High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.

Learning Goal	Proficiency Scale
Students will understand how patterns of forms and events guide organization and classification.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • using patterns of time, rates of change and cycles to form opinions or ideas about the natural or designed world. • classifying information based on observed patterns. • organizing data to reveal patterns and uncovers a solution to a natural or designed problem. • using patterns to identify cause and effect relationships. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: evidence, qualitative, quantitative, bias, cause and effect. • performing processes such as: o identifying patterns related to time, including simple rates of change and cycles. o developing graphic representations to communicate patterns. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Rock Cycle

- identifying relevant and meaningful data to influence a conclusion.?
- identifying bias in interpretations of data.?

Learning Targets - History of the Earth

- MS-ESS2-3. Identifying patterns in data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: rock strata, relative, geologic, time scale, fossils, evolution, extinction, volcano, internal, external, sedimentary, igneous, weathering, erosion, volcano, earthquake, fault, expansion, contraction, decomposition, flood, mudslide, plate, tectonics.

Learning Targets - Matter and Energy in Organisms and Ecosystems

- MS-LS2-1. Analyzing and interpreting data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: photosynthesis, reactants, products, chemical reaction, chloroplast, chlorophyll, molecule, respiration, ecosystem, resource, population, influence, physical, biological, food web, law of conservation of matter, producer, consumer, decomposer, ecosystem, predator, prey, scavenger, recycle, food chain.

Learning Targets - Natural Selection and Adaptation

- MS-LS4-1. Identifying patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
- MS-LS4-2. Identifying patterns found in anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
- MS-LS4-3. Identifying patterns found in similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: fossil, diversity, extinction, anatomy, chronological, layer, era, fossil data, natural selection, adaptation, genetic, trait, survival, reproduction, chromosome, DNA, probability, sexual, asexual, proportional reasoning.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.

Learning Goal	Proficiency Scale
Students will be able to investigate and explain causal relationships.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • demonstrating that events that occur together with regularity might or might not signify a cause and effect relationship. • designing mechanisms in order to test the outcomes. • explaining effects that are seen as a result of causes that are unseen. • proving how effects, resulting from factors, are beneficial or detrimental to a system or organism. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: factor, organism, outcome. • performing processes such as: o identifying and testing causal relationships. o using relationships to explain change. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Earth's Resources

- MS-ESS3-1. Determining how past and current geoscience processes (cause) have influenced the uneven distributions of

Earth's mineral, energy, and groundwater resources (effect).

Learning Targets - Engineering Design

- MS-ETS1-1. Defining 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.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: deforestation, overpopulation, water and air pollution, global warming, restoration of natural environments, river bank/coastal stabilization, recycling, channelization, reintroduction of species, depletion of resources, technology, mitigate, catastrophic, solution, monitoring, design, impact, aquifer, levee, development, wetland, pollution, population, per capita, consumption, resources, society

Learning Targets - Growth, Development, and Reproduction of Organisms

- MS-LS1-4. Identifying patterns in animal behaviors and specialized plant structures that affect the probability of successful reproduction of animals and plants respectively.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: characteristics, behaviors, asexual, sexual, hereditary, Punnett square, genetic modification, chromosome, gene, gene therapy, predators, prey, trait, genetic modification, chromosome, gene, gene therapy, trait, sexual, asexual, agar, code, biotic, abiotic, composition, organism, competition, genotype, phenotype

Learning Targets - Human Impact

- MS-ESS3-4. Determining how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: volcano, earthquake, interior, exterior, mass wasting, tsunami, hurricane, typhoon, tornado, flood, magnitude, hazard, technology, mitigate, catastrophic, solution, monitoring, design, impact, aquifer, levee, development, wetland, pollution, population, per capita, consumption, resources, society, deforestation, overpopulation, water and air pollution, global warming, restoration of natural environments, river bank/coastal stabilization, recycling, channelization, reintroduction of species, depletion of resources, technology, mitigate, catastrophic, solution, monitoring, design, impact, aquifer, levee, development, wetland, pollution, population, per capita, consumption, resources, society

Learning Targets - Interdependent Relationships in Ecosystems

- MS-LS2-2. Using patterns to predict interactions among organisms across multiple ecosystems.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: ecosystem, biotic, abiotic, producer, consumer, decomposer, community, population, species, niche, habitat, photosynthesis, organism, competitive, predator, prey, symbiotic, mutually beneficial, purification, recycling, nutrient, erosion, deforestation, overpopulation, pollution, global warming, climate change, channelization, depletion, endangered, invasive species, habitat, biodiversity.

Learning Targets - Matter and Energy in Organisms and Ecosystems

- MS-LS2-1. Providing evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: photosynthesis, reactants, products, chemical reaction, chloroplast, chlorophyll, molecule, respiration, ecosystem, resource, population, influence, physical, biological, food web, law of conservation of matter, producer, consumer, decomposer, ecosystem, predator, prey, scavenger, recycle, food chain.

Learning Targets - Natural Selection and Adaptation

- MS-LS4-4. Describing how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
- MS-LS4-6. Explaining how natural selection may lead to increases and decreases of specific traits in populations over time.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: fossil, diversity, extinction, anatomy, chronological, layer, era, fossil data, natural selection, adaptation, genetic, trait, survival, reproduction, chromosome, DNA, probability, sexual, asexual, proportional reasoning.

Learning Targets - Earth's Systems

- MS-ESS3-1. Determining how past and current geoscience processes (cause) have influenced the uneven distributions of Earth's mineral, energy, and groundwater resources (effect).
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: melting, crystallization, weathering, deformation, sedimentation, minerals, metamorphic, igneous, hydrosphere, geosphere, atmosphere, evaporation, condensation, precipitation, surface run-off, groundwater flow, convection, conduction, radiation, water cycle, rock cycle, gravity, renewable, nonrenewable, geothermal, hydroelectric, fossil fuel, petroleum, sediment, ore, subduction zone, hydrothermal, resources.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

Learning Goal	Proficiency Scale	
Students will understand how changes in scale, proportion, or quantity affect a system's structure and/or performance	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • recognizing what is relevant to a phenomena at different measures of size, time, and energy • understanding the scale of systems too large or too small to be seen. • comparing models to a natural or designed system in terms of scale, proportion, or quantity. • creating a visual representation of data to communicate scale, proportion and/or quantity. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: proportion. • performing processes such as: o recognizing natural objects and observable phenomena exist from the very small to the immensely large. o using standard units to measure and describe physical quantities such as, but not limited to, weight, time, temperature, and volume. o creating a visual representation of data to communicate scale, proportion and/or quantity. o recognizing numerical values of powers of 10. 1: Student demonstrates limited understanding or skill with the learning goal.	

Learning Targets - History of the Earth

- MS-ESS1-4. Explain, using evidence from rock strata, how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
- MS-ESS2-2. Describing how geoscience processes have changed Earth's surface at varying time and spatial scales.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: rock strata, relative, geologic, time scale, fossils, evolution, extinction, volcano, internal, external, sedimentary, igneous, weathering, erosion, volcano, earthquake, fault, expansion, contraction, decomposition, flood, mudslide, plate, tectonics

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Systems and system models. Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.

Learning Goal	Proficiency Scale

Students will be able to define systems they are studying.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal.
	
	3: Student demonstrates mastery with the learning goal as evidenced by:
	• proving a system's boundaries, conditions, inputs and outputs.
	• identifying patterns of the inputs and outputs of a system.
	• using models to simulate systems.
	• evaluating the strengths and weaknesses of the models.
	
	2: Student demonstrates he/she is nearing proficiency by:
	• recognizing and recalling specific vocabulary, such as: boundaries, conditions, model.
	• performing processes such as:
	  ○ identifying the various functions the parts do within the whole.
	  ○ categorizing parts of a system and how they relate to the whole.
	
	1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Matter and Energy in Organisms and Ecosystems

- MS-LS1-7. Developing a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
- MS-LS2-3. Developing a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: photosynthesis, reactants, products, chemical reaction, chloroplast, chlorophyll, molecule, respiration, ecosystem, resource, population, influence, physical, biological, food web, law of conservation of matter, producer, consumer, decomposer, ecosystem, predator, prey, scavenger, recycle, food chain.

Learning Targets - Earth's Systems

- MS-ESS2-1. Developing a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
- MS-ESS2-4. Developing a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: melting, crystallization, weathering, deformation, sedimentation, minerals, metamorphic, igneous, hydrosphere, geosphere, atmosphere, evaporation, condensation, precipitation, surface run-off, groundwater flow, convection, conduction, radiation, water cycle, rock cycle, gravity, renewable, nonrenewable, geothermal, hydroelectric, fossil fuel, petroleum, sediment, ore, subduction zone, hydrothermal, resources.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC *Energy and matter: Flows, cycles, and conservation.* Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

Learning Goal	Proficiency Scale
Students will understand how changes in energy and matter help them define a system's limitations and possibilities.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • applying the law of conservation of matter as it is displayed in a natural or designed system. • illustrating the transfer and cycling of matter and energy in a system. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: illustrate. • performing processes such as: o recognizing energy can be transferred in various ways and between objects. o observing and illustrating energy and matter flows and cycles in systems. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Matter and Energy in Organisms and Ecosystems

- MS-LS1-6. Interpreting the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
- MS-LS1-7. Showing how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
- MS-LS2-3. Describing the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: photosynthesis, reactants, products, chemical reaction, chloroplast, chlorophyll, molecule, respiration, ecosystem, resource, population, influence, physical, biological, food web, law of conservation of matter, producer, consumer, decomposer, ecosystem, predator, prey, scavenger, recycle, food chain

Learning Targets - Earth's Systems

- MS-ESS2-1. Describing the cycling of Earth's materials and the flow of energy that drives this process.
- MS-ESS2-4. Describing the cycling of water through Earth's systems highlighting the energy from the sun and the force of gravity.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: melting, crystallization, weathering, deformation, sedimentation, minerals, metamorphic, igneous, hydrosphere, geosphere, atmosphere, evaporation, condensation, precipitation, surface run-off, groundwater flow, convection, conduction, radiation, water cycle, rock cycle, gravity, renewable, nonrenewable, geothermal, hydroelectric, fossil fuel, petroleum, sediment, ore, subduction zone, hydrothermal, resources.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)
NGSS CCC *Stability and change*. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Learning Goal	Proficiency Scale
Students will understand conditions of stability and rates of change.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • understanding factors that influence stability and rates of change in a larger system. • identifying examples of systems in dynamic equilibrium. • measuring change (in systems, objects or organisms) in terms of differences over time. • identifying examples of systems that appear stable, but over long periods of time they will eventually, or already have, changed. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: rate, system, equilibrium, dynamic equilibrium. • performing processes such as: o recognizing that change happens over time. o identifying rates of change. o identifying examples of stability and change within a system. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Interdependent Relationships in Ecosystems

- MS-LS2-5. Evaluating ways of maintaining biodiversity and ecosystem services.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: ecosystem, biotic, abiotic, producer, consumer, decomposer, community, population, species, niche, habitat, photosynthesis, organism, competitive, predator, prey, symbiotic, mutually beneficial, purification, recycling, nutrient, erosion, deforestation, overpopulation, pollution, global warming, climate change, channelization, depletion, endangered, invasive species, habitat, biodiversity.

Learning Targets - Matter and Energy in Organisms and Ecosystems

- MS-LS2-4. Predict how changes to physical or biological components of an ecosystem affect populations.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: photosynthesis, reactants, products, chemical reaction, chloroplast, chlorophyll, molecule, respiration, ecosystem, resource, population, influence, physical, biological, food web, law of conservation of matter, producer, consumer, decomposer, ecosystem, predator, prey, scavenger, recycle, food chain.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.

Learning Goal	Proficiency Scale
Students will understand how patterns guide organization and classification.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • making observations using both qualitative and quantitative data. • assessing the validity of the data from the process by which it was collected. • forming conclusions based on evidence and patterns from data. • organizing data in multiple ways to uncover patterns. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: audience, influence, conclusion, relevant, validity. • performing processes such as: o organizing data to best meet the needs of the audience. o Identifying relevant and meaningful data to influence a conclusion. o identifying bias in interpretations of data. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Universe

Universe - Goal 1: Student will analyze and interpret data to compare and contrast objects in the universe.
Universe - Goal 3: Student will develop and use models to describe cyclic patterns of lunar phases.
Universe - Goal 4: Student will develop and use models to describe cyclic patterns of Earth's seasons.
Universe - Goal 5: Student will develop and use models to describe cyclic patterns of eclipses.
Scientific Method - Goal 2: Student will be able to make qualitative and quantitative observations and distinguish between the two.
Scientific Method - Goal 3: Student clearly communicates data using tables and graphs.

Learning Targets - Human Impact

- MS-ESS3-2. Identifying patterns in data on natural hazards to forecast future catastrophic events.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: volcano, earthquake, interior, exterior, mass wasting, tsunami, hurricane, typhoon, tornado, flood, magnitude, hazard, technology, mitigate, catastrophic, solution, monitoring, design, impact, aquifer, levee, development, wetland, pollution, population, per capita, consumption, resources, society, deforestation, overpopulation, water and air pollution, global warming, restoration of natural environments, river bank/coastal stabilization, recycling, channelization, reintroduction of species, depletion of resources, technology, mitigate, catastrophic, solution, monitoring, design, impact, aquifer, levee, development.

Learning Targets - Space Systems

- MS-ESS1-1. Describing the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: eclipse, ellipse, season, axial tilt, rotation, revolution, latitude, equator, lunar, phase, scale, proportionality, crust, atmosphere, orbital radius, telescopes, satellites, solar system, galaxy, universe, gravity, satellites, orbit, ellipse

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.

Learning Goal	Proficiency Scale
Students will be able to investigate and explain causal relationships.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • identifying how various factors contribute to a cause and/or different results. • explaining why events have simple and multifaceted causes. • using relationships to predict phenomena in natural or designed systems. • proving that phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. • classifying relationships as causal or correlational, and recognizing that correlation does not necessarily imply causation. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: probability, correlation, causation, multifaceted. • performing processes such as: o explaining causes and the results of events in familiar contexts. o demonstrating that events that occur together with regularity might or might not signify a cause and effect relationship. o explaining effects that are seen as a result of causes that are unseen. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Universe

- **Universe - Goal 2:** Student will develop and use models to describe the role of gravity.
- **Universe - Goal 3:** Student will develop and use models to describe cyclic patterns of lunar phases.
- **Universe - Goal 4:** Student will develop and use models to describe cyclic patterns of Earth's seasons.
- **Universe - Goal 5:** Student will develop and use models to describe cyclic patterns of eclipses.

Learning Targets - Engineering Design

- MS-ETS1-1. Defining 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.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: science, engineering, technology, research, climate, natural resource, economics, renewable, non-renewable.

Learning Targets - Growth Development and Reproduction of Organisms

- MS-LS3-2. Describing why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
- MS-LS1-5. Explaining how environmental and genetic factors influence the growth of organisms.
- MS-LS4-5. Interpreting the way humans influence (or have influenced) the inheritance of desired traits in organisms.
- **Growth, Development, & Reproduction - Goal 2:** Student describes how environmental and genetic factors affect growth and development of organisms.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: characteristics, behaviors, asexual, sexual, hereditary, Punnett square, chromosome, gene, predators, prey, trait, genetic modification, chromosome, gene, gene therapy, trait, sexual, asexual.

Learning Targets - Human Impact

- MS-ESS3-3. Determining how human activities impact the environment.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: volcano, earthquake, interior, exterior, mass wasting, tsunami, hurricane, typhoon, tornado, flood, magnitude, hazard, technology, mitigate, catastrophic, solution, monitoring, design, impact, aquifer, levee, development, wetland, pollution, population, per capita, consumption, resources, society, deforestation, overpopulation, water and air pollution, global warming,

restoration of natural environments, river bank/coastal stabilization, recycling, channelization, reintroduction of species, depletion of resources, technology, mitigate, catastrophic, solution, monitoring, design, impact, aquifer, levee, development.

Learning Targets - Structure, Function, and Information Processing

- MS-LS1-8. Explaining how sensory receptors cause a response to stimuli and how they are stored.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: brain, sensory, input, stimuli, response, nerve, receptor, memory, cell, organelle, multicellular, unicellular, nucleus, chloroplasts, mitochondria, cell membrane, cell wall, tissue, organs, cytoplasm, system, organism, biology, biomedical, nanotechnology, centrifuge, botany, veterinarian, circulatory, excretory, digestive, respiratory, muscular.
- **Structure, Function, & Information Processing - Goal 3:** Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. [Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.]

Learning Targets -Weather and Climate

- MS-ESS2-5. Demonstrating that the motions and complex interactions of air masses results in changes in weather conditions.
- MS-ESS2-5. Collecting data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
- **Weather - MS-ESS2-5. Goal 1:** Student can analyze data, including maps, and construct and use models to develop understanding of the factors that control weather.
- **Weather - MS-ESS2-6. Goal 2:** Student can analyze data, including maps, and construct and use models to develop understanding of the factors that control climate.
- **Weather - Goal 3:** Student can analyze evidence, including tables, graphs, maps to develop understanding of the natural factors and human activities that influence change in global temperature.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: weather, temperature, pressure, humidity, precipitation, wind, latitude, altitude, geographic land distribution, atmospheric circulation, oceanic circulation, climate, global temperature, natural factors, human activities

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

Learning Goal	Proficiency Scale
Students will understand how changes in scale, proportion, or quantity affect a system's structure and/or performance	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • Relate objects or organisms using ratios and/or scales. • determining ratio or scale from data. • comparing quantities of objects or organisms using data. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: ratio, magnitude, equation, model. • performing processes such as: o using estimation to make determinations of scale, proportion and quantity. o comparing a scale model to a natural or designed system. o creating a visual representation of data to communicate scale, proportion and/or quantity. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Energy

- MS-PS3-4. Describing 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.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: kinetic energy, speed, velocity, mass, force, conservation of energy, potential energy, thermal energy, heat, temperature, conductor, insulator, calorie, joule.

Learning Targets - Structure, Function, and Information Processing

- MS-LS1-1. Providing evidence that living things are made of cells, either one cell or many different numbers and types of cells.
- **Structure, Function and Information Processing - Goal 1:** Student will understand that living organisms are systems of interacting subsystems composed, on the most basic level, of cells.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: brain, sensory, input, stimuli, response, nerve, receptor, memory, cell, organelle, multicellular, unicellular, nucleus, chloroplasts, mitochondria, cell membrane, cell wall, tissue, organs, cytoplasm, system, organism, biology, biomedical, nanotechnology, centrifuge, botany, veterinarian, circulatory, excretory, digestive, respiratory, muscular.

Learning Targets - Space Systems

- MS-ESS1-3. Determining scale properties of objects in the solar system.
- MS-ESS1-3. Analyzing and interpreting data to determine scale properties of objects in the solar system.
- **Universe - MS-LS1-1. Goal 1:** Student will analyze and interpret data to compare and contrast objects in the universe.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: eclipse, ellipse, season, axial tilt, rotation, revolution, latitude, equator, lunar, phase, scale, proportionality, crust, atmosphere, orbital radius, telescopes, satellites, solar system, galaxy, universe, gravity, satellites, orbit, ellipse

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Systems and system models. Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.

Learning Goal	Proficiency Scale
Students will be able to relate parts of a system to the whole.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • use models and simulations to illustrate a system. • critiquing how systems interact with other systems • provinging how systems may have sub-systems and may be a part of larger complex systems. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: component, interaction, simulation, complex. • performing processes such as: ○ making observations of a system created to do a task. ○ identifying patterns of the inputs and outputs of a system. ○ analyzing models used to represent systems and their interactions—such as inputs, processes and outputs—and energy and matter flows within systems. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Engineering Design

- MS-ETS1-1. Defining 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.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: science, engineering, technology, research, climate, natural resource, economics, renewable, non-renewable.

Learning Targets - Forces and Interactions

- MS-PS2-4. Developing or using a system to demonstrate gravitational interactions on interacting objects.

Learning Targets - Structure, Function, and Information Processing

- MS-LS1-3. Proving the body is a system of interacting subsystems composed of groups of cells.
- MS-LS1-2. Developing and using a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
- **Growth, Development, & Reproduction - Goal 1:** Student describes factors that impact reproduction.
- **Growth, Development, & Reproduction - Goal 2:** Student describes how environmental and genetic factors affect growth and development of organisms.
- **Structure, Function and Information Processing - MS-LS1-1. Goal 1:** Student will understand that living organisms are systems of interacting subsystems composed, on the most basic level, of cells.
- **Structure, Function, & Information Processing - Goal 3:** Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. [Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.]
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: brain, sensory, input, stimuli, response, nerve, receptor, memory, cell, organelle, multicellular, unicellular, nucleus, chloroplasts, mitochondria, cell membrane, cell wall, tissue, organs, cytoplasm, system, organism, biology, biomedical, nanotechnology, centrifuge, botany, veterinarian, circulatory, excretory, digestive, respiratory, muscular.

Learning Targets - Space Systems

- MS-ESS1-1. Developing and using a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

- MS-ESS1-2. Developing and using a model to describe the role of gravity in the motions within galaxies and the solar system.
- **Universe - Goal 2:** Student will develop and use models to describe the role of gravity.
- **Universe - Goal 3:** Student will develop and use models to describe cyclic patterns of lunar phases.
- **Universe - Goal 4:** Student will develop and use models to describe cyclic patterns of Earth's seasons.
- **Universe - Goal 5:** Student will develop and use models to describe cyclic patterns of eclipses.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: eclipse, ellipse, season, axial tilt, rotation, revolution, latitude, equator, lunar, phase, scale, proportionality, crust, atmosphere, orbital radius, telescopes, satellites, solar system, galaxy, universe, gravity, satellites, orbit, ellipse

Learning Targets -Weather and Climate

- MS-ESS2-6. Using models to describe atmospheric and oceanic circulation and their impacts.
- **Weather - Goal 1:** Student can analyze data, including maps, and construct and use models to develop understanding of the factors that control weather.
- **Weather - Goal 2:** Student can analyze data, including maps, and construct and use models to develop understanding of the factors that control climate.
- **Weather - Goal 4: 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.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: weather, temperature, pressure, humidity, precipitation, wind, latitude, altitude, geographic land distribution, atmospheric circulation, oceanic circulation, climate, global temperature, natural factors, human activities

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC *Energy and matter: Flows, cycles, and conservation.* Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

Learning Goal	Proficiency Scale
Students will understand how changes in energy and matter help them define a system's limitations and possibilities.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • demonstrating the energy or matter as it flows in a system or process. • comparing different forms of energy or matter in a system. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: potential energy, kinetic energy. • performing processes such as: o applying the law of conservation of matter as it is displayed in a natural or designed system. o illustrating the matter and energy in a system. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Weather and Climate

- **Weather - MS-ESS2-5. Goal 1:** Student can analyze data, including maps, and construct and use models to develop understanding of the factors that control weather.
- **Weather - MS-ESS2-6 Goal 2:** Student can analyze data, including maps, and construct and use models to develop understanding of the factors that control climate.
- **Weather - Goal 4: 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.

Learning Targets - Energy

- MS-PS3-3. Applying scientific principles of thermal energy transfer.
- MS-PS3-5. Proving that when the kinetic energy of an object changes, energy is transferred to or from the object.
- **Energy - Goal 1: MS-PS2-2.** Student describes, demonstrates, or models thermal energy transfer factors.
  Energy - Goal 2: MS-PS3-4. Students will describe, demonstrate, or model energy transfer among materials and is able to explain the relationship between temperature and average kinetic energy of the particles.
- **Energy - Goal 3: MS-PS3-5.** Students are able to provide evidence to support their conclusion regarding energy transfer between objects.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: kinetic energy, speed, velocity, mass, force, conservation of energy, potential energy, thermal energy, heat, temperature, conductor, insulator, calorie, joule.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC *Structure and function*. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

Learning Goal	Proficiency Scale
Students will understand the structures of an object or organism determines its properties and functions.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • analyzing structures and system to determine how they function. • analyzing the function of the structure to the whole object or organism. • critiquing a structure's design and construction in relation to how it serves particular function. • critiquing a living thing's adaptations and how it serves particular functions. • categorizing substructures based on their shapes and the parts that serve functions. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as structure, function, shape, composition, substructure, relationship. • performing processes such as: o making observations about the shape, composition, and relationship among the parts in a system. o investigating the different substructures of different materials. o defining components that make up a system. o identifying the functions of various structures. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Growth Development and Reproduction of Organisms

- MS-LS3-1. Developing and using a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
- MS-LS3-2. Developing and using a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
- **Growth, Development, & Reproduction - Goal 1:** Student describes factors that impact reproduction.
- **Growth, Development, & Reproduction - Goal 2:** Student describes how environmental and genetic factors affect growth and development of organisms.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: characteristics, behaviors, asexual, sexual, hereditary, Punnett square, chromosome, gene, predators, prey, trait, genetic modification, chromosome, gene, gene therapy, trait, sexual, asexual.

Learning Targets - Structure, Function, and Information Processing

- MS-LS1-2. Describing how the function of a cell as a whole and ways parts of cells contribute to the function.
- MS-LS1-1. Conducting an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells.
- ·MS-LS1-8. Gathering and synthesizing information to prove/demonstrate/refute that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
- **Structure, Function and Information Processing - MS-LS1-1. Goal 1:** Student will understand that living organisms are systems of interacting subsystems composed, on the most basic level, of cells.
- **Structure, Function and Information Processing - MS-LS1-2. MS-LS1-3. Goal 2:** Student will develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
- **Structure, Function, & Information Processing - Goal 3:** Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. [Assessment Boundary: Assessment does not include mechanisms for the transmission of this information.]
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: brain, sensory, input, stimuli, response, nerve, receptor, memory, cell, organelle, multicellular, unicellular, nucleus, chloroplasts, mitochondria, cell membrane, cell wall, tissue, organs, cytoplasm, system, organism, biology, biomedical, nanotechnology, centrifuge, botany, veterinarian, circulatory, excretory, digestive, respiratory, muscular.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC *Stability and change*. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Learning Goal	Proficiency Scale
Students will understand conditions of stability and rates of change.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • evaluating factors that contribute to the stability or rate of change. • comparing stability and change relative to time. • proving how cyclic change patterns can be stable. • assessing the role of equilibrium in maintaining stability. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: relative, maintain. • performing processes such as: o identifying factors that influence stability and change. o measuring change (in systems, objects or organisms) in terms of differences over time. o observing that change may occur at different rates. o identifying examples of systems that appear stable, but over long periods of time they will eventually change. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Weather and Climate

- MS-ESS3-5. Assessing and citing evidence factors that have caused the rise in global temperatures over the past century.
- **Weather - MS-ESS3-5. MS-ESS3-2. MS-ESS3-3. Goal 3:** Student can analyze evidence, including tables, graphs, maps to develop understanding of the natural factors and human activities that influence change in global temperature.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: weather, temperature, pressure, humidity, precipitation, wind, latitude, altitude, geographic land distribution, atmospheric circulation, oceanic circulation, climate, global temperature, natural factors, human activities.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.

Learning Goal	Proficiency Scale
Students will understand how patterns of forms and events guide organization and classification.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • analyzing micro and macroscopic patterns in rates of change and other numerical relationships. • analyzing graphic representations to identify patterns in data. • differentiating patterns through various types of classification systems. • diagnosing the patterns of failure of a designed system. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: microscopic, macroscopic. • performing processes such as: o making observations using both qualitative and quantitative data. o assessing the validity of the data from the process by which it was collected. o forming a conclusion based on evidence and patterns from data. o organizing data in multiple ways to uncover patterns. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Waves and Electromagnetic Radiation

- MS-PS4-1. Using mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: wave, amplitude, frequency, wavelength, crest, trough, medium, energy, compression, rarefaction, reflection, absorption, transmission, disturbance, mechanical wave, electromagnetic wave, digital, analog, signal, fiber optic, transmit, pulse, binary.
- **Wave Energy Learning Target 1**- Students will understand the properties of waves.

Learning Targets - Engineering Design

- MS-ETS1-3. Analyzing data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: model, test, modification, fair test, bias, tool, design, design solution, engineering, characteristics, solution
- **Foundations Learning Target 3**: Students will use the scientific method to design and evaluate an experiment for any testable question.
- **Foundations Learning Target 1:** Students will use correct tools to measure matter in metric units and label units correctly
- **Chemistry Learning Target 7-** Students will describe heat and how it is transferred
- **Electricity Learning Target 5**- Students will be able to demonstrate advantages and disadvantages of each wired complete circuit.
- **Wave Energy Learning Target 7:** Students will identify and explain types of reflection
- **Wave Energy Learning target 8:** Students will compare refraction of light through different materials

Learning Targets - Energy

- MS-PS3-1. Constructing and interpreting graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: kinetic energy, potential energy, speed, acceleration, gravity, velocity, mass, force, conservation of energy, potential energy, kinetic energy, thermal energy, heat, temperature, conductor, insulator, conservation of energy, calorie, joule

Learning Targets - Chemical Reactions

- Atomic structure
- MS-PS1-2. Analyzing and interpreting data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: chemical reaction, physical change, chemical change, law of conservation of matter, atom, molecule, mass, matter, exothermic, endothermic, temperature, atom, heat, kinetic molecular theory, conductor, insulator, law of conservation of energy, exothermic, endothermic, temperature
- **Chemistry Learning Target 6** - Student is able to classify chemical reactions and provide evidence of the law of conservation of mass.
- **Chemistry Learning target 5** - Student is able to recognize and classify changes in matter as chemical or physical.
- **Chemistry Learning Target 1:** Student is able to use the periodic table to identify and determine properties of Elements, Compounds, and Molecules.

Learning Targets - Forces and Interactions

- MS-PS2-2. Planning an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- MS-PS2-5. Conducting an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: electric, magnetic, force, field, balanced, unbalanced, gravity, static, interaction, Newton, inertia, speed, acceleration, interaction, independent variable, dependent variable, control, tools.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.

Learning Goal	Proficiency Scale
Students will be able to investigate and explain causal relationships.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • classifying correlational and causal relationships. • explaining that correlation does not necessarily imply causation. • applying cause and effect relationships to predict phenomena in natural or designed systems. • communicating that phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: predict. • performing processes such as: o identifying how various factors contribute to a cause and/or different results. o explaining why some events have simple and other events have multifaceted causes. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Structure and Properties of matter

- MS-PS1-4. Predicting and describing how adding or removing thermal energy changes particle motion, temperature, and state of a pure substance.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: temperature, thermal energy, molecule, heat, equilibrium, conduction, convection, radiation, solid, liquid, gas, kinetic molecular theory, phase change, molecule, atoms, natural resource, synthetic resource, solids, liquids, gases, physical properties, chemical properties, mixture, pure substance, matter.
- **Chemistry Learning Target 3:** Students will use the Kinetic Molecular Theory to illustrate particle arrangement and movement in each state of matter.
- **Chemistry Learning Target 4:** Students will use changes in energy to describe volume changes within various states of matter.

Learning Targets - Forces and Interactions

- MS-PS2-3. Determining the factors that affect the strength of electric and magnetic forces.
- MS-PS2-5. Proving that fields exist between objects exerting forces on each other even though the objects are not in contact.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: electric, magnetic, force, field, balanced, unbalanced, gravity, static, interaction, Newton, inertia, speed, acceleration, interaction, independent variable, dependent variable, control, tools.

Learning Targets - Energy

- MS-PS3-5. Constructing, using, and presenting arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: kinetic energy, potential energy, speed, acceleration, gravity, velocity, mass, force, conservation of energy, potential energy, conservation of energy, thermal energy, heat, temperature, conductor, insulator, conservation of energy, calorie, joule

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

Learning Goal	Proficiency Scale
Students will understand how changes in scale, proportion, or quantity affect a system's structure and/or performance	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • comparing models of time, space, or energy. • explaining how examples observed at one scale may not be observable at another scale, and the function of natural and designed systems may change with scale. • using proportional relationships (e.g., speed as the ratio of distance traveled to time taken) to gather information about the magnitude of properties and processes. • representing scientific relationships through the use of algebraic expressions and equations. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: observable, relationship, ratio, magnitude, algebraic, expression. • performing processes such as: o using ratios or scales to relate objects or organisms. o determining ratio or scale from data. o comparing quantities of objects or organisms using data. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Structure and Properties of Matter

- MS-PS1-1. Developing models to describe the atomic composition of simple molecules and extended structures.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: temperature, thermal energy, molecule, heat, equilibrium, conduction, convection, radiation, solid, liquid, gas, kinetic molecular theory, phase change, molecule, atoms, natural resource, synthetic resource, solids, liquids, gases, physical properties, chemical properties, mixture, pure substance, matter.

Learning Targets - Energy

- MS-PS3-1. Describing the relationships of kinetic energy to the mass of an object and to the speed of an object.
- MS-PS3-4. Describing 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.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: kinetic energy, potential energy, speed, acceleration, gravity, velocity, mass, force, conservation of energy, potential energy, kinetic energy, thermal energy, heat, temperature, conductor, insulator, conservation of energy, calorie, joule

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC Systems and system models. Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.

Learning Goal	Proficiency Scale
Students will be able to define systems they are studying.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • investigating or analyzing a system by defining its boundaries and initial conditions, as well as its inputs and outputs. • using models (e.g., physical, mathematical, computer models) to simulate the flow of energy, matter, and interactions within and between systems at different scales. • using models or simulations to predict the behavior of a system • recognizing that predictions have limited precision and reliability due to the assumptions and approximations inherent in the models. • designing systems to do specific tasks. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: scale, behavior, prediction, precision, reliability, assumption, approximation, inherent, tasks. • performing processes such as: ○ use models and simulations to illustrate a system. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Forces and Interactions

- MS-PS2-1. Developing or using a system to apply Newton's Third Law involving the motion of two colliding objects.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: electric, magnetic, force, field, balanced, unbalanced, gravity, static, interaction, Newton, inertia, speed, acceleration, interaction, independent variable, dependent variable, control, tools

Learning Targets - Energy

- MS-PS3-2. Using a system or system model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: kinetic energy, potential energy, speed, acceleration, gravity, velocity, mass, force, conservation of energy, potential energy, conservation of energy, thermal energy, heat, temperature, conductor, insulator, conservation of energy, calorie, joule

Learning Targets - Engineering Design

- MS-ETS1-4. Developing 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.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: model, test, modification, fair test, bias, tool, design, design solution, engineering, characteristics, solution
- Foundations Learning Target 3: Students will use the scientific method to design and evaluate an experiment for any testable question.
- Foundations Learning Target 1: Students will use correct tools to measure matter in metric units and label units correctly
- Chemistry Learning Target 7- Students will describe heat and how it is transferred
- Electricity Learning Target 5- Students will be able to demonstrate advantages and disadvantages of each wired complete circuit.
- Wave Energy Learning Target 7: Students will identify and explain types of reflection
- Wave Energy Learning target 8: Students will compare refraction of light through different materials

Learning Targets - Chemical Reactions

- MS-PS1-5. Developing and using a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: chemical reaction, physical change, chemical change, law of conservation of matter, atom, molecule, mass, matter, exothermic, endothermic, temperature, atom, heat, kinetic molecular theory, conductor, insulator, law of conservation of energy,

exothermic, endothermic, temperature

- **Chemistry Learning Target 6** - Student is able to classify chemical reactions and provide evidence of the law of conservation of mass.
- **Chemistry Learning target 5** - Student is able to recognize and classify changes in matter as chemical or physical.

Learning Targets - Waves and Electromagnetic Radiation

- MS-PS4-2. Developing and using a model to describe that waves are reflected, absorbed, or transmitted through various materials.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: wave, amplitude, frequency, wavelength, crest, trough, medium, energy, compression, rarefaction, reflection, absorption, transmission, disturbance, mechanical wave, electromagnetic wave, digital, analog, signal, fiber optic, transmit, pulse, binary.
- Wave Energy Learning Target 8- Students will compare refraction of light through different materials
- Wave Energy Learning Target 1- Students will understand the properties of waves.

Learning Targets - Structure and Properties of Matter

- MS-PS1-1. Developing models to describe the atomic composition of simple molecules and extended structures.
- MS-PS1-4. Developing a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: temperature, thermal energy, molecule, heat, equilibrium, conduction, convection, radiation, solid, liquid, gas, kinetic molecular theory, phase change, molecule, atoms, natural resource, synthetic resource, solids, liquids, gases, physical properties, chemical properties, mixture, pure substance, matter.
- **Chemistry Learning Target 1:** Student is able to use the periodic table to identify and determine properties of Elements, Compounds, and Molecules.
- **Chemistry Learning Target 2:** Student is able to use properties to describe matter as either pure substance or mixture.
- **Chemistry Learning Target 3:** Students will use the Kinetic Molecular Theory to illustrate particle arrangement and movement in each state of matter.
- **Chemistry Learning Target 4:** Students will use changes in energy to describe volume changes within various states of matter.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC *Energy and matter: Flows, cycles, and conservation.* Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

Learning Goal	Proficiency Scale
Students will understand how changes in energy and matter help them define a system's limitations and possibilities.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • proving atoms are conserved in physical and chemical processes. • analyzing the transfer of energy, within a natural or designed system, that drives the motion and/or cycling of matter. • classifying forms of energy (e.g. energy in fields, thermal energy, energy of motion). • distinguishing between mass and weight. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: system, atom, physical, chemical. • performing processes such as: o drawing conclusions from evidence about the law of conservation of matter. o demonstrating the energy as it flows into, out of, and within a system. o describing forms of energy (e.g. energy in fields, thermal energy, energy of motion). o defining the energy stored in a system. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Chemical Reactions

- MS-PS1-5. Developing and using a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
- MS-PS1-6. Demonstrating that either thermal energy is released or absorbed by chemical processes.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: chemical reaction, physical change, chemical change, law of conservation of matter, atom, molecule, mass, matter, exothermic, endothermic, temperature, atom, heat, kinetic molecular theory, conductor, insulator, law of conservation of energy, exothermic, endothermic, temperature
- **Chemistry Learning Target 6** - Student is able to classify chemical reactions and provide evidence of the law of conservation of mass.
- **Chemistry Learning target 5** - Student is able to recognize and classify changes in matter as chemical or physical.
- **Chemistry Learning Target 7-** Students will describe heat and how it is transferred

Learning Targets - Energy

- MS-PS3-5. Proving that when the kinetic energy of an object changes, energy is transferred to or from the object.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: kinetic energy, potential energy, speed, acceleration, gravity, velocity, mass, force, conservation of energy, potential energy, conservation of energy, thermal energy, heat, temperature, conductor, insulator, conservation of energy, calorie, joule

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC *Structure and function*. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

Learning Goal	Proficiency Scale
Students will understand that the way in which an object or living thing is shaped determines its properties and functions.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • modeling complex structures and systems to visualize how their function depends on the shape, composition, and relationships among its parts. • understanding complex natural and designed structures and systems to determine how they function. • designing structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. • evaluating the composition of material to improve the function. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as structure, function, shape, composition, substructure, relationship. • performing processes such as: o modeling simple systems. o evaluating how the function depends on the shapes, composition, and relationships among its parts. o analyzing a simple structures and system to determine how they function. o designing structures to serve particular functions. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Waves and Electromagnetic Radiation

- MS-PS4-2. Describe that waves are reflected, absorbed, or transmitted through various materials.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: wave, amplitude, frequency, wavelength, crest, trough, medium, energy, compression, rarefaction, reflection, absorption, transmission, disturbance, mechanical wave, electromagnetic wave, digital, analog, signal, fiber optic, transmit, pulse, binary.

Learning Targets - Structure and Properties of Matter

- MS-PS1-3. Gathering and making sense of information to describe that synthetic materials come from natural resources.
- MS-PS1-3. Proving how synthetic materials have impacted society.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: temperature, thermal energy, molecule, heat, equilibrium, conduction, convection, radiation, solid, liquid, gas, kinetic molecular theory, phase change, molecule, atoms, natural resource, synthetic resource, solids, liquids, gases, physical properties, chemical properties, mixture, pure substance, matter.

Learning Targets - Engineering Design

- MS-ETS1-2. Evaluating competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: model, test, modification, fair test, bias, tool, design, design solution, engineering, characteristics, solution.

Learning Targets - Energy

- MS-PS3-3. Designing, constructing, and testing a device that either minimizes or maximizes thermal energy transfer.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: kinetic energy, potential energy, speed, acceleration, gravity, velocity, mass, force, conservation of energy, potential energy, kinetic energy, thermal energy, heat, temperature, conductor, insulator, conservation of energy, calorie, joule
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Learning Targets - Chemical Reactions

- MS-PS1-6. Undertaking a design project to construct, test, and modify a device that either releases or absorbs thermal

energy by chemical processes.

- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: chemical reaction, physical change, chemical change, law of conservation of matter, atom, molecule, mass, matter, exothermic, endothermic, temperature, atom, heat, kinetic molecular theory, conductor, insulator, law of conservation of energy, exothermic, endothermic, temperature

Learning Targets - Waves and Electromagnetic Radiation

- MS-PS4-3. Integrating 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.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: wave, amplitude, frequency, wavelength, crest, trough, medium, energy, compression, rarefaction, reflection, absorption, transmission, disturbance, mechanical wave, electromagnetic wave, digital, analog, signal, fiber optic, transmit, pulse, binary.

High Priority Standards (CCSS, State, National, TILS, CREDE, etc.)

NGSS

CCC *Stability and change*. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Learning Goal	Proficiency Scale
Students will understand conditions of stability and rates of change.	4: Student demonstrates an in-depth inference, advanced application or innovates with the learning goal. 3: Student demonstrates mastery with the learning goal as evidenced by: • critiquing stability and change in natural or designed systems by considering forces at different scales. • determining cause and effect of changes in one part of a system on another part. • proving how a system in dynamic equilibrium is stable due to a balance of feedback mechanisms. • connecting how the stability might be disturbed by either sudden events or gradual changes that accumulate over time. 2: Student demonstrates he/she is nearing proficiency by: • recognizing and recalling specific vocabulary, such as: feedback mechanism, gradual, balance. • performing processes such as: o developing an argument about how factors influence the stability or change in various systems. o summarizing how forces impact the larger system. o comparing systems in dynamic equilibrium. 1: Student demonstrates limited understanding or skill with the learning goal.

Learning Targets - Forces and Interactions

- MS-PS2-2. Proving an object's motion depends on the sum of the forces on the object and the mass of the object.
- Students will be able to use/know and understand/recognize and recall domain specific vocabulary such as: electric, magnetic, force, field, balanced, unbalanced, gravity, static, interaction, Newton, inertia, speed, acceleration, interaction, independent variable, dependent variable, control, tools.