Science Strands: 6th Grade

Any Strand highlighted in yellow has been determined by our WCSD teachers, district and state content experts as essential for students to master.

Strand 6.1: Structure and Motion within the Solar System

The solar system consists of the Sun, planets, and other objects within Sun's gravitational influence. Gravity is the force of attraction between masses. The Sun-Earth-Moon system provides an opportunity to study interactions between objects in the solar system that influence phenomena observed from Earth. Scientists use data from many sources to determine the scale and properties of objects in our solar system.

Learning Targets	Academic Vocabulary	Questions Stems	Possible Assessments
Develop and use a model of the Sun-Earth-Moon system to describe the cyclic patterns of lunar phases, eclipses of the Sun and Moon, and seasons. Examples of models could be physical, graphical, or conceptual. Develop and use a model to describe the role of gravity and inertia in orbital motions of objects in our solar system. Use computational thinking to analyze data and determine the scale and properties of objects in the solar system.	Tilt Direct sunlight Rotation Revolution Inertia Orbital Radius Lunar	What patterns are noticed about the moon? What does the tilt of the Earth affect? what would be a good model of the different seasons?	Making a model of the lunar phases. Constructing a graph of the different scales of objects in the universe.

Strand 6.2: Energy Affects Matter

Matter and energy are fundamental components of the universe. Matter is anything that has mass and takes up space. Transfer of energy creates change in matter. Changes between general states of matter can occur through the transfer of energy. Density describes how closely matter is packed together. Substances with a higher density have more matter in a given space than substances with a lower density. Changes in heat energy can alter the density of a material. Insulators resist the transfer of heat energy, while conductors easily transfer heat energy. These differences in energy flow can be used to design products to meet the needs of society.

Learning Targets	Academic Vocabulary	Questions Stems	Possible Assessments
Develop models to show that molecules are made of different kinds, proportions and quantities of atoms. Emphasize understanding that there are differences between atoms and molecules, and that certain combinations of atoms form specific molecules. Develop a model to predict the effect of heat energy on states of matter and density. Emphasize the arrangement of particles in states of matter (solid, liquid, or gas) and during phase changes (melting, freezing, condensing, and evaporating). Plan and carry out an investigation to determine the relationship between temperature, the amount of heat transferred, and the change of average particle motion in various types or amounts of matter. Emphasize recording and evaluating data, and communicating the results of the investigation. Design *an object, tool, or process* that minimizes or maximizes heat energy transfer.	Solid Liquid Gas Molecule Particles Melting Freezing Condensing Evaporating Matter Atom Proton Neutron Electron Density Insulator Energy	Why are there solids, liquids, and gas? What would happen if you take away or add heat to solids, liquids, and gas? How do molecules form?	Students design and carry out an investigation into changing the states of matter. Students create a chart and graph with information about heat transfer. Students write a summary of an investigation and are able to share it with someone.

Strand 6.3: Earth's Weather Patterns and Climate

All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. Heat energy from the Sun, transmitted by radiation, is the primary source of energy that affects Earth's weather and drives the water cycle. Uneven heating across Earth's surface causes changes in density, which result in convection currents in water and air, creating patterns of atmospheric and oceanic circulation that determine regional and global climates.

Learning Targets	**Academic Vocabulary**	**Questions Stems**	**Possible Assessments**
Develop a model to describe how the cycling of water through Earth's systems is driven by energy from the Sun, gravitational forces, and density. Investigate the interactions between air masses that cause changes in weather conditions. Examples of data collection could include field observations, laboratory experiments, weather maps, or diagrams. Develop and use a model to show how unequal heating of Earth's systems cause patterns of atmospheric and oceanic circulation that determine regional climates. Construct an explanation supported by evidence for the role of the natural greenhouse effect in Earth's energy balance, and how it enables life to exist on Earth.	Water Cycle Map Climate Greenhouse Effect Radiation Convection Conduction Atmosphere	Why do the oceans have currents? What causes different types of weather? What causes the weather in Utah?	Collect and analyze weather data to provide evidence for how air masses flow from regions of high pressure to low pressure causing a change in weather. Construct an explanation of the atmospheric and oceanic circulations. Construct a model of the Water Cycle.

Strand 6.4: Stability and Change in Ecosystems

The study of ecosystems includes the interaction of organisms with each other and with the physical environment. Consistent interactions occur within and between species in various ecosystems as organisms obtain resources, change the environment, and are affected by the environment. This influences the flow of energy through an ecosystem, resulting in system variations. Additionally, ecosystems benefit humans through processes and resources, such as the production of food, water and air purification, and recreation opportunities. Scientists and engineers investigate interactions among organisms and evaluate design solutions to preserve biodiversity and ecosystem resources.

Learning Targets	**Academic Vocabulary**	**Questions Stems**	**Possible Assessments**
Analyze data to provide evidence for the effects of resource availability on organisms and populations in an ecosystem. Ask questions to predict how changes in resource availability affects organisms in those ecosystems. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. Emphasize consistent interactions in different environments such as competition, predation, and mutualism. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. Emphasize food webs and the role of producers, consumers, and decomposers in various ecosystems. Examples could include Utah ecosystems such as mountains, Great Salt Lake, wetlands, and deserts.	Ecosystem resource Limiting Factor Competition Predation Mutualism Food Web Producer Consumer Decomposer	How do you know something is alive? What happens when an organism is taken out of the environment? What could happen if a new species is introduced into an environment?	*Evaluate competing design solutions* for preserving ecosystem resources and biodiversity based on how well the solutions maintain stability within the ecosystem. Construct an argument supported by evidence that the stability of populations is affected by changes to an ecosystem. Students will construct a food web with provided organisms. Predict what happens when an organism is taken out of an environment.
