Unit 1: Earth's Place in Space				
How do interactions between the sun, Earth, and moon affect the planet?				
Sub Unit	Essential Question	Science Concepts	Performance Expectations	Science Practices & CC
1.1 Earth and Sky	How can we use models to help us understand what we observe in the sky (lunar phases and eclipses?) How does the movement of the Earth around the sun explain the seasons?	**ESS1.A: The Universe and Its Stars** ● Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1) **ESS1.B: Earth and the Solar System** ● This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1)	**MS-ESS1-1** 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.	**Developing and Using Models** Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. >> Develop and use a model to describe phenomena. (MS-ESS1-1) (MS-ESS1-2) **Patterns** >> Patterns can be used to identify cause-and-effect relationships. (MS-ESS1-1)
	Notes:			
Sub Unit	Essential Question	Science Concepts	Performance Expectations	Science Practices & CC
1.2 The Solar System	What is beyond Earth's atmosphere? What is Earth's place in space? What explains the movement of objects in space?	**ESS1.A: The Universe and Its Stars** ● Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2) **ESS1.B: Earth and the Solar System** ● The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2),(MS-ESS1-3)	**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.	**Developing and Using Models** Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. >> Develop and use a model to describe phenomena. (MS-ESS1-1) (MS-ESS1-2) **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5

		• The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)		experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. >> Analyze and interpret data to determine similarities and differences in findings. (MS-ESS1-3) **Scale, Proportion, and Quantity** >> Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3),(MS-ESS1-4) **Systems and System Models** >> Models can be used to represent systems and their interactions. (MS-ESS1-2)
	Notes:			
Unit 2: Earth's Systems				
What forms does matter take on Earth? How does matter change and move through the planet?				
Sub Unit	Essential Question	Science Concepts	Performance Expectations	Science Practices & CCC
2.1 The Lithosphere: Earth's Rocky Surface	Where does energy on Earth come from and where does it go? How does energy drive changes in Earth's materials? How has Earth changed since its formation?	**ESS2.A: Earth's Materials and Systems** • All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1) • The planet's systems interact over scales that range from microscopic	**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	**Developing and Using Models** Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. >> Develop and use a model to describe phenomena. (MS-ESS2-1),(MS-ESS2-6) **Constructing Explanations and Designing Solutions**

		to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2) **ESS1.C: The History of Planet Earth** ● Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. *(HS.ESS1.C GBE),(secondary to MS-ESS2-3)* **ESS2.B: Plate Tectonics and Large-Scale System Interactions** ● Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3) **ESS2.C: The Roles of Water in Earth's Surface Processes** ● Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2)	time and spatial scales.* **MS-ESS2-3** Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. *partially assessed	Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. >> Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future. (MS-ESS2-2) **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. >> Analyze and interpret data to provide evidence for phenomena. (MS-ESS2-3) **Stability and Change** >> Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1) **Scale Proportion and Quantity** >> Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS2-2)
	Notes:			

Sub Unit	Essential Question	Science Concepts	Performance Expectations	Science Practices & CCC
2.2 The Hydrosphere: Earth's Water Resources	Where can water be found on the planet? How does water move through Earth and its systems? How have humans impacted Earth's water resources? How can humans protect and restore Earth's water resources?	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. (MS-ESS2-5) ● Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4) **ESS3.C: Human Impacts on Earth Systems** ● Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3) ● Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3),(MS-ESS3-4)	**MS-ESS2-4** Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. **MS-ESS3-3** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. **MS-ETS1-1** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	**Developing and Using Models** Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. >> Develop a model to describe unobservable mechanisms. (MS-ESS2-4) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. >> Apply scientific principles to design an object, tool, process or system. (MS-ESS3-3) **Asking Questions and Defining Problems** Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models. >> Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1)

				Engaging in Argument from Evidence Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world. >> Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-ETS1-2) **Energy and Matter** >> Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4) **Cause and Effect** >> Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3)
	Notes:			
Sub Unit	Essential Question	Science Concepts	Performance Expectations	Science Practices & CCC
2.3 The Atmosphere: Weather and Climate	How does the movement of water affect weather conditions? How does the movement of water affect climate? What explains changes in weather conditions? How does Earth's	**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,	**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	**Planning and Carrying Out Investigations** Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions. >> Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of

	place in space determine regional climates? What is the role of human activity in the rise of global temperatures over the last century?	and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5) • Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4) • 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) **ESS3.B: Natural Hazards** • Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2) **ESS3.D: Global Climate Change** • Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's	atmospheric and oceanic circulation that determine regional climates. **MS-ESS3-2** Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. **MS-ESS3-5** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	conditions. (MS-ESS2-5) **Developing and Using Models** Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. >> Develop and use a model to describe phenomena. (MS-ESS2-1),(MS-ESS2-6) **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. >> Analyze and interpret data to determine similarities and differences in findings. (MS-ESS3-2) **Asking Questions and Defining Problems** Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models. >> Ask questions to identify and clarify evidence of an argument. (MS-ESS3-5) **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

		mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)		outputs—and energy, matter, and information flows within systems. (MS-ESS2-6) **Patterns** >> Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2) **Stability and Change** >> Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5)
	Notes:			
Unit 3: Earth's Past and Future				
What do we know about Earth's past? What can we predict about its future? How can our activities make a difference - for better or for worse?				
Sub Unit	Essential Question	Science Concepts	Performance Expectations	Science Practices & CCC
3.1 Earth's History	How has Earth changed over time? How can we organize events in Earth's past?	**ESS2.A: Earth's Materials and Systems** ● The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2) **ESS1.C: The History of Planet Earth** ● The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an	**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-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	**Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. >> Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws

		absolute scale. (MS-ESS1-4)	history. *partially assessed	that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS1-4) **Scale, Proportion, and Quantity** >> Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3),(MS-ESS1-4) **Scale Proportion and Quantity** >> Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS2-2) >> Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-4)
	Notes:			
Sub Unit	Essential Question	Science Concepts	Performance Expectations	Science Practices & CC
3.2 Earth's Future: Human Impacts	How do humans rely on Earth's resources? How have humans impacted Earth's resources? How can humans mitigate their impact on the Earth?	**ESS3.A: Natural Resources** ● Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1) **ESS3.C: Human Impacts on Earth Systems** ● Human activities have significantly	**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-ESS3-3** Apply scientific principles to design a method for monitoring and minimizing a human impact on the	**Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. >> Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws

		altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3) • Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3),(MS-ESS3-4)	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-ETS1-3** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS3-1) >> Apply scientific principles to design an object, tool, process or system. (MS-ESS3-3) **Engaging in Argument from Evidence** Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s). >> Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-ESS3-4) **Cause and Effect** >> Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3) >> Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1),(MS-ESS3-4)
	Notes:			