SWEETWATER COUNTY SCHOOL DISTRICT #1

Science

K-12 Curriculum Map

Draft July 2019

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Sweetwater County School District #1 Vision Statement

As an innovative district, united with our community, we empower and inspire ALL students to academic excellence in pursuit of their interests and passions.

Sweetwater County School District #1 Mission Statement

To provide a quality education for ALL students. The district will accomplish this by:

- making students our first priority
- utilizing community partnerships
- promoting professional excellence
- being committed to excellence in education
- providing a safe, orderly and efficient environment for learning

Science Mission Statement

Students in Sweetwater County School District #1 will explore the interconnected nature of life, physical, earth sciences while analyzing and applying that knowledge and technological solutions to think continually and solve real world problems. Students will build knowledge through content-rich informational text, scientific inquiry and interactive activities. Students will share and clearly express scientific ideas using oral, written and visual communication.

Sweetwater County School District No. 1 Curriculum Terms	
Curriculum Term	**Definition**
Community Curriculum Council (CCC)	advisory council responsible for evaluating current systems and making recommendations regarding curriculum, instruction, and assessment practices
Subject Area Committee (SAC)	team of representatives from a specific subject area who will write the curriculum and common assessments
Curriculum map	what SCSD1 values and guarantees that students will learn
Purpose statement	identifies the purpose of a class
Benchmark	overall outcome for a unit
Learning target	individual skills that lead up to achieving the benchmark
Resource, textbook, program, etc.	resource adopted by the district to help teach the local curriculum
Pacing Guide	identifies when a benchmark will be taught and when it will be assessed
Proficiency Scale	a tool to show learning goals and the progression of learning for students.
Instructional Planning Resources (IPR)	organizational tool for planning lessons based on learning targets rather than days
Formative assessment	informal assessment used to direct instruction
Common Assessment	common assessment given within a benchmark by all teachers who teach the same class

How to Read the Curriculum Map

Purpose Statement *identifies the purpose of a class and what is new or different at this level.*

Purpose Statement:	Students will investigate and analyze plants, animals, and weather. Students will observe the effects made upon the environment by humans, the sun, and plants and animals. Students will use problem solving to design and apply to create a solution to a problem.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmark *overall outcome for a unit*

Benchmarks:

SCI.K.1	Students will observe and describe patterns of weather conditions in order to prepare for and respond to severe weather. Students will determine the effect of sunlight and building a structure that will reduce the warming effect of sunlight.	Standard Reference
SCI.K.1.1	Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.	K- ESS3-2
SCI.K.1.2	Use and share observations of local weather conditions to describe patterns over time.	K-ESS2-1
SCI.K.1.3	Make observations to determine the effect of sunlight on Earth's surface.	K-PS3-1
SCI.K.1.4	Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.	K-ETS1-2
Vocabulary	weather, forecasting, severe, patterns, sunny, cloudy, rainy, snowy, seasons	

Learning Target Code
SCI.K.1.3 = *Subject area (Science)*
SCI.***K***.1.3 = *Grade/course level*
SCI.K.***1***.3 = *Benchmark*
SCI.K.1.***3*** = *Learning target*

Learning Targets *are individual skills that lead up to achieving the benchmark.*

State Standard Reference
K-PS3-1 = *Grade*
K-***PS***35-1 = *Disciplinary Core Idea*
K-PS***3***-1 = *Standard*
K-PS3-***1*** = *Benchmark*

Science Curriculum at a Glance

Grade Level or Course	Purpose Statement
Kindergarten Science	Students will investigate and analyze plants, animals, and weather. Students will observe the effects made upon the environment by humans, the sun, and plants and animals. Students will use problem solving to design and apply to create a solution to a problem.
1st Grade Science	Students will analyze sounds through vibrations and solve problems related to light. Furthermore, they will determine how plants and animals use superpowers to adapt and survive. Lastly, students will investigate the Sun, Earth, and Moon to predict patterns based on observations and data.
2nd Grade Science	Students will investigate and analyze matter by observable properties. Students will conduct an investigation to determine the basic needs of plants, develop a model that explains an animal's role in dispersing seeds and pollination, and compare the diversity of life in different habitats. Students will examine the history of planet Earth to analyze changes made over time.
3rd Grade Science	Students will evaluate how force affects stability and magnetism. They will compare and contrast organisms' life cycles and how adaptations can increase or decrease survival rates. Students will analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variations of these traits exist in groups of similar organisms. They will explain how environmental changes can cause problems for the plants and animals that live there. Students will represent data on tables and graphs to describe typical weather conditions expected during a particular season. They will analyze how weather affects world climates and create a simple design solution to reduce the impact of weather-related hazards.
4th Grade Science	Students will evaluate how organisms receive and process information. They will analyze the transfer of energy and the cause and effect relationships between energy and collisions. They will investigate waves and their properties and how they cause objects to move. Students will apply their knowledge of waves to understand the scale of the rate of weathering or erosion. Students will interpret data from maps to describe patterns of Earth's features. They will determine the impacts of natural hazards and resource use.
5th Grade Science	Students will develop and analyze models representing how matter is used by plants, animals and decomposers in an environment. Furthermore, students will use models to explain interactions between Earth's spheres. Students will use graphical displays to support arguments about how Earth's position in the universe causes phenomena visible on Earth. Students will measure, graph and

	conduct experiments with matter to understand properties of matter and how matter changes in mixtures and solutions. They will apply their understanding of these subjects to develop solutions to Earth's problems and conserve Earth's resources.
6th Grade Science	Students will model connections within different levels of living organisms and Earth's climate systems, using physical science concepts to explain processes within each of these systems.
7th Grade Integrated Science	Students will track the cycling of matter and energy in chemical systems, food webs, the water cycle, and the rock cycle. Students then examine how human activities alter these systems.
8th Grade Integrated Science	Students will use science and engineering practices to plan and conduct investigations involving force, motion, energy, and waves throughout the universe. Students will synthesize evidence to demonstrate how processes change the Earth and living organisms over time. Students will evaluate solutions to address the effects of human population growth on Earth's resources.
Physical Science	Students will use models, evidence, and observations at the macroscopic level to explain matter and energy phenomena at an atomic level.
Biology	Students will explain the characteristics of life, identify and summarize hierarchical relationships and construct an explanation for how cellular organelles support life giving processes. Students will explain and summarize the ecological processes present in a balanced ecosystem, including modeling how energy flows and nutrients cycle. Students will identify the role of DNA in passing on heritable characteristics and analyze evidence in earth's historical record to explain evolution and speciation. Lastly, students will evaluate human impact on these biological processes.
Environmental Science	Students will analyze the fundamental physical and biological principles that govern the natural world. Students will identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them.
Agronomy	Agronomy is the application of soil and plant sciences to land management and crop production that incorporates the wise use of natural resources and conservation practices. Students will learn about connections with the natural world, such as air, water, soil, and plant interactions, which provide them with the knowledge base and technical proficiency needed to be successful with a career in agronomy.

Animal Science	Student will be provided instruction that focuses on the basic scientific principles and processes that are involved in animal physiology, breeding, nutrition, and care in preparation for an animal science career major. Topics include animal diseases, introduction to animal science, animal nutrition, animal science issues, career opportunities, and animal evaluation. English language arts, mathematics, and science are reinforced.
Astronomy	Instruction will be a general survey of Astronomy including, but not limited to, the solar system and its constituents, stars, asteroids, meteors, comets, and their basic properties, systems of stars including clusters, the Milky Way, and other galaxies, the universe, its past, present, and future structure, topics of current interest including pulsars, quasars, and black holes.
Botany	Students will study plant anatomy (parts), plant physiology (function), horticulture (naming and classifying), plant ecology (interactions) and biomes, and the basics of gardening. Many different kinds of activities combine to help the student build knowledge and skills in biological concepts as they relate to plants. Integrated throughout the course may be related topics in other areas such as Chemistry, Geology, and Sociology.
Chemistry	Topics we will explore in the class include, but may not be limited to, structure of atoms, chemical bonding and reactions, and states of matter. Students will examine all of these both qualitatively and quantitatively, at macroscopic and microscopic scales.
Chemistry of Food	This class is an introductory chemistry course for students who are interested in pursuing a career in Culinary Arts. Students will receive instruction in food chemistry, food handling and food preparation from the perspective of safely preparing and handling food.
Entomology	Students will investigate what contributes to the success of insects and learn to appreciate the diversity and importance of insects. Students will study the development of insects and their relatives, external and internal anatomical modifications, physiological processes and the impact they have on human society.
Forensics I	This course will integrate science, mathematics, and writing skills to provide the fundamentals to understand and perform elementary crime scene investigation and evidence collection in common techniques from the study of hair to fingerprinting, blood typing and spattering, and determining meaning, manner, mechanism, cause and time of death and toxicology. Field trips, labs, and real case studies will be used to involve students in hands-on learning. It will involve some biology, chemistry, and physics applications.

Forensics II	Students will analyze crime scenes and evidence found at crimes scenes. Students will investigate the science behind the several evidence types and when the evidence has been or could be used. Anthropology, casts and impressions, tool marks, firearms and ballistics, glass, soil, entomology, death and handwriting analysis will be studied.
Forestry/Natural Resources	Students will investigate the establishing forests and other natural resources by natural and artificial means, maintaining and surveying forests and natural resources, identifying and protecting trees and natural resources, practicing silviculture, measuring trees and land, mapping, preparing for timber and natural resources sales and harvest, employing multiple-use resource management keeping and records.
Genetics	Students will investigate the inheritance patterns of living things. Students will be expected to utilize genetic concepts and apply them to living things.
Geology	Students will investigate the physical processes involved in the formation and shaping of our planet. They will analyze the formation of the Earth and Earth-moon system, the physical changes through geological time, the composition of the Earth, and the geophysical, seismic, and morphological processes with resulting landforms and structures (Topics can focus on or include the geology of Wyoming).
Herpetology	Students will survey the origin, evolution, systematics, taxonomy and diversity of amphibians and non-avian reptiles.
Human Anatomy and Physiology	*Under construction*
Marine Science	Students will investigate coastal and marine systems. Students will learn about the chemical and physical properties of these systems and the interrelationships that surround them.
Meteorology	Students will investigate the dynamic processes at play within the Earth's fluid atmosphere and how these processes produce weather. Students will learn about the origin and evolution of Earth's atmosphere, the structure and characteristics of the atmosphere, the Earth/Sun relationship and its influence on the seasons solar and terrestrial radiation, the hydrologic cycle the gas laws, global circulation, weather systems and weather maps.

Microbiology	Students will investigate microorganisms, viruses, bacteria, fungi, protozoa, and multicellular parasites, and the roles they play in our lives. Included is a study of how some of these organisms cause disease. Students will be expected to utilize the microscope on their own in the study of these organisms. They will also learn how to culture some organisms using sterile techniques.
Pharmacology	Students will develop an understanding of the basic concepts of pharmacology. Students will investigate pharmaceuticals that have an effect on the cardiopulmonary, vascular, central and peripheral nervous system, and antimicrobial drugs on the human body. Student will utilize case studies to evaluate treatments or misuse of drugs. The history of pharmacology as well as herbal medicine will also be addressed.
Phyics	Students will use observational data to calculate everyday phenomenon in both translational and rotational systems.
The Science of Wyoming	In this unique class about the state of Wyoming, students will learn about the diversity of living things in the state, how our national parks show the geological history of the state, the contrasts between the eastern side and western side in terms of weather and why it happens, and the ecosystems represented in the state.
Zoology	Students will survey the nine major phyla of the Animal Kingdom. Zoology is a course that deals with the study of animal life. Zoologists research everything they think to ask about animals including their anatomy, interrelationships, physiology, genetics, distributions and habitats.

Kindergarten Science

Purpose Statement:	Students will investigate and analyze plants, animals, and weather. Students will observe the effects made upon the environment by humans, the sun, and plants and animals. Students will use problem solving to design and apply to create a solution to a problem.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmarks:

SCI.K.1		Students will observe and describe patterns of weather conditions in order to prepare for and respond to severe weather. Students will determine the effect of sunlight and building a structure that will reduce the warming effect of sunlight.	Standard Reference
	SCI.K.1.1	Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.	K- ESS3-2
	SCI.K.1.2	Use and share observations of local weather conditions to describe patterns over time.	K-ESS2-1
	SCI.K.1.3	Make observations to determine the effect of sunlight on Earth's surface.	K-PS3-1
	SCI.K.1.4	Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.	K-ETS1-2
Vocabulary		weather, forecasting, severe, patterns, sunny, cloudy, rainy, snowy, seasons	

SCI.K.2		Students will observe and describe the relationship of animals and what they need to survive. Students will communicate solutions to manage the impact humans have on the environment and cite evidence for how animals adapt.	Standard Reference
	SCI.K.2.1	Use observations to describe patterns of what animals (including humans) need to survive.	K- LS1-1
	SCI.K.2.2	Use a model to represent the relationship between the needs of different animals (including humans) and the places they live.	K-ESS3-1

	SCI.K.2.3	Construct an argument supported by evidence for how animals (including humans) can change the environment to meet their needs.	K-ESS2-2
	SCI.K.2.4	Communicate solutions that will manage the impact of humans on the land, water, air, and/or other living things in the local environment.	K-ESS3-3
Vocabulary		survive, adaptations, environment, change, needs	

SCI.K.3		Students will plan and conduct investigations, analyze data, and observe motion of an object. Students will use tools, materials, simple sketches and drawings and analyze data to solve a given problem.	Standard Reference
	SCI.K.3.1	Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.	K-PS2-1
	SCI.K.3.2	Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.	K-PS2-2
	SCI.K.3.3	Make observations to determine the effect of sunlight on Earth's surface.	K-PS3-1
	SCI.K.3.4	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	K-ETS1-1
	SCI.K.3.5	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	K-ETS1-3
Vocabulary		investigation, plan, conduct, motion, push, pull, solution, data,	

SCI.K.4		Students will observe and describe what plants need to survive. Students will communicate solutions to manage the impact humans have on the environment and cite evidence for how plants adapt.	Standard Reference
	SCI.K.4.1	Use observations to describe patterns of what plants need to survive.	K- LS1-1
	SCI.K.4.2	Use a model to represent the relationship between the needs of different plants and the places they live.	K-ESS3-1

	SCI.K.4.3	Construct an argument supported by evidence for how plants can change the environment to meet their needs.	K-ESS2-2
	SCI.K.4.4	Communicate solutions that will manage the impact of humans on the land, water, air, and/or other living things in the local environment.	K-ESS3-3
Vocabulary		survive, adaptations, environment, change, needs	

1st Grade Science

Purpose Statement:	Students will analyze sounds through vibrations and solve problems related to light. Furthermore, they will determine how plants and animals use superpowers to adapt and survive. Lastly, students will investigate the Sun, Earth, and Moon to predict patterns based on observations and data.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmarks:

SCI.1.1		Students will observe, research, and justify how plants and animals adapt and survive. Students will design a solution to a problem by mimicking how plants and animals use their external parts to help them survive, grow, and meet their needs. (i.e. What structures and behaviors help plants and animals survive?)	Standard Reference
	SCI.1.1.1	Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.	1-LS3-1
	SCI.1.1.2	Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.	1-LS1-2
	SCI.1.1.3	Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.	1-LS1-1
	SCI.1.1.4	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.	K-2-ETS1-2
Vocabulary		adaptation, observe, habitat, model, offspring, organism, plants, predator, and survive	

SCI.1.2		Students will plan and conduct investigations, use and create tools, make observations and analyze data to explore sound. They will compare strengths and weaknesses of two objects to solve a problem. (i.e. Why can we hear sounds?)	Standard Reference
	SCI.1.2.1	Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.	1-PS4-1
	SCI.1.2.2	Use tools and materials to design and build a device that uses sound to solve the problem of communicating over a distance.	1-PS4-4
	SCI.1.2.3	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development/creation of a new or improved object or tool.	K-2-ETS1-1
	SCI.1.2.4	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	K-2-ETS1-3
Vocabulary		analyze, data, investigate, sound wave, vibrating, wavelength, and sound	

SCI.1.3		Students will make observations, gather information, and analyze data to identify the patterns of the sun, moon, and stars. They will compare strengths and weaknesses of two objects to solve a problem. (i.e. Can patterns of the sun, moon, and stars be used to make predictions of future observations?)	Standard Reference
	SCI.1.3.1	Observe the sun, moon, and stars to describe and predict patterns.	1-ESS1-1
	SCI.1.3.2	Ask questions, make observations, and gather information about a situation people want to change or define a simple problem that can be solved through the development of a new or improved object or tool.	K-2-ETS1-1
	SCI.1.3.3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	K-2-ETS1-3
	SCI.1.3.4	Make observations at different times of year to differentiate the amount of daylight to the time of year.	1-ESS1-2

Vocabulary	analyze, data, Earth, moon, star, sun, sunlight, patterns, weather, temperature, engineer, and predict

SCI.1.4		Students will make observations, create and conduct investigations, to evaluate whether or not objects need light to illuminate them in order to be seen throughout the year. Students will develop an illustration or create a model to show how the shape of an object helps it function. (i.e. Why are we able to see objects?)	Standard Reference
	SCI.1.4.1	Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.	1-PS4-2
	SCI.1.4.2	Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.	1-PS4-3
	SCI.1.4.3	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.	K-2-ETS1-2
	SCI.1.4.4	Make observations at different times of year to differentiate the amount of daylight to the time of year.	1-ESS1-2
Vocabulary		observe, light, illuminate, investigate, model, patterns, and engineer	

2nd Grade Science

Purpose Statement:	Students will investigate and analyze matter by observable properties. Students will conduct an investigation to determine the basic needs of plants, develop a model that explains an animal's role in dispersing seeds and pollination, and compare the diversity of life in different habitats. Students will examine the history of planet Earth to analyze changes made over time.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmarks:

SCI.2.1		Students will analyze and classify different materials by their properties, including how some changes to materials are caused through cooling and heating. Students will identify where water is found on Earth and create a model of land and water in a specific area. (i.e. What patterns related to water exist in the natural world?)	Standard Reference
	SCI.2.1.1	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.	2-PS1-1
	SCI.2.1.2	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.	2-PS1-4
	SCI.2.1.3	Obtain information to identify where water is found on Earth and that it can be solid, liquid or gas.	2-ESS2-3
Vocabulary		condensation, Earth, evaporation, gas, glacier, land, liquid, physical change, properties, solid, states of matter, temperature, water	

SCI.2.2		Students will develop a model of a new or improved tool that solves a given problem. Students will produce various objects using suitable materials for an intended purpose, including objects that can be disassembled and made into a new object. Students will compare strengths and weaknesses of objects used to solve a specific problem. (i.e. What patterns related to water exist in the natural world?)	Standard Reference
	SCI.2.2.1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	K-2-ETS1-1
	SCI.2.2.2	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.	2-PS1-2
	SCI.2.2.3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	K-2-ETS1-3
Vocabulary		analyze, disassemble, intended purpose, material, observations. Properties, strength, weakness	

SCI.2.3		Students will create a model of land and water in a specific area. Students will determine that Earth events can occur quickly or slowly and investigate solutions to prevent changes to land. (i.e. Why does the land change over time?)	Standard Reference
	SCI.2.3.1	Develop a model to represent the shapes and kinds of land and bodies of water in an area.	2-ESS2-2
	SCI.2.3.2	Use information from several sources to provide evidence that Earth events can occur quickly or slowly.	2-ESS1-1
	SCI.2.3.3	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.	2-ESS2-1
Vocabulary		causality, climate, Earth, effect, environment, erosion, land, natural hazard, physical change, relationship, weather, weathering	

SCI.2.4		Students will complete an investigation of a plant's basic needs. Students will develop a model that represents an animal's role in the dispersing of seeds and pollination. Students will compare life in different habitats. Students will produce a model that shows how the shape of an object is important to its function to solve a given problem. (i.e. What does a plant need?)	Standard Reference
	SCI.2.4.1	Plan and conduct an investigation to determine if plants need sunlight and water to grow.	2-LS2-1
	SCI.2.4.2	Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.	2-LS2-2
	SCI.2.4.3	Make observations of plants and animals to compare the diversity of life in different habitats.	2-LS4-1
	SCI.2.4.4	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.	K-2-ETS1-2
Vocabulary		adaptation, animal, dispersing, ecosystem, effect, environment, habitat, interdependent, investigate, light, mimic, model, observations, ovules, petals, pistil, plants, pollen, pollination, relationship, reproduction, sepal, stamen, stigma, sunlight, water	

3rd Grade Science

Purpose Statement:	Students will evaluate how force affects stability and magnetism. They will compare and contrast organisms' life cycles and how adaptations can increase or decrease survival rates. Students will analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variations of these traits exist in groups of similar organisms. They will explain how environmental changes can cause problems for the plants and animals that live there. Students will represent data on tables and graphs to describe typical weather conditions expected during a particular season. They will analyze how weather affects world climates and create a simple design solution to reduce the impact of weather-related hazards. **Please note** that the content and skills included at the third grade level act as the foundation for all subsequent learning in science. In other words, science must be made a priority.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Bundling:
What is bundling? "Bundles" are groups of standards arranged together to create the endpoints for units of instruction. Bundling is just one step in a curriculum development process; many other steps are required to create instructional materials designed for the NGSS.
Why bundle? Bundling is a helpful step in implementing standards because it helps students see connections between concepts and can allow more efficient use of instructional time.
Click here for more about bundling.

Benchmarks:

SCI.3.1		Students will analyze organisms to identify how they are the same and different and why some animals form groups to survive. Students will develop models to describe life cycles and adaptations for survival. (i.e. Why are organisms different from one another?)	Standard Reference
	SCI.3.1.1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parent and that variation of these traits exists in a group of similar organisms.	3-LS3-1
	SCI.3.1.2	Use evidence to support the explanation that observable traits can be influenced by the environment.	3-LS3-2

	SCI.3.1.3	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	3-ESS2-1 (partially assessable)
	SCI.3.1.4	Construct an argument that some animals form groups that help members survive.	3-LS2-1 (partially assessable)
	SCI.3.1.5	Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.	3-LS1-1
Vocabulary		analyze, interpret, traits, organisms, adaptations, environment, life cycles, survive, diverse, inherited, offspring	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.3.2		Students will analyze environments and conditions for survival to determine the effects on organisms. Students will generate solutions to a problem related to survival of organisms. (i.e. How does the environment affect organisms?)	Standard Reference
	SCI.3.2.1	Construct an argument that some animals form groups that help members survive.	3-LS2-1
	SCI.3.2.2	Use evidence to construct an exploration for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.	3-LS4-2
	SCI.3.2.3	Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	3-LS4-3
	SCI.3.2.4	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	3-ESS2-1 (partially assessable)
	SCI.3.2.5	Make a claim about the merit (worthiness) of a design solution that reduces the impacts of a weather-related hazard.	3-ESS3-1
	SCI.3.2.6	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	3-5 ETS1-2
Vocabulary		generate, represent, merit of design, construct, evidence, hazard, habitat, species, constraints, criteria	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.3.3		Students will gather and display information to confirm that the environment used to be different and predict consequences of possible problems with our environment today. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost *(e.g.-the fossil record)*. (i.e. How do we know the environment used to be different?)	Standard Reference
	SCI.3.3.1	Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.	3-LS4-1
	SCI.3.3.2	Make a claim about the merit (worthiness) of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	3-LS4-4
	SCI.3.3.3	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	3-ESS2-1
	SCI.3.3.4	Obtain and combine information to describe climates in different regions of the world.	3-ESS2-2
	SCI.3.3.5	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	3-5-ETS1-1
Vocabulary		define, fossils, hypothesis, consequences, regions, climates, claim	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.3.4		Through investigations, students will identify what happens when objects interact. They will plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (i.e. What happens when different objects interact?)	Standard Reference
	SCI.3.4.1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.	3-PS2-1
	SCI.3.4.2	Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.	3-PS2-2

	SCI.3.4.3	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.	3-PS2-3
	SCI.3.4.4	Define a simple design problem that can be solved by applying scientific ideas about magnets.	3-PS2-4
	SCI.3.4.5	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	3-5-ETS1-3
Vocabulary		investigation, identify, balanced and unbalanced forces, motion, fair test, failure point, prototype, magnets, magnetic, interact, variables, aspects, electric, scientific ideas	

Click here to access the NGSS bundle that is aligned to this benchmark.

4th Grade Science

Purpose Statement:	Students will evaluate how organisms receive and process information. They will analyze the transfer of energy and the cause and effect relationships between energy and collisions. They will investigate waves and their properties and how they cause objects to move. Students will apply their knowledge of waves to understand the scale of the rate of weathering or erosion. Students will interpret data from maps to describe patterns of Earth's features. They will determine the impacts of natural hazards and resource use.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Bundling:
What is bundling? "Bundles" are groups of standards arranged together to create the endpoints for units of instruction. Bundling is just one step in a curriculum development process; many other steps are required to create instructional materials designed for the NGSS.
Why bundle? Bundling is a helpful step in implementing standards because it helps students see connections between concepts and can allow more efficient use of instructional time.
Click here for more about bundling.

Vocabulary for all benchmarks:
Application of Science - any use of scientific knowledge for a specific purpose, whether to do more science; to design a product, process or medical treatment: to develop a new technology; or to predict the impacts of human actions.
Control - standard against which experimental observations may be evaluated: procedure identical to the experimental procedure except for the one factor being studied.
Core - ideas in science that have broad importance and explanatory power in a discipline or across disciplines of science, and which are teachable and learnable at increasing levels of depth over multiple years; core ideas are grouped into four major domains: physical science; life sciences; earth and space sciences; and engineering, technology and applications of science; each broad core idea is described and then broken down into more focused component ideas.
Engineering - a systematic and often iterative approach to designing objects processes, and systems to meet human needs and wants.
Hypothesis - A proposed explanation of certain facts
Technology - any modification of the natural world made to fulfill human needs or desires
** Vocabulary referenced from Wyoming State Science Standards Appendix J - pp. 42-62.

Benchmarks:

SCI.4.1		Students will evaluate how organisms receive and process information and have internal and external structures to support survival. They will define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost. (i.e .How do organisms receive and process information?)	Standard Reference
	SCI.4.1.1	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	4-PS4-2
	SCI.4.1.2	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	4-LS1-1
	SCI.4.1.3	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	4-LS1-2
	SCI.4.1.4	Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost.	3-5-ETS1-1
Vocabulary		adaptations, anatomy, behavior, biological adaptations, ecosystems, external, offspring, organ, reproduction, retina, sensory receptor, translucent, transparent	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.4.2		Students will analyze how energy is transferred from place to place, including sound, light, heat, and electric currents. They will apply scientific ideas to create a device that converts energy from one form to another. (i.e. How do we move energy and information from place to place?)	Standard Reference
	SCI.4.2.1	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.	4-PS3-2
	SCI.4.2.2	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	4-PS3-4
	SCI.4.2.3	Generate and compare multiple solutions that use patterns to transfer information.	4-PS4-3

Vocabulary	beam, communicate, conduction, conductivity, convection, diffraction, illuminate, reflective, refraction

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.4.3		Students will analyze the transfer of energy and the cause and effect relationships between energy and collisions. They will plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. (i.e. What happens when objects collide?)	Standard Reference
	SCI.4.3.1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.	4-PS3-1
	SCI.4.3.2	Ask questions and predict outcomes about the changes in energy that occur when objects collide.	4-PS3-3
	SCI.4.3.3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	3-5-ETS1-3
Vocabulary		causality, dynamic, force, inertia, momentum, Newton's First, Second, and Third Laws of Motion	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.4.4		Students will investigate waves and their properties and how they cause objects to move. They will apply their knowledge of the effects of weathering and the rate of erosion by providing evidence of these natural processes. Students will generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (i.e. What effect can water have on land?)	Standard Reference
	SCI.4.4.1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.	4-PS4-1
	SCI.4.4.2	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.	4-ESS1-1
	SCI.4.4.3	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	4-ESS2-1

	SCI.4.4.4	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	3-5-ETS1-2
Vocabulary		amplitude, causality, climate, deposition, erosion, frost wedging, interference, kinetic energy, Law of Conservation of Energy, mechanical weathering, plate tectonics, Rock Cycle, Seismic Wave, sound wave, spectra, Tsunami, wavelength	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.4.5		Students will interpret data from maps to describe patterns of Earth's features. They will determine the impacts of natural processes (hazards) and use of resources on humans in their environment. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (i.e. How can we reduce negative impacts of natural hazards and of resource use?)	Standard Reference
	SCI.4.5.1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.	4-PS4-1
	SCI.4.5.2	Analyze and interpret data from maps to describe patterns of Earth's features.	4-ESS2-2
	SCI.4.5.3	Obtain and combine information to describe that energy and fuels are derived from renewable and nonrenewable resources and how their uses affect the environment.	4-ESS3-1
	SCI.4.5.4	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	4-ESS3-2
	SCI.4.5.5	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	3-5-ETS1-2
Vocabulary		conservation, natural hazards, natural resources, weathering	

Click here to access the NGSS bundle that is aligned to this benchmark.

5th Grade Science

Purpose Statement:	Students will develop and analyze models representing how matter is used by plants, animals and decomposers in an environment. Furthermore, students will use models to explain interactions between Earth's spheres. Students will use graphical displays to support arguments about how Earth's position in the universe causes phenomena visible on Earth. Students will measure, graph and conduct experiments with matter to understand properties of matter and how matter changes in mixtures and solutions. They will apply their understanding of these subjects to develop solutions to Earth's problems and conserve Earth's resources.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Bundling:
What is bundling? "Bundles" are groups of standards arranged together to create the endpoints for units of instruction. Bundling is just one step in a curriculum development process; many other steps are required to create instructional materials designed for the NGSS.
Why bundle? Bundling is a helpful step in implementing standards because it helps students see connections between concepts and can allow more efficient use of instructional time.
Click here for more about bundling.

Benchmarks:

SCI.5.1		Students will create models representing the movement of energy and matter through ecosystems. They will create and evaluate solutions to the conservation of Earth's resources and environments.	Standard Reference
	SCI.5.1.1	Develop a model to describe that matter is made of particles too small to be seen.	5-PS1-1
	SCI.5.1.2	Identify organisms within categories of producers and consumers to include identifying plants as producers, primary and secondary consumers and bacteria and fungus as consumers.	Foundational (for success in upper grades)
	SCI.5.1.3	Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	5-LS2-1
	SCI.5.1.4	Support an argument that plants get materials they need for growth primarily from air and water.	5-LS1-1

	SCI.5.1.5	Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.	5-PS3-1
	SCI.5.1.6	Obtain and combine information about ways individual communities use science ideas to conserve Earth's resources and environment.	5-ESS3-1
	SCI.5.1.7	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	3-5-ETS1-2
Vocabulary		abiotic, absorption, animal, bacteria, biodiversity, biotic, carbohydrate, classification, consumer, conservation, decomposer, ecosystems, endangered species, energy, environments, food web, fungus, habitat, matter, natural resources, organism, particle, photosynthesis, producer, solution, diversity, sustainability	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.5.2		Students will develop models and conduct experiments to demonstrate relationships and interactions between the atmosphere, geosphere, hydrosphere and biosphere. They will define a simple design problem reflecting a need or want that includes specified criteria for success and constraints in materials, time or cost.	Standard Reference
	SCI.5.2.1	Support an argument that the gravitational force exerted by Earth on objects is directed down.	5-PS2-1
	SCI.5.2.2	Develop a model to describe that matter is made of particles too small to be seen.	5-PS1-1
	SCI.5.2.3	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere and/or atmosphere interact.	5-ESS2-1
	SCI.5.2.4	Describe and graph the amounts and percentages of saltwater and freshwater in various reservoirs and provide evidence about the distribution of water on Earth.	5-ESS2-2
	SCI.5.2.5	Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	5-ESS3-1
	SCI.5.2.6	Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints in materials, time or cost *(e.g. bring water*	3-5-ETS1-1

		to a community or purify water for drinking with limited money or materials).	
Vocabulary		atmosphere, biosphere, cryosphere, distribution, Earth, geosphere, geothermal, gravity, groundwater, hydrosphere, reservoir	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.5.3		Students will use models and graphical displays to represent concepts concerning the Earth's position in the universe and observable phenomena that results from this position.	Standard Reference
	SCI.5.3.1	Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.	5-ESS1-1
	SCI.5.3.2	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows and day and night.	5-ESS1-2
	SCI.5.3.3	Represent data in graphical displays to reveal patterns of daily changes in the seasonal appearance of some stars in the night sky.	5-ESS1-2
Vocabulary		star, patterns, universe, phenomena, graph, patterns, seasons, sun	

Click here to access the NGSS bundle that is aligned to this benchmark.

SCI.5.4		Students will plan and carry out experiments using controlled variables of mixtures and solutions to understand properties of matter.	Standard Reference
	SCI.5.4.1	Develop a model to describe that matter is made of particles too small to be seen.	5-PS1-1
	SCI.5.4.2	Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	5-PS1-2
	SCI.5.4.3	Make observations and measurements to identify materials based on their properties.	5-PS1-3
	SCI.5.4.4	Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	5-PS1-4
	SCI.5.4.5	Plan and carry out fair tests in which variables are controlled and failure points considered to identify aspects of a model or prototype that can be improved.	3-5-ETS1-3

Vocabulary	physical and chemical change, variables, experiment, investigation, hypothesis, mixture, solution, observation, properties, prototype, relationship, substances

Click here to access the NGSS bundle that is aligned to this benchmark.

6th Grade Science

Purpose Statement:	Students will model connections within different levels of living organisms and Earth's climate systems, using physical science concepts to explain processes within each of these systems.

This curriculum map is based on the 2016 California Framework preferred integrated course model. Click on the link to find the full model as well as lesson plans and storylines.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmarks:

SCI.6.1		Students will create a model illustrating that humans and planet earth are made up of interacting systems. **Science and engineering practices (SEPs)** • Developing and Using Models • Planning and Carrying out Investigations **Crosscutting concepts (CCCs)** • Systems and system models	Standard Reference
	SCI.6.1.1	Plan and carry out an investigation provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.	MS-LS1-1
	SCI.6.1.2	Develop and use models to describe the parts, functions and basic processes of cells.	MS-LS1-2
	SCI.6.1.3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	MS-LS1-3
	SCI.6.1.4	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	MS-LS1-8
	SCI.6.1.5	Develop and use a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	MS-ESS2-4
	SCI.6.1.6	Develop and use a model to describe how unequal heating and rotation of the Earth causes patterns of atmospheric and oceanic circulation that determine regional climates.	MS-ESS2-6

	SCI.6.1.7	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-ETS1-1
	SCI.6.1.8	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	MS-ETS1-2
Vocabulary		cell, biotic, abiotic, prokaryotic, eukaryotic, nucleus, chloroplasts, mitochondria, cell membrane, cell wall, vacuole, cytoplasm, ribosome, unicellular, multicellular, chloroplast, organelles, structure, function, tissues, organ, organ system, organism, structure, function, stimuli, response, weather, climate, cycle, precipitation, condensation, evaporation, groundwater, atmosphere, troposphere, hydrosphere, latitude, altitude, oceanic circulation, air pressure, currents, temperature, wind, gravity, rotation, revolution	
Unit Progression		In this first unit, students **develop and use models** that describe **systems and system models** and apply these ideas to different Earth science and life science contexts. A key understanding is that systems are made of component parts that interconnect with each other, moreover each of the component parts is itself a system that is made of component parts. This notion of systems within systems within systems (also called nested systems) is particularly apparent in analyzing a "human being system" that is made of components called body systems (e g , the circulatory system) that are made of organs (e g , the heart) that are made of tissues that consist of different kinds of cells.	

SCI.6.2		Students will create a model to show how the transfer of energy can help us understand earth's hydrosphere and atmosphere systems. **Science and engineering practices (SEPs)** • Developing and Using Models **Crosscutting concepts (CCCs)** • Energy and Matter • Within Systems and systems models	Standard Reference
	SCI.6.2.1	Develop and use a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	MS-ESS2-4
	SCI.6.2.2	Develop and use a model to describe how unequal heating and rotation of the Earth causes patterns of	MS-ESS2-6

		atmospheric and oceanic circulation that determine regional climates.	
	SCI.6.2.3	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-PS3-4
Vocabulary		Weather, climate, cycle, precipitation, condensation, evaporation, groundwater, atmosphere, troposphere, hydrosphere, latitude, altitude, oceanic circulation, carbon footprint, air pressure, currents, temperature, wind, gravity, rotation, revolution, conduction, convection, energy, potential energy, kinetic energy, thermal energy, matter, mass, temperature	
Unit Progression		In this unit, students explore weather from the perspective of the flow of **energy and cycling of matter** within a system to **develop models.** In grade five, students developed models of how Earth's systems interact (Unit 1 reviews the systems). They also explored the reservoirs of the water cycle. In Unit 2, students deepen their understanding by analyzing the processes of the water cycle and the physical science underlying these processes. These Earth science and physical science concepts are then applied to understanding weather in different regions. Patterns of temperature and precipitation are **causally** related to geographical features such as proximity to the ocean, latitude, altitude, and proximity to mountains. The water cycle is also important conceptually because of its central role in weather phenomena and because it provides an example of a property of a whole system that is different than the properties of its parts.	

SCI.6.3		Students will create a model to explain how the earth's systems influence how species evolve and how they respond based on environmental stimuli. **Science and engineering practices (SEPs)** • Obtain, Evaluate, Communicate Information **Crosscutting concepts (CCCs)** • Cause & Effect • Within Systems and systems models	Standard Reference
	SCI.6.3.1	Collect data to provide evidence of how the motions and complex interactions of air masses result in changes in weather conditions.	MS-ESS2-5
	SCI.6.3.2	Develop and use a model to describe how unequal heating and rotation of the Earth causes patterns of atmospheric and oceanic circulation that determine regional climates.	MS-ESS2-6

	SCI.6.3.3	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-PS3-4
	SCI.6.3.4	Use evidence to support an explanation that plant and animal characteristics and behaviors increase their odds of reproduction.	MS-LS1-4
	SCI.6.3.5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	MS-LS1-5
	SCI.6.3.6	Gather and synthesize information that sensory receptors respond to stimuli.	MS-LS1-8
	SCI.6.3.7	Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.	MS-LS3-2
Vocabulary		Gene, heredity, sexual reproduction, asexual reproduction, adaptation, natural selection, alleles, mitosis, meiosis, dominant, recessive, homozygous, heterozygous, chromosome, Gregor Mendel, Punnett square, weather, climate, cycle, precipitation, condensation, evaporation, groundwater, atmosphere, troposphere, hydrosphere, latitude, altitude, oceanic circulation, carbon footprint, air pressure, currents, temperature, wind, gravity, rotation, revolution, conduction, convection, energy, potential energy, kinetic energy, thermal energy, matter, mass, temperature,	
Unit Progression		Unit 3 extends the students' investigations to the more general level of regional climate in different parts of the planet. Students will **obtain, evaluate and present information** how regional climates influence plants and animals in that same region. At the level of climate, students can correlate the **cause and effect** relationships that determine regional climate patterns and the circulation of matter and energy by the atmosphere and ocean. Students also correlate cause and effect relationships between the climate of a region and the structures and behaviors of plants and animals that live in that region. Regional climate provides another compelling example of a property of a whole system.	

SCI.6.4		Students will design a solution to lessen the human footprint on the environment in order to prevent a decline in a particular animal or plant species. **Science and engineering practices (SEPs)** • Constructing explanations/ Designing solutions **Crosscutting concepts (CCCs)** • Cause & Effect (with solution-oriented approach)	Standard Reference
	SCI.6.4.1	Apply scientific principles to design a method for monitoring, evaluating, and managing human impact on the environment.	MS-ESS3-3
	SCI.6.4.2	Use evidence to support an explanation that plant and animal characteristics and behaviors increase their odds of reproduction.	MS-LS1-4
	SCI.6.4.3	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	MS-LS1-5
	SCI.6.4.4	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-ETS1-1
	SCI.6.4.5	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	MS-ETS1-2
Vocabulary		carbon footprint, Gene, heredity, sexual reproduction, asexual reproduction, adaptation, natural selection, alleles, mitosis, meiosis, dominant, recessive, homozygous, heterozygous, chromosome, Gregor Mendel, Punnett square, Energy, potential energy, kinetic energy, thermal energy, matter, mass, temperature,	
Unit Progression		Unit 4 concludes the year by scaling from the regional climate level to the global level. Students will construct explanations and design solutions indicating that human activities can have an impact on the environment, which impacts plants and animals. In previous instructional segments, students had several opportunities to design solutions to problems primarily from engineering and technology perspectives. During Unit 4, they have opportunities to work on projects related to monitoring an environmental issue and designing solutions to reduce the impacts related to that issue, thus showing a cause and effect relationship. Global climate change provides many opportunities to further develop and apply skills relating to	

	the technological and scientific aspects of solving societal problems. Global climate change also provides a real-world context where some of the criteria and constraints can involve social motivations and patterns of behavior that must be considered as part of the design in solving a problem.

7th Grade Integrated Science

Purpose Statement:	Students will track the cycling of matter and energy in chemical systems, food webs, the water cycle, and the rock cycle. Students then examine how human activities alter these systems.

This curriculum map is based on the 2016 California Framework preferred integrated course model. Click on the link to find the full model as well as lesson plans and storylines.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmarks:

SCI.7.1		Students will develop and use models to explain the structure, function, and distribution of natural resources. They will use this understanding to construct explanations on what synthetic materials are based on. **Science and engineering practices (SEPs)** • Developing and using Models **Crosscutting concepts (CCCs)** • Structure and Function (of matter)	Standard Reference
	SCI.7.1.1	Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	MS-ESS3-1
	SCI.7.1.2	Develop models to describe the atomic composition of simple molecules and extended structures.	MS-PS1-1
	SCI.7.1.3	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	MS-PS1-3
	SCI.7.1.4	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-PS1-4
Vocabulary		matter, mass, law of conservation of mass, atom, molecule, compound, physical and chemical properties and changes, states of matter, solid, liquid, gas, reaction, temperature, thermal energy, particle motion/kinetic energy, physical and chemical properties	
Unit Progression		In this unit, students will develop detailed conceptual models of how atoms interact and change as they heat up or are involved in chemical reactions.	

	The model can be used to explain phenomena like air pressure in bike tires, snow capped mountains, and transformation of natural resources into synthetic materials. Students can answer questions such as: What does it mean to be "all natural"

SCI.7.2		Students will develop a model based off of an investigation to explain how energy and matter flow through individual organisms through chemical reactions **Science and engineering practices (SEPs)** • Developing and using Models • Planning and carrying out investigations **Crosscutting concepts (CCCs)** • Energy and Matter (of different Systems and systems models)	Standard Reference
	SCI.7.2.1	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms	MS-LS1-6
	SCI.7.2.2	Develop 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-LS1-7
	SCI.7.2.3	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred	MS-PS1-2
	SCI.7.2.4	Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved	MS-PS1-5
	SCI.7.2.5	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes	MS-PS1-6
	SCI.7.2.6	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process	MS-ESS2-1
	SCI.7.2.7	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-ETS1-1

	SCI.7.2.8	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	MS-ETS1-2
	SCI.7.2.9	Analyze 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	MS-ETS1-3
	SCI.7.2.10	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.	MS-ETS1-4
Vocabulary		photosynthesis, respiration, organism, ecosystem, biotic, abiotic, aerobic, anaerobic, cycle, energy, molecules, ATP, glucose/sugar, mitochondria, chloroplast, carbon cycle, nitrogen cycle, rock cycle, sedimentary, metamorphic, igneous, cementation, deposition, pressure, erosion, weathering, compaction, convection currents, magma, lava, inner core, outer core, mantle, lithosphere, asthenosphere, crust, rock, mineral	
Unit Progression		In this unit, students **investigate** physical changes and chemical reactions in the contexts of organisms and rocks. With chemical reactions, atoms rearrange their connections and form new substances. Chemical reactions also often involve the absorption or release of energy. The formation by plants of food consumed by other organisms and the breaking down of this food sets the stage for one strand of understanding cycles of **matter and flows of energy.** The transformations of minerals and rocks provide a complementary strand of physical and chemical changes that also involve cycles of matter and flows of energy. As they engage with these changes in very different contexts, students can attain a deeper appreciation that the amount of matter always remains the same. In physical changes and in chemical reactions, the numbers of each type of participating atom remains the same.	

SCI.7.3		Students will analyze and interpret data to explain that matter and energy are cycled through all parts of the biosphere and geosphere **Science and engineering practices (SEPs)** • Analyze and interpret data **Crosscutting concepts (CCCs)** • Systems and System models (thru stability and change interactions) • Patterns	Standard Reference
	SCI.7.3.1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem	MS-LS2-1

	SCI.7.3.2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems	MS-LS2-2
	SCI.7.3.3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem	MS-LS2-3
	SCI.7.3.4	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred	MS-PS1-2
	SCI.7.3.5	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society	MS-PS1-3
	SCI.7.3.6	Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved	MS-PS1-5
	SCI.7.3.7	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	MS-ESS2-3
	SCI.7.3.8	Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes	MS-ESS3-1
Vocabulary		geologic time scale, fossils, plate tectonics, continental drift, Pangaea, Alfred Wegener, synthetic materials, geoscience, natural hazards, volcanoes, earthquakes, transform plate boundaries, subduction zone, convergent plate boundaries	
Unit Progression		As the year progresses, students begin exploring cycles of matter and flows of energy at larger scales, such as in different kinds of natural environments and their ecosystems. Ecosystems by their very nature embody the integration of Earth science and life science. This integration is especially evident in the flows of matter and energy that connect organisms with each other and with their physical environments. Students also investigate the geoscience processes that change Earth's surfaces at varying time and spatial scales, and that results in the uneven distribution of Earth's mineral, energy, and groundwater resources. These physical environments play large roles in determining features of the organisms that live in the local ecosystems. Students explore biotic and abiotic interactions within these ecosystems, and the resulting macroscopic cycles of matter, flows of energy, and changes in organism populations. These general patterns apply across ecosystems that may otherwise appear to be very different from each other.	

SCI.7.4		Students will construct explanations of how human activities and natural processes change ecosystems. **Science and engineering practices (SEPs)** • Constructing explanations/ Designing solutions **Crosscutting concepts (CCCs)** • Stability and Change (as a result of changes in Energy and Matter)	Standard Reference
	SCI.7.4.1	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations	MS-LS2-4
	SCI.7.4.2	Evaluate competing design solutions for maintaining biodiversity and ecosystem services	MS-LS2-5
	SCI.7.4.3	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society	MS-PS1-3
	SCI.7.4.4	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	MS-ESS2-2
	SCI.7.4.5	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects	MS-ESS3-2
Vocabulary		biodiversity, resource, abiotic, biotic, populations, ecosystems, biomes, community, organism, predator, prey, symbiosis, mutualism, parasitism, commensalism, population density, species, food webs, energy pyramid, producer, consumer, decomposer, competition, trophic level, carrying capacity, invasive species	
Unit Progression		Toward the end of the year, students address challenges to sustainability by applying their understanding of the natural processes and human activities that shape Earth's resources and ecosystems. These environmental challenges can cover a wide variety of contexts such as adverse consequences of synthetic materials, natural hazards (e g , earthquakes and hurricanes), climate change, and habitat destruction. In Unit 4, students research issues related to sustaining biodiversity and ecosystem services. They then have the responsibility to design engineering solutions that rely on the basic science skills that they developed in earlier instructional segments. They apply their knowledge, such as a systems-based [CCC-4] understanding of how Earth's organisms, including humans, are intimately connected with each other and with Earth's cycles of matter and flows of energy [CCC-5] In their design challenges, students define the problem, balance criteria and constraints, and evaluate their proposed solutions.	

8th Grade Integrated Science

Purpose Statement:	Students will use science and engineering practices to plan and conduct investigations involving force, motion, energy, and waves throughout the universe. Students will synthesize evidence to demonstrate how processes change the Earth and living organisms over time. Students will evaluate solutions to address the effects of human population growth on Earth's resources.

This curriculum map is based on the 2016 California Framework preferred integrated course model. Click on the link to find the full model as well as lesson plans and storylines.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmarks:

SCI.8.1		Students will use mathematical and computational thinking to describe relationships among force, motion, and energy. **Science and engineering practices (SEPs)** • Using mathematical & computational thinking **Crosscutting concepts (CCCs)** • Cause & Effect (through patterns in data, leading to stability & change)	Standard Reference
	SCI.8.1.1	Plan 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-PS2-2
	SCI.8.1.2	Apply Newton's third law of motion to design a solution to a problem involving the motion of two colliding objects.	MS-PS2-1
	SCI.8.1.3	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	MS-PS3-1
	SCI.8.1.4	Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	MS-PS3-2
	SCI.8.1.5	Apply Newton's third law of motion to design a solution to a problem involving the motion of two colliding objects.	MS-PS2-1 MS-ETS1-1 MS-ETS1-2

			MS-ETS1-3 MS-ETS1-4 MS-ETS2-2 WY
Vocabulary		mass, frame of reference, distance, displacement, speed, velocity, acceleration, force, Isaac Newton, Newton's First Law, Newton's Second Law, Newton's Third Law, balanced/unbalanced forces, inertia, work, power, simple machine, energy, potential energy, kinetic energy, weight, gravity, force, friction	
Unit Progression		Students will address one possible explanation of the mass extinctions: impact by an asteroid. A snapshot shows how a computer simulation helps students develop models of forces and motion. In an engineering connection, students investigate the phenomena of car crashes. They design a bumper and explain its function in terms of energy transfer, a common theme throughout this unit. Students revisit the idea of extinction by asteroid impact and look for evidence of energy transfer at an impact site.	

SCI.8.2		Students will develop and use a model to construct a scientific explanation of how objects interact from the subatomic to universal level due to non-contact forces. **Science and engineering practices (SEPs)** • Developing & using a model • Constructing a scientific explanation **Crosscutting concepts (CCCs)** • Scale, proportion, & quantity (using systems & system models)	Standard Reference
	SCI.8.2.1	Develop and use 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-ESS1-1
	SCI.8.2.2	Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	MS-PS2-4
	SCI.8.2.3	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	MS-ESS1-2
	SCI.8.2.4	Analyze and interpret data to determine scale properties of objects in the solar system.	MS-ESS1-3
	SCI.8.2.5	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	MS-PS2-3

	SCI.8.2.6	Conduct 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.	MS-PS2-5
	SCI.8.2.7	Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	MS-PS3-2
Vocabulary		gravity/gravitational force, Earth, sun, moon, lunar phases, new moon, full moon, waxing/waning crescent/gibbous, first quarter, third quarter, lunar eclipse, solar eclipse, total/partial eclipse, umbra, penumbra, orbit, solar system, galaxy, scale, diameter, structure, composition, surface features, orbital radius, mass, weight, rotate, revolve, orbit, axis, non-contact force, mass, electric, magnet, force field, electromagnet, electric motor, generator	
Unit Progression		In this unit, (Noncontact Forces Influence Phenomena) also uses phenomena from space to help students develop models of noncontact forces (gravity, magnetism, and electric fields). Noncontact forces can be difficult to visualize, so the framework illustrates how teachers can complement hands-on investigations with physical and computational models. In a snapshot, students analyze and interpret data to determine which forces cause gigantic volcanic eruptions on Jupiter's moon, Io.	

SCI.8.3		Students will engage in arguments from evidence that changes to biodiversity throughout geologic time are due to evolutionary processes. **Science and engineering practices (SEPs)** • Engaging in arguments from evidence (to construct a scientific explanation) **Crosscutting concepts (CCCs)** • Stability and change (due to individual cause & effect relationships)	Standard Reference
	SCI.8.3.1	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-ESS1-4
	SCI.8.3.2	Analyze and interpret data for 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. (*Apply organization and principles of taxonomy.*)	MS-LS4-1

	SCI.8.3.3	Develop and use 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. (*Review underpinnings of genetics i.e., how gene mutations lead to adaptations.*)	MS-LS3-1
	SCI.8.3.4	Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.	MS-LS4-2
	SCI.8.3.5	Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.	MS-LS4-4
	SCI.8.3.6	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.	MS-LS4-5 MS-ETS2-1 WY MS-ETS2-2 WY
	SCI.8.3.7	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	MS-LS4-6
Vocabulary		geologic time, natural selection, evolution, adaptations, mutations, chromosomes, genes, dominant, recessive, generations, extinction, diversity, taxonomy, anatomy, fossil, variation, inheritance, traits, populations	
Unit Progression		Unit 3 guides the students through mass extinction events by reading fossil evidence in layers of rock to explain why different species exist during each time period, and how similarities (structure and genetic) link past and present organisms. Students transition to interpreting data about natural selection and evolution in modern-day organisms. How genetic variation (mutations) and adaption allows organisms to survive and reproduce, passing on those traits and adaptations to the next generation.	

SCI.8.4		Students will define problems related to human impact on local ecosystems (that can be monitored using appropriate technology) and propose solutions to mitigate those problems. **Science and engineering practices (SEPs)** • Asking questions & defining problems **Crosscutting concepts (CCCs)** • Cause & Effect (developing patterns)	Standard Reference
	SCI.8.4.1	Use 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.	MS-PS4-1
	SCI.8.4.2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	MS-PS4-2
	SCI.8.4.3	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-PS4-3 MS-ETS1-1 MS-ETS1-2 MS-ETS2-1 WY
	SCI.8.4.4	Develop and use 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-ESS1-1
	SCI.8.4.5	Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems.	MS-ESS3-4 MS-ETS1-3 MS-ETS2-2 WY
	SCI.8.4.6	Apply scientific principles to design a method for monitoring, evaluating, and managing a human impact on the environment	MS-ESS3-3
	SCI.8.4.7	Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.	MS-LS4-4
	SCI.8.4.8	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	MS-LS4-6
Vocabulary		wave, transverse wave, longitudinal wave, crest, trough, compression, rarefaction, amplitude, frequency, wavelength, reflected, absorbed, transmitted, digital signals, analog signals, natural resources, populations, consumption, carrying capacity, population density	

Unit Progression	Unit 4 guides students through **asking questions and defining problems** with regard to a local example of the **effects** of humans on natural selection and natural resources. This concept is then scaled down to individuals within a population and scaled up to increases of the whole human population. Pattern relationships are explored with regard to animal behaviors, seasons, and human interactions. Students explore how these changes are monitored using applicable technologies, with a focus on the strengths of digital signals as opposed to analog signals, based on their properties as evidenced by mathematical models of waves and physical models of how waves interact within a system to transfer energy.

Physical Science

Purpose Statement:	Students will use models, evidence, and observations at the macroscopic level to explain matter and energy phenomena at an atomic level.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Semester 1 Benchmarks:

SCI.PS.1		Students will be able to develop models to illustrate the changes in composition of the nucleus of the atom in fission and fusion processes with a phenomena starting with the Big Bang Theory.	Standard Reference
	SCI.PS.1.1	Illustrate the parts of an atom (*e.g., proton, electron, neutron*).	HS-PS1-8
	SCI.PS.1.2	Compare and contrast the four forces of nature (*e.g., strong and weak nuclear forces, electromagnetic, and gravitational*).	HS-PS1-8
	SCI.PS.1.3	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.	HS-ESS1-2
	SCI.PS.1.4	Use a model to illustrate the processes of fission, fusion, and radioactive decay.	HS-PS1-8
	SCI.PS.1.5	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy in the form of radiation.	HS-ESS1-1
Vocabulary		fission, fusion, radioactive decay, energy, Big Bang Theory, nuclei, alpha particle, beta particle, gamma ray	

SCI.PS.2		Students will be able to explain interactions of matter based on structures and properties.	Standard Reference
	SCI.PS.2.1	Identify different types of bond strength (*e.g., ionic, covalent, polar, non-polar).*	HS-PS1-1
	SCI.PS.2.2	Apply basic electron configuration to determine valence electron count.	HS-PS1-1
	SCI.PS.2.3	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	HS-PS1-7

	SCI.PS.2.4	Apply periodic table trends to determine the outcome of simple chemical reactions.	HS-PS1-2
	SCI.PS.2.5	Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscopic scale to infer the strength of electrical forces between particles.	HS-PS1-3
	SCI.PS.2.6	Use scientific and technical information to explain why certain materials are picked for certain applications (i.e., conduction of electricity, use in clothing, pharmaceuticals, flexibility and durability of plastics, synthetic vs. natural materials).	HS-PS2-6 HS-ETS1-5
Vocabulary		ionic bond, valence electrons, covalent bond, energy level, chemical bond, polar and nonpolar bonds, hydrogen bond, alkali metals, alkaline earth metals, halogens, noble gases, transition elements, representative elements, rare earth (inner transition) metals, products, reactants	

SCI.PS.3		Students will analyze matter and energy conversions and conservation using a variety of models.	Standard Reference
	SCI.PS.3.1	Evaluate models of energy conversions at the macroscopic levels to infer particle motion.	HS-PS3-2
	SCI.PS.3.2	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	HS-PS1-5
	SCI.PS.3.3	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	HS-PS1-6
	SCI.PS.3.4	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	HS-PS3-3
	SCI.PS.3.5	Create or apply a computational model (*e.g., Sankey models)* to calculate energy conversions as it flows in and out of a system.	HS-PS3-1
	SCI.PS.3.6	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	HS-PS3-4

	SCI.PS.3.7	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.	HS-PS1-4
Vocabulary		Law of Conservation of Energy, states of matter, phase changes, thermal energy (heat), nuclear energy, electromagnetic energy, electrical energy, radiant energy, light energy, sound energy, chemical energy	

Semester 2 Benchmarks:

SCI.PS.4		Students will be able to use the concept of wave properties to illustrate use in everyday phenomena.	Standard Reference
	SCI.PS.4.1	Synthesize mathematical representations to illustrate the relationships among frequency, wavelength, and speed of waves in different media. *Clarification: review calculator skills including significant figures, scientific notation, and formula manipulation.*	HS-PS4-1
	SCI.PS.4.2	Evaluate evidence (graphs, video, animation, simulations, readings) behind the idea that electromagnetic radiation can either be a wave or a particle.	HS-PS4-3
	SCI.PS.4.3	Use the principles of wave behavior and wave interactions to explain how technological devices transmit and capture information and energy.	HS-PS4-5
	SCI.PS.4.4	Compare and contrast the advantages and disadvantages of using digital transmission and storage of information.	HS-PS4-2
Vocabulary		wavelength, amplitude, frequency, Schrödinger's principle	

SCI.PS.5		Students will be able to analyze data to support Newton's second law of motion and evaluate how a device protects an object from damage, modifying as necessary.	Standard Reference
	SCI.PS.5.1	Diagram forces (*e.g., free body diagram*) to predict the motion of an object.	
	SCI.PS.5.2	List all simple machines – wheel and axle, pulley, inclined plane, wedge, level (all types), screw. Demonstrate how they improve mechanical advantage and efficiency.	(underpinning)

	SCI.PS.5.3	Analyze data to support the relationship that forces placed on objects are related to the mass and acceleration of the object.	HS-PS2-1
	SCI.PS.5.4	Design, evaluate and refine a device that minimizes the force on a macroscopic object during a collision.	HS-PS2-3 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4
	SCI.PS.5.5	Support the claim that the total momentum of a system of objects is conserved when there is no net force using a mathematical representation.	HS-PS2-2
Vocabulary		force, acceleration, speed, velocity, Newton's 1st, 2nd, and 3rd laws of motion, balanced and unbalanced forces, vector, scalar, impulse, g-force, elasticity, work, power	

SCI.PS.6		Students will be able to use a mathematical computation to explain the motion of orbiting objects in the solar system.	Standard Reference
	SCI.PS.6.1	Predict the motion of an orbiting object using a mathematical computation.	HS-ESS1-4
	SCI.PS.6.2	Apply mathematical computation of Newton's Law of Gravitation and/or Coulomb's Law to determine the gravitational and/or electrostatic forces between objects.	HS-PS2-4
Vocabulary		centripetal force, Kepler's Laws of Motion	

SCI.PS.7		Students will model and explain the relationship between electricity and magnetism.	Standard Reference
	SCI.PS.7.1	Model (*e.g., circuit diagrams*) and construct simple electrical circuits.	(underpinning)
	SCI.PS.7.2	Conduct an investigation that an electric current can produce a magnetic field.	HS-PS2-5
	SCI.PS.7.3	Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	HS-PS3-5
Vocabulary		electron, electricity, current, voltage, circuit, A/C, D/C	

Biology

Purpose Statement:	Students will explain the characteristics of life, identify and summarize hierarchical relationships and construct an explanation for how cellular organelles support life giving processes. Students will explain and summarize the ecological processes present in a balanced ecosystem, including modeling how energy flows and nutrients cycle. Students will identify the role of DNA in passing on heritable characteristics and analyze evidence in earth's historical record to explain evolution and speciation. Lastly, students will evaluate human impact on these biological processes.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmarks:

SCI.BIO.1		Students will analyze the characteristics of life and then describe, illustrate, and explain how life is supported by basic processes.	Standard Reference
	SCI.BIO.1.1	List and define the basic characteristics of life including: ● Homeostasis (Active and Passive Transport) ● Organisms are made of cells that are organized ● Organisms respond to environment ● Organisms have the ability to reproduce,grow, and adapt ● Organisms take in and use atoms and molecules to use energy Organisms pass traits to offspring	
	SCI.BIO.1.2	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis, including positive and negative feedback mechanisms. *(NOTE: Assessment does not include the cellular processes involved in the feedback mechanism.)*	HS-LS1-3
	SCI.BIO.1.3	Develop and demonstrate a model to illustrate the hierarchical organization of interacting systems (*e.g., biological hierarchy, food webs, nutrient uptake in*	HS-LS1-2

		plants and animals, interactions between organs in an organism, interactions between cell organelles).	
	SCI.BIO.1.4	Review and extend descriptions of the structure and function of cell parts with a focus on cell membrane, cell wall, centrioles, chloroplasts, cytoplasm, DNA, mitochondria, nucleus, golgi apparatus, endoplasmic reticulum, ribosome, RNA, and vacuole.	
	SCI.BIO.1.5	Research and explain using evidence from a variety of sources how 1. Carbon, hydrogen, and oxygen may combine with other elements to form amino acids and other large carbon based molecules. 2. Hydrocarbons (including but not limited to lipids, proteins, and carbohydrates) may combine to form large carbon based molecules. *(NOTE: Does not include the details of specific chemical reactions or macromolecule subgroups.)*	HS-LS1-6
Vocabulary		homeostasis, diffusion, osmosis, hierarchy, amino acids, carbon based molecule, hydrocarbon, lipid, carbohydrate, nucleic acid, protein	

SCI.BIO.2		Students will be able to construct an argument to explain how genetic processes influence a population.	Standard Reference
	SCI.BIO.2.1	Illustrate and describe the structure of DNA and RNA (transfer, messenger, and/or ribosomal).	HS-LS1-1
	SCI.BIO.2.2	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. *(NOTE: Does not include the biochemical mechanisms of specific steps in the process.)*	HS-LS3-1
	SCI.BIO.2.3	Given a strand of DNA, use the process of protein synthesis to identify the correct amino acid sequence.	HS-LS1-1 HS-LS3-1
	SCI.BIO.2.4	Define mutation and explain how mutations can happen both internally and through environmental causes.	
	SCI.BIO.2.5	Evaluate and illustrate the influence mitosis and meiosis have on producing and maintaining complex organisms. (Include a description of the entire cell cycle, the phases of division, the fact that the processes provide growth and varied genetic makeup, and	HS-LS1-4

		tissues/organs/systems that work together to meet the needs of the organism.) *(NOTE: Does not include specific gene control mechanisms.)*	
	SCI.BIO.2.6	Make and defend a claim based on evidence that inheritable genetic variations may result from: 1. New genetic combinations through meiosis 2. Viable errors occurring during replication 3. Mutations caused by environmental factors. *(NOTE: Emphasis is on using data to support arguments. Assessment does not include the biochemical mechanism of specific steps in the processes.)*	HS-LS3-2
	SCI.BIO.2.7	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. *(NOTE: Emphasis on the use of math to describe probability. Does not include Hardy Weinberg calculations.)*	HS-LS3-3
Vocabulary		genes, transcription, translation, protein, DNA, mRNA, tRNA, mitosis, meiosis, chromosome, nucleotide, amino acid, allele, dominant, recessive, heterozygous, homozygous, mutation	

SCI.BIO.3		Students will analyze the conditions for evolution and speciation. Students will construct an explanation for the processes of natural selection and adaptation and explain how multiple lines of evidence demonstrate that different species are related.	Standard Reference
	SCI.BIO.3.1	Apply concepts of statistics and probability to support explanations that organism with an advantageous heritable trait tend to increase in proportion of organisms lacking the trait. *(Assessment is based on statistical and graphical analysis. Emphasis is on analyzing shifts in numerical distribution of traits and using these shifts as evidence to support explanations.)*	HS-LS4-3
	SCI.BIO.3.2	Construct an explanation based on evidence that the process of evolution primarily results from four factors.	HS-LS4-2
	SCI.BIO.3.3	Analyze evidence and construct an explanation for how natural selection leads to advantageous heritable traits that increase in proportion in a population.	HS-LS4-4

	SCI.BIO.3.4	Interpret multiple lines of empirical evidence and draw conclusions whether the evidence supports common ancestry and biological evolution, including a review of the principles of taxonomy.	HS-LS4-1 HS-ETS1-5
	SCI.BIO.3.5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	HS-LS4-5
	SCI.BIO.3.6	Create and/or use a simulation to evaluate the impacts of human activity on biodiversity. *(Note: The Wyoming standard stated differs slightly from the linked NGSS standard.)*	HS-LS4-6 HS-ETS1-4
	SCI.BIO.3.7	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants (*e.g., mass extinction, threatened and/or endangered species, habitat destruction, pollution).*	HS-ETS1-1
Vocabulary		natural selection, adaptation, fossil record, homologous structures, law of superposition, descent with modification, geographic distribution, artificial selection, gene pool, genetic drift, bottleneck effect, founder effect, gene flow, fitness, species, population, reproductive isolation, geographic isolation, dichotomous keys, scientific names	

SCI.BIO.4		Students will construct an explanation based on evidence for cycling of matter and flow of energy among organisms and in ecosystems.	Standard Reference
	SCI.BIO.4.1	Use a model (including but not limited to diagrams, chemical equations, conceptual models) to illustrate how photosynthesis transforms light energy into stored chemical energy. *(Emphasis is on inputs and outputs of matter rather than the biochemical steps.)*	HS-LS1-5
	SCI.BIO.4.2	Use a model (including but not limited to diagrams, chemical equations, conceptual models) to illustrate that cellular respiration is a chemical process whereby the bonds of sugar molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. *(Emphasis on the conceptual understanding of the inputs and outputs of cellular respiration. Assessments should not include identification of the steps or specific processes involved in cellular respiration.)*	HS-LS1-7

	SCI.BIO.4.3	Develop a model based on evidence from a variety of sources to illustrate and explain the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. *(NOTE: Do not include the specific chemical steps of photosynthesis and respiration.)*	HS-LS2-5
	SCI.BIO.4.4	Construct an explanation, using a variety of sources, for how matter cycles and energy flows in aerobic and anaerobic conditions (*e.g., bioremediation of hydrocarbons, decomposition, photosynthesis, and cellular respiration).* *(NOTE: Assessment does not include the specific chemical processes involved.)*	HS-LS2-3
	SCI.BIO.4.5	Interpret mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. *(Mathematical representations include but are not limited to: graphs, diagrams, equations, physical models, formulas, pictures, and simulations.)*	HS-LS2-4
Vocabulary		photosynthesis, cellular respiration, chloroplast, mitochondria, ATP, trophic levels, food webs, food chains, bioremediation	

SCI.BIO.5		Students will analyze how and why organisms interact with one another and their environment.	Standard Reference
	SCI.BIO.5.1	Evaluate the claims, evidence, and reasoning that the complex biotic and abiotic interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a modified ecosystem.	HS-LS2-6
	SCI.BIO.5.2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	HS-LS2-2
	SCI.BIO.5.3	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	HS-LS2-1
	SCI.BIO.5.4	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8

Vocabulary	biotic/abiotic factors, density dependent, density independent, limiting resources, carrying capacity, competition, symbiosis, niche, feeding relationships, keystone species, individual and group behaviors, ocean zones, Earth zones (polar, temperate, tropical), ecological succession, population dynamics

SCI.BIO.6		Students will evaluate the effects of human activities on ecosystem dynamics.	Standard Reference
	SCI.BIO.6.1	Evaluate and assess impacts on the environment and biodiversity in order to refine or design a solution for detrimental impacts or enhancement for positive impacts. *(Note: The Wyoming standard stated differs slightly from the linked NGSS standard.)*	HS-LS2-7
	SCI.BIO.6.2	Critique a current proposed solution to decrease human impact on different ecosystems.	HS-ETS1-3
	SCI.BIO.6.3	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary		urbanization, habitat restoration, invasive species, pollution, climate change, biodiversity, speciation, extinction	

Environmental Science

Purpose Statement:	Students will analyze the fundamental physical and biological principles that govern the natural world. Students will identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Benchmarks:

SCI.ES.1		Students will analyze geological processes in order to explain the Theory of Plate Tectonics.	Standard Reference
	SCI.ES.1.1	Evaluate evidence of the past and current movements of crust and the theory of plate tectonics to explain the ages of crustal rocks.	HS-ESS1-5 HS-ETS1-5
	SCI.ES.1.2	Develop a model based on evidence to describe the cycling of matter by thermal convection in Earth's interior.	HS-ESS2-3
	SCI.ES.1.3	Develop a model to illustrate how Earth's internal and surface processes operate at different space and time scales to form tectonic features *(e.g., land features, seafloor features, constructive and destructive forces)*.	HS-ESS2-1
Vocabulary		convection currents, rock cycle, weathering, erosion, plate boundaries, mid-ocean ridges, trench, subduction zone, inner core, outer core, mantle, asthenosphere, lithosphere, continental crust, oceanic crust, seismology	

SCI.ES.2		Students will construct an argument about the effect of water on Earth systems using evidence of water's movement, distribution, and quality.	Standard Reference
	SCI.ES.2.1	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	HS-ESS2-5
	SCI.ES.2.2	Analyze geoscience data to make a claim about how changes to Earth's surface can create feedbacks that cause changes to other Earth systems.	HS-ESS2-2

Vocabulary	specific heat, cohesion, adhesion, infiltration, weathering, erosion, precipitation, condensation, transpiration, percolation, evaporation, hydrosphere, aquifer

SCI.ES.3		Students will analyze how the flow of energy in and out of Earth's systems and the cycling of carbon influence weather and climate.	Standard Reference
	SCI.ES.3.1	Develop a quantitative model to describe the cycling of carbon.	HS-ESS2-6
	SCI.ES.3.2	Construct an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	HS-LS2-3 HS-ETS1-5
	SCI.ES.3.3	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	HS-ESS2-4
	SCI.ES.3.4	Conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	HS-PS3-4
Vocabulary		carbon compounds, aerobic, anaerobic, cellular respiration, photosynthesis, absorption, Earth's energy balance/budget, greenhouse gases, greenhouse effect, convection currents, weather, climate, ocean currents, atmospheric circulation, atmospheric layers, ozone layer	

SCI.ES.4		Students will use evidence to construct an account of Earth's early history and explain how life coevolved with these events.	Standard Reference
	SCI.ES.4.1	Construct an account of Earth's formation and early history using evidence.	HS-ESS1-6 HS-ETS1-5
	SCI.ES.4.2	Construct an argument about the coevolution of Earth's systems and life on Earth.	HS-ESS2-7
Vocabulary		geologic time scale, uniformitarianism, faults, atmospheric composition, continental drift, fossil record, Milankovitch cycle	

SCI.ES.5		Students will use data and evidence to justify claims relating to climate change and human activity.	Standard Reference
	SCI.ES.5.1	Construct an explanation of how the availability of resources, natural disasters and changes in climate have influenced human activity.	HS-ESS3-1 HS-ETS1-1 HS-ETS1-3 HS-ETS1-5
	SCI.ES.5.2	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. *(Note: Emphasis on the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.)*	HS-ESS3-5 HS-PS3-1 HS-ETS1-4 HS-ETS1-5
Vocabulary		climate change, greenhouse effect, weather, flooding, drought, natural resource	

SCI.ES.6		Students will draw connections between local and global energy usage, and evaluate solutions for developing, managing, and using energy and mineral resources.	Standard Reference
	SCI.ES.6.1	Evaluate competing design solutions for developing, managing, and using energy and mineral resources based on cost-benefit ratios.	HS-ESS3-2 HS-ETS1-3 HS-ETS1-5
	SCI.ES.6.2	Use computational tools to illustrate the relationships among resource management, human populations and biodiversity.	HS-ESS3-3 HS-ETS1-4
	SCI.ES.6.3	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	HS-PS3-3 HS-ETS1-2
	SCI.ES.6.4	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion and radioactive decay.	HS-PS1-8 HS-ETS1-3
Vocabulary		renewable and non-renewable resources, surface mining, subsurface mining, kinetic energy, potential energy, law of conservation of energy, energy efficient, reclamation, fission, fusion, proton, neutron	

SCI.ES.7		Students will analyze human actions and their impacts on Earth's systems and all life on Earth.	Standard Reference
	SCI.ES.7.1	Evaluate the evidence supporting claims that changes in environmental conditions may result in: increases in populations, emergence of new species, and extinction of species.	HS-LS4-5 HS-ETS1-5
	SCI.ES.7.2	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	HS-ESS3-4 HS-LS2-7 HS-ETS1-3
	SCI.ES.7.3	Use the results of a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	HS-ESS3-6 HS-LS4-6 HS-ETS1-4
	SCI.ES.7.4	Analyze a major global challenge to specify quantitative and qualitative criteria and constraints for solutions that account for societal needs and wants.	HS-ETS1-1
Vocabulary		endangered species, biodiversity, invasive species, habitat destruction, pollution, overpopulation, overharvesting	

Agronomy

Purpose Statement:	Agronomy is the application of soil and plant sciences to land management and crop production that incorporates the wise use of natural resources and conservation practices. Students will learn about connections with the natural world, such as air, water, soil, and plant interactions, which provide them with the knowledge base and technical proficiency needed to be successful with a career in agronomy.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.AGRO.1		Students will evaluate plans to best manage our soil and water resources.	Standard Reference
	SCI.AGRO.1.1	Plan and conduct an investigation of the properties of water and its' effects on Earth materials and surface processes.	HS-ESS2-5
	SCI.AGRO.1.2	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human population, and biodiversity.	HS-ESS3-3
Vocabulary			

SCI.AGRO.2		Students will evaluate plans to best manage our crops.	Standard Reference
	SCI.AGRO.2.1	Evaluate or refine a technological solution that reduces impacts of human activities on natural resources.	HS-ESS3-4
Vocabulary			

SCI.AGRO.3		Students will evaluate plans to best manage our soil nutrient resources.	Standard Reference
	SCI.AGRO.3.1	Evaluate or refine a technological solution that reduces impacts of human activities on natural resources.	HS-ESS3-4
Vocabulary			

SCI.AGRO.4		Students will evaluate plans to best manage pests which affect our crops.	Standard Reference
	SCI.AGRO.4.1	Evaluate or refine a technological solution that reduces impacts of human activities on natural resources.	HS-ESS3-4
Vocabulary			

SCI.AGRO.5		Students will evaluate plans to best maximize the growing of food.	Standard Reference
	SCI.AGRO.5.1	Analyze geoscience data and the results from global climate models to make an evidence based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.	HS-ESS3-5
Vocabulary			

SCI.AGRO.6		Students will evaluate plans to use our technology resources.	Standard Reference
	SCI.AGRO.6.1	Analyze geoscience data and the results from global climate models to make an evidence based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.	HS-ESS3-5
Vocabulary			

SCI.AGRO.7		Students will evaluate plans to best illustrate the relationships among Earth's systems in agriculture.	Standard Reference
	SCI.AGRO.7	Use computational representation to illustrate the relationships among Earth's systems and how those relationships are being modified due to human activity.	HS-ESS3-6
Vocabulary			

Animal Science

Purpose Statement:	Student will be provided instruction that focuses on the basic scientific principles and processes that are involved in animal physiology, breeding, nutrition, and care in preparation for an animal science career major. Topics include animal diseases, introduction to animal science, animal nutrition, animal science issues, career opportunities, and animal evaluation. English language arts, mathematics, and science are reinforced.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.ANS.1		Students will analyze veterinary terms to define and learn their meaning.	Standard Reference
	SCI.ANS.1.1	Recognize common Greek and Latin prefixes, suffixes, and root. Learn commonly used abbreviations used in veterinary medicine.	RST.11-12.4
Vocabulary			

SCI.ANS.2		Students will identify and discuss the basic organization of life forms and the relationship between structure and function within an organism.	Standard Reference
	SCI.ANS.2	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.ANS.2	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.ANS.2	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	HS-LS1-4
	SCI.ANS.2	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	HS-LS1-7
Vocabulary			

SCI.ANS.3		Students will discuss the pathology and terminology used to diagnose animal diseases.	Standard Reference
	SCI.ANS.3.1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.ANS.3.2	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.ANS.3.3	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	HS-LS1-4
	SCI.ANS.3.4	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	HS-LS1-7
	SCI.ANS.3.5	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	HS-LS3-1
	SCI.ANS.3.6	Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.ANS.3.7	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
Vocabulary			

SCI.ANS.4		Students will understand and identify the specific processing technologies for poultry, beef, swine, mutton and their related products.	Standard Reference
	SCI.ANS.4.1	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	HS-LS2-3
	SCI.ANS.4.2	Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms	HS-LS2-6

		in stable conditions, but changing conditions may result in a new ecosystem.	
	SCI.ANS.4.3	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	HS-LS2-7
	SCI.ANS.4.4	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
	SCI.ANS.4.5	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	HS-LS3-1
	SCI.ANS.4.6	Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.ANS.4.7	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
Vocabulary			

SCI.ANS.5		Students will apply management principles for maintaining the health and well-being of agricultural animals.	Standard Reference
	SCI.ANS.5.1	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	HS-LS2-3
	SCI.ANS.5.2	Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
	SCI.ANS.5.3	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	HS-LS2-7
	SCI.ANS.5.4	Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
Vocabulary			

SCI.ANS.6		Students will identify the basic types of microbes and how to prevent infections of our food chain and in animals.	Standard Reference
	SCI.ANS.6	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.ANS.6	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.ANS.6	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.ANS.6	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	HS-LS1-5
	SCI.ANS.6	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	HS-LS1-6
Vocabulary			

SCI.ANS.7		Students will apply principles of animal nutrition to ensure the proper growth of production animals.	Standard Reference
	SCI.ANS.7.1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.ANS.7.2	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.ANS.7.3	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	HS-LS1-4
	SCI.ANS.7.4	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	HS-LS1-7
Vocabulary			

SCI.ANS.8		Students will learn the difference between animal rights and animal welfare.	Standard Reference
	SCI.ANS.8.1	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.	HS-ETS1-3
	SCI.ANS.8.2	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	HS-ETS1-4
Vocabulary			

SCI.ANS.9		Students will examine consumer products, services and benefits derived from the production of agricultural animals.	Standard Reference
	SCI.ANS.9.1	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.	HS-ETS1-3
	SCI.ANS.9.2	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	HS-ETS1-4
Vocabulary			

Astronomy

Purpose Statement:	Instruction will be a general survey of Astronomy including, but not limited to, the solar system and its constituents, stars, asteroids, meteors, comets, and their basic properties, systems of stars including clusters, the Milky Way, and other galaxies, the universe, its past, present, and future structure, topics of current interest including pulsars, quasars, and black holes.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.AST.1		Students will review and describe the possibilities for the rise of life on Earth, its requirements, and possible differences in the definition of life as it applies to the Universe, as well as how we are attempting to locate life elsewhere.	Standard Reference
	SCI.AST.1.1	Evaluate the advantages and disadvantages of using digital transmission and storage of information. (Arecibo message)	HS-PS4-2
	SCI.AST.1.2	Evaluate evidence behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. (Electro- magnetic spectrum)	HS-PS4-3
	SCI.AST.1.3	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. (Biological evolution)	HS-LS1-1
	SCI.AST.1.4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. (Mutations, simple to complex life forms)	HS-LS1-4
	SCI.AST.1.5	Construct explanations and revise, as needed, based on evidence for: 1) how carbon, hydrogen, and oxygen may combine with other elements to form amino acids and/ or other large carbon-based molecules, and 2) how other hydrocarbons may also combine to form large carbon-based molecules. (Chemical evolution)	HS-LS1-6

	SCI.AST.1.6	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. (Biological evolution)	HS-LS3-1
	SCI.AST.1.7	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. (Natural Selection)	HS-LS3-2
	SCI.AST.1.8	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. (Natural Selection)	HS-LS4-3
	SCI.AST.1.9	Construct an explanation based on evidence for how natural selection leads to adaptation of populations. (Mutation v. Adaptation)	HS-LS4-4
	SCI.AST.1.10	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. (Natural Selection)	HS-LS4-5
	SCI.AST.1.11	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (Looking for Life in the Universe)	HS-ETS1-1
	SCI.AST.1.12	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. (Looking for Planets, life, etc. Sending probes.)	HS-ETS1-3
	SCI.AST.1.13	Evaluate the validity and reliability of claims in a variety of materials. (Current events and news)	HS-ETS1-5
Vocabulary			

SCI.AST.2		Students will mathematically compare measuring scales used in the Solar System, the Galaxy, and the Universe, as well as describe the vastness in a way that demonstrates understanding of those scales.	Standard Reference
	SCI.AST.2.1	Evaluate the validity and reliability of claims in a variety of materials. (Current events and news)	HS-ETS1-5
Vocabulary			

SCI.AST.3		Students will observe and predict motions in the sky, such as moon phase and affects, planetary movements across the sky, seasonal changes on Earth around the ecliptic, and Zodiac constellation changes.	Standard Reference
	SCI.AST.3.1	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. (Directions of motion in sky)	HS-PS2-2
	SCI.AST.3.2	Evaluate the validity and reliability of claims in a variety of materials. (Current Events)	HS-ETS1-5
Vocabulary			

SCI.AST.4		Students will map the history of Astronomy, including the claims and discoveries from people such as, but not limited to, Aristotle, Ptolemy, Copernicus, Brahe, Kepler, Galileo, Newton, Einstein, Sagan, De Grasse, and Hawking.	Standard Reference
	SCI.AST.4.1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. (Use Newton's discoveries to support Kepler's laws; Orbits of Objects)	HS-PS2-1
	SCI.AST.4.2	Use mathematical representations to predict the gravitational and/or electrostatic forces between objects using Newton's Law of Gravitation and/or Coulomb's Law, respectively. (Orbiting Objects)	HS-PS2-4
	SCI.AST.4.3	Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. (Uses of Different Telescope types)	HS-PS4-5

	SCI.AST.4.4	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. (Kepler's Laws of Planetary Motion)	HS-ESS1-4
	SCI.AST.4.5	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (Current Events)	HS-ETS1-1
	SCI.AST.4.6	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. (Space Exploration; Current Events)	HS-ETS1-3
	SCI.AST.4.7	Evaluate the validity and reliability of claims in a variety of materials. (Current Events)	HS-ETS1-5
Vocabulary			

SCI.AST.5		Students will explain the stages and optional pathways in the life cycle of stars and the components that limit those, including, but not limited to the use of the Hertzsprung-Russell diagram.	Standard Reference
	SCI.AST.5.1	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. (Nuclear Fusion)	HS-PS1-8
	SCI.AST.5.2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). (Nuclear Fusion)	HS-PS3-2
	SCI.AST.5.3	Evaluate evidence behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. (Conduction, Convection, and Radiation; Red Shift and Blue Shift)	HS-PS4-3
	SCI.AST.5.4	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually	HS-ESS1-1

		reaches Earth in the form of radiation. (Our Sun, its lifespan, and energy transfer time)	
	SCI.AST.5.5	Communicate scientific ideas about the way stars, over their life cycle, produce elements. (Nuclear Fusion types; Supernovae)	HS-ESS1-3
	SCI.AST.5.6	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. (Using light curves to find binary systems and planets)	HS-ETS1-4
	SCI.AST.5.7	Evaluate the validity and reliability of claims in a variety of materials. (Current Events)	HS-ETS1-5
Vocabulary			

SCI.AST.6		Students will differentiate between Astronomy and Cosmology, identifying the stages of the Big Bang and explaining possible outcomes for the future of the our sun, galaxy, and the Universe.	Standard Reference
	SCI.AST.6.1	Use mathematical representations to predict the gravitational and/or electrostatic forces between objects using Newton's Law of Gravitation and/or Coulomb's Law, respectively. (Nucleosynthesis, Reionization, Recombination, Cosmic Microwave Background)	HS-PS2-4
	SCI.AST.6.2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). (Nucleosynthesis, Reionization, Recombination, Cosmic Microwave Background)	HS-PS3-2
	SCI.AST.6.3	Evaluate evidence behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. (Nucleosynthesis, Reionization, Recombination, Cosmic Microwave Background)	HS-PS4-3
	SCI.AST.6.4	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. (Nucleosynthesis, Reionization,	HS-ESS1-2

		Recombination, Cosmic Microwave Background, Universe Expansion)	
	SCI.AST.6.5	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. (Understanding of the age and beginning of the Universe)	HS-ETS1-1
	SCI.AST.6.6	Evaluate the validity and reliability of claims in a variety of materials. (Current Events)	HS-ETS1-5
Vocabulary			

Botany

Purpose Statement:	Students will study plant anatomy (parts), plant physiology (function), horticulture (naming and classifying), plant ecology (interactions) and biomes, and the basics of gardening. Many different kinds of activities combine to help the student build knowledge and skills in biological concepts as they relate to plants. Integrated throughout the course may be related topics in other areas such as Chemistry, Geology, and Sociology.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.BOT.1		Students will be introduced to the study of plants and gardening basics	Standard Reference
	SCI.BOT.1.1	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.BOT.1.2	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.BOT.1.3	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	HS-LS1-5
	SCI.BOT.1.4	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	HS-LS1-7
	SCI.BOT.1.5	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	HS-LS2-5
	SCI.BOT.1.6	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	HS-LS1-4
Vocabulary			

SCI.BOT.2		Students will investigate the structures and functions of plants.	Standard Reference
	SCI.BOT.2.1	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms	HS-LS1-4
	SCI.BOT.2.2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.BOT.2.3	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	HS-LS2-5
	SCI.BOT.2.4	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	HS-LS1-7
Vocabulary			

SCI.BOT.3		Students will investigate the structures and functions of roots, stems, leaves and seeds.	Standard Reference
	SCI.BOT.3.1	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	HS-LS1-5
	SCI.BOT.3.2	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	HS-LS2-5
	SCI.BOT.3.3	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
Vocabulary			

SCI.BOT.4		Students will learn the classification of plants, the biomes they live in and their role in ecology.	Standard Reference
	SCI.BOT.4.1	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to	HS-LS1-6

		form amino acids and/or other large carbon-based molecules.	
	SCI.BOT.4.2	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions	HS-LS2-3
	SCI.BOT.4.3	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	HS-LS2-4
	SCI.BOT.4.4	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	HS-LS2-1
	SCI.BOT.4.5	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales	HS-LS2-2
	SCI.BOT.4.6	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
	SCI.BOT.4.7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	HS-LS2-7
	SCI.BOT.4.8	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*	HS-LS4-6
Vocabulary			

Chemistry

Purpose Statement:	Topics we will explore in the class include, but may not be limited to, structure of atoms, chemical bonding and reactions, and states of matter. Students will examine all of these both qualitatively and quantitatively, at macroscopic and microscopic scales.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.CHEM.1		Students will practice appropriate laboratory safety habits.	Standard Reference
	SCI.CHEM.1.1	Identify the locations and proper uses of laboratory safety equipment.	
	SCI.CHEM.1.2	Demonstrate appropriate behaviors in the science laboratory.	
	SCI.CHEM.1.3	Describe appropriate responses to laboratory accidents.	
	SCI.CHEM.1.4	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.	HS-ETS1-3
Vocabulary			

SCI.CHEM.2		Students will describe, predict, and explain the properties of the atom, including nuclear structure, quantum mechanics, and trends on the periodic table.	Standard Reference
	SCI.CHEM.2.1	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	HS-PS1-8
	SCI.CHEM.2.2	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	HS-PS4-1
	SCI.CHEM.2.3	Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle	HS-PS4-3

		model, and that for some situations one model is more useful than the other.	
	SCI.CHEM.2.4	Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	HS-PS4-5
	SCI.CHEM.2.5	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	HS-PS1-1
	SCI.CHEM.2.6	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.CHEM.3		Students will describe, explain, and apply the properties of Ionic and Covalent Bonding.	Standard Reference
	SCI.CHEM.3.1	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.	HS-PS2-6
	SCI.CHEM.3.2	Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	HS-PS3-5
	SCI.CHEM.3.3	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.	HS-PS1-4
	SCI.CHEM.3.4	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of materials.	HS-PS2-6
	SCI.CHEM.3.5	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	HS-PS1-5
	SCI.CHEM.3.6	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	HS-PS1-2

	SCI.CHEM.3.7	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	HS-PS3-1
	SCI.CHEM.3.8	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects)	HS-PS3-2
	SCI.CHEM.3.9	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.CHEM.4		Students will predict, explain, and appropriately represent the patterns and outcomes of various chemical reactions.	Standard Reference
	SCI.CHEM.4.1	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	HS-PS1-2
	SCI.CHEM.4.2	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.	HS-PS1-4
	SCI.CHEM.4.3	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	HS-PS1-5
	SCI.CHEM.4.4	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	HS-PS1-6
	SCI.CHEM.4.5	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction	HS-PS1-7
	SCI.CHEM.4.6	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.CHEM.5		Students will apply the mole concept to carry out stoichiometric calculations (quantitative relationships in chemical reactions).	Standard Reference
	SCI.CHEM.5.1	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction	HS-PS1-7
	SCI.CHEM.5.2	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	HS-PS1-6
	SCI.CHEM.5.3	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	HS-PS1-5
	SCI.CHEM.5.4	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.CHEM.6		Students will predict, explain, and apply the properties of gases, liquids, solids, and solutions.	Standard Reference
	SCI.CHEM.6	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	HS-PS1-1
	SCI.CHEM.6	Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscopic scale to infer the strength of electrical forces between particles.	HS-PS1-3
	SCI.CHEM.6	Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	HS-PS1-6
	SCI.CHEM.6	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	HS-PS1-5
	SCI.CHEM.6	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other	HS-PS3-1

		component(s) and energy flows in and out of the system are known.	
	SCI.CHEM.6	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects)	HS-PS3-2
	SCI.CHEM.6	Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	HS-PS3-5
	SCI.CHEM.6	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	HS-PS3-4
	SCI.CHEM.6	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

Chemistry of Food

Purpose Statement:	This class is an introductory chemistry course for students who are interested in pursuing a career in Culinary Arts. Students will receive instruction in food chemistry, food handling and food preparation from the perspective of safely preparing and handling food.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.CF.1		Students will explain and use the metric system effectively and demonstrate the scientific method	Standard Reference
	SCI.CF.1.1	Design a solution to a complex real-world problem by breaking it down to smaller, more manageable parts that can be solved through engineering.	HS-ETS1-2
Vocabulary			

SCI.CF.2		Students will evaluate the chemistry procedures necessary to produce a food product.	Standard Reference
	SCI.CF.2.1	Construct and revise an explanation of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table and knowledge of the patterns of chemical properties.	HS-PS1-2
	SCI.CF.2.2	Apply scientific principles and evidence to provide and explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which the rate a reaction occurs.	HS-PS1-5
	SCI.CF.2.3	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for social needs and wants.	HS-ETS1-1
	SCI.CF.2.4	Refine the design of a chemical system by specifying a change in condition that would produce increased products at equilibrium.	HS-PS1-6
Vocabulary			

Entomology

Purpose Statement:	Students will investigate what contributes to the success of insects and learn to appreciate the diversity and importance of insects. Students will study the development of insects and their relatives, external and internal anatomical modifications, physiological processes and the impact they have on human society.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.ENT.1		Students, though the use of models, will be able to demonstrate insect morphology, growth, behavior, development, and reproduction.	Standard Reference
	SCI.ENT.1.1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.ENT.1.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.ENT.1.3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.ENT.1.4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	HS-LS1-4
	SCI.ENT.1.5	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	HS-LS3-1
	SCI.ENT.1.6	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.ENT.1.7	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
	SCI.ENT.1.8	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in	HS-LS4-2

		number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	
	SCI.ENT.1.9	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	HS-LS4-5
Vocabulary			

SCI.ENT.2		Students will evaluate the structures of an insect and determine its taxonomy.	Standard Reference
	SCI.ENT.2.1	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.ENT.2.2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	HS-LS2-2
	SCI.ENT.2.3	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
Vocabulary			

SCI.ENT.3		Students will evaluate the effectiveness of a pest management plan they produce.	Standard Reference
	SCI.ENT.3.1	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	HS-LS2-7
	SCI.ENT.3.2	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
	SCI.ENT.3.3	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*	HS-LS4-6
Vocabulary			

SCI.ENT.4		Students will use simulations to evaluate the effectiveness of insecticides and their effects on humans and the environment.	Standard Reference
	SCI.ENT.4.1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	HS-LS2-1
	SCI.ENT.4.2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	HS-LS2-2
	SCI.ENT.4.3	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
Vocabulary			

SCI.ENT.5		Students will determine if an insect is useful or not in the environment through the use of interactives and simulations.	Standard Reference
	SCI.ENT.5.1	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
	SCI.ENT.5.2	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	HS-LS4-6
Vocabulary			

Forensics I

Purpose Statement:	This course will integrate science, mathematics, and writing skills to provide the fundamentals to understand and perform elementary crime scene investigation and evidence collection in common techniques from the study of hair to fingerprinting, blood typing and spattering, and determining meaning, manner, mechanism, cause and time of death and toxicology. Field trips, labs, and real case studies will be used to involve students in hands-on learning. It will involve some biology, chemistry, and physics applications.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.FOR1.1		Students will practice the application of the skills of unbiased observations in a crime scene.	Standard Reference
	SCI.FOR1.1.1	Observe pictures of objects and crime scenes and report out observations.	
	SCI.FOR1.1.2	Create an experiment to measure the observation skills of others.	
	SCI.FOR1.1.3	Determine the significance of observation of a crime scene in the real world by reporting use of non-biased observation and witness testimony in case studies.	HS-ETS1-5
	SCI.FOR1.1.4	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.FOR1.2		Students will process a crime scene with crime scene sketches, photographs, evidence and witness statements.	Standard Reference
	SCI.FOR1.2.1	Identify members of the response team at a crime scene and catalog their role.	
	SCI.FOR1.2.2	Photograph evidence, location, conditions, angles, and distance shots at a crime scene.	
	SCI.FOR1.2.3	Sketch a crime scene using both rough and final drafts to scale.	
	SCI.FOR1.2.4	Identify the types of evidence; collecting, packaging, and labeling it as appropriate.	

	SCI.FOR1.2.5	Identify types of witnesses and what information they provide. Including eyewitness, character witness, expert witness.	
	SCI.FOR1.2.6	Identify the misteps in processing crime scenes using previous cases. *(Examples include JonBenet Ramsey, O.J. Simpson, etc)*.	HS-STS1-3
	SCI.FOR1.2.7	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.FOR1.3		Students will process and identify types of hair evidence collected at a simulated crime scene.	Standard Reference
	SCI.FOR1.3.1	Locate, collect, and process hair from a mock crime.	
	SCI.FOR1.3.2	Make slides using hair evidence and a microscope to identify the cuticle, medulla, and follicle.	
	SCI.FOR1.3.3	Compare and contrast human and animal hair.	
	SCI.FOR1.3.4	Develop a logical argument using evidence from a mock crime scene to identify a suspect(s) to matching hair evidence.	
	SCI.FOR1.3.5	Describe how hair is used as evidence in solving a crime using case studies.	
	SCI.FOR1.3.6	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	HS-ETS1-1
	SCI.FOR1.3.7	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.FOR1.4		Students will process fiber and textile evidence, determining fiber types, thread counts, and weave patterns to solve a crime.	Standard Reference
	SCI.FOR1.4.1	Distinguish between natural and synthetic fibers using tests such as burning, chemical breakdown, microscope analysis, and staining.	
	SCI.FOR1.4.2	Identify the type of weave and thread count in a textile.	
	SCI.FOR1.4.3	develop a logical argument including and excluding suspects with evidence in a mock crime to identify matching fibers or textiles.	

	SCI.FOR1.4.4	Describe how fibers and textiles are used as evidence in solving crimes using case studies.	
	SCI.FOR1.4.5	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.FOR1.5		Students will observe, collect, and identify botany or pollen evidence when solving crimes.	Standard Reference
	SCI.FOR1.5.1	Classify plants based on structure and function. Examples of classification types may include gymnosperms vs. angiosperms, species identification using a dichotomous key etc.	
	SCI.FOR1.5.2	Make slides of spores, seeds, and different flower parts to observe and identify structures in plants and fungi.	
	SCI.FOR1.5.3	Compare and contrast how different types of plants reproduce.	
	SCI.FOR1.5.4	Report on how plant and fungi evidence can contribute to solving a crime using case studies.	
	SCI.FOR1.5.5	Compare and contrast between spores, seeds, and endospores.	
	SCI.FOR1.5.6	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.FOR1.6		Students will locate, identify, and lift different types of fingerprints left at crime scenes.	Standard Reference
	SCI.FOR1.6.1	Fingerprint a peer and be fingerprinted.	
	SCI.FOR1.6.2	Identify and pinpoint a multitude of fingerprint minutiae.	
	SCI.FOR1.6.3	Analyze and compare and contrast multiple fingerprints to include and exclude suspects from mock crimes scenes.	
	SCI.FOR1.6.4	Identify the criteria and limitations of how fingerprints can contribute to solving a crime using case studies.	
	SCI.FOR1.6.5	Describe and practice different types of lifting techniques (dusting, fuming, photographing, etc.) for different types of fingerprints (latent, patent, and plastic).	

	SCI.FOR1.6.6	compare and contrast the technological advantage of AIFIS and CODUS to paper ten-cards in immediate identification of suspects.	
	SCI.FOR1.6.7	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.FOR1.7		Students will identify DNA uses and types that can contribute to solving a crime.	Standard Reference
	SCI.FOR1.7.1	Compare and contrast between nuclear and mitochondrial DNA, chromosomes, STR's, and YSTR's, introns, and exons, and the uses and/or functions for each.	HS-LS3-1
	SCI.FOR1.7.2	Explain why mitochondria have a chromosome and how it identifies female lineage and why YSTR's are important in identifying members of the same male lineage.	HS-LS3-2
	SCI.FOR1.7.3	Report impact of DNA evidence on the past, present and the future of society. This may include information from The Innocence Project, CODUS, NAMUS, PCR, private genetic testing labs, and the development of DNA analysis technology.	HS-PS4-2
	SCI.FOR1.7.4	Extract DNA in the classroom.	
	SCI.FOR1.7.5	Analyze and report the information from electropherograms to determine familial relationships	
	SCI.FOR1.7.6	Relate how DNA evidence can contribute to strengthening the solving of a crime using case studies.	
	SCI.FOR1.7.7	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.FOR1.8		Students will use blood types and measuring blood spatter shapes/formations that contribute to solving a crime.	Standard Reference
	SCI.FOR1.8.1	Compare and contrast the different types of blood, calculate their statistical proportions in populations, and describe how antigens carried on them can narrow suspects to class or near individual-type of evidence.	HS-LS3-3

	SCI.FOR1.8.2	Measure the change in size, shape, and number of satellites of a blood drop due to changes in height of the drop.	HS-PS2-2 HS-PS2-4
	SCI.FOR1.8.3	Measure the change in length and width of a blood drop to find the incoming angle of the blood and use this measurement and the lines of convergence to calculate the area of origin the blood came from using trigonometry.	
	SCI.FOR1.8.4	Correctly identify blood type by analyzing antibody test outcomes and explain why the blood is clotting or not.	
	SCI.FOR1.8.5	Identify and explain spatter types and velocities using pictures.	
	SCI.FOR1.8.6	Provide details on how blood type and spatter can contribute to solving a crime using case studies.	HS-ETS1-5
	SCI.FOR1.8.7	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

SCI.FOR1.9		Students will identify toxins, drugs, and poisons, along with their effects, using various schedules and formats based on their potency, origin, and composition, along with legal status.	Standard Reference
	SCI.FOR1.9.1	Identify and justify the schedule and classification of different drugs.	
	SCI.FOR1.9.2	Describe the impacts and effects of drug/alcohol use to societies.	HS-ETS1-1 HS-ETS1-3
	SCI.FOR1.9.3	Apply instances of how toxicology can contribute to solving a crime using case studies.	HS-ETS1-5
	SCI.FOR1.9.4	Evaluate the validity and reliability of claims in a variety of materials.	HS-ETS1-5
Vocabulary			

Forensics II

Purpose Statement:	Students will analyze crime scenes and evidence found at crimes scenes. Students will investigate the science behind the several evidence types and when the evidence has been or could be used. Anthropology, casts and impressions, tool marks, firearms and ballistics, glass, soil, entomology, death and handwriting analysis will be studied.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.FOR2.1		Students will critique the usefulness of anthropology in solving a crime.	Standard Reference
	SCI.FOR2.1.1	Outline/report out from textbook basic information about entomology including history, human skeleton, skeletal differences between males and females, major sutures and age determination, skeletal differences between asian, african and european descent and overall forensic value.	
	SCI.FOR2.1.2	Chart and illustrate the skeletal differences between males and females	
	SCI.FOR2.1.3	Identify all major bones in the human body.	
	SCI.FOR2.1.4	Identify all major sutures in the body.	
	SCI.FOR2.1.5	Determine the age, ethnicity or sex of remains given specific information.	
	SCI.FOR2.1.6	Describe the anatomy of bones.	
	SCI.FOR2.1.7	Conclude identity of Romanov remains based on anthropological evidence provided.	
Vocabulary			

SCI.FOR2.2		Students will critique the usefulness of casts and impressions in solving a crime.	Standard Reference
	SCI.FOR2.2.1	Outline/report out from textbook basic information about casts and impressions including technology used, impression and cast types and overall forensic value.	
	SCI.FOR2.2.2	Practice an impression casting technique.	
	SCI.FOR2.2.3	Collect data about shoe size, foot size and height to analyze if there is a pattern or connection.	

	SCI.FOR2.2.4	Analyze and compare and contrast tire tracks.	
	SCI.FOR2.2.5	Analyze information about bite marks in order to determine importance in a crime.	
	SCI.FOR2.2.6	Use case studies to evaluate the usefulness of cast and impression evidence to solve a crime.	
Vocabulary			

SCI.FOR2.3		Students will critique the usefulness of tool marks in solving a crime.	Standard Reference
	SCI.FOR2.3.1	Outline/report out from textbook basic information about tool marks including technology used, impression and cast types, tool types and overall forensic value.	
	SCI.FOR2.3.2	Analyze, compare and contrast several screwdriver and chisel pictures to determine a match.	
	SCI.FOR2.3.3	Analyze, compare and contrast several hammer impressions to determine a match.	
	SCI.FOR2.3.4	Design a mock lineup of tools and tool found at crime scene. Students will provide tool impressions for each option and crime scene impression. Also they must provide analysis questions and answers.	
	SCI.FOR2.3.5	Use case studies to evaluate the usefulness of tool mark evidence to solve a crime.	
Vocabulary			

SCI.FOR2.4		Students will critique the usefulness of ballistics in solving a crime.	Standard Reference
	SCI.FOR2.4.1	Outline/report out from textbook basic information about ballistics including history, technology used, types of firearms, bullet trajectory, gun powder residue and overall forensic value.	
	SCI.FOR2.4.2	Calculate bullet trajectory.	
	SCI.FOR2.4.3	Compare and contrast bullet and firing pin pictures.	
	SCI.FOR2.4.4	Compare the accuracy of different firearms.	
	SCI.FOR2.4.5	Illustrate and identify different types and parts of firearms.	
	SCI.FOR2.4.6	Use case studies to evaluate the usefulness of ballistic evidence to solve a crime.	

Vocabulary	

SCI.FOR2.5		Students will critique the usefulness of glass in solving a crime.	Standard Reference
	SCI.FOR2.5.1	Outline/report out from textbook basic information about glass evidence including history, technology, glass types, shatter patterns and overall forensic value.	
	SCI.FOR2.5.2	Compare the densities of different types of glass.	
	SCI.FOR2.5.3	Analyze and describe glass fracture pattern pictures.	
	SCI.FOR2.5.4	Compare and contrast refractive indexes of different glass types.	
	SCI.FOR2.5.5	Use case studies to evaluate the usefulness of glass evidence to solve a crime.	
Vocabulary			

SCI.FOR2.6		Students will critique the usefulness of soil examination in solving a crime.	Standard Reference
	SCI.FOR2.6.1	Outline/report out from textbook basic information about entomology including history, usefulness in postmortem interval, anatomy of insects, forensically important species and life cycle of the blow fly.	
	SCI.FOR2.6.2	Research and present information on the main soil orders of the world.	
	SCI.FOR2.6.3	Compare and contrast different types of soils and minerals based on characteristics and physical properties.	
	SCI.FOR2.6.4	Use case studies to evaluate the usefulness of soil examination to solve a crime.	
Vocabulary			

SCI.FOR2.7		Students will critique the usefulness of entomology in solving a crime.	Standard Reference
	SCI.FOR2.7.1	Outline/report out from textbook basic information about entomology including history, usefulness in postmortem interval, anatomy of insects, forensically important species and life cycle of the blow fly.	

	SCI.FOR2.7.2	Illustrate and explain the life cycle of a blow fly including stages with a timeline, respiration, feeding behaviors.	
	SCI.FOR2.7.3	Calculate the accumulated degree hours using insect identification information.	
	SCI.FOR2.7.4	Determine the significance of entomology in the real world by reporting use of entomology in case studies.	
Vocabulary			

SCI.FOR2.8		Students will critique the usefulness of understanding of death in solving a crime.	Standard Reference
	SCI.FOR2.8.1	Outline/report out from textbook basic information about death including manner, causes, mechanisms, history, autopsy, algor mortis, livor mortis, rigor mortis.	
	SCI.FOR2.8.2	Discuss the emotional and psychological aspects of death to empathise with humanity. (Reading article, guest speakers, watching video)	
	SCI.FOR2.8.3	Calculate post mortem interval using algor mortis and varying environmental conditions.	
	SCI.FOR2.8.4	Calculate post mortem interval using rigor mortis and varying environmental conditions.	
	SCI.FOR2.8.5	Calculate post mortem interval using livor mortis and varying environmental conditions.	
	SCI.FOR2.8.6	Analyze death scene evidence including algor mortis, livor mortis, rigor mortis and environmentals conditions or other circumstances to determine a post mortem interval.	
	SCI.FOR2.8.7	Use case studies to evaluate the usefulness of mechanisms, manner, causes of death to solve a crime.	
Vocabulary			

SCI.FOR2.9		Students will critique the usefulness of handwriting analysis in solving a crime.	Standard Reference
	SCI.FOR2.9	Outline/report out from textbook basic information about handwriting including history, handwriting characteristics for analysis and forensic use.	

	SCI.FOR2.9	Explain the difference between fraud, forgery and how handwriting and counterfeit relate to both.	
	SCI.FOR2.9	Analyze paper money and identify important features of 1, 5, 10 and 20 dollar bills	
	SCI.FOR2.9	Analyze and compare handwriting samples using the 12 handwriting characteristics.	
	SCI.FOR2.9	Determine the significance of handwriting analysis in the real world by reporting use of handwriting analysis in case studies.	
Vocabulary			

Forestry/Natural Resources

Purpose Statement:	Students will investigate the establishing forests and other natural resources by natural and artificial means, maintaining and surveying forests and natural resources, identifying and protecting trees and natural resources, practicing silviculture, measuring trees and land, mapping, preparing for timber and natural resources sales and harvest, employing multiple-use resource management keeping and records.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Resources for this class include but are not limited to:

Wyoming Fish And Game Regional Office in Green River Wyoming
United States Forest Service – Ashley National Forest
Grand Teton National Forest
Yellowstone National Forest
Western Wyoming Community College

Benchmarks:

SCI.FRS.1		Students will discover the components of a forest and learn about their structure and function.	Standard Reference
	SCI.FRS.1.1	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.FRS.1.2	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
	SCI.FRS.1.3	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	HS-LS1-5
	SCI.FRS.1.4	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	HS-LS2-3
Vocabulary			

SCI.FRS.2		Students will learn about how aquaculture relates to a healthy forest.	Standard Reference
	SCI.FRS.2.1	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.FRS.2.2	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	HS-LS1-5
	SCI.FRS.2.3	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
Vocabulary			

SCI.FRS.3		Students will be able to determine what constitutes a healthy forest	Standard Reference
	SCI.FRS.3.1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales	HS-LS2-1 WY
	SCI.FRS.3.2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	HS-LS2-2
	SCI.FRS.3.3	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
	SCI.FRS.3.4	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity	HS-LS2-7
	SCI.FRS.3.5	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
Vocabulary			

SCI.FRS.4		Students will learn about forest product production and careers associated with product production.	Standard Reference
	SCI.FRS.4.1	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
	SCI.FRS.4.2	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	HS-LS2-7
	SCI.FRS.4.3	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
Vocabulary			

SCI.FRS.5		Students will learn about their state's forest and the contribution it makes to the state economy.	Standard Reference
	SCI.FRS.5.1	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	HS-LS4-6
Vocabulary			

SCI.FRS.6		Students will learn about urban forest management.	Standard Reference
	SCI.FRS.6.1	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.FRS.6.2	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.FRS.6.3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	HS-LS2-3 WY
	SCI.FRS.6.4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	HS-LS2-4
	SCI.FRS.6.5	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	HS-LS2-1

	SCI.FRS.6.6	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
	SCI.FRS.6.7	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	HS-LS4-6
	SCI.FRS.6.8	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
Vocabulary			

SCI.FRS.7		Students will learn about the forest's natural resources.	Standard Reference
	SCI.FRS.7.1	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	HS-LS1-5
	SCI.FRS.7.2	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	HS-LS1-6
	SCI.FRS.7.3	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy	HS-LS1-7
	SCI.FRS.7.4	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	HS-LS2-3
	SCI.FRS.7.5	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	HS-LS2-4
	SCI.FRS.7.6	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	HS-LS2-5
	SCI.FRS.7.7	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis	HS-LS1-3

	SCI.FRS.7.8	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.FRS.7.9	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
Vocabulary			

SCI.FRS.8		Students will learn about forest wildlife management.	Standard Reference
	SCI.FRS.8.1	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
	SCI.FRS.8.2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.FRS.8.3	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species	HS-LS4-5
	SCI.FRS.8.4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	HS-LS4-4
	SCI.FRS.8.5	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	HS-LS4-3
	SCI.FRS.8.6	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment .	HS-LS4-2
	SCI.FRS.8.7	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	HS-LS4-1

Vocabulary	

SCI.FRS.9		Students will learn about forests around the world.	Standard Reference
	SCI.FRS.9.1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	HS-LS4-`
	SCI.FRS.9.2	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	HS-LS4-5
	SCI.FRS.9.3	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	HS-LS4-4
	SCI.FRS.9.4	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.FRS.9.5	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity	HS-LS4-6 WY
	SCI.FRS.9.6	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
	SCI.FRS.9.7	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
	SCI.FRS.9.8	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales	HS-LS2-1
	SCI.FRS.9.9	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	HS-LS2-2
Vocabulary			

Genetics

Purpose Statement:	Students will investigate the inheritance patterns of living things. Students will be expected to utilize genetic concepts and apply them to living things.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.GEN.1		Students will learn the steps of mitosis, meiosis and the structure of chromosomes.	Standard Reference
	SCI.GEN.1.1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.GEN.1.2	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	HS-LS1-4
	SCI.GEN.1.3	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	HS-LS3-1
	SCI.GEN.1.4	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.GEN.1.5	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
Vocabulary			

SCI.GEN.2		Students will investigate the basics of Mendelian genetics.	Standard Reference
	SCI.GEN.2.1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	HS-LS4-1
	SCI.GEN.2.2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual	HS-LS4-2

		reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	
	SCI.GEN.2.3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	HS-LS4-3
Vocabulary			

SCI.GEN.3		Students will investigate the influence of sex chromosomes on traits, diseases, and gender.	Standard Reference
	SCI.GEN.3.1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	HS-LS4-1
	SCI.GEN.3.2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	HS-LS4-2
	SCI.GEN.3.3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	HS-LS4-3
	SCI.GEN.3.4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	HS-LS4-4
	SCI.GEN.3.5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	HS-LS4-5
Vocabulary			

SCI.GEN.4			Standard Reference
	SCI.GEN.4.1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	HS-LS3-1
	SCI.GEN.4.2	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
Vocabulary			

SCI.GEN.5		Students will explore the concept of molecular genetics.	Standard Reference
	SCI.GEN.5	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.GEN.5	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
	SCI.GEN.5	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
Vocabulary			

SCI.GEN.6		Students will investigate recombinant DNA and its' contemporary issues.	Standard Reference
	SCI.GEN.6.1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	HS-LS3-1
	SCI.GEN.6.2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
Vocabulary			

SCI.GEN.7		Students will study populations genetics.	Standard Reference
	SCI.GEN.7.1	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
Vocabulary			

Geology

Purpose Statement:	Students will investigate the physical processes involved in the formation and shaping of our planet. They will analyze the formation of the Earth and Earth-moon system, the physical changes through geological time, the composition of the Earth, and the geophysical, seismic, and morphological processes with resulting landforms and structures (Topics can focus on or include the geology of Wyoming).

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.GEO.1		Students will determine what physical geology is, and explain why we study it, differentiate between the Earth systems, compare and contrast the two heat engines, explain the processes in the rock cycle, compare and contrast plate tectonics and continental drift, and explain and apply isostatic rebound.	Standard Reference
	SCI.GEO.1.1	Define what geology, and physical geology is and explain the practical aspects for studying geology.	
	SCI.GEO.1.2	Explain, and be able to apply the Earth's systems to the changes on Earth's surface for the rest of the course.	HS-ESS2-2 HS-ESS2-4
	SCI.GEO.1.3	Differentiate between the Earth's two heat engines and apply how they affect the Earth.	HS-ESS2-3 HS-ESS2-4 HS-ESS1-1
	SCI.GEO.1.4	Differentiate between, and model the compositional and mechanical layers of the Earth.	HS-ESS2-3
	SCI.GEO.1.5	Distinguish between the three types of rocks that make up the Earth and explain the rock cycle.	
	SCI.GEO.1.6	Differentiate between oceanic and continental crust and their characteristics.	
	SCI.GEO.1.7	Research the basics of the theory of plate tectonics and the development of this theory.	
	SCI.GEO.1.8	Explain the process of isostatic adjustment and apply it to plate tectonics and surficial processes.	
	SCI.GEO.1.9	Evaluate the validity and reliability of claims in a variety of materials.	HS-ESS1-5
Vocabulary		lithification, asthenosphere, lithosphere, atmosphere, hydrosphere, convergence, divergence, equilibrium, geosphere, isostatic adjustment,	

	transform boundary, subduction zone, biosphere, Earth system, igneous rock, sedimentary rock, metamorphic rock, core, mantle, crust.

SCI.GEO.2		Students will analyze the formation of the Earth, it's compositional structure, and the origin of the Earth-moon system.	Standard Reference
	SCI.GEO.2.1	Analyze evidence of how the Big Bang resulted in the composition of matter in the universe.	HS-ESS1-2
	SCI.GEO.2.2	Sequence the formation of the Earth and Ur minerals from the elements formed in a previously existing star.	HS-ESS1-3 HS-ESS1-6
	SCI.GEO.2.3	Analyze evidence explaining the differentiation of the Earth into its compositional layers.	HS-ESS1-6
	SCI.GEO.2.4	Analyze evidence supporting the formation of the Earth - moon system.	HS-ESS1-6 HS-ESS1-4
	SCI.GEO.2.5	Apply scientific reasoning and analyze evidence from ancient Earth materials, meteorites and other planetary surfaces to construct an account of the age of the Earth.	HS-ESS1-6
	SCI.GEO.2.6	Evaluate the validity and reliability of claims in a variety of materials.	HS-ESS1-5
Vocabulary		differentiation, meteor, asteroid, meteorite, Nebular Hypothesis, planetesimal, solar nebula, nova, supernova, Big Bang Theory, solar wind, gravity	

SCI.GEO.3		Students will research the physical changes occuring on the Earth over geological time, the role of fossils and formation of the geological time scale.	Standard Reference
	SCI.GEO.3.1	Explain and apply the four basic geological principles for the remainder of the course.	
	SCI.GEO.3.2	Analyze evidence showing how the age of the Earth is determined and apply the basic geologic principles to determine geologic events in relative time.	HS-ESS1-6
	SCI.GEO.3.3	Analyze the role of fossils and index fossils in the formation of the geological time scale.	HS-ESS2-7
	SCI.GEO.3.4	Determine the role of radioactive isotopes in numerically dating rocks and the Earth and applying it to the geological time scale.	
	SCI.GEO.3.5	Evaluate evidence of the past and current movements of continental and oceanic crust and the	HS-ESS1-5

		theory of plate tectonics to explain the age of the earth.	
	SCI.GEO.3.6	Explore to determine the role of extinctions in the development of the geologic time scale.	HS-ESS2-7
	SCI.GEO.3.7	Interpret a sequence of rock using the basic principles, unconformities, fossils and faults to develop a geologic history of the sequence.	
	SCI.GEO.3.8	Evaluate the validity and reliability of claims in a variety of materials.	HS-ESS1-5
Vocabulary		actualism, angular unconformity, contacts, correlation, cross-cutting relationships, disconformity, eras, epochs, extinction, faunal succession, formation, half-life, inclusion, index fossil, isotopes, isotopic dating, lateral continuity, nonconformity, numerical age, original horizontality, periods, physical continuity, Precambrian, radioactive decay, standard geologic time scale, superposition, unconformity, uniformitarianism	

SCI.GEO.4		Students will identify the elemental and mineral composition of the Earth's crust.	Standard Reference
	SCI.GEO.4.1	Describe the components of an atom, and covalent, ionic and electrical bonding.	
	SCI.GEO.4.2	Investigate and determine the eight most common elements found in the Earth.	HS-ESS1-3
	SCI.GEO.4.3	Analyze the formation of the silicon- oxygen tetrahedron as the basic building block of the most prevalent minerals making up the Earth; the silicates.	
	SCI.GEO.4.4	Analyze the formation of the different silicate crystals by the bonding of the silicon-oxygen tetrahedrons.	
	SCI.GEO.4.5	Identify the different characteristics of minerals with emphasis on the silicates.	
	SCI.GEO.4.6	Investigate the other major categories of minerals and identify and name one mineral from each group.	
	SCI.GEO.4.7	Test and identify 15 different minerals based upon their characteristics.	
	SCI.GEO.4.8	Apply Bowen's Reaction Series to explain the sequence of silicate crystallization from a melt.	
	SCI.GEO.4.9	Analyze how oxygen isotopes can provide information on past climate change.	

Vocabulary	bonding, Bowen's Reaction Series, chain silicate structure, covalent bonding, crystal form, element, ferromagnesium mineral, fracture, framework silicate structure, ion, ionic bonding, isolated silicate structure, isotope, metallic bonding,

SCI.GEO.5		Students will identify the geomorphological processes that shape the Earth's topographic features.	Standard Reference
	SCI.GEO.5.1	Differentiate between weathering, erosion, transportation and deposition.	
	SCI.GEO.5.2	Differentiate between mechanical and chemical weathering processes.	
	SCI.GEO.5.3	Investigate and identify the agents of mechanical weathering.	HS-ESS2-5
	SCI.GEO.5.4	Investigate and identify the processes/agents involved in chemical weathering.	HS-ESS2-5 HS-ESS2-2
	SCI.GEO.5.5	Investigate the products of weathering to determine why clays are so abundant.	
	SCI.GEO.5.6	Research and create a model of a topographical landform as a result of the different geomorphological processes.	HS-ESS2-3
	SCI.GEO.5.7	Research soil erosion and the factors involved including how, rates, and consequences. They will analyze this to the Dust Bowl of the 1930's and predict whether this could occur again today.	
	SCI.GEO.5.8	Investigate, understand and create a model of the inorganic carbon cycle.	HS-ESS2-6
	SCI.GEO.5.9	Evaluate the validity and reliability of claims in a variety of materials.	HS-ESS1-5
Vocabulary		carbonic acid,cementation,chemical weathering, carbonic acid, clay mineral, compaction, deposition. differential weathering, dissolution, erosion, exfoliation, exfoliation dome, frost action,frost heaving, frost wedging, geomorphology, hematite, limonite, lithified, mechanical weathering, oxidation, pressure release, sediments,sedimentary rock, sheet joint, soil, spheroidal weathering, transportation, weathering	

SCI.GEO.6		Students will identify the geological resources of the Earth, the extraction of them and environmental impact of their extraction.	Standard Reference
	SCI.GEO.6.1	Research the energy resources of the Earth: coal, petroleum, and uranium.	
	SCI.GEO.6.2	Research both sides of the hydraulic fracturing issue and and write an opinion paper regarding hydraulic fracturing and the possible environmental impacts of it.	HS-ESS3-2 HS-ESS2-2
	SCI.GEO.6.3	Research the metallic and nonmetallic geological resources.	
	SCI.GEO.6.4	Research and analyze the environmental impact of resource extraction on the Earth.	HS-ESS3-6 HS-ESS3-1
	SCI.GEO.6.5	Evaluate or refine a technological solution that reduces the impacts of human activities on natural resources.	HS-ESS3-4
	SCI.GEO.6.6	Research the role of fresh water as an vital and invaluable (priceless) natural geologic resource and develop and explain an idea to solve a complex real world problem involving a lack of fresh water.	HS-ETS1-2 HS-ESS3-3
	SCI.GEO.6.7	Evaluate the validity and reliability of claims in a variety of materials.	HS-ESS1-5
Vocabulary		coal, coal bed methane, heavy crude, hydrothermal vein, natural gas, nonrenewable resource, oil field, oil (tar) sand, oil shale, ore, petroleum. Placer deposit, reserve, reservoir rock, resources, source rock, strip mining, structural (for oil)l trap	

SCI.GEO.7		Students will identify the internal geophysical properties of the Earth, how they apply to plate tectonics, and the resulting physical structures on the seafloor and on the continents.	Standard Reference
	SCI.GEO.7.1	Investigate and analyze evidence for convection currents.	HS-ESS2-3
	SCI.GEO.7.2	Analyze the theory of plate tectonics and compare and contrast the “push-pull” and “pull-push” versions of plate motion.	
	SCI.GEO.7.3	Define the different tectonic forces and the types of plate boundaries associated with each of the forces.	

	SCI.GEO.7.4	Research and identify the different physical structures formed by each of the different types of plate boundaries.	HS-ESS2-1
	SCI.GEO.7.5	Analyze how the earth's core generates the protective magnetic field and predict what could happen when the core completely solidifies.	
	SCI.GEO.7.6	Analyze how earthquake waves provide evidence for the earth's internal structure.	
	SCI.GEO.7.7	Analyze evidence for mantle plumes and compare and contrast the effects of them in oceanic crust and continental crust. (Hawaii vs, Yellowstone)	HS-ESS2-3
	SCI.GEO.7.8	Evaluate the validity and reliability of claims in a variety of materials.	HS-ESS1-5
Vocabulary		active continental margin, anomaly, asthenosphere, convection, convergent plate boundary, crustal rebound, divergent plate boundary, fracture zone, geophysics, geothermal gradient, heat flow,island arc, isostasy, isostatic adjustment, lithosphere, magmatic arc, magnetic field, magnetic pole, magnetic reversal, mantle plume, mid-ocean ridge, oceanic trench, passive continental margin, plate, plate tectonics, pelagic sediment, P-wave shadow zone, paleomagnetism, rift valley, seamount, sea-floor spreading, subduction, S-wave shadow zone, seismic reflection, seismic refraction, terrigenous sediment,transform fault, transform boundary, turbidity current,	

SCI.GEO.8		Students will identify the forces that produce tectonic movement, Earth's structural change, faults, and mountain building.	Standard Reference
	SCI.GEO.8.1	Differentiate between stress and strain, and apply them to the behavior of rocks.	
	SCI.GEO.8.2	Differentiate between a dome and a basin, and identify and label strike and dip on a diagram of each.	
	SCI.GEO.8.3	Differentiate between anticlines and synclines, and identify and label a diagram of each.	
	SCI.GEO.8.4	Differentiate between folded and fault-block mountains and give an example of each.	
	SCI.GEO.8.5	Differentiate between joints and faults.	
	SCI.GEO.8.6	Diagram each type of fault and label the motions of each.	
	SCI.GEO.8.7	Identify and label diagrams of the four types of folds.	

	SCI.GEO.8.8	Evaluate the validity and reliability of claims in a variety of materials.	HS-ESS1-5
Vocabulary		Accreted terrane, angle of dip, anticline, axial plane, brittle, compressive stress, craton, dip-slip fault, direction of dip, ductile, elastic limit, fault, fault-block mountains, fold, fold and thrust belts, footwall, geologic cross section, geologic map, hanging wall, hinge line, isoclinal fold, joint, joint set, left-lateral fault, limb, major mountain belt, mountain range, normal fault, oblique-slip fault, open fold, orogeny, overturned fold, Precambrian shield, plunging fold, recumbent fold, reverse fault, right-lateral fault, shear stress, strain, stress, strike, strike-slip fault, structural basin, structural dome, syncline, tensional stress, thrust fault.	

SCI.GEO.9		Students will identify the types of volcanoes and earthquakes and how they relate to the tectonic forces of the earth.	Standard Reference
	SCI.GEO.9.1	Analyze how different types of subducting plate boundaries result in different chemical compositions of lava and the resulting types of volcanoes.	HS-ESS2-4 HS-ESS2-3
	SCI.GEO.9.2	Compare and contrast volcanism on earth with volcanism throughout the solar system.	
	SCI.GEO.9.3	Understand that an earthquake occurs as the stress in a rock is released in waves, and analyze the motions of the four types of earthquake waves.	
	SCI.GEO.9.4	Analyze past earthquake activity and apply it to predict future earthquake activity.	
	SCI.GEO.9.5	Using designated materials, design and construct an earthquake resistant building and test it against the four types of earthquake waves.	HS-ETS1-3
	SCI.GEO.9.6	Analyze the Pacific Rim and its relationship to volcanoes, earthquakes and plate boundaries.	
	SCI.GEO.9.7	Using the time-travel curve, plot the epicenter of a given earthquake.	
	SCI.GEO.9.8	Evaluate the validity and reliability of claims in a variety of materials.	HS-ESS1-5
Vocabulary		aftershock, Benioff Zone, body wave, Block, bomb,caldera, cinder cone, circum-Pacific belt, composite volcano, depth of focus, earthquake, elastic rebound theory, epicenter, extrusive, focus, felsic, intensity, intermediate, intrusive, lava tube, Love-wave, mafic, magnitude, Mediterranean belt, Modified Mercalli scale, moment magnitude, P-wave, phenocryst, pillow basalt, pyroclastic flow, pyroclast, Rayleigh waves, Richter scale, S-wave,	

	seismic sea wave, seismic wave, surface wave, shield volcano, travel-time curve, tsunami, viscosity, volcanic dome,

Herpetology

Purpose Statement:	Students will survey the origin, evolution, systematics, taxonomy and diversity of amphibians and non-avian reptiles.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.HEP.1		Students will understand and learn the taxonomy scheme of the Herps.	Standard Reference
	SCI.HEP.1.1	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.HEP.1.2	Evaluate the evidence supporting claims that changes in environmental conditions may result in: 1) increases in the number of individuals of some species, 2) the emergence of new species over time, and 3) the extinction of other species.	HS-LS4-5
	SCI.HEP.1.3	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	HS-LS4-6
	SCI.HEP.1.4	Evaluate the evidence for the role of group behavior on individual and species chances to survive and reproduce.	HS-LS2-8
	SCI.HEP.1.5	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	HS-LS2-7
	SCI.HEP.1.6	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
	SCI.HEP.1.7	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.HEP.1.8	Construct an explanation based on evidence for how natural selection leads to the adaptation of populations.	HS-LS4-4
Vocabulary			

SCI.HEP.2		Students will choose a Herp of their choice and produce a plan to save them.	Standard Reference
	SCI.HEP.2.1	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	HS-LS2-7
Vocabulary			

Marine Science

Purpose Statement:	Students will investigate coastal and marine systems. Students will learn about the chemical and physical properties of these systems and the interrelationships that surround them.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.MS.1		Students will apply an understanding of atomic and molecular structure to explain the properties of matter and predict outcomes of chemical and nuclear reactions.	Standard Reference
	SCI.MS.1.1	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	HS-PS1-1
	SCI.MS.1.2	Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscopic scale to infer the strength of electrical forces between particles.	HS-PS1-3
	SCI.MS.1.3	Apply scientific principles and use evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	HS-PS1-5
Vocabulary			

SCI.MS.2		Students will explain and illustrate with examples how living systems interact with the biotic and abiotic environment.	Standard Reference
	SCI.MS.2.1	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms	HS-LS1-2
	SCI.MS.2.2	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms	HS-LS1-4
	SCI.MS.2.3	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy	HS-LS1-5
	SCI.MS.2.4	Construct explanations and revise as needed based on evidence for 1) How carbon, hydrogen, and oxygen form sugar molecules may combine with	HS-LS1-6

		other elements to form amino acids and/or other large carbon-based molecules, and 2) How other hydrocarbons may also combine to form large carbon-based molecules.	
	SCI.MS.2.5	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of sugar molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	HS-LS1-7
	SCI.MS.2.6	Use mathematical and/or computational representations to support explanations of factors that affect carry capacity of ecosystems at different scales.	HS-LS2-1
	SCI.MS.2.7	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	HS-LS2-2
	SCI.MS.2.8	Evaluate the claims, evidence and reasoning that complex biotic and abiotic interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a modified ecosystem.	HS-LS2-6
Vocabulary			

SCI.MS.3		Students will describe how humans are dependent on the diversity of resources provided by the Earth and Sun.	Standard Reference
	SCI.MS.3.1	Evaluate the evidence supporting claims that changes in environmental conditions may result in: 1) increases in the number of individuals of some species, 2) the emergence of new species over time, and 3) the extinction of other species.	HS-LS4-5
	SCI.MS.3.2	Create and/or use a simulation to evaluate the impacts of human activity on biodiversity.	HS-LS4-6
Vocabulary			

SCI.MS.4		Students will evaluate evidence that Earth's geosphere, atmosphere, hydrosphere and biosphere interact as a complex system.	Standard Reference
	SCI.MS.4.1	Evaluate the evidence supporting claims that changes in environmental conditions may result in: 1) increases in the number of individuals of some species, 2) the emergence of new species over time, and 3) the extinction of other species.	HS-LS4-5
	SCI.MS.4.2	Create and/or use a simulation to evaluate the impacts of human activity on biodiversity.	HS-LS4-6
Vocabulary			

SCI.MS.5		Students will explain how biological evolution accounts for the unity and diversity of living organisms.	Standard Reference
	SCI.MS.5.1	Construct an explanation based on evidence that the process of evolution primarily results from four factors: 1) The potential for a species to increase in number, 2) The heritable genetic variation of individuals in a species due to mutation and sexual reproduction, 3) competition for limited resources, and 4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	HS-LS4-2
	SCI.MS.5.2	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable traits tend to increase in proportion to organisms lacking this trait.	HS-LS4-3
	SCI.MS.5.3	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	HS-LS4-4
Vocabulary			

SCI.MS.6		Students will be able to analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living system's dependence on natural selection.	Standard Reference
	SCI.MS.6.1	Use mathematical and/or computational representations to support explanations of factors that affect carry capacity of ecosystems at different scales.	HS-LS2-1

	SCI.MS.6.2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	HS-LS2-2
	SCI.MS.6.3	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere and geosphere.	HS-LS2-5
	SCI.MS.6.4	Evaluate and assess impacts on the environment and biodiversity in order to refine or design a solution for detrimental impacts or enhancement for positive impacts.	HS-LS2-7
	SCI.MS.6.5	Evaluate the evidence for the role of group behavior on individual and species chances to survive and reproduce.	HS-LS2-8
Vocabulary			

Meteorology

Purpose Statement:	Students will investigate the dynamic processes at play within the Earth's fluid atmosphere and how these processes produce weather. Students will learn about the origin and evolution of Earth's atmosphere, the structure and characteristics of the atmosphere, the Earth/Sun relationship and its influence on the seasons solar and terrestrial radiation, the hydrologic cycle the gas laws, global circulation, weather systems and weather maps.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.MT.1		Students will explore Earth's atmosphere, origin, composition, and structure.	Standard Reference
	SCI.MT.1.1	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.	HS-ESS2-2
	SCI.MT.1.2	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	HS-ESS2-3
	SCI.MT.1.3	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	HS-ESS2-4
	SCI.MT.1.4	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	HS-ESS2-6
Vocabulary			

SCI.MT.2		Student will explore solar and terrestrial radiation.	Standard Reference
	SCI.MT.2.1	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	HS-ESS2-6
	SCI.MT.2.2	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	HS-ESS2-3
Vocabulary			

SCI.MT.3		Students will investigate the hydrologic cycle.	Standard Reference
	SCI.MT.3.1	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	HS-ESS2-5
Vocabulary			

SCI.MT.4		Students will observe and discover forms of condensation and precipitation.	Standard Reference
	SCI.MT.4.1	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	HS-ESS2-5
Vocabulary			

SCI.MT.5		Students will learn the gas laws and apply them to weather phenomena.	Standard Reference
	SCI.MT.5.1	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	HS-ESS2-4
Vocabulary			

SCI.MT.6		Students will research, observe and discuss global atmospheric circulation and air masses.	Standard Reference
	SCI.MT.6.1	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	HS-ESS2-3
Vocabulary			

SCI.MT.7		Students will learn to observe and identify weather patterns and fronts.	Standard Reference
	SCI.MT.7.1	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	HS-ESS2-3
Vocabulary			

SCI.MT.8		Students will explore what causes our violent weather phenomena.	Standard Reference
	SCI.MT.8.1	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	HS-ESS2-3
Vocabulary			

Microbiology

Purpose Statement:	Students will investigate microorganisms, viruses, bacteria, fungi, protozoa, and multicellular parasites, and the roles they play in our lives. Included is a study of how some of these organisms cause disease. Students will be expected to utilize the microscope on their own in the study of these organisms. They will also learn how to culture some organisms using sterile techniques.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.MC.1		Students will explore the basics of microbial existence and detection.	Standard Reference
	SCI.MC.1.1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	HS- LS1-1
	SCI.MC.1.2	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	HS-LS1-4
	SCI.MC.1.3	Take and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	HS-LS3-2
	SCI.MC.1.4	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
	SCI.MC.1.5	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	HS-LS4-1
	SCI.MC.1.6	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	HS-LS4-2

	SCI.MC.1.7	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	HS-LS4-5
Vocabulary			

SCI.MC.2		Students will apply the laboratory skills to be able to identify bacteria and its' characteristics.	Standard Reference
	SCI.MC.2.1	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	HS-PS1-3
	SCI.MC.2.2	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.	HS-PS2-6
Vocabulary			

SCI.MC.3		Students will explore eukaryotic cells and prokaryotic cells including viruses, structure and function.	Standard Reference
	SCI.MC.3.1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.MC.3.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.MC.3.3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
	SCI.MC.3.4	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors	HS-LS3-2
	SCI.MC.3.5	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms	HS-LS1-4
	SCI.MC.3.6	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new	HS-LS3-2

		genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors	
	SCI.MC.3.7	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population	HS-LS3-3
	SCI.MC.3.8	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	HS-PS3-1
Vocabulary			

SCI.MC.4		Students will learn about the microbial ecology, applications in the food industry, and medical microbiology.	Standard Reference
	SCI.MC.4.1	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	HS-PS1-5
	SCI.MC.4.2	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	HS-PS3-3
	SCI.MC.4.3	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	HS-LS1-5
	SCI.MC.4.4	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	HS-LS2-3
	SCI.MC.4.5	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
Vocabulary			

Pharmacology

Purpose Statement:	Students will develop an understanding of the basic concepts of pharmacology. Students will investigate pharmaceuticals that have an effect on the cardiopulmonary, vascular, central and peripheral nervous system, and antimicrobial drugs on the human body. Student will utilize case studies to evaluate treatments or misuse of drugs. The history of pharmacology as well as herbal medicine will also be addressed.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.PHM.1		Students will evaluate the importance of herbal medicine on modern pharmacological concoctions.	Standard Reference
	SCI.PHM.1.1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	HS-ESS3-1
	SCI.PHM.1.2	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.PHM.1.3	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.PHM.1.4	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3
Vocabulary			

SCI.PHM.2		Students will have a working knowledge of how drugs act and be able to identify the general drug effect for newly marketed drugs.	Standard Reference
	SCI.PHM.2.1	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis	HS-LS1-3
	SCI.PHM.2.2	Construct an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions, and revise as needed	HS-LS2-3

Vocabulary	

SCI.PHM.3		Students will gain perspective on the way drugs are dosed and understand drug-dosing curves.	Standard Reference
	SCI.PHM.3.1	Use the periodic table as a miel to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	HS-PS1-1
	SCI.PHM.3.2	Construct an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table and knowledge of chemical properties, and revise, as needed.	HS-PS1-2
	SCI.PHM.3.3	Apply scientific principles and use evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	HS-PS1-5
	SCI.PHM.3.4	Evaluate the design of a chemical system by changing conditions to produce increased amounts of products at equilibrium, and refine the design, as needed.	HS-PS1-6
Vocabulary			

SCI.PHM.4		Students will critically evaluate new pharmacological trends in research and assert how the knowledge may be used by users of the drugs produced by this research.	Standard Reference
	SCI.PHM.4.1	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	HS-ETS1-2
	SCI.PHM.4.2	Evaluate a solution to a real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability and aesthetics, as well as possible social, cultural, and environmental impacts.	HS-ETS1-3
	SCI.PHM.4.3	Use a computer simulation to model the impact of proposed solutions to a real-world problem with numerous criteria and constraints on interactions	HS-ETS1-4

		within and between systems relevant to the problem.	
Vocabulary			

Physics

Purpose Statement:	Students will use observational data to calculate everyday phenomenon in both translational and rotational systems.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.PHYS.1		Students will use calculations to make predictions about an object in motion in one dimensional situations.	Standard Reference
	SCI.PHYS.1.1	Calculate displacements, average velocities and instantaneous velocities in real world style problems.	HS-PS2-1
	SCI.PHYS.1.2	Use factor label methods to convert between different measurement systems along with getting the correct units to place on measurements.	HS-PS2-1
	SCI.PHYS.1.3	Read motion diagrams to tell the distance, displacement, position, time, velocity, constant acceleration of an object at a given time.	HS-PS2-1
	SCI.PHYS.1.4	Calculate acceleration, initial velocity, final velocity and displacement of an object given other pieces of the equation.	HS-PS2-1
	SCI.PHYS.1.5	Use free-fall on the Earth to predict the position of an object.	HS-PS2-1
Vocabulary			

SCI.PHYS.2		Students will use calculations to make predictions about an object in motion in two dimensional situations.	Standard Reference
	SCI.PHYS.2.1	Take a vector and break it into its component vectors both graphically and geometrically.	HS-PS2-1
	SCI.PHYS.2.2	Add/subtract multiple vectors in any directions and be able to describe the resultant vector.	HS-PS2-1
	SCI.PHYS.2.3	Calculate positions of an object that is moving through a two dimensional system where the object could be acceleration in either coordinate.	HS-PS2-1
	SCI.PHYS.2.4	Relate and predict objects when different frames of reference are used.	HS-PS2-1

Vocabulary	

SCI.PHYS.3		Students will calculate using Newton's three laws of motion to predict macroscopic objects position.	Standard Reference
	SCI.PHYS.3.1	Recognize the four universal forces.	HS-PS2-1
	SCI.PHYS.3.2	Recognize objects that are obeying Newton's 1st law of motion and calculate the forces on an object during this time.	HS-PS2-1
	SCI.PHYS.3.3	Use Newton's 2nd law to predict changes in an object's motion.	HS-PS2-1
	SCI.PHYS.3.4	Use mathematical representations to predict the gravitational forces between objects using Newton's Law of Gravitation.	HS-PS2-1
	SCI.PHYS.3.5	Use Newton's 3rd law to draw free-body diagrams of objects that interact with each other.	HS-PS2-1
	SCI.PHYS.3.6	Predict positions, velocities and accelerations of objects with friction and inclined planes.	HS-PS2-1
	SCI.PHYS.3.7	Apply Newton's Laws to real world situations.	HS-PS2-1
Vocabulary			

SCI.PHYS.4		Students will create or apply a computational model to calculate the change in the energy of one component in a system when the change in energy flows in and out of the system are known.	Standard Reference
	SCI.PHYS.4.1	Use the Work-Energy Theorem to convert work into initial and final kinetic energy when no energy is lost in the system.	HS-PS3-3
	SCI.PHYS.4.2	Use the Work-Energy Theorem when potential energy is added to the system.	HS-PS3-3
	SCI.PHYS.4.3	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	HS-PS3-3
Vocabulary			

SCI.PHYS.5		Students will use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	Standard Reference
	SCI.PHYS.5.1	Be given equations and derivations of how impulse and momentum relate.	HS-PS2-2
	SCI.PHYS.5.2	Use mathematical representations to work problems with conservation of momentum.	HS-PS2-2
	SCI.PHYS.5.3	Determine the difference between elastic and inelastic collisions and solve problems related to these differences.	HS-PS2-2
	SCI.PHYS.5.4	Solve problems in two dimensions using energy and momentum combined.	HS-PS2-2
Vocabulary			

SCI.PHYS.6		Students will take take their background from translational systems and relate it into rotary systems.	Standard Reference
	SCI.PHYS.6.1	Take translational equations and see the relationship in rotary systems.	HS-PS2-1
	SCI.PHYS.6.2	Solve problems using centripetal forces.	HS-PS2-1
	SCI.PHYS.6.3	Solve problems using Kepler's Laws.	HS-PS2-1
Vocabulary			

SCI.PHYS.7		Students can solve real world problems that work with rotational equilibrium and rotational dynamics.	Standard Reference
	SCI.PHYS.7.1	Take the relationship of Newton's 2nd law and convert it into torque. Then solve problems using this new equation.	HS-PS2-1
	SCI.PHYS.7.2	Use torque and forces to show equilibrium in two conditions on problems.	HS-PS2-1
	SCI.PHYS.7.3	Solve problems that use torque to cause angular accelerations.	HS-PS2-1
	SCI.PHYS.7.4	Solve problems that add rotational kinetic energy.	HS-PS3-3
	SCI.PHYS.7.5	Solve problems that add angular momentum.	HS-PS2-2
Vocabulary			

The Science of Wyoming

Purpose Statement:	In this unique class about the state of Wyoming, students will learn about the diversity of living things in the state, how our national parks show the geological history of the state, the contrasts between the eastern side and western side in terms of weather and why it happens, and the ecosystems represented in the state.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.WY.1		Students will explore the geological and ecological systems of Big Horn Canyon.	Standard Reference
	SCI.WY.1.1	Evaluate evidence of the past and current movement of continental and oceanic crust and the theory of plate tectonics to explain the ages of the crustal rocks.	HS-ESS1-5
	SCI.WY.1.2	Develop a model to illustrate how the Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	HS-ESS2-1
	SCI.WY.1.3	Analyze geoscience data to make the claim that one change to Earth's surface can create feedback's that cause changes to other Earth systems.	HS-ESS2-2
	SCI.WY.1.4	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit.	HS-ESS3-2
	SCI.WY.1.5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts on Earth's systems.	HS-ESS3-5
Vocabulary			

SCI.WY.2		Students will explore the geological and ecological systems of Devils' Tower.	Standard Reference
	SCI.WY.2.1	Evaluate evidence of the past and current movement of continental and oceanic crust and the theory of plate tectonics to explain the ages of the crustal rocks.	HS-ESS1-5

	SCI.WY.2.2	Develop a model to illustrate how the Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	HS-ESS2-1
	SCI.WY.2.3	Analyze geoscience data to make the claim that one change to Earth's surface can create feedback's that cause changes to other Earth systems.	HS-ESS2-2
	SCI.WY.2.4	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit.	HS-ESS3-2
	SCI.WY.2.5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts on Earth's systems.	HS-ESS3-5
Vocabulary			

SCI.WY.3		Students will explore the geological and ecological systems of Fossil Butte National Monument.	Standard Reference
	SCI.WY.3.1	Evaluate evidence of the past and current movement of continental and oceanic crust and the theory of plate tectonics to explain the ages of the crustal rocks.	HS-ESS1-5
	SCI.WY.3.2	Develop a model to illustrate how the Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	HS-ESS2-1
	SCI.WY.3.3	Analyze geoscience data to make the claim that one change to Earth's surface can create feedback's that cause changes to other Earth systems.	HS-ESS2-2
	SCI.WY.3.4	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit.	HS-ESS3-2
	SCI.WY.3.5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts on Earth's systems.	HS-ESS3-5
Vocabulary			

SCI.WY.4		Students will explore the geological and ecological systems of Hot Springs National Park.	Standard Reference
	SCI.WY.4.1	Evaluate evidence of the past and current movement of continental and oceanic crust and the theory of plate tectonics to explain the ages of the crustal rocks.	HS-ESS1-5
	SCI.WY.4.2	Develop a model to illustrate how the Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	HS-ESS2-1
	SCI.WY.4.3	Analyze geoscience data to make the claim that one change to Earth's surface can create feedback's that cause changes to other Earth systems.	HS-ESS2-2
	SCI.WY.4.4	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit.	HS-ESS3-2
	SCI.WY.4.5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts on Earth's systems.	HS-ESS3-5
Vocabulary			

SCI.WY.5		Students will explore the geological and ecological systems of The Grand Tetons.	Standard Reference
	SCI.WY.5.1	Evaluate evidence of the past and current movement of continental and oceanic crust and the theory of plate tectonics to explain the ages of the crustal rocks.	HS-ESS1-5
	SCI.WY.5.2	Develop a model to illustrate how the Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	HS-ESS2-1
	SCI.WY.5.3	Analyze geoscience data to make the claim that one change to Earth's surface can create feedback's that cause changes to other Earth systems.	HS-ESS2-2
	SCI.WY.5.4	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit.	HS-ESS3-2
	SCI.WY.5.5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast	HS-ESS3-5

		of the current rate of global or regional climate change and associated future impacts on Earth's systems.	
Vocabulary			

SCI.WY.6		Students will explore the geological and ecological systems of Yellowstone National Park.	Standard Reference
	SCI.WY.6.1	Evaluate evidence of the past and current movement of continental and oceanic crust and the theory of plate tectonics to explain the ages of the crustal rocks.	HS-ESS1-5
	SCI.WY.6.2	Develop a model to illustrate how the Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	HS-ESS2-1
	SCI.WY.6.3	Analyze geoscience data to make the claim that one change to Earth's surface can create feedback's that cause changes to other Earth systems.	HS-ESS2-2
	SCI.WY.6.4	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit.	HS-ESS3-2
	SCI.WY.6.5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts on Earth's systems.	HS-ESS3-5
Vocabulary			

Zoology

Purpose Statement:	Students will survey the nine major phyla of the Animal Kingdom. Zoology is a course that deals with the study of animal life. Zoologists research everything they think to ask about animals including their anatomy, interrelationships, physiology, genetics, distributions and habitats.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

SCI.ZOO.1		Students will demonstrate the relationship between Earth and human activity.	Standard Reference
	SCI.ZOO.1.1	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations and biodiversity.	HS-ESS3-3
Vocabulary			

SCI.ZOO.2		Students will be able to form an explanation of the structure and function of organisms.	Standard Reference
	SCI.ZOO.2.1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out essential functions of life through systems of specialized cells.	HS-LS1-1
	SCI.ZOO.2.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	HS-LS1-2
	SCI.ZOO.2.3	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. (meiosis)	HS-LS-4
Vocabulary			

SCI.ZOO.3		Students will be able to evaluate the interactions, the flow of energy and the dynamics of an ecosystem.	Standard Reference
	SCI.ZOO.3.1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	HS-LS2-1

	SCI.ZOO.3.2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	HS-LS2-2
	SCI.ZOO.3.3	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	HS-LS2-4
	SCI.ZOO.3.4	Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6
	SCI.ZOO.3.5	Design, evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity	HS-LS2-7
	SCI.ZOO.3.6	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
Vocabulary			

SCI.ZOO.4		Students will be able to demonstrate the patterns of heredity and explain how variation of traits occur.	Standard Reference
	SCI.ZOO.4.1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the the instructions for characteristics traits passed from parents to offspring.	HS-LS3-1
	SCI.ZOO.4.2	Make and defend a claim based on evidence that inheritable genetic variations may result from: 1) new genetic combinations through meiosis, 2) viable errors occurring during replication, and/or 3)mutations caused by environmental factors..	HS-LS3-2
	SCI.ZOO.4.3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	HS-LS3-3
Vocabulary			

SCI.ZOO.5		Students will be able to synthesis evidence and construct and explanation of the wide diversity of life on Earth.	Standard Reference
	SCI.ZOO.5.1	Construct an explanation based on evidence that the process of Evolution primarily.	HS-LS4-2
	SCI.ZOO.5.2	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	HS-LS4-6
Vocabulary			

Appendix A

Sweetwater County School District #1
Pacing Guide

Grade/Course:		Teacher:	

Code	Benchmark	Time Frame	Assessment Period			
			1	2	3	4

Appendix B

Instructional Planning Resource

School:		**Teacher:**	
Subject/Course:		**Time required:**	

Benchmark:	
Learning Target:	**Standard Reference:**
	Tech Standard Reference:
	Cross-Curricular Standard Reference:
Formative Assessment: □ Oral □ Written □ Product □ Performance	
Criterion:	

Context (Relevancy) :		
Teacher Methods	**Student Activities**	**Resources**
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.
6.	6.	6.
7.	7.	7.

Intervention	**Enrichment**

Wyoming Science and Engineering Practices

1. Asking Questions & Defining Problems					
A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world(s) works and which can be empirically tested. Engineering questions clarify problems to determine criteria for successful solutions and identify constraints to solve problems about the designed world. Both scientists and engineers also ask questions to clarify ideas.					
Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.	**K-2**	• Ask questions based on observations to find more information about the natural and/or designed world(s).	• Ask and/or identify questions that can be answered by an investigation.	• Define a simple problem that can be solved through the development of a new or improved object or tool.	
Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.	**3-5**	• Ask questions about what would happen if a variable is changed.	• Identify scientific (testable) and non-scientific (non-testable) questions. • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.	• Use prior knowledge to describe problems that can be solved. • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.	
Asking questions and defining problems in 6–8 builds on K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.	**6-8**	Ask questions • that arise from careful observation of phenomena, models, or unexpected results, to clarify and/or seek additional information. • to identify and/or clarify evidence and/or the premise(s) of an argument. • to determine relationships between independent and dependent variables and relationships in models.. • to clarify and/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 or the interpretation of a data set.	• 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.
Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.	**9-12**	Ask questions • that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information. • that arise from examining models or a theory, to clarify and/or seek additional information and relationships. • to determine relationships, including quantitative relationships, between independent and dependent variables. • to clarify and refine a model, an explanation, or an engineering problem.	• Evaluate a question to determine if it is testable and relevant. • Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.	• Ask and/or evaluate questions that challenge the premise(s) of an argument, the interpretation of a data set, or the suitability of a design.	• Define a design problem that involves the development of a process or system with interacting components and criteria and constraints that may include social, technical and/or environmental considerations.

Wyoming Science and Engineering Practices

2. Developing and Using Models

A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.

Modeling tools are used to develop questions, predictions and explanations; analyze and identify flaws in systems; and communicate ideas. Models are used to build and revise scientific explanations and proposed engineered systems. Measurements and observations are used to revise models and designs.

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.	**K-2**	• Distinguish between a model and the actual object, process, and/or events the model represents. • Compare models to identify common features and differences.	• Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).	• Develop a simple model based on evidence to represent a proposed object or tool.
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.	**3-5**	• Identify limitations of models.	• Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events. • Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. • Develop and/or use models to describe and/or predict phenomena.	• Develop a diagram or simple physical prototype to convey a proposed object, tool, or process. • Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.
Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.	**6-8**	• Evaluate limitations of a model for a proposed object or tool.	• Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events. • Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. • Develop and/or use models to describe and/or predict phenomena.	• Develop and/or 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.
Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s).	**9-12**	• Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism, or system in order to select or revise a model that best fits the evidence or design criteria. • Design a test of a model to ascertain its reliability.	• Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system. • Develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations.	• Develop a complex model that allows for manipulation and testing of a proposed process or system. • Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

Wyoming Science and Engineering Practices

3. Planning and Carrying Out Investigations				
Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters. Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.				
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.	**K-2**	• With guidance, plan and conduct an investigation in collaboration with peers (for K). • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.	• Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.	• Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons. • Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal. • Make predictions based on prior experiences.
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.	**3-5**	• Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.	• Evaluate appropriate methods and/or tools for collecting data.	• Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. • Make predictions about what would happen if a variable changes. • Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.
Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.	**6-8**	• Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. • Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.	• Evaluate the accuracy of various methods for collecting data.	• Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. • Collect data about the performance of a proposed object, tool, process, or system under a range of conditions.

Wyoming Science and Engineering Practices

3. Planning and Carrying Out Investigations				
Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters. Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.				
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.	**9-12**	• Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled. • Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. • Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.	• Select appropriate tools to collect, record, analyze, and evaluate data.	• Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated. • Manipulate variables and collect data about a complex model of a proposed process or system to identify failure points or improve performance relative to criteria for success or other variables.

Wyoming Science and Engineering Practices

4. Analyzing and Interpreting Data

Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis.

Engineering investigations include analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria—that is, which design best solves the problem within given constraints. Like scientists, engineers require a range of tools to identify patterns within data and interpret the results. Advances in science make analysis of proposed solutions more efficient and effective.

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.	**K-2**	• Record information (observations, thoughts, and ideas). • Use and share pictures, drawings, and/or writings of observations. • Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems. • Compare predictions (based on prior experiences) to what occurred (observable events).			• Analyze data from tests of an object or tool to determine if it works as intended.
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.	**3-5**	• Represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.	• Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.	• Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.	• Analyze data to refine a problem statement or the design of a proposed object, tool, or process. • Use data to evaluate and refine design solutions.
Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.	**6-8**	• Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships. • Use graphical displays (e.g., maps, charts, graphs, and/or 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 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/or 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.

Wyoming Science and Engineering Practices

4. Analyzing and Interpreting Data					
Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis. Engineering investigations include analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria—that is, which design best solves the problem within given constraints. Like scientists, engineers require a range of tools to identify patterns within data and interpret the results. Advances in science make analysis of proposed solutions more efficient and effective.					
Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.	**9-12**	• Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.	• Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.	• Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data. • Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations	• Evaluate the impact of new data on a working explanation and/or model of a proposed process or system. • Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

Wyoming Science and Engineering Practices

5. Using Mathematical and Computational Thinking					
In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; solving equations exactly or approximately; and recognizing, expressing, and applying quantitative relationships. Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions.					
Mathematical and computational thinking in K–2 builds on prior experience and progresses to recognizing that mathematics can be used to describe the natural and designed world(s).	**K-2**	• Decide when to use qualitative vs. quantitative data.	• Use counting and numbers to identify and describe patterns in the natural and designed world(s).	• Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.	• Use quantitative data to compare two alternative solutions to a problem.
Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.	**3-5**	• Decide if qualitative or quantitative data are best to determine whether a proposed object or tool meets criteria for success.	• Organize simple data sets to reveal patterns that suggest relationships.	• Describe, measure, estimate, and/or graph quantities such as area, volume, weight, and time to address scientific and engineering questions and problems.	• Create and/or use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem.
Mathematical and computational thinking in 6–8 builds on K–5 experiences and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.	**6-8**	• Use digital tools (e.g., computers) to analyze very large data sets for patterns and trends.	• Use mathematical representations to describe and/or support scientific conclusions and design solutions.	• Create algorithms (a series of ordered steps) to solve a problem. • Apply mathematical concepts and/or processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. • Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.	
Mathematical and computational thinking in 9-12 builds on K-8 and experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.	**9-12**	• Create and/or revise a computational model or simulation of a phenomenon, designed device, process, or system.	• Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.	• Apply techniques of algebra and functions to represent and solve scientific and engineering problems. • Use simple limit cases to test mathematical expressions, computer programs, algorithms, or simulations of a process or system to see if a model "makes sense" by comparing the outcomes with what is known about the real world. • Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, etc.).	

Wyoming Science and Engineering Practices

6. Constructing Explanations and Designing Solutions

The end-products of science are explanations and the end-products of engineering are solutions.

The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories.

The goal of engineering design is to find a systematic solution to problems that is based on scientific knowledge and models of the material world. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal requirements. The optimal choice depends on how well the proposed solutions meet criteria and constraints.

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.	**K-2**	• Use information from observations (firsthand and from media) to construct an evidence-based account for natural phenomena.		• Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem. • Generate and/or compare multiple solutions to a problem.	
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.	**3-5**	• Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).	• Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.	• Identify the evidence that supports particular points in an explanation.	• Apply scientific ideas to solve design problems. • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.
Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.	**6-8**	• Construct an explanation that includes qualitative or quantitative relationships between variables that predict(s) and/or describe(s) 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) and the assumption that 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/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events.	• Apply scientific reasoning to show why the data or evidence is adequate for the explanation or conclusion.	• Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system. • Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. • Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and re-testing.

Wyoming Science and Engineering Practices

6. Constructing Explanations and Designing Solutions					
The end-products of science are explanations and the end-products of engineering are solutions. The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories. The goal of engineering design is to find a systematic solution to problems that is based on scientific knowledge and models of the material world. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal requirements. The optimal choice depends on how well the proposed solutions meet criteria and constraints.					
Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.	**9-12**	• Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.	• Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that 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/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.	• Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.	• Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

Wyoming Science and Engineering Practices

7. Engaging in Argument from Evidence

Argumentation is the process by which evidence-based conclusions and solutions are reached.

In science and engineering, reasoning and argument based on evidence are essential to identifying the best explanation for a natural phenomenon or the best solution to a design problem.

Scientists and engineers use argumentation to listen to, compare, and evaluate competing ideas and methods based on merits.

Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims.

Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).	**K-2**	• Identify arguments that are supported by evidence. • Distinguish between explanations that account for all gathered evidence and those that do not. • Analyze why some evidence is relevant to a scientific question and some is not. • Distinguish between opinions and evidence in one's own explanations.	• Compare and refine arguments based on an evaluation of the evidence presented. • Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.	• Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.	• Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues. • Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).	**3-5**	• Compare and refine arguments based on an evaluation of the evidence presented. • Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.	• Respectfully provide and receive critiques from peers about a proposed procedure, explanation or model.by citing relevant evidence and posing specific questions.	• Construct and/or support an argument with evidence, data, and/or a model. • Use data to evaluate claims about cause and effect.	• Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.
Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).	**6-8**	• Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or 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.	• Construct, use, and/or present an oral and written argument 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 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.

Wyoming Science and Engineering Practices

7. Engaging in Argument from Evidence					
Argumentation is the process by which evidence-based conclusions and solutions are reached. In science and engineering, reasoning and argument based on evidence are essential to identifying the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation to listen to, compare, and evaluate competing ideas and methods based on merits. Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims.					
Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.	**9-12**	• Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues. • Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.	• Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence and challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining what additional information is required to resolve contradictions.	• Construct, use, and/or present an oral and written argument or counter-arguments based on data and evidence.	• Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge, and student-generated evidence. • Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and/or logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).

Wyoming Science and Engineering Practices

8. Obtaining, Evaluating, and Communicating Information					
Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to obtain information that is used to evaluate the merit and validity of claims, methods, and designs.					
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.	**K-2**	• Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).	• Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.	• Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.	• Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.
Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.	**3-5**	• Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence. • Compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices.	• Combine information in written text with that contained in corresponding tables, diagrams, and/or charts to support the engagement in other scientific and/or engineering practices.	• Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.	• Communicate scientific and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts.
Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.	**6-8**	• Critically read scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s).	• Integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings.	• Gather, read, synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. • Evaluate data, hypotheses, and/or conclusions in scientific and technical texts in light of competing information or accounts.	• Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.