**6th Grade Science Curriculum Pacing Map 2018 - 2019**

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| **Term** | **Definition** |
| Strand | Strands are significant areas of learning within a science discipline. They provide an overarching topic or theme to which all of the standards align. |
| Standard | The standards are performance expectations. They articulate the essential elements of what students should know and be able to do. |
| Three Dimensional Instruction  (3D) | 3D Instruction is an approach to instruction that combines the science and engineering practices, crosscutting concepts and disciplinary core ideas together in order to help students make sense of phenomena and solve problems. The three dimensions connect students with the knowledge and the skills needed to understand complex material. |
| Science & Engineering Practices  (SEP) | These 8 practices help students develop a knowledge of how scientific knowledge is developed; exposing students to a wide range of approaches that can be used to make sense of phenomena and solve problems. These practices help students gather information, reason with it and then communicate their understanding. The practices are not a linear set of instructions, rather they assist students in connecting a wide range of skills and content in order to be proficient in the work of doing science and engineering. |
| Crosscutting Concepts  (CCC) | These are interdisciplinary themes that help students see connections between content areas and to scaffold new learning based on their previous experiences in order to make sense of phenomena. |
| Disciplinary Core Ideas  (DCI) | Core ideas in science are the concepts, laws and theories that have a high explanatory value for making sense of phenomena. Core ideas have utility for engaging students in interesting and meaningful instruction that will help students not only in the classroom, but as they make decisions in their personal lives. |
| 🔑 Key Concepts for Differentiation | In an effort to assist teachers in the process of differentiation in Tier I teaching, Key Concepts have been identified as those specific standards a teacher should focus on during small group instruction with struggling students.    Key Concepts are not an alternative to teaching the entire SEEd Standards, rather they emphasize which concepts to prioritize for differentiation. |
| I can statement | Learning target/learning goal that is written in student-friendly language. |

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| **Resources** | **Checklist for evaluating and developing 3D science resources** |
| [Granite Intranet SEEd Website](https://gsdsites.graniteschools.org/departments/instructionalservices/curriculum/science/Pages/SEEdStandards.aspx)  [USBE Core Standards](http://www.uen.org/core/science/)  [USBE OER Science Textbook](http://www.uen.org/oer/)  [www.seedstorylines.org](http://www.seedstorylines.org) | * Is it aligned to the core? * Do students make sense of a phenomenon or solve a problem? * Are students purposefully engaged in using the science and engineering practices? * Are the crosscutting concepts made explicit to students? * Is the focus on student sensemaking rather than memorization of facts and vocabulary? * Does it engage students in deep levels of thinking and explanation about the phenomenon or problem? |

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| **Quarter 1** | **6th Grade Science** | **46 Days** | **2018 - 2019** |
| **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.  | | | |

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| **Standards** | **3D Focus** | **I Can Statements** |
| 🔑 **6.1.1 Develop and use a model o**f 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. | * Developing and using a model * Patterns * Earth and the solar system | I can develop a model to describe the patterns of moon phases, eclipses, and seasons. |
| 🔑 **6.1.2** **Develop and use a model** to describe the role of gravity and inertia in orbital motions of objects in our solar system. | * Developing and using a model * Systems and system models * Earth and the solar system | I can use a model to describe how gravity and inertia cause orbital motion. |
| 🔑 **6.1.3 Use computational thinking to analyze data** and determine the scale and properties of objects in the solar system. Examples of scale could include size and distance. Examples of properties could include layers, temperature, surface features, and orbital radius. Data sources could include Earth and space-based instruments such as telescopes and satellites. Types of data could include graphs, data tables, drawings, photographs, and models. | * Analyzing and interpreting data * Using mathematical and computational thinking * Scale, proportion, and quantity * Earth and the solar system | I can use computational thinking to determine the relative distance and size of objects in the solar system.  I can analyze data to compare the properties of objects in the solar system. |

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| **Quarter 2** | **6th Grade Science** | **44** **Days** | **2018 - 2019** |
| **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. | | | |

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| **Standards** | **3D Focus** | **I Can Statements** |
| **🔑 6.2.1 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. Examples of simple molecules could include water (H2O), atmospheric oxygen (O2), and carbon dioxide (CO2). | * Developing and using models * Scale, proportion, and quantity * Structure and properties of matter | I can develop a model to explain the relationship between atoms and molecules. |
| **🔑 6.2.2** **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). | * Developing and using models * Cause and effect * Structure and properties of matter * Definitions of energy | I can develop a model to show how adding or removing heat energy affects states of matter and density. |
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| **🔑 6.2.3 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.  | * Planning and carrying out investigations * Energy and matter * Definitions of energy * Energy transfer | I can design an investigation to show how the amount of heat transfer needed to change the temperature of matter depends on the type or quantity of matter. |
| **6.2.4 Design** an object, tool, or process that minimizes or maximizes heat energy transfer. Identify criteria and constraints, develop a prototype for iterative testing, analyze data from testing, and propose modifications for optimizing the **design solution**. Emphasize demonstrating how the structure of differing materials allows them to function as either conductors or insulators. | * Designing a solution * Structure and function * Energy transfer * Engineering design | I can design an object that will either reduce or increase the transfer of heat energy. |

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| **Quarter 3** | **6th Grade Science** | **47 Days** | **2018 - 2019** |
| **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. | | | |

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| **Standards** | **3D Focus** | **I Can Statements** |
| **🔑 6.3.1 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.  | * [Develop](http://www.nap.edu/openbook.php?record_id=13165&page=56)ing and using models * Energy and matter * The roles of water in Earth’s surface | I can develop a model to explain the role of energy and gravity as water cycles through Earth’s systems. |
| **🔑 6.3.2 Investigate** the interactions between air masses that cause changes in weather conditions. 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. Examples of data collection could include field observations, laboratory experiments, weather maps, or diagrams. | * Planning and conducting investigations * Cause and effect * Weather and climate | I can conduct an investigation to explain how interactions between air masses cause changes in weather conditions. |
| **🔑 6.3.3 Develop and use a model** to show how unequal heating of the Earth’s systems causes patterns of atmospheric and oceanic circulation that determine regional climates. Emphasize how warm water and air move from the equator toward the poles. Examples of models could include Utah regional weather patterns such as lake-effect snow and wintertime temperature inversions. | * [Develop](http://www.nap.edu/openbook.php?record_id=13165&page=56)ing and using models * Systems and system models * Patterns * Weather and climate | I can develop a model that shows how the global movement of air and water determine regional climates. |
| **6.3.4 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. Examples could include comparisons between Earth and other planets such as Venus and Mars. | * Constructing explanations * Energy and matter * Weather and climate | I can construct an explanation for how the natural greenhouse effect allows life to exist on Earth. |

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| **Quarter 4** | **6th Grade Science** | **42** **Days** | **2018 - 2019** |
| **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.  | | | |

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| **Standards** | **3D Focus** | **I Can Statements** |
| **6.4.1 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. Examples could include water, food, and living space in Utah environments. | * Analyzing and interpreting data * Asking questions * Cause and effect * Interdependent relationships in ecosystems | I can ask questions and analyze data about how changes in the availability of resources will affect organisms in an ecosystem. |
| **6.4.2 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.  | * Constructing explanations * Patterns * Interdependent relationships in ecosystems | I can explain and predict the patterns of interactions between organisms in different ecosystems. |
| **🔑 6.4.3 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. | * Developing and using models * Energy and matter: flows, cycles, and conservation * Interdependent relationships in ecosystems | I can develop a model to describe how matter and energy are transferred between living and nonliving things in an ecosystem. |
| **🔑 6.4.4 Construct an argument supported by evidence** that the stability of populations is affected by changes to an ecosystem. Emphasize how changes to living and nonliving components in an ecosystem affect populations in that ecosystem. Examples could include Utah ecosystems such as mountains, Great Salt Lake, wetlands, and deserts. | * Engaging in argument from evidence * Stability and change * Interdependent relationships in ecosystems | I can use evidence to support the claim that changing an ecosystem will affect its stability. |
| **6.4.5** *Evaluate competing design solutions* for preserving ecosystem services that protect resources and biodiversity based on how well the solutions maintain stability within the ecosystem. Emphasize **obtaining, evaluating, and communicating** information of differing design solutions. Examples could include policies affecting ecosystems, responding to invasive species or solutions for the preservation of ecosystem resources specific to Utah, such as air and water quality and prevention of soil erosion. | * Obtaining, evaluating, and communicating information * Stability and change * Interdependent relationships in ecosystems * Engineering design | I can evaluate solutions created by others to determine how effective the solution is at helping maintain an ecosystem’s stability. |