SWEETWATER COUNTY SCHOOL DISTRICT #1

Science

K-12 CURRICULUM MAP

JUNE 2022

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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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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 build 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, 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. 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 science and engineering practices 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, and any relevant current events.
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	Students will explore the 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 phenoma in both translational and rotational systems.
The Science of Wyoming	In this unique class about the state of Wyoming, students will analyze the geological processes throughout Wyoming to explore how these have affected wildlife and settlement in the state. Students will also learn about the diversity of living things in the state, how different areas of the state 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, 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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 build 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	**Ask questions to obtain information about the relationship between the needs of different animals (including humans) and the places they live.**	K-ESS3-1
	SCI.K.2.3	**Discuss 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	**Ask questions, make observations, and gather information that can help solve a problem through the development of a new or improved object or tool.**	K-ETS1-1
	SCI.K.3.4	**Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.**	K-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	**Ask questions to obtain information about the relationship between the needs of different plants and the places they live.**	K-ESS3-1
	SCI.K.4.3	**Discuss 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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.**	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 properties of materials can be changed by cooling.	2-PS1-4
	SCI.2.1.3	**Obtain information 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
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. (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
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. 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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.

Quarter 1 Benchmark:

SCI.3.1		**Students will analyze organisms to identify how they are the same and different and how organisms adapt 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.

Quarter 2 Benchmark:

SCI.3.2		**Students will analyze environments and conditions for survival to determine the effects on organisms. Students will analyze the variation of organisms through the process of selection. (i.e. How does the environment affect organisms?)**	Standard Reference
	SCI.3.2.1	**Analyze and interpret data to provide evidence that plans and animals have trais inherited from their parent and that variation of these traits exists in a group of similar organisms.**	3-LS3-1
	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
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.

Quarter 3 Benchmark:

SCI.3.3		**Students will gather and display information to confirm that environments are different and predict consequences of possible problems with our environment today. Students will investigate and make predictions about the weather through careful observation of the clouds and win. (i.e. How do we know the environment used to be different?)**	Standard Reference
	SCI.3.3.1	**Make a claim about the 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.3.3.2	**Represent data in graphical displays to describe typical weather conditions expected during a particular season.**	3-ESS2-1
	SCI.3.3.3	**Obtain and combine information to describe climates in different regions of the world.**	3-ESS2-2
Vocabulary		define, fossils, hypothesis, consequences, regions, climates, claim	

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

Quarter 4 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 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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. (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 the transfer of energy and the cause and effect relationships between energy and collisions. (i.e. What happens when objects collide?)**	Standard Reference
	SCI.4.2.1	**Use evidence to construct an explanation relating the speed of an object to the energy of that object.**	4-PS3-1
	SCI.4.2.2	Ask questions and predict outcomes about the changes in energy that occur when objects collide.	4-PS3-3
	SCI.4.2.3	**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.4.3		**Students will analyze how energy is transferred from place to place, including sound, light, heat, and electric currents, and waves. (i.e. How do we move energy and information from place to place?)**	Standard Reference
	SCI.4.3.1	**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.4.3.2	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	4-PS3-4
	SCI.4.3.3	Generate and compare multiple solutions that use patterns to transfer information.	4-PS4-3
	SCI.4.3.4	**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
Vocabulary		beam, communicate, conduction, conductivity, illuminate, reflective, refraction, amplitude, wavelength, sound waves, transverse waves, longitudinal wave	

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

SCI.4.4		**Students will investigate features and processes of the Earth's surface. (i.e. What effect can water have on land?)**	Standard Reference
	SCI.4.4.1	**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.4.4.2	**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.4.4.3	**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, weathering, 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. (i.e. How can we reduce negative impacts of natural hazards and of resource use?)**	Standard Reference
	SCI.4.5.1	**Analyze and interpret data from maps to describe patterns of Earth's features.**	4-ESS2-2
	SCI.4.5.2	**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.4.5.3	**Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.**	4-ESS3-2
	SCI.4.5.4	**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		conservation, natural hazards, natural resources	

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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.**	Standard Reference
	SCI.5.1.1	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 (diagrams, flow charts, food chains/webs) to describe that energy in animals' food was once energy from the sun.**	5-PS3-1
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 analyze possible solutions to a problem occurring between two spheres and how society has used science to help this.**	Standard Reference
	SCI.5.2.1	**Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere and/or atmosphere interact.**	5-ESS2-1
	SCI.5.2.2	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.5.2.3	**Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.**	5-ESS3-1
	SCI.5.2.4	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
	SCI.5.2.5	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 to a community or purify water for drinking with limited money or materials).*	3-5-ETS1-1
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	Support an argument that the gravitational force exerted by Earth on objects is directed down.	5-PS2-1
	SCI.5.3.3	**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.5.3.4	**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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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	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.6.1.4	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	unicellular, multicellular, cell, cell membrane, cell wall, chloroplasts, mitochondrion, nucleus, function, organelle, tissues, organ, organ system, organism, systems, subsystems
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 (+subsystem). 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 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.6.2.1	Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	MS-LS1-3
	SCI.6.2.2	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.6.2.3	**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.6.2.4	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.6.2.5	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.6.2.6	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		unicellular, multicellular, cell, cell membrane, cell wall, chloroplasts, mitochondrion, nucleus, function, organelle, tissues, organ, organ system, organism, systems, subsystems, transpiration, precipitation, condensation, evaporation, groundwater, atmosphere, thermal energy, latitude, rotation, weather, climate	
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 (+subsystem). 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.6.3		**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.6.3.1	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.6.3.2	**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
Vocabulary		convection, temperature, ocean currents, density, Coriolis effect, thermal energy, conduction, radiation, matter, energy, mass	

	Review: Weather, climate, cycle, precipitation, condensation, evaporation, groundwater, ocean currents, atmosphere, latitude, altitude, temperature, wind, currents, system
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.6.4		**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.6.4.1	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.6.4.2	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	**Gather and synthesize information that sensory receptors respond to stimuli.**	MS-LS1-8
	SCI.6.4.5	**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, offspring, genetic variation, inherited trait, sexual reproduction, asexual reproduction, adaptation, alleles, dominant, recessive, chromosome, Punnett square, stimuli, response Review: weather, climate, atmosphere, latitude, oceanic currents, global winds, air mass
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.6.5		**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.6.5.1	**Apply scientific principles to design a method for monitoring, evaluating, and managing human impact on the environment.**	MS-ESS3-3
	SCI.6.5.2	Use evidence to support an explanation that plant and animal characteristics and behaviors increase their odds of reproduction.	MS-LS1-4
	SCI.6.5.3	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	MS-LS1-5
	SCI.6.5.4	**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.6.5.5	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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

Benchmarks:

SCI.7.1		**Students will develop and use models to predict and describe changes in state of a pure substance.** **Science and engineering practices (SEPs)** • Developing and using Models **Crosscutting concepts (CCCs)** • Structure and Function (of matter)	Standard Reference
	SCI.7.1.1	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems	MS-LS2-2
	SCI.7.1.2	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.7.1.3	Develop models to describe the atomic composition of simple molecules and extended structures.	MS-PS1-1
	SCI.7.1.4	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	MS-PS1-3
	SCI.7.1.5	**Develop a model that predicts and describes changes in particle motion when thermal energy is added or removed.**	MS-PS1-4
	SCI.7.1.6	**Develop a model that predicts and describes changes in temperature when thermal energy is added or removed.**	MS-PS1-4

	SCI.7.1.7	**Develop a model that predicts and describes changes in state of a pure substance when thermal energy is added or removed.**	MS-PS1-4
	SCI.7.1.8	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem	MS-LS2-3
Vocabulary		matter, mass, atom, molecule, states of matter, solid, liquid, gas, temperature, thermal energy, particle motion/kinetic energy	
Unit Progression		In this unit, students will develop detailed conceptual models of how atoms interact and change as they heat up. 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.	

SCI.7.2		**Students will develop a model to explain the basic structure of matter, signs of a chemical reaction, and the conservation of mass.** **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	**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.7.2.2	**Develop models to describe the atomic composition of simple molecules and extended structures.**	MS-PS1-1
	SCI.7.2.3	**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
Vocabulary		energy, molecules, atoms, compounds	
Unit Progression		In this unit, students **investigate** physical and chemical properties and chemical reactions in the contexts of basic chemical reactions. With chemical reactions, atoms rearrange their connections and form new substances. Chemical reactions also often involve the recycling of matter and mass is conserved.	

SCI.7.3		**Students will develop a model to explain how energy and matter flow through individual organisms through chemical reactions like photosynthesis.** **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.7.3.1	**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.7.3.2	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
Vocabulary		photosynthesis, respiration, organism, energy, molecules, glucose/sugar, chloroplast, chlorophyll	
Unit Progression		In this unit, students **investigate** 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.**	

SCI.7.4		**Students will develop a model based off of an investigation to explain how energy and matter flow through the spheres of the Earth at various time and spatial scales.** **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.7.4.1	**Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process**	**MS-ESS2-1**
	SCI.7.4.2	**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	cycle, energy, molecules, carbon 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 the geosphere, atmosphere, biosphere. With chemical reactions, atoms rearrange their connections and form new substances. 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.** 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.

SCI.7.5		**Students will develop a model based off of an investigation to explain how energy and matter flow through the spheres of the Earth at various time and spatial scales.** **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.7.5.1	**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
Vocabulary		convection currents, inner core, outer core, mantle, lithosphere, asthenosphere, crust, rock, mineral	
Unit Progression		In this unit, 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.	

SCI.7.6		**Students will analyze and interpret data to explain that matter and energy are cycled through all of the living and nonliving parts of the earth.** **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.7.6.1	**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.7.6.2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems	MS-LS2-2
	SCI.7.6.3	**Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem**	MS-LS2-3
Vocabulary		Ecosystem, population, growth, environment, competition, predator, prey, mutually beneficial, cause and effect, patterns, producer, consumer, decomposer, energy, living, non-living, conservation of mass, and conservation of energy, carrying capacity	
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 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.7.7		**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.7.7.1	**Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations**	MS-LS2-4
	SCI.7.7.2	Evaluate competing design solutions for maintaining biodiversity and ecosystem services	MS-LS2-5
	SCI.7.7.3	**Gather and make sense of information to describe that synthetic materials come from natural resources and impact society**	MS-PS1-3
	SCI.7.7.4	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.7.7.5	**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, populations, ecosystems, biomes, community, population density, invasive species, terrestrial, oceanic	
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.	

SCI.7.8		**Students will evaluate and analyze data to compare competing design solutions to construct, test, and modify a device that either releases or absorbs thermal energy by a chemical process.** **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.7.8.1	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.7.8.2	**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.7.8.3	**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.7.8.4	**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.7.8.5	**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		Iteration, criteria, constraints, prototype, exothermic, endothermic, system, environmental impact	
Unit Progression		In this unit, students **investigate** chemical reactions. With chemical reactions, atoms rearrange their connections and form new substances. Chemical reactions also often involve the absorption or release of energy.	

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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. identify and describe*:** **i. The components within the system** **ii. The criteria and constraints of the problem** **iii. How Newton's third law will be applied to design the solution to the problem.**	MS-PS2-1 MS-ETS1-1 MS-ETS1-2 MS-ETS1-3 MS-ETS1-4 MS-ETS2-2 WY
	SCI.8.1.3	**Design their solution within given criteria and constraints.**	

	SCI.8.1.4	**Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.**	
	SCI.8.1.5	**Analyze data from tests to revise and optimize their design solutions.**	
Vocabulary		mass, distance, displacement, speed, velocity, acceleration, force, Isaac Newton, Newton's First Law, Newton's Second Law, Newton's Third Law, balanced/unbalanced forces, inertia, energy, weight, gravity, force, friction, motion, newton, collide, net force	

SCI.8.2		**Students will use mathematical and computational thinking to describe relationships among potential and kinetic 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.8.2.1	**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.8.2.2	**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.8.2.3	**Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.**	MS-PS3-5
Vocabulary		Distance, mass, speed, energy, potential energy, kinetic energy, weight, gravity, force, friction, relative position, force, system, law of conservation of energy, motion	

SCI.8.3		**Students will construct a scientific explanation of how objects interact 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.8.3.1	**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.8.3.2	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	MS-PS2-3
	SCI.8.3.3	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
Vocabulary		gravity/gravitational force, mass, weight, non-contact force, mass, electric force, magnet, force field, electromagnetic force, magnetic field, attractive, repulsive, interacting objects, charged object, charged particle magnitude, current	

SCI.8.4		**Students will create a model to describe motions and patterns within our solar system.** **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.8.4.1	**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.8.4.2	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	MS-ESS1-2
	SCI.8.4.3	Analyze and interpret data to determine scale properties of objects in the solar system.	MS-ESS1-3

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, mass, weight, rotate, revolve, orbit, axis, mass, electric, magnet, force field, star, cyclic patterns, big bang theory, dust, gas, planet, asteroid, gravitational pull

SCI.8.5		**Students will analyze and interpret data from rock strata and the fossil record to determine patterns of change throughout Earth's history.** **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.8.5.1	**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.8.5.2	**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
Vocabulary		geologic time, extinction, diversity, fossil, variation, populations, fossil record, chronological order, law of superposition, petrification, sedimentary layers, radioactive dating, rock strata	

SCI.8.6		**Students will construct an explanation based on evidence that changes to biodiversity throughout geologic time are due to genetics and 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.8.6.1	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.8.6.2	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.8.6.3	**Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.**	MS-MS-LS4-6
	SCI.8.6.4	**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.8.6.5	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
Vocabulary		natural selection, evolution, adaptations, mutations, chromosomes, genes, dominant, recessive, generations, extinction, diversity, anatomy, variation, inheritance, traits, populations, evolve, common ancestry, evolutionary history, cell, proteins, sexual reproduction, beneficial, genetic variation, selective breeding, offspring, artificial selection, genetic engineering	

SCI.8.7		**Students will define problems related to human impact on ecosystems and propose solutions to mitigate those problems.** **Science and engineering practices (SEPs)** • Asking questions & defining problems **Crosscutting concepts (CCCs)** • Cause & Effect	Standard Reference
	SCI.8.7.1	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.8.7.2	**Apply scientific principles to design a method for monitoring, evaluating, and managing a human impact on the environment**	MS-ESS3-3 MS-ETS1-4
Vocabulary		natural resources, populations, consumption, carrying capacity, population density, human activity, species, population, environment, per capita, biosphere, consumption, extinction, natural resources, habitat	

SCI.8.8		**Students will describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.** **Science and engineering practices (SEPs)** • Asking questions & defining problems **Crosscutting concepts (CCCs)** • Cause & Effect (developing patterns)	Standard Reference
	SCI.8.8.1	**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.8.8.2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	MS-PS4-2
	SCI.8.8.3	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
Vocabulary		wave, transverse wave, longitudinal wave, crest, trough, compression, amplitude, frequency, wavelength, reflected, absorbed, transmit, digital signals, analog signals, simple wave, sound energy, vibration, pitch, medium, sound waves, light energy, transparent, kinetic energy, refraction, brightness, encode, wave pulse	

Physical Science

Purpose Statement:	Students will use science and engineering practices 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

SCI.PS.1		**Students will be able to develop models to illustrate the changes in composition of the nucleus of an atom during fission and fusion processes.**	Standard Reference
	SCI.PS.1.1	Illustrate the parts of an atom (*e.g., proton, electron, neutron*).	underpinning
	SCI.PS.1.2	Compare and contrast the four forces of nature (*e.g., strong and weak nuclear forces, electromagnetic, and gravitational*).	underpinning
	SCI.PS.1.3	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
	SCI.PS.1.4	**Develop models to illustrate the changes in composition of the nucleus of an atom and the energy released during the processes of fission, fusion, and radioactive decay.**	HS-PS1-8
Vocabulary		aton, nucleum, proton, neutron, electron, electron cloud, mass number, atomic weight, isotope, fission, fusion, radioactive decay, energy, 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	Compare and contrast trends of different types of bonds (*e.g., ionic, covalent, polar, non-polar, metallic).*	underpinning
	SCI.PS.2.2	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy levels of atoms.**	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	**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 knowleddge of the patterns of chemical properties, and revise, as needed.**	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, metals, nonmetals, metalloids, alkali metals, alkaline earth metals, halogens, noble gases, transition elements, representative elements, rare earth (inner transition) metals, products, reactants	

SCI.PS.3		**Students will define various types and forms of energy and explain real-world situations in terms of energy conservation and transfer.**	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	**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.3.3	Create or apply a computational model to calculate energy conversions as it flows in and out of a system.	HS-PS3-1
	SCI.PS.3.4	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

Vocabulary	kinetic energy, gravitational potential energy, elastic potential energy, Law of Conservation of Energy, mechanical energy, states of matter, phase changes, thermal energy (heat), nuclear energy, electromagnetic energy, electrical energy, radiant energy, light energy, sound energy, chemical energy

SCI.PS.4		**Students will describe wave properties and explain their applications in technology for information transfer.**	Standard Reference
	SCI.PS.4.1	**Use mathematical representations to solve for wave speed (v), wave frequency (f), or wavelength (λ) for waves in different types of 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	**Construct an explanation using technical information of how waves are used to transmit and capture energy and information in different devices.**	HS-PS4-5
	SCI.PS.4.4	Identify the advantages and disadvantages of using digital transmission and storage of information.	HS-PS4-2
Vocabulary		mechanical wave, electromagnetic wave, transverse wave, longitudinal wave, wavelength, wave amplitude, wave frequency, wave speed, constructive waves, destructive waves, photons, speed of light, media, $v=f \cdot \lambda$, digital wave pulses	

SCI.PS.5		**Students will analyze data to support Newton's second law of motion and evaluate how a device protects an object from damage during a collision.**	Standard Reference
	SCI.PS.5.1	Diagram forces (*e.g., free body diagram*) to predict the motion of an object.	underpinning
	SCI.PS.5.2	Explain how simple machines provide a mechanical advantage and how to improve their 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 model and explain the relationship between electricity and magnetism.**	Standard Reference
	SCI.PS.6.1	Model (*e.g., circuit diagrams*) and construct simple electrical circuits.	(underpinning)
	SCI.PS.6.2	**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.PS.6.3	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
	SCI.PS.6.4	**Conduct an investigation to provide evidence that an electric current can proeduce a magnetic field and that a changing magnetic field can produce a magnetic current.**	HS-PS2-5
Vocabulary		electron, proton, electricity, current, voltage, circuit, A/C, D/C, magnetic field, photon, magnetic pole	

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

Benchmarks:

SCI.BIO.1		**Students will list the characteristics of life and demonstrate how basic processes support the overall function of the hierarchy.**	Standard Reference
	SCI.BIO.1.1	**List and define the basic characteristics of life including:** ● **Homeostasis** ● **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	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.1.3	**Research and explain using evidence from a variety of sources how** **1. Carbon, hydrogen, and oxygen may combine with other elements to form**	HS-LS1-6

		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.*	
	SCI.BIO.1.4	Explain and give examples of homeostasis, including how positive and negative feedback mechanisms work together to stabilize or destabilize a system. (Include forms of active and passive transport in organisms) *NOTE: Assessment does not include the cellular processes involved in the feedback mechanism.*	HS-LS1-3
	SCI.BIO.1.5	**List the first nine levels of the hierarchy and develop a model to show how they work together for life to thrive and survive.**	HS-LS1-2
Vocabulary		atom, molecule, macromolecule, organelle, cell, tissue, organ, system, organism, population, community, ecosystem, biosphere, homeostasis, diffusion, osmosis, hypertonic, hypotonic, isotonic, hierarchy, amino acids, carbon-based molecule, hydrocarbon, lipid, carbohydrate, nucleic acid, protein, positive feedback loop, negative feedback loop, prokaryote, eukaryote	

SCI.BIO.2		**Students will diagram and explain how changes in DNA can affect organisms.**	Standard Reference
	SCI.BIO.2.1	**Create a model that illustrates the structure of DNA and RNA (transfer, messenger, and/or ribosomal).**	HS-LS1-1
	SCI.BIO.2.2	**Analyze provided 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.	

		Note: Types of mutations should include frame shift, insertion, deletion, and silent.	
	SCI.BIO.2.5	**Connect the processes of mitosis and meiosis to the creation and maintenance of 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 tissues/organs/systems that work together to meet the needs of the organism.)** *NOTE: Does not include specific gene control mechanisms.*	HS-LS1-4
	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, chromatin, sister chromatids, nucleotide-sugar, phosphate, nitrogenous base, codon, anticodon, amino acid, allele, dominant, recessive, heterozygous, homozygous, Punnett square, mutation, frame shift, insertion mutation, deletion mutation, silent mutation, mutagen, hierarchy	

SCI.BIO.3		**Students will construct an explanation for the processes of natural selection and evolution using multiple lines of evidence.**	Standard Reference
	SCI.BIO.3.1	**Define evolution and differentiate between evolution and natural selection.**	underpinning
	SCI.BIO.3.2	**Construct an explanation based on evidence that the process of evolution primarily results from the following four factors:**	HS-LS4-2

		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.** **4) The proliferation of those organisms that are better able to survive and reproduce in the environment.**	
	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.** *NOTE: Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems (such as ranges of seasonal tempature, long-term change in climate, acidity, light, geographic barriers, or evolution of other organisms) contribute to a change in gene frequency over time, leading to adaptation of populations).*	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.** *NOTE: Emphasis is on conceptual understanding of the role of each line of evidenence has in supporting the idea of common ancestry and biological evolution.* *NOTE: Clarification on taxonomy review – explaining how the phenotypic and genotypic relationships between organisms determine taxonomy and indicate a possible common ancestry.*	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.** *NOTE: Emphasis on determining the cause and effect relationship.*	HS-LS4-5
	SCI.BIO.3.6	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. *NOTE: Assessment is based on statistical and graphical analysis. Emphasis is on analyzing shifts in*	HS-LS4-3

		numerical distribution of traits and using these shifts as evidence to support explanations.	
Vocabulary		evolution, species, competition, biotic, abiotic, organism, population, community, ecosystem, 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, taxonomy	

SCI.BIO.4		**Students will construct a possible pathway for a carbon atom through a given ecosystem and justify their choices.**	Standard Reference
	SCI.BIO.4.1	**Interpret mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.** *NOTE: Mathematical representations include but are not limited to: graphs, diagrams, equations, physical models, formulas, pictures, and simulations.*	HS-LS2-4
	SCI.BIO.4.2	**Use a model (including but not limited to diagrams, chemical equations, conceptual models) to illustrate how photosynthesis transforms light energy into stored chemical energy.** *NOTE: Emphasis is on inputs and outputs of matter rather than the biochemical steps.*	HS-LS1-5
	SCI.BIO.4.3	**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.** *NOTE: 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.4.4	**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.4.5	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
Vocabulary		photosynthesis, cellular respiration, chloroplast, stroma, autotroph, heterotroph, thylakoid, CO_2, H_2O, $C_6H_{12}O_6$, mitochondria, Cytoplasm, ATP, trophic levels, food webs, food chains, bioremediation, matter, energy, aerobic (30 - 40 ATP), anaerobic (2 ATP), decomposition, biogeochemical cycle, biosphere, Glycolysis, Krebs Cycle, Glucose, NADH, NAD, FADH, FAD, O_2, atmosphere, hydrosphere, geosphere, molecule, atom, chemical bonds	

SCI.BIO.5		**Students will hypothesize the effects of a disturbance on a balanced ecosystem and use evidence to defend their choices.**	Standard Reference
	SCI.BIO.5.1	Explain how biologists use the taxonomic levels to groups organisms according to characteristics and behaviors.	underpinning
	SCI.BIO.5.2	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8
	SCI.BIO.5.3	**Develop and demonstrate a model to illustrate the hierarchical organization of interacting systems *(e.g., biological hierarchy, food webs, nutrient uptake in plans and animals, interactions between organs in an organism, interactions between cell organelles)*.**	HS-LS1-2
	SCI.BIO.5.4	**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.5.5	**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.BIO.5.6	**Use mathematical and/or computational representations to support explanations of**	HS-LS2-1

		factors that affect carrying capacity of ecosystems at different scales.	
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, biodiversity, kingdom, phylum, class, order, family, genus, species	

SCI.BIO.6		**When given a global issue, students will compare and contrast the environmental/societal/economical impacts of proposed solutions.**	Standard Reference
	SCI.BIO.6.1	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.6.2	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 HS-ETS1-3
	SCI.BIO.6.3	**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 endangerted species, habitat destruction, pollution).***	HS-ETS1-1
Vocabulary		urbanization, habitat restoration, invasive species, pollution, climate change, biodiversity, speciation, extinction, endangered species, habitat fragmentation, deforestation, equitable distribution of food and resources, desertification, waste disposal, plastic pollution, overhunting, rapid globalization, drought	

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

Benchmarks:

SCI.ES.1		**Students will analyze human natural resource use and use evidence to explain how overpopulation impacts natural resource consumption.**	Standard Reference
	SCI.ES.1.1	Define overpopulation and list factors that contribute to the issue.	ESS3-1
	SCI.ES.1.2	**Analyze population dynamics data across different regions and wealth levels to construct an explanation for why overpopulation occurs.**	
	SCI.ES.1.3	**Explain and give examples of excessive natural resource use by humans.**	ESS3-3
	SCI.ES.1.4	**Research and explain, using evidence, examples of sustainable resource management.**	ESS3-4

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	**Use mathematical and computational thinking to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.**	ESS2-4
	SCI.ES.2.2	**Use a model to describe the cycling of carbon, through the biosphere, geosphere, atmosphere and hydrosphere.**	ESS2-6
	SCI.ES.2.3	**Analyze climate data to construct an argument of the associated impacts of climate change to Earth's systems.**	ESS3-5

	SCI.ES.2.4	**Evaluate proposed solutions to climate change that account for environmental and societal needs and wants.**	ESS3-4

SCI.ES.3		**Students will analyze various human actions in order to explain their impacts to Earth's biodiversity.**	Standard Reference
	SCI.ES.3.1	Define biodiversity and explain its importance to healthy, functional ecosystems.	ESS2-2
	SCI.ES.3.2	**Identify the main human causes of biodiversity loss and construct an argument from evidence of the most destructive human practices.**	ESS3-3
	SCI.ES.3.3	Research environmental laws that impact biodiversity and examine their efficiency.	
	SCI.ES.3.4	**Evaluate proposed solutions to biodiversity loss that account for environmental and societal needs and wants.**	ESS3-4
	SCI.ES.3.5	**Create a presentation that communicates the biodiversity loss crisis and proposed solutions**	

SCI.ES.4		**Students will analyze human water usage and its effects on the water cycle.**	Standard Reference
	SCI.ES.4.1	Use a model to identify the natural processes of the water cycle.	ESS2-5
	SCI.ES.4.2	**Explain and give examples of human water usage.**	
	SCI.ES.4.3	**Analyze how human water usage impacts the natural environment and society.**	ESS2-2
	SCI.ES.4.4	Identify key concepts of environmental water laws.	
	SCI.ES.4.5	**Make and defend a claim based on evidence for which proposed water solution is better for the environment and society.**	ESS3-4

SCI.ES.5		**Students will analyze solid waste management practices in order to explain how these practices affect the environment.**	Standard Reference
	SCI.ES.5.1	List and describe the steps of the materials economy cycle and how it is influenced by consumerism patterns.	ESS3-1

	SCI.ES.5.2	**Compare and contrast solid waste management strategies:** • **Landfill** • **Incineration** • **Recycling** • **Compost**	ESS3-3
	SCI.ES.5.3	**Explain and give examples of environmental problems with improper waste management.**	ESS3-3
	SCI.ES.5.4	**Evaluate proposed solutions to improper waste management that account for environmental and societal needs and wants.**	ESS3-4

SCI.ES.6		**Students will evaluate mineral resources, mining, energy types and energy usage 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.**	Standard Reference
	SCI.ES.6.1	Identify and list common minerals used in human society.	ESS3-1
	SCI.ES.6.2	**Explain and give examples of different mining techniques.**	ESS3-2
	SCI.ES.6.3	**Analyze the environmental impacts of mining.**	ESS3-3
	SCI.ES.6.4	Compare and contrast renewable and nonrenewable energy resources.	ESS3-2
	SCI.ES.6.5	**Analyze how human energy usage impacts the environment.**	ESS3-3
	SCI.ES.6.6	**Create a presentation that evaluates energy types 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.**	ETS1-3
	SCI.ES.6.7	**Make and defend a claim based on evidence for which mineral resources and energy types should be used by human society in the future.**	ESS3-4

SCI.ES.7		**Students will organize land use strategies in order to construct an explanation of their impacts on the environment.**	Standard Reference
	SCI.ES.7.1	**Identify and describe various land use types.**	
	SCI.ES.7.2	Compare and contrast urban vs rural land use.	

	SCI.ES.7.3	**Analyze current agricultural practices and its impact on ecosystems.**	
	SCI.ES.7.4	Define and explain the requirements for healthy soil quality.	
	SCI.ES.7.5	**Evaluate proposed solutions to improper land use that account for environmental and societal needs and wants.**	

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 in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6

	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, and any relevant current events.

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

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

SCI.AST.1		**Students will describe the scale of the solar system, Milky Way Galaxy, and the Universe.**	Standard Reference
	SCI.AST.1.1	**Use Astronomical Units to create a project/model/assignment of our solar system.**	
	SCI.AST.1.2	**Define Light Years and use them to tell the distance to the nearest star, describe the size of the Milky Way, and/or distances to other stars and galaxies.**	
	SCI.AST.1.3	Demonstrate the distance from Earth to the moon and the time it takes using current technology to travel there.	
	SCI.AST.1.4	Demonstrate the distance from Earth to other planets, stars, and galaxies, and the time to travel to them using current technology.	
	SCI.AST.1.5	Use the speed of light to determine how long messages will take to travel to other places and be returned.	
Vocabulary		scale, solar system, galaxy, astronomical unit, light year, star, planet, satellite, universe, cluster, supercluster, moon, satellite, observable universe, orbit, expansion of the universe, rotation	

SCI.AST.2		**Students will describe common objects, events, and motions in the sky.**	Standard Reference
	SCI.AST.2.1	**Explain the magnitude system for star classification and determining distance to stars.**	
	SCI.AST.2.2	**Use a project/assignment to show understanding of the Phases of the Moon.**	

	SCI.AST.2.3	**Use a project/assignment to show understanding of the cause of seasons.**	
	SCI.AST.2.4	**Use a project/assignment of some type to show understanding of Eclipses, solar and/or lunar.**	
Vocabulary		constellations, celestial sphere, celestial pole, celestial equator, ecliptic, horizon, zenith, nadir, circumpolar, arcminutes, arcseconds, parsec, solstice, equinox, precession, lunar phases, lunar eclipse, solar eclipse, annular eclipse, saros cycle, retrograde motion, parallax, apparent magnitude, absolute magnitude	

SCI.AST.3		**Students will describe the mechanisms and life cycles of stars.**	Standard Reference
	SCI.AST.3.1	**Explain the predictable cycle of the stages of stars and how it's related to its mass.**	
	SCI.AST.3.2	Describe the different types of light on the electromagnetic spectrum and how those are used in understanding different star types.	
	SCI.AST.3.3	**Demonstrate the connection between luminosity, size, and temperature of stars using the H-R diagram (Boltzmann's law).**	
	SCI.AST.3.4	**Demonstrate the progression of events leading to the death of different types of Stars (Novae, Supernovae, Black Holes, White Dwarfs, Neutron stars).**	
	SCI.AST.3.5	**Show understanding of what stars are and how they burn (nuclear fusion --- proton-proton chain and CNO cycle).**	HS-ESS1-1 HS-ESS-3 HS-PS1-8
Vocabulary		wavelength, frequency, luminosity, magnitude system, parsec, parallax, spectral type, HR diagram, binary, visual binary, spectroscopic binary, eclipsing binary, main sequence, interstellar medium, interstellar dust, gravity, pressure, protostar, nuclear fusion, helium fusion, supernova, white dwarf, black hole, accretion disk, pulsar, event horizon, singularity, Schwarzschild radius	

SCI.AST.4		**Students will explore the evidence and basic events of the Big Bang Theory, inflation, expansion, and current theories on the fate of the Universe.**	Standard Reference
	SCI.AST.4.1	**Map out the eras and their length of times described from the Big Bang up until now.**	HS-PS2-1

	SCI.AST.4.2	Explain how the universe has evolved by comparing it to the evolution of life on Earth.	HS-PS2-4
	SCI.AST.4.3	**Describe the cosmic microwave background and its importance as evidence of the Big Bang.**	HS-PS4-5
	SCI.AST.4.4	**Differentiate the difference between inflation and expansion of the universe.**	HS-ESS1-4
	SCI.AST.4.5	**Describe the 4 current expansion models proposed to determine the fate of the universe.**	HS-ETS1-1
Vocabulary		Big Bang Theory, matter, antimatter, nucleosynthesis, cosmic microwave background, inflation, expansion, critical density, Olbers' Paradox, Dark Matter, Dark Energy, flatness	

If time permits, the following benchmarks may be included:

SCI.AST.5		Students will explain the conflict of understanding other life in the Universe based on our understanding of requirements for life on Earth.	Standard Reference
	SCI.AST.5.1	**Describe the theories for the development of life on Earth and its requirements.**	HS-LS2-6 HS-LS4-5
	SCI.AST.5.2	**Compare and contrast the requirements of life on Earth to conditions on other planets or moons.**	HS-LS2-6
	SCI.AST.5.3	Students will explore how we are attempting to locate life elsewhere.	HS-ETS1-2 HS-ETS1-3
	SCI.AST.5.4	**Describe moons and planets that are or were in the past, places that life may or could have existed and why, based on the type of life that exists on Earth.**	
Vocabulary		astrobiology, fossils, habitable worlds, habitable zone, orphan planets, SETI, Drake equation	

SCI.AST.6		Students will explain the conflict in earlier history concerning the position of the Sun and Earth and motion of the planets using Kepler's Three Laws of Planetary Motion.	Standard Reference
	SCI.AST.6.1	**Compare and contrast the progression from geocentrism to heliocentrism and the long standing conflict of the placement of Earth.**	
	SCI.AST.6.2	**Explore the age-old dilemma of the motion of Planets, resolved by Brahe and Kepler in the development of the 3 laws of planetary motion, and retroactive motion.**	HS-ESS1-4

	SCI.AST.6.3	Apply Kepler's three laws of motion to a model of planets orbiting a star.	
	SCI.AST.6.4	Explore the historical background of Astronomy from Aristotle and Democritus through Isaac Newton.	
Vocabulary		ellipse, foci, eccentricity, Kepler's 3 laws of planetary motion, aphelion, perihelion, pseudoscience	

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:	Students will explore the 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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.2		**Students will make and analyze measurements and apply those measurements to chemistry concepts.**	Standard Reference
	SCI.CHEM.2.1	**Identify appropriate units and methods for different measurements.**	
	SCI.CHEM.2.2	**Apply the concept of significant figures to evaluate precision in measurements.**	
	SCI.CHEM.2.3	**Apply dimensional analysis methods to convert between different units of measurement.**	

SCI.CHEM.3		**Students will predict and analyze the properties of the atom, including nuclear structure, quantum mechanics, and trends on the periodic table.**	Standard Reference
	SCI.CHEM.3.1	**Describe and compare the locations and properties of the subatomic particles.**	HS-PS1-8
	SCI.CHEM.3.2	**Analyze changes in the composition of the nucleus of the atom and the energy changes**	HS-PS1-8

		involved in fission, fusion, and radioactive decay.	
	SCI.CHEM.3.3	**Use mathematical to analyze the relationships between frequency, wavelength, and energy of waves.**	HS-PS4-1
	SCI.CHEM.3.4	**Use quantum theory to describe and predict patterns in the arrangements and behaviors of electrons.**	HS-PS1-1
	SCI.CHEM.3.5	**Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in atoms.**	HS-PS1-1

SCI.CHEM.4		**Students will analyze and apply the processes of Ionic and Covalent Bonding.**	Standard Reference
	SCI.CHEM.4.1	**Predict and describe the bonds that will form between different combinations of atoms.**	HS-PS2-4 HS-PS3-5
	SCI.CHEM.4.2	**Model ionic and covalent bonds with Lewis dot structures.**	
	SCI.CHEM.4.3	**Analyze the geometric shapes of covalent molecules using the VSEPR model.**	
	SCI.CHEM.4.4	**Predict and explain macroscopic properties of materials based on microscopic patterns of chemical bonds.**	HS-PS1-3 HS-PS2-6 HS-PS3-2
	SCI.CHEM.4.5	**Write accurate chemical formulas and names for ionic and covalent compounds.**	

SCI.CHEM.5		**Students will predict, explain, and appropriately represent the patterns and outcomes of various chemical reactions.**	Standard Reference
	SCI.CHEM.5.1	**Apply the principles of conservation of mass to write balanced chemical equations.**	HS-PS1-7
	SCI.CHEM.5.2	**Identify, describe, and label the patterns in different types of chemical reactions.**	HS-PS2-6
	SCI.CHEM.4.3	**Apply the patterns in chemical reactions to predict the likely outcomes of those reactions.**	HS-PS2-6

SCI.CHEM.6		**Students will apply the mole concept to carry out stoichiometric calculations (quantitative relationships in chemical reactions).**	Standard Reference
	SCI.CHEM.6.1	**Apply the mole concept to relate macroscopic mass measurement sto numbers of atoms or molecules in a sample.**	HS-PS1-7
	SCI.CHEM.6.2	**Apply the mole concept to analyze empirical and molecular formulas for compounds.**	HS-PS1-7
	SCI.CHEM.6.3	**Apply the mole concept to predict amounts of reactants and products in chemical equations.**	HS-PS1-7

If time permits, the following benchmark may be taught:

SCI.CHEM.7		Students will predict, explain, and apply the properties of gases, liquids, and solids.	Standard Reference
	SCI.CHEM.7	Apply the microscopic properties of atoms and molecules to predict the macroscopic behaviors of gases, both qualitatively and quantitatively.	HS-PS1-1 HS-PS1-3 HS-PS1-5
	SCI.CHEM.7	Apply the microscopic properties of atoms and molecules to predict the macroscopic behaviors of liquids and solids, both qualitatively and quantitatively.	HS-PS1-1 HS-PS1-3 HS-PS1-5

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

SCI.CF.1		**Students will conduct a project that requires specifying a problem, designing and conducting an experiment, analyzing its data, and reporting results/solutions.**	Standard Reference
	SCI.CF.1.1	**Identify a problem**	HS-PS1-6
	SCI.CF1.2	**Design and conduct an experiment**	HS-ETS1-2
	SCI.CF.1.3	**Collect data and analyze**	HS-ETS1-3
	SCI.CF.1.4	**Report results**	
	SCI.CF.1.5	Analyze and critique the process they took and the data/results.	HS-ETS1-3

SCI.CF.2		**Students will analyze how the history and selective breeding of food has created the current food selections, including GMOs.**	Standard Reference
	SCI.CF.2.1	Outline the history of food.	
	SCI.CF.2.2	**Investigate how meals have changed from hunter-gatherers to current societal norms.**	HS-ETS1-1
	SCI.CF.2.3	Describe how specific fruits and vegetables have evolved throughout history.	HS-ETS1-1 HS-ETS1-3
	SCI.CF.2.4	**Compare selective breeding to GMOs.**	HS-ETS1-2
	SCI.CF.2.5	**Formulate and defend an opinion on GMOs.**	HS-ETS1-3

SCI.CF.3		**Students will synthesize an explanation of how atomic structure and reactivity of elements creates the macromolecules in our food and prove which macromolecules are in a given substance.**	Standard Reference
	SCI.CF.3.1	**Draw and identify the atomic structure.**	HS-PS1-1
	SCI.CF.3.2	**Predict the reactivity of elements based on location on the periodic table.**	HS-PS1-1
	SCI.CF.3.3	**Use concepts to solve chemical reactions of food products and prove that periodic table trends, valence electrons, and chemical properties affect reactions.**	HS-PS1-2 HS-PS1-7
	SCI.CF.3.4	Connect food product reactions to the Law of Conservation of mass by analyzing mathematical representations of the reactions.	HS-PS1-7
	SCI.CF.3.5	Describe macromolecules.	
	SCI.CF.3.6	**Analyze substances to determine which macromolecules are present.**	
Vocabulary		Atom, proton, neutron, electron, valence, chemical properties, physical properties, law of conservation of mass, macromolecules	

SCI.CF.4		**Students will investigate different food safety issues such as bioaccumulation and food-borne illnesses and draw conclusions on prevalence, sources, and prevention.**	Standard Reference
	SCI.CF.4.1	**Describe contact tracing and predict patient 0.**	HS-ETS1-1
	SCI.CF.4.2	Illustrate bioaccumulation and biomagnification.	
	SCI.CF.4.3	**Apply concepts of bioaccumulation to real-life food safety situations.**	
	SCI.CF.4.4	Identify bacteria that cause food-borne illness.	
	SCI.CF.4.5	**Cite evidence to critique food safety prevention practices.**	HS-ETS1-3 HS-ETS1-5

SCI.CF.5		**Students will evaluate current food industry practices.**	Standard Reference
	SCI.CF.2.1	Interpret the human food system and construct their own.	
	SCI.CF.2.2	**Investigate how the food industry has evolved.**	
	SCI.CF.2.3	**Analyze if the food industry has recently changed.**	

	SCI.CF.2.4	**Draw conclusions and cite evidence for support on student's stance on the food industry.**	HS-ETS1-3 HS-ETS1-5

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, through 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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

SCI.FOR1.2		**Students will analyze 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 and collect evidence, document location and conditions, angles, and take all appropriate close, mid-range, 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 missteps 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

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	**Describe methods and tools used to analyze hair microscopically, chemically, genetically, and new advances such as neutron activation analysis.**	HS-ETS1-1
	SCI.FOR1.3.7	**Evaluate the validity and reliability of claims in a variety of materials.**	HS-ETS1-5

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 observing 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

SCI.FOR1.5		**Students will explain how to 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	**Observe slides and identify spores, seeds, and different flower parts and identify structures in plants and fungi.**	
	SCI.FOR1.5.3	Compare and contrast how different types of plants reproduce.	
	SCI.FOR1.5.4	**Explain 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

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 and patterns.**	
	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

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 in a male lineage.**	HS-LS3-2
	SCI.FOR1.7.3	**Defend the 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

SCI.FOR1.8		**Students will use blood types and 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

If time permits, the following benchmark may be taught:

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

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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 the identity of Romanov remains based on anthropological evidence provided.	

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	**Demonstrate how to create an impression casting.**	
	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.	

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 found at a 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.	

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.	

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.	

SCI.FOR2.6		**Students will critique the usefulness of soil examination in solving a crime.**	Standard Reference
	SCI.FOR2.6.1	**Describe how forensic experts macro- and microscopically examine soil evidence, as well we test its chemical, physical, and biological components.**	
	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.	

SCI.FOR2.7		**Students will critique the usefulness of entomology in solving a crime.**	Standard Reference
	SCI.FOR2.7.1	Describe from textbook the 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.	

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	**Demonstrate aspects of the emotional and psychological affects of death to empathize 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.	

If time permits, the following benchmark may be taught:

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.	

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

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

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

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	HS-LS2-6

		in stable conditions, but changing conditions may result in a new ecosystem.	
	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

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

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

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

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

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	HS-LS4-5

		species, (2) the emergence of new species over time, and (3) the extinction of other species.	
	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

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

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 reproduction, (3) competition for limited resources,	HS-LS4-2

		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

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

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

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

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

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

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

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	**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.2.2	**Analyze evidence explaining the differentiation of the Earth into its compositional layers.**	HS-ESS1-6
	SCI.GEO.2.3	**Analyze evidence supporting the formation of the Earth - moon system.**	HS-ESS1-6 HS-ESS1-4
	SCI.GEO.2.4	**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.2.5	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 theory of plate tectonics to explain the age of the earth.**	HS-ESS1-5
	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.**	HS-ESS2-7
	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.**	HS-ESS2-2 HS-ESS2-4
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

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

Human Anatomy and Physiology

(full year course)

Purpose Statement:	Students will construct, observe, and participate in experiments using anatomical/physiological concepts, the fundamental concepts and principles of anatomy, physiology and the role of homeostasis in health maintenance, the application of knowledge of the basic structures and functions of systems of the human body in a healthy state: integumentary, skeletal, muscular, nervous, endocrine, circulatory, immune, respiratory, digestive, urinary, and reproductive, and investigate and discuss authentic case studies of realistic patients in unhealthy states.

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

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

SCI.AP.1		**Students will use directional terms to identify specific body parts to model the hierarchy and basic structures of the human body.**	Standard Reference
	SCI.AP.1.1	**Develop and demonstrate a model to illustrate the hierarchical organization of interacting systems (interactions between organs in an organism, interactions between cell organelles)**	HS-LS1-2
	SCI.AP.1..2	Contrast the differences between the dorsal and ventral body cavities.	HS-LS1-3
	SCI.AP.1.3	**Given a diagram or description,identify the body region, body plane, and/or body cavity using directional terms.**	HS-LS1-2
Vocabulary		anatomy, physiology, histology, cytology, axial, apendicular, superior, inferior, anterior, ventral, posterior, dorsal, medial, lateral, intermediate, proximal, distal, parasagittal, midsagittal, superficial, deep, coronal, sagittal, transverse, dorsal cavity, ventral cavity, homeostasis	

SCI.AP.2		**Students will investigate the structure, function and differentiation of human cells, and tissues to identify tissue types (microscopically: epithelial, connective, muscle, nervous) and determine function.**	Standard Reference
	SCI.AP.2.1	**Identify the primary types and function of tissues (epithelial, connective, muscular, nervous) and their chief subcategories.**	HS-LS1-2
	SCI.AP.2.2	Classify epithelial tissue based on the number of cell layers and cell shape.	HS-LS1-2
	SCI.AP.2.3	**Contrast each type of muscle tissue and explain the unique role of each.**	HS-LS1-3
	SCI.AP.2.4	Examine and differentiate between various kinds of tissue using a microscope and prepared slides ● Epithelial: squamous, stratified, cuboidal, columnar, and transitional ● Connective: adipose, blood, cartilage, bone, dense, areolar ● Nervous: neuron, neuroglia Muscular: smooth, skeletal, cardiac	HS-LS1-2
Vocabulary		epithelial, connective, adipose, blood, cartilage, tendons, ligaments, bone, muscle, cardiac muscle, smooth muscle, skeletal muscles, neuron, neuroglia	

SCI.AP.3		**Students will demonstrate how bones, joints, and ligaments function to permit movement and mobility in the skeleton.**	Standard Reference
	SCI.AP.3.1	**Describe the basic structure and types of bones and how they grow.**	HS-LS1-3
	SCI.AP.3.2	Identify the components of the axial and appendicular skeleton and their basic functions	HS-LS1-2
	SCI.AP.3.3	**Identify different types of bones, (flat, irregular, long and short) their functions and parts.**	HS-LS1-2

	SCI.AP.3.4	**Model and explain bone growth, repair and remodeling**	HS-LS1-2
	SCI.AP.3.5	**Identify the types of joints,their means of classification, and demonstrate the manner in which each facilitates movement.**	HS-LS1-2
Vocabulary		Condyle, process, facet, foramen, meatus, trochanter, tuberosity, tubercle, epicondyle, pronation, supination, rotation, abduction, adductions, flexion, extension, circumduction, inversion, eversion, protraction, retraction, elevation, depression, opposition, articulation, synovial fluid, synarthroses, amphiarthrosis, diarthroses, symphyses	

SCI.AP.4		**Students will explain distinguishing characteristics of muscles, and show how muscle structure permits movement and integrates with the skeletal and nervous systems.**	Standard Reference
	SCI.AP.4.1	**Describe the structural and functional characteristics unique to muscle tissue.**	HS-LS1-3
	SCI.AP.4.2	Identify the main axial muscles and appendicular muscles of the body.	HS-LS1-2
	SCI.AP.4.3	**Model the sliding filament theory.**	HS-LS1-2
	SCI.AP.4.4	Create a diagram explaining the aerobic/anaerobic energy sources of muscle contraction.	HS-LS1-2
	SCI.AP.4.5	**Identify structures of the muscular system and show the relationship between these structures, and how they function with the skeletal and nervous systems.**	HS-LS1-2
Vocabulary		involuntary, voluntary, cardiac muscle, skeletal muscles, smooth muscle, fascia, motor neurons, myoneural junction, neuromuscular junction, striated muscles, tendon, endomysium, perimysium, fascicle, epimysium, thick filaments, thin filaments	

SCI.AP.5		**Students will model and explain how the nervous system (brain, spinal cord, sensory neurons, motor neurons) and Endocrine System mediates communication between different parts of the body and the body's interactions with the environment.**	Standard Reference
	SCI.AP.5.1	**Compare and contrast the Central Nervous System and the Peripheral Nervous System.**	HS-LS1-2
	SCI.AP.5.2	**Compare and contrast the sympathetic and parasympathetic divisions**	HS-LS1-2
	SCI.AP.5.3	**Model the basic structure and functions of the neuron and compare the three types of neurons**	HS-LS1-2
	SCI.AP.5.4	**Model and explain the basics of the nerve impulse transmission at the synapse.**	HS-LS1-2
	SCI.AP.5.5	**Identify the major regions of the brain and describe their functions**	HS-LS1-2
	SCI.AP.5.6	Compare and contrast the major sense organs of the nervous system.	HS-LS1-2
	SCI.AP.5.7	**Identify which parts of the brain are part of the endocrine system and their basic functions.**	HS-LS1-2
Vocabulary		Neuron, dendrite, axon, myelin sheath, neuroglia, glial cells, Astrocytes, microglia, oligodendrocytes, Schwann cells, efferent neurons, afferent neurons, synapse, synaptic cleft, cerebrum, fissures, Adrenal glands, ovaries, pineal glands, pituitary gland, testis, thyroid gland, endocrine, exocrine	

SCI.AP.6		**Students will investigate the major structures and functions of the Human Circulatory System, research diseases that impact it, and report out the form, function and impact at different hierarchical levels.**	Standard Reference
	SCI.AP.6.1	**Explain how there are 8 different blood types in humans and the factors that contribute to these different types. Analyze what happens if the wrong blood was donated in a transfusion.**	HS-LS1-2

	SCI.AP.6.2	**Model the overall function of the cardiovascular system and summarize how it uses the heart, blood vessels, and blood to accomplish this function.**	HS-LS1-2
	SCI.AP.6.3	**Model the interior of the heart and label the atria, ventricles, valves, and major arteries and Veins then summarize the pathway that oxygen-poor blood will take in order to become oxygen-rich blood that can then be distributed to the tissues in our body.**	HS-LS1-2
	SCI.AP.6.4	**Research major diseases/disorders of the circulatory system.**	HS-LS1-2
Vocabulary		Arteries, capillaries, veins, venules, pulmonary circuit, systemic circuit, pulmonary arteries, superior and inferior vena cava, coronary sinus, pulmonary artery, pulmonary veins, aorta, right and left atrium, right and left ventricle, tricuspid valve, bicuspid valve, pulmonary semilunar valve, mitral valve, pulmonary valve, endocardium, myocardium, epicardium, pericardium	

SCI.AP.7		**Students will model the structure and function of the Human Respiration System.**	Standard Reference
	SCI.AP.7.1	**Describe the primary function of the respiratory system and identify the major components of the respiratory system and describe their functions.**	HS-LS1-2
	SCI.AP.7.2	**Model inhalation and exhalation and explain the diffusion of gas in and out of the blood**	HS-LS1-3
	SCI.AP.7.3	**Model the structure and organization of the lungs and the bronchi inside of them.**	HS-LS1-2
Vocabulary		Nasal cavity, pharynx, larynx, trachea, bronchus, bronchiole, alveoli, epiglottis, glottis, pleura, diaphragm	

SCI.AP.8		**Students will model the structure and function of the Human Digestion System.**	Standard Reference
	SCI.AP.8.1	**Model and explain the organs and accessory organs in the digestive system and their functions.**	HS-LS1-3

	SCI.AP.8.2	**Students will create a model that follows a piece of food from the mouth to the anus explaining and using proper language for how the food is broken down and absorbed by the body including removing waste.**	HS-LS1-2
	SCI.AP.8.3	Analyze why nutrition is important for maintaining health. Explain the basics of nutrition and metabolism. Describe conditions, diseases, that affect this system	HS-LS1-3
Vocabulary		Alimentary canal, anus, esophagus, gallbladder, large intestine, liver, mouth, oral cavity, pancreas, pharynx, salivary glands, small intestine, stomach, peristalsis, villi, microvilli, jejunum, duodenum, ileum	

SCI.AP.9		**Students will model the structure and function of the Human Excretory System.**	Standard Reference
	SCI.AP.9.1	**Identify the components of the urinary system and list their functions.**	HS-LS1-3
	SCI.AP.9.2	**Model the parts of a nephron that describes the processes involved in urine formation**	HS-LS1-2
	SCI.AP.9.3	**Explain the roles of the adrenal cortex and pancreas in relationship to the urinary system.**	HS-LS1-2
	SCI.AP.9.4	Research conditions or diseases affect the urinary system.	HS-LS1-2
Vocabulary		malabsorption, eating disorders pH, urine, nephron, calyx, efferent, afferent, corpuscle, glomerulus, filtrate, proximal, distal, micturation urea, creatinine, uric acid, filtration, reabsorption, secretion, ADH, osmotic, renin, angiotensin, electrolyte, buffer, acid, base, calcification pancreas, insulin, adrenal medulla, glucagon, exocrine, endocrine, alpha, beta, islets bladder infection, kidney disease, UTI, incontinence, acidosis, alkalosis	

SCI.AP.10		**Students will model the structure and function of the Integumentary System.**	Standard Reference
	SCI.AP.10.1	**Explain the main function of the integumentary system and how it works alongside at least three other body systems to accomplish this function.**	HS-LS1-3
	SCI.AP.10.2	**Analyze and describe other roles that the integumentary system plays in maintaining homeostasis, highlighting any other body systems that also contribute to accomplishing these functions.**	HS-LS1-2
	SCI.AP.10.3	Compare and contrast the overall structure and roles of the epidermis and the dermis.	HS-LS1-2
	SCI.AP.10.4	**Model a hair filament, and nail and identify its main parts.**	HS-LS1-2
	SCI.AP.10.5	Explain the different functional roles of the primary and secondary lymphoid organs and list each structure included within each group.	HS-LS1-2
	SCI.AP.10.6	**Defend the claim that the lymph nodes are the most critical structures in the lymphatic system.**	HS-LS1-2
Vocabulary		Skin, hair, nails, sebaceous glands, sweat glands, cutaneous membrane, hair, nails, pathogens, sebaceous glands, sensory receptors, skin, sweat glands, dermis, epidermis, hypodermis, subcutaneous layer	

SCI.AP.11		**Students will model the structure and function of the Lymphatic and Immune System.**	Standard Reference
	SCI.AP.11.1	**Model the structure and function of the lymphatic system.**	HS-LS1-3
	SCI.AP.11.2	Describe the function of interstitial fluid and lymph.	HS-LS1-2
	SCI.AP.11.3	**Describe immunity and the defense mechanisms of the body.**	HS-LS1-2
	SCI.AP.11.4	Describe autoimmune diseases.	HS-LS1-2

Vocabulary	Interstitial fluid, lymph nodes, trabecule, germinal center, macrophages, lymphadenitis, spleen, thymus gland, lacteals, tonsils, antigen, autoimmunity, hypersensitivity, allergen

SCI.AP.12		**Model the primary sex organs and describe the role they play in accomplishing the overall function of the reproductive system.**	Standard Reference
	SCI.AP.12.1	**Identify the name and summarize the function of a structure of the female reproductive system when given a description, picture, or physical specimen to reference.**	HS-LS1-3
	SCI.AP.12.2	**Identify the name and summarize the function of a structure of the male reproductive system when given a description, picture, or physical specimen to reference.**	HS-LS1-3
	SCI.AP.12.3	**Describe where sperm are made and summarize the path they take as they mature and leave the male body, explaining the significance of the different accessory gland secretions to the sperm in the semen.**	HS-LS1-2
	SCI.AP.12.4	**Summarize the path an oocyte will take from ovulation to implantation. Include the mechanisms utilized to move it along this path and how this process relates to menstruation.**	HS-LS1-2
	SCI.AP.12.5	List the three layers of the uterine wall and describe the specific roles of the two deepest layers in the overall function of the female reproductive system.	HS-LS1-2
	SCI.AP.12.6	Summarize where milk is made in lactating females and the path it takes to be secreted from the body for a nursing baby	HS-LS1-2
Vocabulary		Gametes, fertilization, zygote, ovaries, ova, fallopian tubes, ectopic pregnancy, fundus, cervix, vagina, vulva, mons pubis, perineum, breasts, areola, menstruation, menopause, testes, serminiferous tubules, ductus deferens, seminal vesicles, prostate gland, co[er's glands, semen	

Human Anatomy and Physiology

(one semester course)

Purpose Statement:	Students will construct, observe, and participate in experiments using anatomical/physiological concepts, the fundamental concepts and principles of anatomy, physiology and the role of homeostasis in health maintenance, the application of knowledge of the basic structures and functions of systems of the human body in a healthy state: integumentary, skeletal, muscular, nervous, endocrine, circulatory, immune, respiratory, digestive, urinary, and reproductive, and investigate and discuss authentic case studies of realistic patients in unhealthy states.

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

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

SCI.APa.1		**Students will use directional terms to identify specific body parts to model the hierarchy and basic structures of the human body.**	Standard Reference
	SCI.APa.1.1	**Develop and demonstrate a model to illustrate the hierarchical organization of interacting systems (interactions between organs in an organism, interactions between cell organelles)**	HS-LS1-2
	SCI.APa.1.2	Contrast the differences between the dorsal and ventral body cavities.	HS-LS1-3
	SCI.APa.1.3	**Given a diagram or description,identify the body region, body plane, and/or body cavity using directional terms.**	HS-LS1-2
Vocabulary		anatomy, physiology, histology, cytology, axial, apendicular, superior, inferior, anterior, ventral, posterior, dorsal, medial, lateral, intermediate, proximal, distal, parasagittal, midsagittal, superficial, deep, coronal, sagittal, transverse, dorsal cavity, ventral cavity, homeostasis	

SCI.APa.2		**Students will investigate the structure, function and differentiation of human cells, and tissues to identify tissue types (microscopically: epithelial, connective, muscle, nervous) and determine function.**	Standard Reference
	SCI.APa.2.1	**Identify the primary types and function of tissues (epithelial, connective, muscular, nervous) and their chief subcategories.**	HS-LS1-2
	SCI.APa.2.2	Classify epithelial tissue based on the number of cell layers and cell shape.	HS-LS1-2
	SCI.APa.2.3	**Contrast each type of muscle tissue and explain the unique role of each.**	HS-LS1-3
	SCI.APa.2.4	Examine and differentiate between various kinds of tissue using a microscope and prepared slides ● Epithelial: squamous, stratified, cuboidal, columnar, and transitional ● Connective: adipose, blood, cartilage, bone, dense, areolar ● Nervous: neuron, neuroglia Muscular: smooth, skeletal, cardiac	HS-LS1-2
Vocabulary		epithelial, connective, adipose, blood, cartilage, tendons, ligaments, bone, muscle, cardiac muscle, smooth muscle, skeletal muscles, neuron, neuroglia	

SCI.APa.3		**Students will demonstrate how the skeletal and muscular systems function to permit movement and mobility in the body.**	Standard Reference
	SCI.APa.3.1	**Describe the basic structure and types of bones and how they grow.**	HS-LS1-3
	SCI.APa.3.2	**Identify the primary components in the axial and appendicular skeleton and their basic functions**	HS-LS1-2
	SCI.APa.3.3	Model and explain bone growth, repair and remodeling	HS-LS1-2

	SCI.APa.3.4	Identify the types of joints,their means of classification, and demonstrate the manner in which each facilitates movement.	HS-LS1-2
	SCI.APa.3.5	**Describe the structural and functional characteristics unique to muscle tissue.**	HS-LS1-3
	SCI.APa.3.6	Identify the main axial muscles and appendicular muscles of the body.	HS-LS1-2
	SCI.APa.3.7	**Model the sliding filament theory and muscle structure.**	HS-LS1-2
	SCI.APa.3.8	**Describe the basic structure and types of bones and how they grow.**	HS-LS1-3
Vocabulary		articulation, synovial fluid, synarthroses, amphiarthrosis, diarthroses, symphyses, involuntary, voluntary, cardiac muscle, skeletal muscles, smooth muscle, fascia, motor neurons,, striated muscles, tendon, endomysium, perimysium, fascicle, epimysium, thick filaments, thin filaments	

SCI.APa.4		**Students will investigate the major structures and functions of the Human Circulatory and Respiratory Systems, model the form, function and impact at different hierarchical levels.**	Standard Reference
	SCI.APa.4.1	Explain how there are 8 different blood types in humans and the factors that contribute to these different types. Analyze what happens if the wrong blood was donated in a transfusion.	HS-LS1-2
	SCI.APa.4.2	**Model the overall function of the cardiovascular system and summarize how it uses the heart, blood vessels, and blood to accomplish this function.**	HS-LS1-2
	SCI.APa.4.3	**Model the interior of the heart and label the atria, ventricles, valves, and major arteries and veins then summarize the pathway that oxygen-poor blood will take in order to become oxygen-rich blood that can then be distributed to the tissues in our body.**	HS-LS1-2

	SCI.APa.4.4	Research major diseases/disorders of the circulatory system.	HS-LS1-2
	SCI.APa.4.5	**Describe the primary function of the respiratory system and identify the major components of the respiratory system and describe their functions.**	HS-LS1-2
	SCI.APa.4.6	Model inhalation and exhalation and explain the diffusion of gas in and out of the blood	HS-LS1-3
	SCI.APa.4.7	Model the structure and organization of the lungs and the bronchi inside of them.	HS-LS1-2
Vocabulary		Arteries, capillaries, veins, venules, pulmonary circuit, systemic circuit, pulmonary arteries, superior and inferior vena cava, coronary sinus, pulmonary artery, pulmonary veins, aorta, right and left atrium, right and left ventricle, tricuspid valve, bicuspid valve, pulmonary semilunar valve, mitral valve, pulmonary valve, endocardium, myocardium, epicardium, pericardium, nasal cavity, pharynx, larynx, trachea, bronchus, bronchiole, alveoli, epiglottis, glottis, pleura, diaphragm	

SCI.AP.5		**Students will model the structure and function of the Human Digestion System.**	Standard Reference
	SCI.AP.5.1	**Model and explain the organs and accessory organs in the digestive system and their functions.**	HS-LS1-3
	SCI.AP.5.2	**Students will create a model that follows a piece of food from the mouth to the anus explaining and using proper language for how the food is broken down and absorbed by the body including removing waste.**	HS-LS1-2
	SCI.AP.5.3	Analyze why nutrition is important for maintaining health. Explain the basics of nutrition and metabolism.	HS-LS1-3
Vocabulary		Alimentary canal, anus, esophagus, gallbladder, large intestine, liver, mouth, oral cavity, pancreas, pharynx, salivary glands, small intestine, stomach, peristalsis, villi, microvilli, jejunum, duodenum, ileum	

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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

SCI.MS.1		**Students will analyze the molecular structure of water to explain the properties of seawater.**	Standard Reference
	SCI.MS.1.1	**Use a model of the water molecule to describe the structure of the water molecule and relate it's structure to water's unique properties.**	HS PS 1-3
	SCI.MS.1.2	**Characterize water's unique properties and relate these properties to its chemical structure.**	ESS2-5
	SCI.MS.1.3	Compare and contrast the heating and cooling of freshwater and saltwater.	ESS2-5
	SCI.MS.1.4	Explain the sources of salt in seawater.	
	SCI.MS.1.5	**Using evidence, justify how changes in salinity and water temperature influence ocean water density.**	HS PS 1-5
Vocabulary		Polar molecule, hydrogen bonding, cohesion, adhesion, surface tension, universal solvent, salinity, temperature, density, heat capacity	

SCI.MS.2		**Students will analyze atmospheric and oceanic circulation to explain their influence on weather and climate.**	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	Explain seasonal changes on Earth in terms of the intensity of solar radiation energy and the Earth's tilt.	
	SCI.MS.2.5	**Analyze sea surface temperature maps to explain regional differences.**	
Vocabulary		Sea surface temperatures, surface/deep currents, coriolis effect, evaporation, condensation, precipitation, atmospheric pressure, convection currents	

SCI.MS.3		**Students will analyze plate tectonics to explain modern ocean basins and their seafloor features.**	Standard Reference
	SCI.MS.3.1	Identify the structure and formation of Earth.	ESS2-3
	SCI.MS.3.2	Describe how scientists map the ocean floor.	
	SCI.MS.3.3	**Compare and contrast subduction and seafloor spreading.**	ESS1-5
	SCI.MS.3.4	**Analyze bathymetric images and identify common seafloor features.**	ESS2-1
	SCI.MS.3.5	**Explain the Theory of Plate Tectonics by describing the processes involved, the geologic features used as supporting evidence, and the major changes in Earth's crust that have occurred as a result of crustal movement.**	ESS1-5
Vocabulary		Core,mantle, crust, ocean/continental crust, convergent/divergent/transform boundaries, subduction, seafloor spreading, passive/active margins, continental shelves/slopes, abyssal plain, sea mounts, islands, trenches, mid-ocean ridge, SONAR	

SCI.MS.4		**Students will analyze how the abiotic factors of the deep sea influence deep sea organisms and ecosystems.**	Standard Reference
	SCI.MS.4.1	**Identify the zones of the ocean and how pressure, temperature, density, salinity and light change with increasing depth.**	LS2-1
	SCI.MS.4.2	**Compare and contrast photosynthesis and chemosynthesis.**	LS2-3
	SCI.MS.4.3	**Analyze the structure and functions of different organisms in response to the abiotic factors of their ecosystem.**	
	SCI.MS.4.4	**Analyze factors that affect biodiversity and populations in deep sea ecosystems.**	LS2-2

Vocabulary	epipelagic/mesopelagic/bathypelagic/abyssopelagic/hadal zones, light absorption, oxygen minimum zone, nutrient levels, chemosynthesis, adaptations, hydrothermal vents, cold seeps

SCI.MS.5		**Students will explain the causes and effects of waves and tides.**	Standard Reference
	SCI.MS.5.1	**Define the parts of a wave and describe the movement of water in a wave.**	PS4-1
	SCI.MS.5.2	**Distinguish the factors that influence wave height and wave speed.**	PS4-1
	SCI.MS.5.3	**Relate tides to the alignment and natural gravitational forces of the Earth, Sun and Moon.**	
	SCI.MS.5.4	**Construct an explanation of how the moon's motion around the earth influences tidal changes.**	
Vocabulary		crest, trough, wavelength, wind speed, fetch, duration, seas/swell/surf, tsunami, gravity, high/low tide, neap/spring tide	

SCI.MS.6		**Students will classify marine organisms based on their major characteristics.**	Standard Reference
	SCI.MS.6.1	Describe essential biological processes for life in the sea.	LS1-2
	SCI.MS.6.2	Categorize the morphological characteristics of marine plankton, invertebrates and vertebrates.	LS1-2
	SCI.MS.6.3	**Analyze the structure and functions of different organisms in response to the abiotic factors of their ecosystem.**	LS1-2
	SCI.MS.6.4	**Classify organisms into the major phyla.**	
	SCI.MS.6.5	**Analyze the similarities and differences between major groups of organisms.**	
Vocabulary			

SCI.MS.7		**Students will analyze human's impacts on the ocean in order to evaluate proposed solutions.**	Standard Reference
	SCI.MS.6.1	Compare and contrast the biotic and abiotic factors of different coastal ecosystems.	
	SCI.MS.6.2	Analyze factors that affect biodiversity and populations in coastal ecosystems.	

	SCI.MS.6.3	**Identify sources of pollution that accumulate in aquatic ecosystems and analyze their impacts on aquatic ecosystems.**	LS4-6
	SCI.MS.6.4	**Define overfishing and explain its impacts on marine biodiversity.**	LS4-6
	SCI.MS.6.5	**Analyze evidence and construct an explanation of the changes to the ocean due to climate change.**	ESS2-4
	SCI.MS.6.6	**Evaluate proposed solutions to human-caused problems in the ocean that account for societal needs and wants.**	ETS1-1
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.

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

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

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

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

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

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

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

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

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.

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	HS-LS4-5

		species, (2) the emergence of new species over time, and (3) the extinction of other species.	

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

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 genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors	HS-LS3-2
	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

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

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.

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

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

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	HS-PS1-1

		patterns of electrons in the outermost energy level of atoms.	
	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

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 within and between systems relevant to the problem.	HS-ETS1-4

Physics

Purpose Statement:	Students will use observational data to calculate everyday phenoma 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

SCI.PHYS.1		**Students will use calculations to make predictions on one dimensional motion.**	Standard Reference
	SCI.PHYS.1.1	**Calculate displacements, average velocities and instantaneous velocities in real world 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		displacement, acceleration, average velocity, instantaneous velocity, distance, speed	

SCI.PHYS.2		**Students will use calculations to make predictions on two dimensional motion.**	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 direction and describe the resultant vector.**	HS-PS2-1
	SCI.PHYS.2.3	**Calculate positions of an object moving through a two dimensional system where the object shows acceleration in one direction (projectile motion).**	HS-PS2-1

	SCI.PHYS.2.4	Relate and predict objects when different frames of reference are used.	HS-PS2-1
Vocabulary		Vector, scalar, component vector, sine, cosine, tangent, projectile	

SCI.PHYS.3		**Students will calculate using Newton's three laws of motion to predict the position of objects.**	Standard Reference
	SCI.PHYS.3.1	List and describe the four universal forces.	HS-PS2-1
	SCI.PHYS.3.2	**Apply calculations to objects that obey Newton's 1st law of motion.**	HS-PS2-1
	SCI.PHYS.3.3	**Apply calculations to objects that obey Newton's 2nd law of motion.**	HS-PS2-1
	SCI.PHYS.3.4	Apply mathematical calculations to predict the gravitational forces between objects using Newton's Law of Gravitation.	HS-PS2-1
	SCI.PHYS.3.5	**Apply 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 on objects that involve friction and inclined planes.	HS-PS2-1
	SCI.PHYS.3.7	Apply Newton's Laws to real world situations.	HS-PS2-1
Vocabulary		Friction, coefficient of friction, Newton's 1st law, Newton's 2nd law, Newton's 3rd law, Newton's law of universal gravitation, incline plane, free-body diagram	

SCI.PHYS.4		**Students will create or apply computational models to calculate the changes in the energy of a system.**	Standard Reference
	SCI.PHYS.4.1	**Apply 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	**Apply 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		energy, potential energy, kinetic energy, work	

SCI.PHYS.5		Students will apply 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 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 analyze the geological processes throughout Wyoming to explore how these have affected wildlife and settlement in the state. Students will also learn about the diversity of living things in the state, how different areas of the state 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.

Bolded items identify learning targets that are considered a priority. Please note, however, that all learning targets/standards in the curriculum map must still be taught, but those in bold should be taught to at least proficiency.

SCI.WY.1		**Students will analyze geological processes and identify formations in Wyoming, while explaining why those formations occurred.**	Standard Reference
	SCI.WY.1.1	**Develop a model illustrating geological processes including, but not limited to: plate tectonics, creation of continental and ocean-floor features, etc.**	HS-ESS2-1 HS-ESS1-6
	SCI.WY.1.2	**Demonstrate knowledge of geological processes by producing the location of those processes in the state.**	
	SCI.WY.1.3	Determine the types and locations of Wyoming's natural resources.	
	SCI.WY.1.4	**Analyze the geological processes impacts on the natural resources in that location.**	HS-ESS2-2
	SCI.WY.1.5	Create a model representing how fossils are formed.	HS-ESS2-1
	SCI.WY.1.6	**Prove the plate tectonic theory by citing evidence that Wyoming was an ocean based on fossils found in the state.**	HS-ESS1-5

SCI.WY.2		**Students will interpret Wyoming's geological features impact on the state's surface processes.**	Standard Reference
	SCI.WY.2.1	Define geoscience and all topics included in geoscience	
	SCI.WY.2.2	**Analyze geoscience data to make claims that one change to Earth's surface can create feedback that causes changes to other systems.**	HS-ESS2-2

	SCI.WY.2.3	**Compare and contrast how the different geological features have impacted the Earth's surface in different locations around the state.**	HS-ESS2-1
	SCI.WY.2.4	**Identify geoscience topics around geological features that have influenced human activity in the state.**	HS-ESS3-1 HS-ESS3-2

SCI.WY.3		**Students will evaluate how geological and geoscientific processes have impacted ecosystems, wildlife, and human activity across the state.**	Standard Reference
	SCI.WY.3.1	Distinguish the different ecosystems in the state and the main wildlife that reside in those ecosystems.	
	SCI.WY.3.2	**Determine human activity across the state and the geological factors affecting that activity.**	HS-ESS3-1
	SCI.WY.3.3	**Construct an explanation based on evidence for how the availability of natural resources and changes in climate have influenced wildlife and human activity.** (Natural resources could be freshwater, fertile soil, high concentrations of minerals and fossil fuels) (Changes in climate could be regional patterns of temperature and precipitation, types of crops and livestock that can be raised in an area)	HS-ESS3-1

SCI.WY.4		**Students will analyze the cause and effect of the industrial side of human activity and evaluate solutions.**	Standard Reference
	SCI.WY.4.1	Debate the pros and cons of mining, wind generation, hydropower, and solar power in Wyoming.	
	SCI.WY.4.2	Compare and contrast the reasons, effects and solutions to the industrial side of human activity.	HS-ESS3-1
	SCI.WY.4.3	**Evaluate energy and mineral resources based on the cost-benefit ratio.**	HS-ESS3-2 HS-ESS3-1
	SCI.WY.4.4	**Evaluate and assess impacts of human activity on ecosystems and biodiversity in order to refine or design a solution.**	HS-LS2-7 HS-ESS3-3

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.

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

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

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

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

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

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

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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.