NGSS Earth & Space Concepts (6-8)

GRD	STNDRD	CONCEPT	OBJECTIVE
6	MS-ESS2-4	Earth's Systems	**Students 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**: *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.*
6	MS-ESS2-5	Earth's Systems	**Students can collect data to provide evidence for how the motions and complex interactions of air masses results 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 changes in **weather can result when different air masses collide**. Emphasis is on **how weather can be predicted** within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation). (Does not include recalling the names of cloud types or weather symbols used on weather maps or the reported diagrams from weather stations.)*
6	MS-ESS2-6	Earth's Systems	**Students can 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**: *Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of **atmospheric circulation** is on the **sunlight-driven** latitudinal banding, the **Coriolis effect**, and resulting prevailing winds; emphasis of **ocean circulation** is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.*
6	MS-ESS3-3	Earth & Human Activity	**Students can apply scientific principles to design a method for monitoring and minimizing a human impact on the environment**: *Examples of the **design process** include examining human environmental impacts, assessing the kinds of solutions that are **feasible,** and designing and evaluating solutions that could reduce that impact. Examples of **human impacts** can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).*
6	MS-ESS3-5	Earth & Human Activity	**Students can 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*

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			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.
7	MS-ESS2-1	Earth's Systems	**Students can 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.*
7	MS-ESS2-2	Earth's Systems	**Students can construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales**: *Emphasis is on how **processes change Earth's surface** at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many **geoscience processes** (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.*
7	MS-ESS2-3	Earth's Systems	**Students can analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions**: *Examples of data include **similarities** of rock and fossil types on **different continents**, the shapes of the continents (including continental shelves), and the locations of **ocean structures** (such as ridges, fracture zones, and trenches).*
7	MS-ESS3-1	Earth & Human Activity	**Students can 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).*
7	MS-ESS3-2	Earth & Human Activity	**Students can analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects**: *Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are **preceded by phenomena** that allow for **reliable predictions**, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet **predictable.** Examples of natural hazards can be taken from interior*

			processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).
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8	MS-ESS1-1	Earth's Place in the Universe	**Students can 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.*
8	MS-PS2-2	Earth's Place in the Universe	**Students can Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system**: *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 their school or state).*
8	MS-PS2-3	Earth's Place in the Universe	**Students can 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 and photographs, and models (does not include recalling facts about properties of the planets and other solar system bodies).*
8	MS-PS2-4	Earth's Place in the Universe	**Students can 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**: *Emphasis is on how **analyses of rock formations** and the **fossils they contain** are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.*