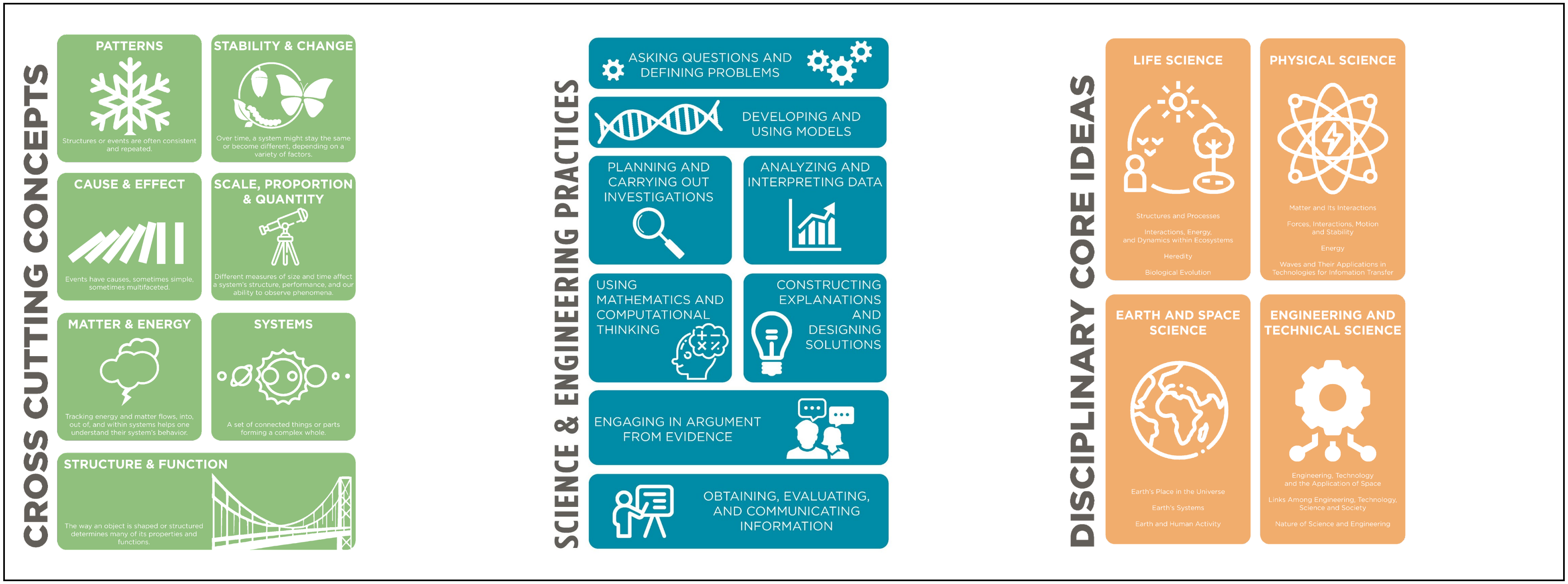
SCIENCE 6 Curricular Document

Table of Contents

Science 6 Course Information	
CURRICULUM/CONTENT AREA	**COURSE LENGTH**
Science	1 year
GRADE LEVEL	**DATE LAST REVIEWED**
6	2016 Program Evaluation 2023
PREREQUISITE(s) ***if applicable***	**BOARD APPROVAL DATE**
NA	2024
PRIMARY RESOURCE ***if applicable***	
Carolina OpenSciEd	

Desired Results	
COURSE DESCRIPTION	
Elmbrook's Middle School Science Programming is designed to build scientific thinking and inquiry by exploring various scientific disciplines such as physical, life, earth & space sciences as well as engineering. Overall, our middle school science programming aims to instill a love for science, nurture critical thinking skills, and lay the groundwork for further scientific study as students progress through their education. Students strengthen their ability to solve problems, become more curious about the world around them, foster a scientific mindset, and discover the wonders of science in their classrooms and their lives.	
ENDURING UNDERSTANDINGS *These are big ideas in science, a.k.a.crosscutting concepts, that provide lenses for viewing phenomena and understanding problems in the world around us and that transfer across all areas of science and engineering.*	ESSENTIAL QUESTIONS *In this course, students will ponder, investigate, reflect, argue, and discuss these open-ended, inquiry questions.*
Patterns: Observed patterns in nature guide organization and classification and prompt questions about relationships and the causes	Unit 1: Light & Matter ● Why do we sometimes see different things when looking at the same object?

underlying them. **Cause and Effect:** Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships and the mechanisms by which they are mediated is a major activity in science and engineering. **Scale, Proportion, and Quantity:** In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales and to recognize proportional relationships between different quantities as scales change. **Systems and Models:** A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. **Energy and Matter:** Tracking energy and matter flows into, out of, and within systems helps one understand their system's behavior. **Structure and Function:** The way an object is shaped or structured determines many of its properties and functions. **Stability and Change:** For both designed and natural systems, conditions that affect stability and factors that control the rates of change are critical elements to consider and understand.	Unit 2: Thermal Energy ● How can containers keep stuff from warming up or cooling down? Unit 3: Weather, Climate, & Water Cycling ● Why does a lot of hail, rain, or snow fall at some times and not others? Unit 4: Plate Tectonics & Rock Cycling ● What causes Earth's surface to change? Unit 5: Natural Hazards ● Where do natural hazards happen and how do we prepare for them? Unit 6: Cells & Systems ● How do living things heal?
3 Dimensional Standards	



Crosscutting Concepts Science Standards by Grade Level Band and Unit		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Cross Cutting Concepts- Grade Level Band							
Standard SCI.CC1 - Patterns Students recognize macroscopic patterns are related to the nature of microscopic and atomic level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.			x	x	x	x	x
Standard SCI.CC2 - Cause and Effect Students classify relationships as either causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause-and-effect relationships in systems can only be explained using probability.		x	x	x	x	x	
Standard SCI.CC3 - Scale, Proportion, and Quantity Students observe time, space, and energy phenomena at various scales using models to study systems that are too large or too small. They understand phenomena observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. They use proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. They represent scientific relationships through the use of algebraic expressions and equations.			x		x		x
Standard SCI.CC4 - Systems and System Models Students understand systems may interact with other systems: They may have sub-systems and be a part of larger complex systems. They use models to represent systems and their interactions- such as inputs, processes, and outputs,-- and energy, matter, and information flows within systems. They also learn that models are limited in that they only represent certain aspects of the system understudy.		x	x	x		x	x

Standard SCI.CC5 - Energy and Matter Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g. energy in fields, thermal energy, and energy of motion”. The transfer of energy can be tracked as energy flows through a designed or natural system.		x	x			
Standard SCI.CC6 - Structure and Function Students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among their parts. They analyze many complex natural and designed structures and systems to determine how they function. They design structures to serve particular functions by taking into account properties of different materials and how materials can be shaped and used.	x	x			x	x
Standard SCI.CC7 - Stability and Change Students explain stability and change in natural or designed systems by examining changes over time and considering forces at different scales, including the atomic scale. They understand changes in one part of a system might cause large changes in another part, systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be distributed by either sudden events or gradual changes that accumulate over time.			x	x	x	

Science & Engineering Practices Science Standards by Grade Level Band and Unit	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Science and Engineering Practices						
Standard SCI.SEP1 - Asking Questions and Defining Problems Students ask questions to specify relationships between variables and clarify arguments and models. This includes the following: ● Ask questions that arise from careful observation of phenomena, models, or unexpected results to clarify or seek additional information. ● Ask questions to identify and clarify evidence and the premise(s) of an argument. ● Ask questions to determine relationships between independent and dependent variables and relationships in models. ● Ask questions to clarify or refine a model, an explanation, or an engineering problem. ● Ask questions that require sufficient and appropriate empirical evidence to answer. ● Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. ● Ask questions that challenge the premise(s) of an argument of a data set. ● Students can 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.	x	x	x	x	x	x
Standard SCI.SEP2 - Developing and Using Models Students develop, use, and revise models to describe, test, and predict more abstract phenomena and design systems. This includes the following: ● Evaluate limitations of a model for a proposed object or tool. ● Develop or modify a model - based on evidence - to match what happens if a variable or component of a system is changed. ● Use and develop a model of simple systems with uncertain and less predictable factors. ● Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. ● Develop and use a model to predict and describe phenomena. ● Develop a model to describe unobservable mechanisms. ● Develop and use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales.	x	x	x	x	x	x
Standard SCI.SEP3 - Planning and Conducting Investigations Students plan and carry out investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models: This includes the following: ● Individually and collaboratively plan an investigation, identifying: independent and dependent variables and controls, tools needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.		x	x			x

● Conduct an investigation. Evaluate and revise the experimental design to produce data that serve as the basis for evidence to meet the goals of the investigation. ● Evaluate the accuracy of various methods for collecting data. ● Collect data under a range of conditions that serve as the basis for evidence to answer scientific questions or test design solutions. ● Collect data about the performance of a proposed object, tool, process, or system under a range of conditions.						
Standard SCI.SEP4 - Analyze and Interpret Data Students extend quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. This includes the following: ● Construct, analyze, or interpret graphical displays of data and large data sets to identify linear and nonlinear relationships. ● Use graphical displays (e.g., maps, charts, graphs, and tables) of large data sets to identify temporal and spatial relationships. ● Distinguish between causal and correlational relationships in data. ● Analyze and interpret data to provide evidence for explanations of phenomena. ● Apply concepts of statistics and probability (including mean, median, mode, and variability) to analyze and characterize data, using digital tools when feasible. ● Consider limitations of data analysis (e.g., measurement, error), and seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials). ● Analyze and interpret data to determine similarities and differences in findings. ● Analyze data to define an optimal operational range for a proposed object, tool, process, or system that best meets criteria for success.		x	x	x	x	x
Standard SCI.SEP5 - Mathematics and Computational Thinking Students identify patterns in large data sets and use mathematical concepts to support explanations and arguments. This includes the following: ● Decide when to use qualitative and quantitative data. ● Use digital tools (e.g., computers) to analyze very large data sets for patterns and trends. ● Use mathematical representations to describe and support scientific conclusions and design solutions. ● Create algorithms (a series of ordered steps) to solve a problem. ● Apply mathematical concepts and processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. ● Use digital tools and mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.			x	x	x	
Standard SCI.SEP6 - Construct Explanations and Design Solutions Students construct explanations supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. This includes the following: ● Construct an explanation that includes qualitative or quantitative relationships between variables that predict and describe phenomena. ● Construct an explanation using models or representations. ● Construct a scientific explanation based on valid and reliable evidence obtained from sources, including the students' own experiments. Solutions should build on the following assumption: Theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. ● Apply scientific ideas, principles, and evidence to construct, revise, or use an explanation for real-world phenomena, examples, or events. Students design solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. This includes the following: ● Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system. ● Undertake a design project, engaging in the design cycle, to construct and implement a solution that meets specific design criteria and constraints. ● Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting.	x	x	x	x	x	x
Standard SCI.SEP7 - Engage in Arguments Students construct a convincing argument that supports or refutes claims for either explanations or solutions about the natural world. This includes the following: ● Compare and critique two arguments on the same topic. Analyze whether they emphasize similar or different evidence and interpretations of facts. ● Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.		x		x	x	x

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
• Construct, use, and present oral and written arguments 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. • Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system. Based the argument on empirical evidence concerning whether or not the technology meets relevant criteria and constraints. • Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.						
Standard SCI.SEP8 - Obtain, evaluate, and Communication Information Students evaluate the validity and reliability of claims, methods, and designs. This includes the following: • Critically read scientific texts adapted for classroom use to determine the central ideas, to obtain scientific and technical information, and to describe patterns in and evidence about the natural and designed world(s). • Clarify claims and findings by integrating text-based qualitative and quantitative scientific information with information contained in media and visual displays. • Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication. Describe how they are supported or not supported by evidence and evaluate methods used. • Evaluate data, hypotheses, and conclusions in scientific and technical texts in light of competing information or accounts. • Communicate scientific and technical information (e.g., about a proposed object, tool process, or system) in writing and through oral presentations.			x		x	x

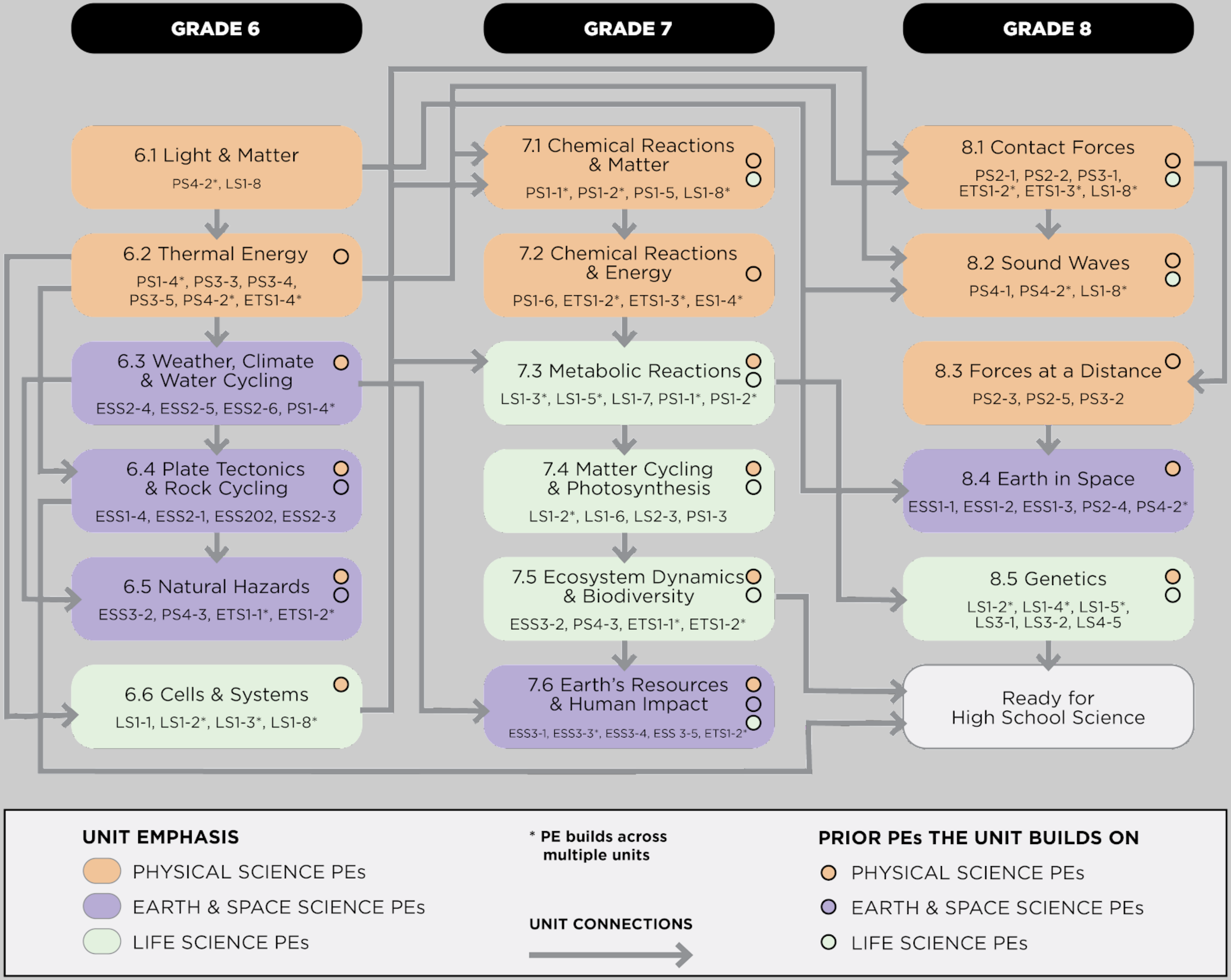
Disciplinary Core Ideas Science Standards by Grade Level Band and Unit		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Disciplinary Core Ideas							
Life Science- Grade Band Level	***Essential Elements*** *These are alternate standards aligned with college, career, and community ready expectations for students with the most significant cognitive disabilities.*						
Standard SCI.LS1- STRUCTURES AND PROCESSES **A.** STRUCTURE & FUNCTION: All living things are made up of cells. In organisms, cells work together to form tissues and organs that are specialized for particular body functions. B. GROWTH AND DEVELOPMENT OF ORGANISMS: Reproduction is essential to every kind of organism. Organisms have unique and diverse life cycles. C. ORGANIZATION FOR MATTER AND FLOW IN ORGANISMS: Plants use the energy from light to make sugars through photosynthesis. Within individual organisms, food is broken down through a series of chemical reactions that rearrange molecules and release energy. D. INFORMATION PROCESSING: Each sense receptor responds to different inputs, transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain resulting in immediate behavior or memories.	EE.MS-LS1-3:Make a claim about how a structure (e.g., organs and organ systems) and its related function supports the survival of animals (circulatory, digestive, and respiratory systems). EE.MS-LS1-5: Interpret data to show that environmental resources (e.g., food, light, space, water) influence growth of organisms (e.g., drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, fish growing larger in large ponds than small ponds).	x					x
Standard SCI.LS2- INTERACTIONS, ENERGY, AND DYNAMICS WITHIN ECOSYSTEMS A. INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS: Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving, any of which can limit their growth. Competitive, predatory, and mutually beneficial interactions vary across ecosystems but the patterns are shared. B. CYCLES OF MATTER AND ENERGY TRANSFER IN ECOSYSTEMS: The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. Food webs model how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem. C. ECOSYSTEM DYNAMICS, FUNCTIONING, AND RESILIENCE: Ecosystems characteristics vary over time. Disruptions to any part of an ecosystem can lead to	EE.MS-LS2-2: Use models of food chains/webs to identify producers and consumers in aquatic and terrestrial ecosystems.						

shifts in all of its populations. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. D. SOCIAL INTERACTIONS AND GROUP BEHAVIOR: Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on - for example, water purification and recycling.							
Standard SCI.LS3- HEREDITY A. INHERITANCE OF TRAITS: Genes chiefly regulate a specific protein, which affect an individual's traits. B. VARIATION OF TRAITS: In sexual reproduction, each parent contributes half of the genes acquired by the offspring resulting in variation between parent and offspring resulting in variation between parent and offspring. Genetic information can be altered because of mutations, which may result in beneficial, negative, or no change to proteins in or traits of an organism.	EE.MS-LS3-2: Make a claim supported by evidence that offspring inherit traits from their parents						
Standard SCI.LS4- BIOLOGICAL EVOLUTION A. EVIDENCE OF COMMON ANCESTRY AND DIVERSITY: The fossil record documents the existence, diversity, extinction, and change of many life forms and their environments through Earth's history. The fossil record and comparisons of anatomical similarities between organisms enables the inference of lines of evolutionary descent. B. NATURAL SELECTION: Both natural and artificial selection result from certain traits giving some individuals an advantage in surviving and reproducing, leading to predominance of certain traits in a population. C. ADAPTATION: Species can change over time in response to changes in environmental conditions through adaptation by natural selection action over generations. Traits that support successful survival and reproduction in the new environment become more common. D. BIODIVERSITY AND HUMANS: Changes in biodiversity can influence humans' resources and ecosystem services they rely on.							
Physical Science	***Essential Elements***						
Standard SCI.PS1- MATTER AND ITS INTERACTIONS A. STRUCTURE AND FUNCTION: The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter. B. CHEMICAL REACTIONS: Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy.	EE.MS-PS1-2: Interpret and analyze data on the properties (e.g., color, texture, odor, and state of matter) of substances before and after chemical changes have occurred (e.g., burning sugar or burning steel wool, rust, effervescent tablets).		x	x			
Standard SCI.PS2- FORCES, INTERACTIONS, MOTION, AND STABILITY A. FORCES AND MOTION: Motion and changes in motion can be qualitatively described using concepts of speed, velocity, and acceleration (including speeding up, slowing down, and/or changing direction). The role of the mass of an object must be qualitatively accounted for in any change of motion due to the application of a force (Newton's first and second law". For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). B. TYPES OF INTERACTIONS: Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object.	EE.MS-PS2-2: Investigate and predict the change in motion of objects based on the forces acting on those objects.						
Standard SCI.PS3- ENERGY A. DEFINITIONS OF ENERGY: Kinetic energy can be distinguished from the various forms of potential energy. B. CONSERVATION OF ENERGY AND ENERGY TRANSFER: Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship	EE.MS-PS3-3: Test and refine a device (e.g., foam cup, insulated box, or thermos) to either minimize or maximize thermal energy transfer (e.g., keeping liquids hot or cold, preventing liquids from freezing, keeping hands warm in cold temperatures).		x				

between the temperature and the total energy of a system depends on the types, states, and amounts of matter. C. RELATIONSHIPS BETWEEN ENERGY AND FORCES: When two objects interact, each one exerts a force on the other, and these forces can transfer energy D. ENERGY IN CHEMICAL PROCESSES AND EVERYDAY LIFE: Sunlight captured by plants and used in a chemical reaction to produce sugar molecules for storing this energy. This stored energy can be released by respiration or combustion, which can be reversed by burning those molecules to release energy.							
Standard SCI.PS4- WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER **A.** WAVE PROPERTIES: A simple wave model has a repeating pattern with a specific wavelength, frequency, and amplitude, and mechanical waves need a medium through which they are transmitted. This model can explain many phenomena including sound and light. Waves can transmit energy. B. ELECTROMAGNETIC RADIATION: The construct of a wave is used to model how light interacts with objects. C. INFORMATION TECHNOLOGIES AND INSTRUMENTATION: Waves can be used to transmit digital information. Digitized information is comprised of a pattern of 1s and 0s.	EE.MS-PS4-2: Use a model to show how light waves (e.g., light through a water glass, light on colored objects) or sound waves are reflected, absorbed, or transmitted through various materials (e.g., water, air, table).	x	x			x	
Earth and Space Science	***Essential Elements***						
Standard SCI.ESS1- EARTH'S PLACE IN THE UNIVERSE A. THE UNIVERSE AND ITS STARS: The solar system is part of the Milky Way, which is one of many billions of galaxies. B. EARTH AND THE SOLAR SYSTEM: The solar system contains many varied objects held together by gravity. Solar system models explain and predict eclipses, lunar phases, and seasons. C. THE HISTORY OF PLANET EARTH: Rock strata and the fossil record can be used as evidence to organize the relative occurrence of major historical events in Earth's history..	EE.5-ESS1-2: Represent and interpret data on a picture, line, or bar graph to show seasonal patterns in the length of daylight hours. EE.MS-ESS1-1: Use an Earth-Sun-Moon model to show that Earth's orbit around the Sun corresponds to a calendar year and the orbit of the Moon around Earth corresponds to a month.				x		
Standard SCI.ESS2- EARTH'S SYSTEMS A. EARTH MATERIALS AND SYSTEMS: Energy flows and matter cycles within and among Earth's systems, including the sun and Earth's interior as primary energy sources. Plate tectonics is one result of these processes. B. PLATE TECTONICS AND LARGE-SCALE SYSTEM INTERACTIONS: Plate tectonics is the unifying theory that explains movements of rocks at Earth's surface and geological history. Maps are used to display evidence of plate movement. C. THE ROLES OF WATER IN EARTH'S SURFACE PROCESSES: Water cycles among land, ocean, and atmosphere, and is propelled by sunlight and gravity. Density variations of sea water drive interconnected ocean currents. Water movement causes weathering and erosion, changing landscape features. D. WEATHER AND CLIMATE: Complex interactions determine local weather patterns and influence climate, including the role of the ocean. E. BIOGEOLOGY: The fossil record documents the existence, diversity, extinction, and change of many life forms throughout history.	EE.5-ESS2-1: Develop a model showing how water (hydrosphere) affects the living things (biosphere) found in a region. EE.MS-ESS2-1: Use a model to describe the change within the rock cycle between the igneous, metamorphic, and sedimentary rock. EE.MS-ESS2-2: Explain how geoscience processes that occur daily (e.g., wind, rain, runoff) slowly change the surface of Earth, while catastrophic events (e.g., earthquakes, tornadoes, floods) can quickly change the surface of Earth. EE.MS-ESS2-6: Interpret basic weather information (e.g., radar, map) to make predictions about future conditions (e.g., precipitation, temperature, wind).			x	x		
Standard SCI.ESS3- EARTH AND HUMAN ACTIVITY A. NATURAL RESOURCES: Humans depend on Earth's land, oceans, fresh water, atmosphere, and biosphere for different resources, many of which are limited or not renewable. Resources are distributed unevenly around the planet as a result of past geologic process	EE.5-ESS3-1: Use information to describe how people can help protect the Earth's resources and how that affects the environment.					x	

B. NATURAL HAZARDS: Patterns can be seen through mapping the history of natural hazards in a region and understanding related geological forces. C. HUMAN IMPACTS ON EARTH SYSTEMS: Human activities have altered the hydrosphere, atmosphere, and lithosphere which in turn has altered the biosphere. Changes to the biosphere can have different impacts for different living things. Activities and technologies can be engineered to reduce people's impacts on Earth. D. GLOBAL CLIMATE CHANGE: Evidence suggests human activities affect global warming. Decisions to reduce the impact of global warming depend on understanding climate science, engineering capabilities, and social dynamics..	EE.MS-ESS3-1: Interpret, based on evidence, how the geoscience processes (e.g., weathering, erosion) create resources. EE.MS-ESS3-3: Develop a plan to monitor and minimize a human impact on the local environment (e.g., water, land, pollution).						
Engineering and Technical Science	***Essential Elements***						
Standard SCI.ETS1- ENGINEERING, TECHNOLOGY, AND THE APPLICATION OF SCIENCE **A.** DEFINING AND DELIMITING ENGINEERING PROBLEMS: The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. B. DEVELOPING POSSIBLE SOLUTIONS: A solution needs to be tested and then modified on the basis of test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. Models of all kinds are important for testing solutions. C. Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process- That is, some of those characteristics may be incorporated into the new design. The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.			x			x	
Standard SCI.ETS2- ILINKS AMONG ENGINEERING, TECHNOLOGY, SCIENCE, AND SOCIETY **A.** INTERDEPENDENCE OF SCIENCE, ENGINEERING, AND TECHNOLOGY: A solution needs to be tested and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluation solutions with respect to how well they meet the criteria and constraints of a problem. B. INFLUENCE OF ENGINEERING, TECHNOLOGY, AND SCIENCE ON SOCIETY AND THE NATURAL WORLD: All human activity draws on natural resources and has both short- and long-term consequences, positive as well as negative, for the health of people and the natural environment. The uses of technologies are driven by people's needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources,and economic conditions.							
Standard: SCI.ETS3: NATURE OF SCIENCE AND ENGINEERING A. SCIENCE AND ENGINEERING ARE HUMAN ENDEAVORS: Individuals and teams from many nations, cultures, and backgrounds have contributed to advances in science and engineering. Scientists and engineers are persistent, use creativity, reasoning, and skepticism, and remain open to new ideas. B. SCIENCE AND ENGINEERING ARE UNIQUE WAYS OF THINKING WITH DIFFERENT PURPOSES: Science asks questions to understand the natural world and assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. Science carefully considers and evaluates anomalies in data and evidence. Engineering seeks solutions to human problems, including issues that arise due to human interaction with the environment. It uses some of the same practices as science and often applies scientific principles to solutions. Science and engineering have direct impacts on the quality of life for all people. Therefore, scientists and engineers need to pursue their work in an ethical							

manner that requires honesty, fairness, and dedication to public health, safety, and welfare. C. SCIENCE AND ENGINEERING USE MULTIPLE APPROACHES TO CREATE NEW KNOWLEDGE AND SOLVE PROBLEMS: A theory is an explanation of some aspect of the natural world. Scientists develop theories by using multiple approaches. Validity of these theories and explanations is increased through a peer review process that tests and evaluates the evidence supporting scientific claims. Theories are explanations for observable phenomena based on a body of evidence developed over time. A hypothesis is a statement that can be tested to evaluate a theory. Scientific laws describe cause and effect relationships among observable phenomena. Engineers develop solutions using multiple approaches and evaluate their solutions against criteria such as cost, safety, time, and performance. This evaluation often involves tradeoffs between constraints to find the optimal solution.							


GRADE 6
GRADE 7
GRADE 8
6.1 Light & Matter
PS4-2*, LS1-8
6.2 Thermal Energy
PS1-4*, PS3-3, PS3-4, PS3-5, PS4-2*, ETS1-4*
6.3 Weather, Climate & Water Cycling
ESS2-4, ESS2-5, ESS2-6, PS1-4*
6.4 Plate Tectonics & Rock Cycling
ESS1-4, ESS2-1, ESS202, ESS2-3
6.5 Natural Hazards
ESS3-2, PS4-3, ETS1-1*, ETS1-2*
6.6 Cells & Systems
LS1-1, LS1-2*, LS1-3*, LS1-8*
7.1 Chemical Reactions & Matter
PS1-1*, PS1-2*, PS1-5, LS1-8*
7.2 Chemical Reactions & Energy
PS1-6, ETS1-2*, ETS1-3*, ES1-4*
7.3 Metabolic Reactions
LS1-3*, LS1-5*, LS1-7, PS1-1*, PS1-2*
7.4 Matter Cycling & Photosynthesis
LS1-2*, LS1-6, LS2-3, PS1-3
7.5 Ecosystem Dynamics & Biodiversity
ESS3-2, PS4-3, ETS1-1*, ETS1-2*
7.6 Earth's Resources & Human Impact
ESS3-1, ESS3-3*, ESS3-4, ESS 3-5, ETS1-2*
8.1 Contact Forces
PS2-1, PS2-2, PS3-1, ETS1-2*, ETS1-3*, LS1-8*
8.2 Sound Waves
PS4-1, PS4-2*, LS1-8*
8.3 Forces at a Distance
PS2-3, PS2-5, PS3-2
8.4 Earth in Space
ESS1-1, ESS1-2, ESS1-3, PS2-4, PS4-2*
8.5 Genetics
LS1-2*, LS1-4*, LS1-5*, LS3-1, LS3-2, LS4-5
Ready for High School Science
UNIT EMPHASIS
PHYSICAL SCIENCE PEs
EARTH & SPACE SCIENCE PEs
LIFE SCIENCE PEs
* PE builds across multiple units
UNIT CONNECTIONS
PRIOR PEs THE UNIT BUILDS ON
PHYSICAL SCIENCE PEs
EARTH & SPACE SCIENCE PEs
LIFE SCIENCE PEs

UNIT 1: Light and Matter

How does a one-way mirror work? Though most everyone knows that one-way mirrors exist, having students model how they work turns out to be a very effective way to develop their thinking about how visible light travels and how we see images. Initial student models in this 6th grade Light and Matter Science Unit reveal a wide variety of ideas and explanations that motivate the unit investigations that help students figure out what is going on and lead them to a deeper understanding of the world around them.This unit is guided by key ideas about how light travels in straight lines, interacts with different materials, and how our eyes sense and process light entering them.

UNIT 1 DESIRED RESULTS

ESSENTIAL QUESTION: *Students will keep considering...*

➔ Why do we sometimes see different things when looking at the same object?

UNIT PRIORITY STANDARDS: *Students will know and be able to...*

Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
➔ System and System Models	➔ Asking Questions and Defining Problems	➔ PS4.B
➔ Structure and Function	➔ Developing and Using Models	➔ LS1.D
	➔ Constructing Explanations and Designing Solutions	

3 DIMENSIONAL LEARNING TARGETS

➔ MS-PS4-2*: I can develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

➔ MS-LS1-8*: I can gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

*Performance Expectations marked with an asterisk are partially developed in this unit and shared with other units.

UNIT 1 ASSESSMENT EVIDENCE

Performance is evaluated in terms of... Students will show their learning by...

Performance Task Description:

Given an authentic scenario, students will demonstrate understanding of the Unit 3 Dimensional Learning Targets (above). This may include ...

➔ ... construct an explanation to explain the one-way mirror phenomenon.

Success Criteria Rubrics

- Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during & after the unit learning, and feedback.
  - Making Models
  - Obtain, Evaluate, and Communicate Information

Key Feedback & Assessment Strategies:

- *Conferring/Strategy Groups: Use current evidence of standards and learning targets; feedback is scaffolded based on student strengths, needs, and goals.*
- *Assessment of Unit Skills- Examples for Targeted Data Collection*
  - *Driving Question Board to gather background knowledge and activate prior knowledge*
  - *Student evidence notebooks: focus notes, CER argument writing, model & model revisions*
  - *Checks for understanding (exit slips, quickwrites, etc.) aligned to unit guiding questions*
  - *Progress Tracker*
  - *Assess unit vocabulary terms*
  - *Evaluate student investigation tasks*
  - *Assess key unit concepts (Unit summative assessment)*
- *Extensions & AP Readiness may include:*
  - Lesson 6: The refraction Extension Opportunity will allow students to develop a more robust understanding of how light bends (or changes direction) when it encounters different transparent mediums (air, water, glass).
  - Lesson 8: The scattering Extension Opportunity allows students to explain more fully why certain smooth surfaces result in a mirror reflection compared to bumpier surfaces.

UNIT 2: Thermal Energy

What keeps different cups or containers from warming up or cooling down? Through a series of lab investigations and simulations, students find two ways to transfer energy into the drink: (1) the absorption of light and (2) thermal energy from the warmer air around the drink. They are then challenged to design their own drink container that can perform as well as the store-bought container, following a set of design criteria and constraints. In this new context of particle models and energy transfer, students learn more about how absorption of light occurs at the particle level. This unit begins to address changes in state; then changes in state are more fully developed in the next unit, 6.3, on water cycling. In 6.3, students learn that evaporation and condensation occur when energy is added or removed from the substance.

UNIT 2 DESIRED RESULTS

ESSENTIAL QUESTION: *Students will keep considering...*

➔ How can containers keep stuff from warming up or cooling down

UNIT PRIORITY STANDARDS: *Students will know and be able to...*

Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
➔ Systems & System Models	➔ Developing & Using Models	➔ PS1.A
➔ Energy and Matter	➔ Planning & Carrying Out Investigations	➔ PS3.A
➔ Structure and Function	➔ Analyzing & Interpreting Data	➔ PS3.B
➔	➔ Constructing Explanations & Designing Solutions	➔ PS4.B
➔	➔ Engaging in Argument from Evidence	➔ ETS1.A
		➔ ETS1.B

3 DIMENSIONAL LEARNING TARGETS

➔ MS-PS1-4*: I can develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

➔ MS-PS3-3: I can apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer

- ➔ MS-PS3-4: I can plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample
- ➔ MS-PS3-5: I can construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
- ➔ MS-PS4-2*: I can develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
- ➔ MS-ETS1-4: I can develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

*These performance expectations are developed across multiple units.

UNIT 2 ASSESSMENT EVIDENCE

Performance is evaluated in terms of… Students will show their learning by…

Performance Task Description:

Given an authentic scenario, students will demonstrate understanding of the Unit 3 Dimensional Learning Targets (above). This may include …

- ➔ … use the 3 dimensions to make sense of a different phenomenon by completing a structured engineering design challenge. Students will use science ideas and information from the task to support their responses.

Success Criteria Rubrics

- ➔ Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during and after the unit learning, and feedback.
  - ◆ Making Models
  - ◆ Construct Explanations and Design Solutions
  - ◆ Planning and Conducting Investigations
  - ◆ Engage in Argument from Evidence

Key Feedback & Assessment Strategies:

- ➔ *Conferring/Strategy Groups: Use current evidence of standards and learning targets; feedback is scaffolded based on student strengths, needs, and goals.*
- ➔ *Assessment of Unit Skills- Examples for Targeted Data Collection*
  - ◆ *Driving Question Board to gather background knowledge and activate prior knowledge*
  - ◆ *Student evidence notebooks: focus notes, CER argument writing, model and model revisions*
  - ◆ *Checks for understanding (exit slips, quickwrites, etc.) aligned to unit guiding questions*
  - ◆ *Progress Tracker*
  - ◆ *Assess unit vocabulary terms*
  - ◆ *Evaluate student investigation tasks*
  - ◆ *Assess key unit concepts (Unit summative assessment)*
- ➔ *Extensions and AP Readiness may include:*
  - ◆ Open the design challenge to other devices in which conduction is the primary means of energy transfer, such as coolers or lunch boxes.
  - ◆ Involve students in setting up the engineering design challenge to name their criteria and constraints and to identify how to test their devices against the criteria and constraints. Students could also interview stakeholders, such as other students, teachers, and family members, to decide what criteria should be most prioritized.

UNIT 3: Weather, Climate, and Water Cycling

In this unit, students explain small-scale storms, mesoscale weather systems, and climate-level patterns of precipitation, such as investigating how ice can fall from the sky on a warm day, how clouds form, why some clouds produce storms with large amounts of precipitation and others don't, and how all that water gets into the air in the first place. The second half of the 6th Grade Science Weather and Climate Unit is anchored in the exploration of a weather report of a winter storm that affected large portions of the midwestern United States. The maps, transcripts, and video that students analyze show them that the storm was forecasted to produce large amounts of snow and ice accumulation in large portions of the northeastern part of the country within the next day. This case sparks questions and ideas for investigations around trying to figure out what could be causing such a large-scale storm and why it would end up affecting a different part of the country a day later.

UNIT 3 DESIRED RESULTS

ESSENTIAL QUESTION: *Students will keep considering...*

- ➔ Why does a lot of hail, rain, or snow fall at some times and not others?

UNIT PRIORITY STANDARDS: *Students will know and be able to...*

Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
➔ Patterns	➔ Developing and Using Models	➔ ESS2.C
➔ Cause and Effect	➔ Planning and Carrying Out Investigations	➔ ESS2.D
➔ Systems and System Models	➔ Analyzing and Interpreting Data	
➔ Matter and Energy		

3 DIMENSIONAL LEARNING TARGETS

- ➔ **MS-PS1-4:** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- ➔ **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-ESS2-5:** Collect data to provide evidence for how the motions and complex interactions of air masses results 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 atmospheric and oceanic circulation that determine regional climates.

UNIT 3 ASSESSMENT EVIDENCE

Performance is evaluated in terms of...   Students will show their learning by...

Performance Task Description:

Given an authentic scenario, students will demonstrate understanding of the Unit 3 Dimensional Learning Targets (above). This may include ...

- ...develop and use a model to describe and explain unobservable mechanisms that drive the cycling of matter and the flow of energy into and through the air to cause some storms to produce large hail while others do not. Students will construct an explanation, using a model and previously developed science ideas, to explain what causes hurricanes to form, grow, and produce (effect) strong winds and large amounts of rain (cycling of matter and flow of energy).
- ...compare and critique two arguments on the same topic and analyze whether they emphasize similar or different mechanisms (cause) in their explanations of the patterns in how the weather changed (effect) during the Jan. 19, 2019 storm.
- ...ask questions about typical patterns and causes related to these in how air masses move across the country and how where a place is located (near the coast or inland, high elevation or low, in the northeast vs. southwest) affects the amount and type of precipitation that the place receives over more than a few years.
- ...apply their understanding to explain phenomena in a new context (climate differences across South America).

Success Criteria Rubrics

Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during and after the unit learning, and feedback.

- Making Models
- Analyze and Interpret Data
- Engage in Argument from Evidence

Key Feedback & Assessment Strategies:

- *Conferring/Strategy Groups: Use current evidence of standards and learning targets, feedback is scaffolded based on student strengths, needs, and goals.*
- *Assessment of Unit Skills- Examples for Targeted Data Collection*
  - *Driving Question Board to gather background knowledge and activate prior knowledge*
  - *Student evidence notebooks: focus notes, CER argument writing, model and model revisions*
  - *Checks for understanding (exit slips, quickwrites, etc.) aligned to unit guiding questions*
  - *Progress Tracker*
  - *Assess unit vocabulary terms*
  - *Evaluate student investigation tasks*
  - *Assess key unit concepts (Unit summative assessment)*
- *Extensions and AP Readiness may include:*
  - Lesson 1: You could replace one of the first two videos of hail with a local example, to establish stronger local relevance. However, keep the third video (timelapse) as it shows changes in the air overhead, which most other videos will not.
  - Lesson 2: You could ask students to start tracking changes in local weather conditions where they live to look for additional patterns over time.
  - Lesson 6: You could ask students to start tracking instances of vertical cloud growth they see in the weather outside.
  - Lesson 11: You could give interested students the opportunity (and some of the materials needed) to build their own homemade barometer and ask them to track changes in air pressure over subsequent days.
  - Lesson 13: If hurricane season impacts your area more than extratropical cyclones tend to, you could extend the unit to investigate how ocean temperatures, currents, and prevailing winds influence the formation of hurricanes and typhoons around the world. If you include a focus on how these systems interact with other air masses, this will provide an alternate pathway to cover mesoscale

	weather phenomena and some climate-level patterns in precipitation, which is the focus of Lessons 14-22. Keep in mind that such a modification to the unit will require a relatively large time investment in pre-development before it is ready to be implemented in the classroom.

UNIT 4: Plate Tectonics and Rock Cycling

Mountains move! And there are ocean fossils on top of Mt. Everest! In this plate tectonics and rock cycling unit, students come to see that the Earth is much more active and alive than they have thought before.

UNIT 4 DESIRED RESULTS

ESSENTIAL QUESTION: *Students will keep considering...*

- ➔ What causes Earth's surface to change?

UNIT PRIORITY STANDARDS: *Students will know and be able to...*

Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
➔ Cause and Effect	➔ Developing & Using Models	➔ ESS1.C
➔ Scale, Proportion, and Quantity	➔ Using Mathematics & Computational Thinking	➔ ESS2.A
➔ Stability and Change	➔ Constructing Explanations and Designing Solutions	➔ ESS2.B
	➔ Engaging in Argument from Evidence	➔ ESS2.C

3 DIMENSIONAL LEARNING TARGETS

- ➔ MS-ESS1-4: I 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.
- ➔ MS-ESS2-1: I can develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
- ➔ MS-ESS2-2: I can construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
- ➔ MS-ESS2-3: I 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.

UNIT 4 ASSESSMENT EVIDENCE

Performance is evaluated in terms of... Students will show their learning by...

Performance Task Description:
Given an authentic scenario, students will demonstrate understanding of the Unit 4 Dimensional Learning Targets (above). This may include ...

- ➔ ...use models they have co-developed of where the continents might have been in the past based on multiple data sets; students explain why the evidence they have from the data sets supports the model they created and where the continents will be in the future.

- ...complete a transfer task where they are presented with fossil fragments of crinoid organisms ended up towards the top of mountains like Mt. Everest. Scientists were able to see and identify these exposed fossils on mountains without having to dig them up. Using what students know about plate tectonics and the processes of weathering and erosion, they develop a model and explain how this fossil can be at the top of Mt. Everest, and how it can be seen at the top of Mt. Everest without having to dig to find it.

Success Criteria Rubrics

- Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during & after the unit learning, and feedback.
  - Making Models
  - Construct Explanations and Design Solutions
  - Analyze and Interpret Data

Key Feedback & Assessment Strategies:

- *Conferring/Strategy Groups: Use current evidence of standards and learning targets; feedback is scaffolded based on student strengths, needs, and goals.*
- *Assessment of Unit Skills- Examples for Targeted Data Collection*
  - *Driving Question Board to gather background knowledge and activate prior knowledge*
  - *Student evidence notebooks: focus notes, CER argument writing, model and model revisions*
  - *Checks for understanding (exit slips, quickwrites, etc.) aligned to unit guiding questions*
  - *Progress Tracker*
  - *Assess unit vocabulary terms*
  - *Evaluate student investigation tasks*
  - *Assess key unit concepts (Unit summative assessment)*
- *Extensions and AP Readiness may include:*
  - Lesson 1: Swap out one of the mountain cards and create one for your local location if there are mountains or interesting landforms that students could analyze to help figure out how Earth's surface changes. Instead of swapping out a mountain card, an extra could also be added for this purpose.
  - Lesson 1: Each of the mountains on the mountain cards come from different parts of the world and have numerous names dependent on the cultures that live in the area. For students who are interested, they could research more about the history of the different names of the mountains and the people who live there. Usually these names identify what the people have experienced from living near a mountain - such as the movement of the mountain, or shaking from earthquakes, etc.
  - Lesson 13: Data about erosion rates for your local area could be added to this lesson along with plate movement if the landforms in your area lend themselves to this analysis.

UNIT 5: Natural Hazards

The first part of the unit focuses on identifying where tsunamis occur, how they form, how they move across the ocean, and what happens as they approach shore. The second part of the unit transitions students to consider combinations of engineering design solutions and technologies to mitigate the effects of tsunamis. Finally, students apply their understanding to consider how to communicate about another natural hazard to stakeholders in a community.

UNIT 5 DESIRED RESULTS

ESSENTIAL QUESTION: *Students will keep considering...*

➔ Where do natural hazards happen and how do we prepare for them?

UNIT PRIORITY STANDARDS: *Students will know and be able to...*

Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
➔ Cause and Effect	➔ Analyzing and Interpreting Data	➔ ESS3.B
➔ System and System Models	➔ Mathematics and Computation Thinking	➔ ETS1.A
➔ Stability and Change	➔ Constructing Explanations and Designing Solutions	➔ ETS1.B
	➔ Engaging in Argument from Evidence	
	➔ Obtaining, Evaluating, and Communicating Information	

3 DIMENSIONAL LEARNING TARGETS

- ➔ MS-ESS3-2: I can analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
- ➔ MS-PS4-3: I can integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.
- ➔ MS-ETS1-1*: I can 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*: I can evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

UNIT 5 ASSESSMENT EVIDENCE

Performance is evaluated in terms of… Students will show their learning by…

Performance Task Description:

Given an authentic scenario, students will demonstrate understanding of the Unit 5 Dimensional Learning Targets (above). This may include …

- … investigate general regional patterns in risk for other natural hazards, as well as the risk of each natural hazard for their local community. Using this data and their wonderings about how other natural hazards impact communities, students make decisions about which natural hazards to investigate further to develop education and communication plans.

Success Criteria Rubrics

- Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during and after the unit learning, and feedback.
  - Analyze and Interpret Data
  - Engage in Argument from Evidence
  - Asking Questions/Defining Problems

Key Feedback & Assessment Strategies:

- *Conferring/Strategy Groups: Use current evidence of standards and learning targets; feedback is scaffolded based on student strengths, needs, and goals.*
- *Assessment of Unit Skills- Examples for Targeted Data Collection*
  - *Driving Question Board to gather background knowledge and activate prior knowledge*
  - *Student evidence notebooks: focus notes, CER argument writing, model and model revisions*
  - *Checks for understanding (exit slips, quickwrites, etc.) aligned to unit guiding questions*
  - *Progress Tracker*
  - *Assess unit vocabulary terms*
  - *Evaluate student investigation tasks*
  - *Assess key unit concepts (Unit summative assessment)*
- *Extensions & AP Readiness may include:*
  - Lesson 3: If the unit is taught after Sound Unit, consider bringing in middle school level DCIs on waves (MS-PS4.A) and model the wavelength, amplitude, and frequency of tsunamis based on stronger or weaker precipitating events (e.g., earthquakes).
  - Lesson 5: Have students jigsaw the different design solutions and research more about them and how they are used in Japan.
  - Lesson 8: If students have done substantial work with middle school wave properties (PS4.A), then this lesson is an opportunity to apply more sophisticated ideas about waves to better understand 'wave pulses' in PS4.C.
  - Lesson 10: Have students present their projects to community members for feedback and revision prior to releasing the final product to the community.
  - All lessons: Remove scaffolds provided with Science and Engineering Practices as a way to give students more independent work with the elements of these practices.

UNIT 6: Cells and Systems

Students investigate what the different parts of our body are made of, from the macro scale to the micro scale. Once students have figured out what their bodies are made of and how the parts of their body work together to be able to move, they wonder how the parts of our body heal. Students investigate what happens when cells make more cells, what cells need to make more cells, and how cells get what they need to make more cells. They apply what they have figured out about the interactions between the different systems in the body to explain the various events of healing that took place for the injury at the start of the unit. Finally, they apply their model for healing to explain growth at growth plates in children's bodies as they become adults.

UNIT 6 DESIRED RESULTS

ESSENTIAL QUESTION: *Students will keep considering...*

➔ *How do living things heal?*

UNIT PRIORITY STANDARDS: *Students will know and be able to...*

Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
➔ Scale, Proportion, and Quantity	➔ Developing and Using Models	➔ LS1.A
➔ Systems and System Models	➔ Planning and Carrying Out Investigations	➔ LS1.D
➔ Structure and Function	➔ Analyzing and Interpreting Data	➔
➔	➔ Engaging in Argumentation	➔

3 DIMENSIONAL LEARNING TARGETS

➔ MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
➔ MS-LS1-2.* I can develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
➔ MS-LS1-3.* I can use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
➔ MS-LS1-8.* I can gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. (This is developed throughout 6th, 7th, and 8th grade.)

*LTs marked with an asterisk are partially developed in this unit and shared with other units

UNIT 6 ASSESSMENT EVIDENCE

Performance is evaluated in terms of... Students will show their learning by...

Performance Task Description:
Given an authentic scenario, students will demonstrate understanding of the Unit 6 Dimensional Learning Targets (above). This may include …

- …use the different events from the Healing Timeline as pieces of evidence that different parts of the student's body had healed. In their explanation they include the interactions between the systems that need to occur for that part to heal.

Success Criteria Rubrics

- Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during and after the unit learning, and feedback.
    - Planning and Conducting Investigations
    - Making Models
    - Engage in Argument from Evidence
    - Obtain, Evaluate, and Communicate Information

Key Feedback & Assessment Strategies:

- *Conferring/Strategy Groups: Use current evidence of standards and learning targets; feedback is scaffolded based on student strengths, needs, and goals.*
- *Assessment of Unit Skills- Examples for Targeted Data Collection*
    - *Driving Question Board to gather background knowledge and activate prior knowledge*
    - *Student evidence notebooks: focus notes, CER argument writing, model and model revisions*
    - *Checks for understanding (exit slips, quickwrites, etc.) aligned to unit guiding questions*
    - *Progress Tracker*
    - *Assess unit vocabulary terms*
    - *Evaluate student investigation tasks*
    - *Assess key unit concepts (Unit summative assessment)*
- *Extensions and AP Readiness may include:*
    - Lesson 2: If you wish, you could conduct the dissection as a demonstration investigation with your students instead of watching the video of the dissection. This would allow students to make closer observations and ask questions about the structures of the chicken wing that might be able to be answered through closer investigations of the parts of the chicken wing.
    - Lesson 5: Instead of sharing microscopic images of nerves with students, if you have slides of nerve smear available, you could allow students to use the microscopes and look at them with a partner to make observations.
    - Lesson 7: The first part of the assessment asks students to plan for an investigation that would help them figure out whether other things in their world are made of cells. Due to the open-ended nature of this question, in the second part of the assessment students analyze microscopic images of six different objects to look for evidence of whether they are made of cells or not. If you have the materials and time, you could allow students to carry out the investigation they plan for in part 1 of the assessment.

Capstone Unit: Science & Engineering Challenge
In this mini capstone unit, students have the opportunity to transfer their 3 dimensional learning from the year to a Science & Engineering Challenge. The challenge may be determined as a grade level, class, or individual, and includes an authentic audience component. Examples may include but are not limited to: Science Fair, Rube Goldberg, a hands-on career connected problem/project, etc.

Capstone Unit: Science & Engineering Challenge
In this mini capstone unit, students have the opportunity to transfer their 3 dimensional learning from the year to a Science & Engineering Challenge. The challenge may be determined as a grade level, class, or individual, and includes an authentic audience component. Examples may include but are not limited to: Science Fair, Rube Goldberg, a hands-on career connected problem/project, etc.

Capstone DESIRED RESULTS		
ESSENTIAL QUESTION: *Students will keep considering...* ➔ *How do Science cutting concepts and Science & Engineering Practices help explain everyday phenomena about Science Disciplinary Core Ideas ?*		
UNIT PRIORITY STANDARDS: *Students will know and be able to...*		
Cross Cutting Concepts	*Science & Engineering Practices (SEP)*	*Disciplinary Core Idea (DCI)*
➔ All	➔ All	➔ Dependent on challenge
Capstone ASSESSMENT EVIDENCE *Performance is evaluated in terms of... Students will show their learning by...*		
Performance Task Description: ➔ Students will demonstrate their 3 Dimensional learning in multiple ways to an authentic audience which may include creation of design or solution, an oral presentation or defense, portfolio, real world performance task, etc.		

Success Criteria Rubrics

- ➔ Standards-aligned rubrics are used for communicating the success criteria, goal setting, reflecting during & after the unit learning, and feedback.

Key Feedback & Assessment Strategies:

- ➔ *Conferring/Strategy Groups: Use current evidence of standards & learning targets, feedback is scaffolded based on student strengths, needs, and goals.*
- ➔ *Reflection on Science & Engineering Practices, Crosscutting Concepts, Disciplinary Core Ideas, teamwork/collaboration skills, process, and product management skills.*