learning tasks, instructions, and directions.
	• Try to anticipate where the needs will be and then address them prior to lessons.
	• Teacher should allow for preferential seating
	• Include Visual Cues/Modeling
	• Allow for technology Integration, especially Assistive Technology

21st Century Life and Career Skills:

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These skills enable students to make informed decisions that prepare them to engage as active citizens in a dynamic global society and to successfully meet the challenges and opportunities of the 21st century workplace. As such, they should be taught and reinforced in all career exploration and preparation programs, with increasingly higher levels of complexity and expectation as a student advances through a program of study.

https://www.state.nj.us/education/cccs/2014/career/9.pdf

- **CRP1**. Act as a responsible and contributing citizen and employee.
- **CRP2**. Apply appropriate academic and technical skills.
- **CRP3**. Attend to personal health and financial well-being.
- **CRP4**. Communicate clearly and effectively and with reason.
- **CRP5**. Consider the environmental, social and economic impacts of decisions.
- **CRP6**. Demonstrate creativity and innovation.
- **CRP7**. Employ valid and reliable research strategies.
- **CRP8**. Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9**. Model integrity, ethical leadership and effective management.
- **CRP10**. Plan education and career paths aligned to personal goals.
- **CRP11**. Use technology to enhance productivity.
- **CRP12**. Work productively in teams while using cultural global competence.

Students are provided with an equitable opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are also encouraged to reason through experiences and exposure to phenomena that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, and educational websites.

Technology Standards:

All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.
https://www.state.nj.us/education/cccs/2014/tech/

8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. **Technology Operations and Concepts:** Students demonstrate a sound understanding of technology concepts, systems and operations.
B. **Creativity and Innovation:** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
C. **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
D. **Digital Citizenship:** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
E. **Research and Information Fluency:** Students apply digital tools to gather, evaluate, and use of information.
F. **Critical thinking, problem solving, and decision making:** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

A. **The Nature of Technology: Creativity and Innovation-** Technology systems impact every aspect of the world in which we live.
B. **Technology and Society:** Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
C. **Design:** The design process is a systematic approach to solving problems.
D. **Abilities in a Technological World:** The designed world in a product of a design process that provides the means to convert resources into products and systems.
E. **Computational Thinking: Programming-** Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.