Grade 6
Earth and Space Science

Earth and Space Science content focuses on the disciplinary core ideas in the Earth and space sciences domain. The first core idea, "Earth's Place in the Universe," describes the universe as a whole and addresses its grand scale in both space and time. The second and third core ideas, "Earth's Systems: Materials and Processes" and "Earth's Systems: Energy and Weather," encompass the processes that produce Earth's continuously changing conditions. The fourth core idea, "Earth and Human Activity," addresses society's interactions with the planet.

Sixth grade students will develop and use models, analyze and interpret data, and construct explanations to gain a better understanding of Earth's systems and Earth's place in the universe. They will carry out investigations and utilize their findings as evidence in order to construct their own understanding of Earth. As they obtain, analyze, and utilize data, students are encouraged to develop solutions to conserve Earth's natural resources and limit the negative impact humans may have on the planet.

Embedded in the content standards are the disciplinary core ideas of the Engineering, Technology, and Applications of Science (ETS) domain, which require students to use design strategies in conjunction with knowledge and understanding of science and technology to solve practical problems. Engineering standards are denoted with a gear icon⚙. Through guided participation in the engineering design process, students will design solutions to mitigate real-world problems including the impact of severe weather and human activity on the environment.

Each content standard completes the stem *"**Students will**…"*

Earth's Place in the Universe		
Sun, Earth, and Moon	1. Manipulate models to demonstrate the patterns of motion of the sun, Earth, and moon.	**Patterns**
	a. Construct an evidence-based explanation of how the relative positions of the sun and Earth result in observable phenomena, including day and night cycles, length of year, and seasons. b. Construct an evidence-based explanation of how the relative positions of the sun, moon, and Earth result in observable phenomena, including lunar cycles, eclipses, and tidal cycles.	**Cause and Effect**
The Solar System and the Universe	2. Evaluate information to compare and contrast past and current views about the structure of the universe and show how these views have changed over time. *Example: structure of the solar system (heliocentric vs. geocentric)*	**Patterns**
	3. Construct an evidence-based explanation of the role of gravity on the movement of natural and manmade objects within galaxies and the solar system. *Examples: planets, moons, comets, asteroids, meteors, satellites*	**Systems and System Models**
	4. Analyze and use data to determine scale properties and characteristics of objects in the solar system including sizes, distances, orbital periods, basic composition, and ability to support life.	**Scale, Proportion, and Quantity**

Earth's Systems: Materials and Processes		
Earth's Processes	5. Obtain, evaluate, and communicate evidence that explains how constructive and destructive processes shape Earth's surface. a. Develop and use models to demonstrate the processes that form rocks and cycle Earth's materials. *Examples: crystallization, heating and cooling, weathering and erosion* b. Construct an evidence-based explanation of how rocks are classified as metamorphic, igneous, or sedimentary based on their characteristics and the process of the rock cycle. c. Develop and use models to demonstrate types of weathering, effects of agents of erosion and transportation, and the formation of environments of deposition. *Examples: physical and chemical weathering; water, wind, ice, and vegetation; deltas, alluvial fans, sand dunes* d. Use research-based evidence to propose a scientific explanation of how the distribution of Earth's resources, including minerals, fossil fuels, and groundwater, results from ongoing geoscience processes.	**Cause and Effect**
Plate Tectonics	6. Construct an evidence-based explanation of how tectonic plate movement impacts Earth's surface over geological time. *Examples: formation of canyons, caverns, volcanic island chains* a. Construct an evidence-based explanation of how Earth's internal energy flows between its surface and its interior. *Examples: transfer of heat from the core to crust; convection currents due to differences in density* b. Construct a scientific explanation of how the movement of lithospheric plates can cause major geologic events and form Earth's surface features, including convergent, divergent, and transform boundaries; earthquakes; and volcanoes. c. Provide evidence of past plate movements, using data regarding the distribution of fossils, rocks, continental shapes, and seafloor structures.	**Energy and Matter**

	7. Analyze data from rock strata and the fossil record to construct a chronology of occurrences in Earth's history. *Examples: fossil evidence, sedimentary rock layers, impact craters, and volcanic eruptions*	
Earth's Systems: Energy and Weather		
Energy Transfer	8. Construct an evidence-based explanation of how the sun's energy drives the motion and cycling of water through the hydrosphere. a. Plan and carry out an investigation to determine the differences in rates of energy transfer from the sun to air, to land, and to water via conduction, convection, and radiation. b. Develop and use a model that illustrates how differences in heat and pressure affect density and the relationship between density and convection.	**Systems and System Models**
Weather	9. Use data analysis to monitor and predict weather changes and the impact of weather events, including severe weather. *Example: Track and analyze temperature and barometric pressure data collected for the local area to identify trends that result in weather changes, and use this analysis to predict future weather events in the area.* a. Obtain, evaluate, and communicate data that describes characteristics of air masses, including temperature, pressure, and humidity. *Examples: weather maps, diagrams, radar, and computer simulations* b. Construct an explanation of how air pressure, weather fronts, and air masses are related to weather events. c. ✪Design solutions to mitigate the impact of severe weather. *Examples: storm shelter, action plan, weather monitoring tools*	**Stability and Change**

Climate	10. Use observations and data from investigations to demonstrate how the sun, air, land, and water affect Earth's climate. *Examples: simulations of convection in the atmosphere and ocean, comparisons of how soil and water absorb heat* a. Develop models demonstrating how unequal heating and the rotation of the Earth cause local and global wind systems and oceanic currents. b. Construct explanations of how the tilt and curvature of the Earth cause unequal heating of its surface, resulting in regional climates based on patterns of latitude. c. Construct an explanation of how altitude, geothermal activity, and oceanic distribution of heat produce typical regional climate patterns. *Examples: mountains, geothermal features in Iceland, California currents*	**Patterns**
Earth and Human Activity		
Human Impact	11. Obtain, evaluate, and communicate information concerning the relationships between human activities and natural processes and how those relationships affect Earth's systems, including human population growth and its impact on the global environment over time. a. ⚙Define problems and design solutions to monitor and mitigate human impact on the environment. *Examples: water usage (removal of water from streams and aquifers or construction of dams and levees), land usage (urban development, agriculture, wetlands), pollution of air, water, and land*	**Cause and Effect**